	SURFACE VEHICLE RECOMMENDED PRACTICE		SAE J1939-71 MAY2012
	Issued	1994-08	
	Revised	2012-05	
		Superseding	J1939-71 2011-03
Vehicle Application Layer (Through May 2011)			

RATIONALE

New parameters and parameter groups are reviewed and discussed by the Truck and Bus Control and Communications Network Committee on a regular basis. This SAE Recommended Practice has been updated to reflect all changes and additions approved and balloted through May 2011.

FOREWORD

This series of SAE Recommended Practices has been developed by the Truck and Bus Control and Communications Network Committee of the Truck and Bus Electrical and Electronics Steering Committee. The objectives of the committee are to develop information reports, recommended practices, and standards concerned with the requirements design and usage of devices that transmit electronic signals and control information among vehicle components. The usage of these documents is not limited to truck and bus applications; other applications may be accommodated with immediate support being provided for construction and agricultural equipment, and stationary power systems. These documents are intended as a guide toward standard practice and are subject to change so as to keep pace with experience and technical advances.

New parameters and parameter groups are reviewed and discussed by the Truck and Bus Control and Communications Network Committee on a regular basis. This documents reflects all changes and additions approved and balloted through May 2011.

1. SCOPE

As described in the parent document, SAE J1939, there is a minimum of seven documents required to fully define a complete version of this network. This particular SAE Recommended Practice, SAE J1939-71, describes an Application Layer for vehicle use.

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SAE reviews each technical report at least every five years at which time it may be reaffirmed, revised, or cancelled. SAE invites your written comments and suggestions.

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2. REFERENCES

2.1 Applicable Publications

General information regarding this series of recommended practices is found in SAE J1939. Unless otherwise specified, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J1349	Engine Power Test Code—Spark Ignition and Compression Ignition—Net Power Rating
SAE J1843	Accelerator Pedal Position Sensor for Use with Electronic Controls in Medium- and Heavy-Duty Vehicle Applications
SAE J1922	Powertrain Control Interface for Electronic Controls Used in Medium- and Heavy-Duty Diesel On-Highway Vehicle Applications
SAE J1939	Recommended Practice for a Serial Control and Communications Vehicle Network
SAE J1939-21	Data Link Layer
SAE J1939-73	Application Layer – Diagnostics
SAE J2012	Diagnostic Trouble Code Definitions
SAE J2403	Medium/Heavy-Duty E/E Systems Diagnosis Nomenclature

2.1.2 ISO Publications

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO 2575	Road Vehicles – Symbols For Controls, Indicators and Tell-Tales
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2.1.3 Other Publications

Patent EP000001386774B1, "Control Apparatus for Brakes of a Commercial Vehicle", Held by Knorr-Bremse Systeme, Germany, Date 8/1/2003, included with permission from the patent holder

3. DEFINITIONS

See SAE J1939 for terms and definitions that are not defined in this document.

4. ABBREVIATIONS

ACC	Adaptive Cruise Control or Autonomous Cruise Control
AEBS	Advanced Emergency Braking System
ATA	American Trucking Association
ATC	Automatic Traction Control
CTI	Central Tire Inflation
DPF	Diesel Particulate Filter
EBS	Electronic Braking System or Electronically-controlled Braking System
ECBS	Electronically-controlled Braking System
EGR	Exhaust Gas Recirculation
FMS	Fleet Management System
HMI	Human Machine Interface
Kp	Engine endspeed governor gain
NOx	Nitrogen Oxide
O2	Oxygen
PLC	Power Line Carrier
ROP	Roll Over Prevention
SCR	Selective Catalytic Reduction
VDC	Vehicle Dynamic (Stability) Control
VGT	Variable Geometry Turbocharger
VMRS	Vehicle Maintenance Reporting System

See SAE J1939 for additional abbreviations that may be used in this document.

5. TECHNICAL REQUIREMENTS

The Application Layer provides a means for application processes to access the OSI environment. This layer contains management functions and generally useful mechanisms to support applications.

5.1 General Guidelines

5.1.1 Signal Characterization

It is the intent of the SAE J1939 network to provide current data and signals from a source so that it may be used by other nodes. It is recommended that the time between physical data acquisition of a signal and the transmission of the data should not exceed two times the repetition rate defined for the data. Additional constraints may be defined for certain parameters (see also 5.1.7.2).

5.1.2 Message Format

The message format of SAE J1939 uses the parameter group number as the label for a group of parameters. Each of the parameters within the group can be expressed in ASCII, as scaled data defined by the ranges described in 5.1.4, or as function states consisting of two or more bits. Alphanumeric data will be transmitted with the most significant byte first.

Most significant byte first for ASCII or alphanumeric data means the individual characters are positioned in the data field in left-to-right reading order of the ASCII string. The left most character of the ASCII string shall be positioned closest to the PGN in the CAN header and transmitted first, and the right most character of the ASCII string shall be positioned farthest from the PGN in the CAN header and transmitted last. For example, if the ASCII string is "The quick brown fox jumped over the lazy dog", then the ASCII character 'T' shall be positioned so it is transmitted first and the ASCII character 'g' shall be positioned so it is transmitted last.

Unless otherwise specified, alphanumeric characters will conform to the ISO Latin 1 ASCII character set as shown in section 5.1.3. Other parameters consisting of 2 or more data bytes shall be transmitted least significant byte first.

The type of data shall also be identified for each parameter. Data may be either status or measured. Status specifies the present state of a multi-state parameter or function as a result of action taken by the transmitting node. This action is the result of a calculation which uses local and/or network "measured" and/or "status" information. Note that specific confirmation of this action is not necessarily assured. For instance, the status may indicate that a solenoid has been activated, yet no measurement may have been taken to ensure the solenoid accomplished its function. Examples of status-type data are: engine brakes are enabled, PTO speed control is active, cruise control is active, the cruise control is in the "set" state of operation (as opposed to a measured indication that the "set" switch contacts are closed), fault codes, torque/speed control override modes, desired speed/speed limit, engine torque mode, engine's desired operating speed, engine's operating speed asymmetry adjustment, etc.

Measured data conveys the current value of a parameter as measured or observed by the transmitting node to determine the condition of the defined parameter. Examples of measured-type data are: boost pressure, ignition on/off, cruise set switch activated, maximum cruise speed, cruise set speed, engine speed, percent load at current speed, etc.

A device shall not receive SPN data from the network segment and retransmit that same SPN data using the same SPN back onto the same network segment.

5.1.3 ISO Latin 1 Character Set

There are 191 graphic characters of the ISO 8859-1 Latin 1 Character set show below. Unless otherwise specified, only these 191 character values are permitted for ASCII parameters. The terminology 'ASCII characters' and 'printable ASCII characters' are used in J1939 to refer to this set of 191 graphic character values.

The remaining 65 characters values (0 through 31 and 127 through 159) are control functions. According to ISO 8859-1, these character values are defined in ISO 6429. The terminology 'ASCII control characters' and 'non-printable ASCII characters' are used in J1939 to refer to this set of 65 character values. As specified in ISO 6429, the character value 0 (zero) is the 'NULL' character.

Horizontal boldface characters are the single hexadecimal digit representing the lower nibble of the single byte code for the character. Vertical boldface characters are the single hexadecimal digit representing the upper nibble of the single byte code for the character.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	----- should not be displayed -----															
1	----- should not be displayed -----															
2	space	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
3	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5	P	Q	R	S	T	U	V	W	X	Y	Z	[\]	^	_
6	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7	p	q	r	s	t	u	v	w	x	y	z	{		}	~	nil
8	----- should not be displayed -----															
9	----- should not be displayed -----															
A	nil	¡	¢	£	¤	¥	¦	§	¨	©	ª	«	¬	-	®	¯
B	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
C	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
D	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
E	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
F	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ

5.1.4 Parameter Ranges

Table 1 defines the ranges used to determine the validity of a transmitted signal. Table 2 defines the ranges used to denote the state of a discrete parameter and Table 3 defines the ranges used to denote the state of a control mode command. The values in the range "error indicator" provide a means for a module to immediately indicate that valid parametric data is not currently available due to some type of error in the sensor, sub-system, or module.

The values in the range "not available" provide a means for a module to transmit a message which contains a parameter that is not available or not supported in that module. The values in the range "not requested" provide a means for a device to transmit a command message and identify those parameters where no response is expected from the receiving device.

If a component failure prevents the transmission of valid data for a parameter, the error indicator as described in Tables 1 and 2 should be used in place of that parameter's data. However, if the measured or calculated data has yielded a value that is valid yet exceeds the defined parameter range, the error indicator should not be used. The data should be transmitted using the appropriate minimum or maximum parameter value.

5.1.5 Assignment of Ranges to New Parameters

This section is intended to define a set of recommended SLOTS (Scaling, Limit, Offset, and Transfer Function) which can be used when parameters are added to J1939. This permits data consistency to be maintained as much as possible between parameters of a given type (temperature, pressure, speed, etc.). Each SLOT is intended to provide a range and resolution suitable for most parameters within a given type. When necessary, a different scaling factor or offset can be used. All SLOTS should be based on a power of 2 scaling from another SLOT. This will minimize the math required for any internal scaling and reduce the opportunity for misinterpreted values. Offsets should be selected preferably on the following basis:

- a. Offset = 0, or
- b. Offset = 50% (equal \pm range)

Appendix A defines the recommended SLOTS to be used when ranges are assigned to new parameters.

Unless otherwise specified, all pressure SLOTS are measured as gage pressure.

TABLE 1 - TRANSMITTED SIGNAL RANGES

Range Name	1 byte	2 bytes	4 bytes	ASCII
Valid Signal	0 to 250 00 ₁₆ to FA ₁₆	0 to 64 255 0000 ₁₆ to FAFF ₁₆	0 to 4 211 081 215 00000000 ₁₆ to FAFFFFFF ₁₆	1 to 254 01 ₁₆ to FE ₁₆
Parameter specific indicator	251 FB ₁₆	64 256 to 64 511 FB00 ₁₆ to FBFF ₁₆	4 211 081 216 to 4 227 858 431 FBxxxxxx ₁₆	none
Reserved range for future indicator bits	252 to 253 FC ₁₆ to FD ₁₆	64 512 to 65 023 FC00 ₁₆ to FDFF ₁₆	4 227 858 432 to 4 261 412 863 FC000000 ₁₆ to FDFFFFFF ₁₆	none
Error indicator	254 FE ₁₆	65 024 to 65 279 FExx ₁₆	4 261 412 864 to 4 278 190 079 FExxxxxx ₁₆	0 00 ₁₆
Not available or not requested	255 FF ₁₆	65 280 to 65 535 FFxx ₁₆	4 278 190 080 to 4 294 967 294 FFxxxxxx ₁₆	255 FF ₁₆

TABLE 2 - TRANSMITTED VALUES FOR DISCRETE PARAMETERS (MEASURED)

Range Name	Transmitted Value
Disabled (off, passive, etc.)	00
Enabled (on, active, etc.)	01
Error indicator	10
Not available or not installed	11

TABLE 3 - TRANSMITTED VALUES FOR CONTROL COMMANDS (STATUS)

Range Name	Transmitted Value
Command to disable function (turn off, etc.)	00
Command to enable function (turn on, etc.)	01
Reserved	10
Don't care/take no action (leave function as is)	11

5.1.6 Adding Parameters to Groups

Several of the Parameter Groups contain bytes that are not defined and may be replaced with new parameters as appropriate. If existing parameter group definitions do not permit the inclusion of a new parameter, a new parameter group may be defined. Refer to SAE J1939 for additional definitions and abbreviations for instructions for adding new parameters to parameter groups and for requesting new parameter group numbers.

In general, parameters should be grouped into parameter groups as follows:

- a. By function (Oil, Coolant, Fuel, etc.) and not by type (temperature, pressure, speed, etc.)
- b. With similar update rates (to minimize unnecessary overhead)
- c. By common subsystem (the device likely to measure and send data)

5.1.7 Transmission Repetition Rates (Update Rates)

5.1.7.1 Definition of Transmission Repetition Rate

All transmission repetition rates defined in SAE J1939/71 are nominal rates. The actual transmission repetition rate on the network should be at this rate plus/minus the "typical" jitter which occurs in microcontroller based systems. The average rate should be the nominal value.

5.1.7.2 Transmission Repetition Rate for Engine Speed and Directly Associated Data (Crank Angle or Time Based Update Rates)

Some parameters may be calculated and/or updated based on engine crank angle rather than at a specific time interval. When this is the case the reference to a specific update rate is not accurate because this time will change based on the speed of the engine. The primary goal is to minimize the latency associated with sampling, calculating and transmitting the data without overburdening the network. There are many approaches to sampling the data to be converted and sent over the network. The two preferred approaches are: (a) Time-based sampling, calculating and transmission; and (b) A hybrid time-based and engine crank angle-based sampling, calculating and transmission where the number of crank angle degrees between updates is modified based on the current operating speed in order to maintain an update rate within an acceptable range (see Figure 1). Because there are multiple ways to acquire and transmit data onto the network the following guidelines have been defined for the engine speed and directly associated data.

1. At speeds above 500 rpm, the time from sampling to message transmission shall not exceed 12 ms. Systems that acquire engine speed information via period measurement inherently have less time delay at higher speeds. Above 1000 rpm, for instance, the time from sampling to message transmission shall range from 5 to 30 ms. Less time is required because the period measurement takes less time at higher speeds. How much time is saved depends on the number of crank angle degrees used to perform the period measurement.
2. "Normal" update rates:
 - a. Time based updates will occur every 20 ms.
 - b. Hybrid time based and engine crank angle based updates are shown in Figure 1

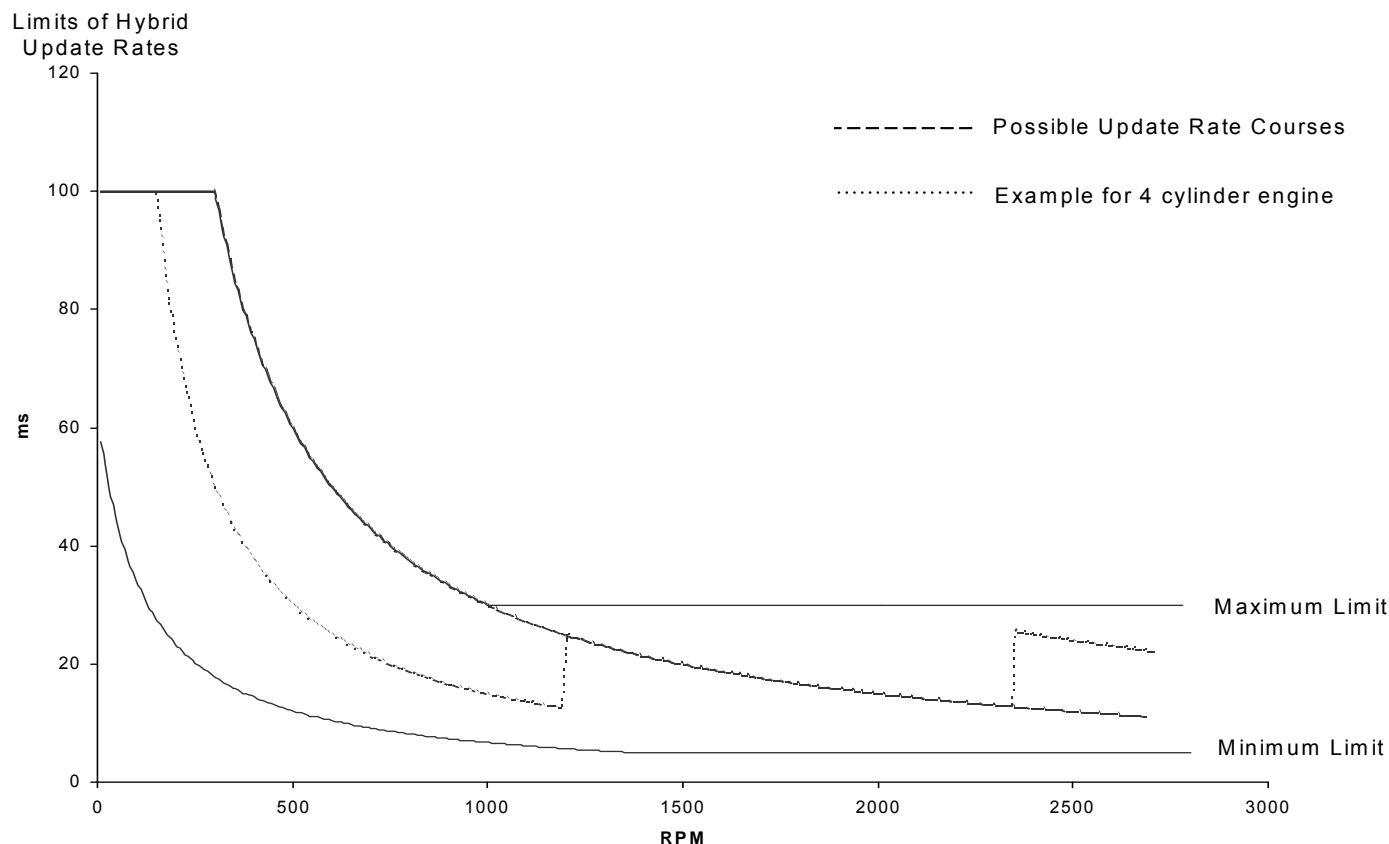


FIGURE 1 - LIMITS OF HYBRID UPDATE RATES

5.1.7.3 Transmission Repetition Rate for On-change Messages

Some periodic messages contain information that is of particular interest when a state change occurs. For example, it is desirable to immediately broadcast a change in the engine configuration rather than waiting a significant period of time for the next periodic update window.

Messages contain information that may change states at a very high rate. A rapidly changing state is not useful to consumers of this information and unnecessarily increases bus loading. An example of this would be a switch state in a cab message.

Transmission repetition rate definition for these messages takes the form of:

Every MAXUPDATEPERIOD and on CHANGECRITERIA but no faster than every MINUPDATEPERIOD

Where:

- CHANGECRITERIA is the criterion that prompts an immediate broadcast of a new message.
- MAXUPDATEPERIOD is the maximum period of the message. When CHANGECRITERIA is not satisfied, this is the preferred period of the message.
- MINUPDATEPERIOD is the minimum period of the message. If CHANGECRITERIA indicates the message should be broadcast more often, the period must be equal to MINUPDATEPERIOD. This does not apply to the first message after a periodic broadcast.

Two acceptable implementations are illustrated below. In each illustration, the horizontal line represents time, the vertical bars topped with a numbered circle represent messages, and the diagonal line represents a timer that counts down to zero, which triggers the transmission of the next periodic message. In both illustrations, all messages are triggered by MAXUPDATEPERIOD except for message 2, which is triggered by CHANGECRITERIA.

Figure 2 shows the method where CHANGECRITERIA results in extra messages that do not change the timing of the subsequent periodic messages. In this illustration, message 2 is triggered by CHANGECRITERIA, but since the countdown timer is not reset, message 3 is then broadcast after MAXUPDATEPERIOD elapses since message 1.

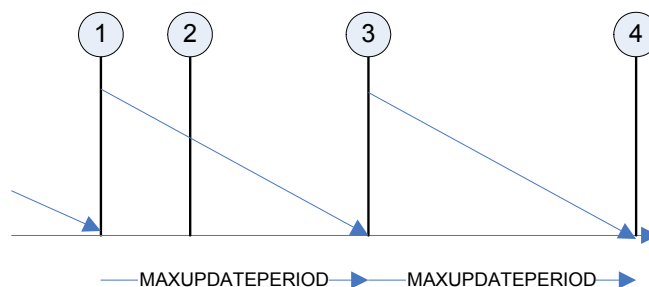


FIGURE 2 – ON-CHANGE IMPLEMENTATION OPTION 1

Figure 3 shows the method where the message period is controlled by the last broadcast message. In this method, message 2 resets the timer, forcing message 3 to occur at a later time than if CHANGECRITERIA had not been satisfied. This implementation results in a lower average bus loading, as illustrated by the lack of message 4 in the same overall time as shown in the previous illustration.

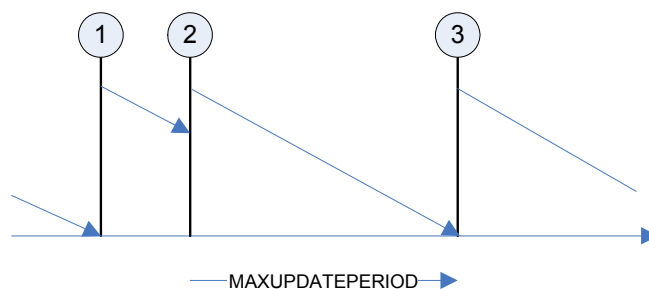


FIGURE 3 – ON-CHANGE IMPLEMENTATION OPTION 2

This message definition was created after many “on change” messages were published. As a result, the implementation of those messages may vary from the description in this section. This section is intended to provide uniformity of future implementations of “on change” messages.

After July 2010, new implementations of “on change” messages are expected to conform to this recommended practice. Many existing implementations prior to that date comply with this definition and no change is required.

While this section describes the preferred implementation, existing implementations prior to July 2010 are grandfathered, and may have an alternate acceptable definition.

5.1.8 Naming Convention for Engine Parameters

When there are multiple instances of the same parameter on the same component (i.e., exhaust ports), the following naming convention will be used. While facing the engine from the flywheel housing, left bank (LB) parameters are assigned prior to the right bank (RB) parameters. Front parameters are assigned prior to the rear or back parameters (with the rear/back being the end containing the flywheel housing). For a six cylinder in-line engine, the position furthest

from the flywheel will be identified as 1. For a 12 cylinder "V" engine, the position furthest from the flywheel on the left bank will be identified as 1, followed by the position next closest to the flywheel on the left bank. When only one parameter is required or available, the parameter denoted as number 1 should be used. (i.e., an engine having only one turbocharger would use Turbocharger 1 Compressor Inlet Temperature when broadcasting the temperature).

5.2 Parameter Definitions

This section provides a description of each parameter used in the SAE J1939 network. The description includes data length, data type, resolution, range, and a tag (label) for reference.

After power on, a node should internally set the "availability bits" of received parameters as not available and operate with default values until valid data is received. When transmitting, undefined bytes should be sent as 255 (FF₁₆) and undefined bits should be sent as 1.

5.2.1 Control Parameters

5.2.1.1 Net Engine Brake Torque (Power)

The measured torque (or power output) of a "fully equipped" engine. A fully equipped engine is an engine equipped with accessories necessary to perform its intended service. This includes, but is not restricted to, the basic engine, including fuel, oil, and cooling pumps, plus intake air system, exhaust system, cooling system, alternator, starter, emissions, and noise control. Accessories which are not necessary for the operation of the engine, but may be engine mounted, are not considered part of a fully equipped engine. These items include, but are not restricted to, power steering pump systems, vacuum pumps, and compressor systems for air conditioning, brakes, and suspensions. When these accessories are integral with the engine, the torque/power absorbed in an unloaded condition may be determined and added to the net engine brake torque. (Refer to SAE J1349.)

Net engine brake torque is calculated by subtracting friction torque from indicated torque for the purposes of this document.

5.2.1.2 Engine Friction Torque

The torque required to drive the engine alone as "fully equipped."

Engine friction torque is equal to the sum of Nominal Friction - Percent Torque (SPN 514) and Estimated Engine Parasitic Losses - Percent Torque (SPN 2978). Nominal Friction - Percent Torque (SPN 514) includes Estimated Pumping - Percent Torque (SPN 5398).

5.2.1.3 Engine Indicated Torque

Engine indicated torque is the torque developed in the cylinders. It is defined as the sum of the net engine brake torque and engine friction torque.

(R) 5.2.1.4 Net Brake Torque (Engine Based Retarder)

Net brake torque of the retarder is calculated by subtracting engine friction torque from engine indicated torque. For example, the net retarder torque would be calculated as 'Actual Retarder - Percent Torque' minus 'Nominal Friction - Percent Torque' minus 'Estimated Parasitic Losses - Percent Torque' (if supported).

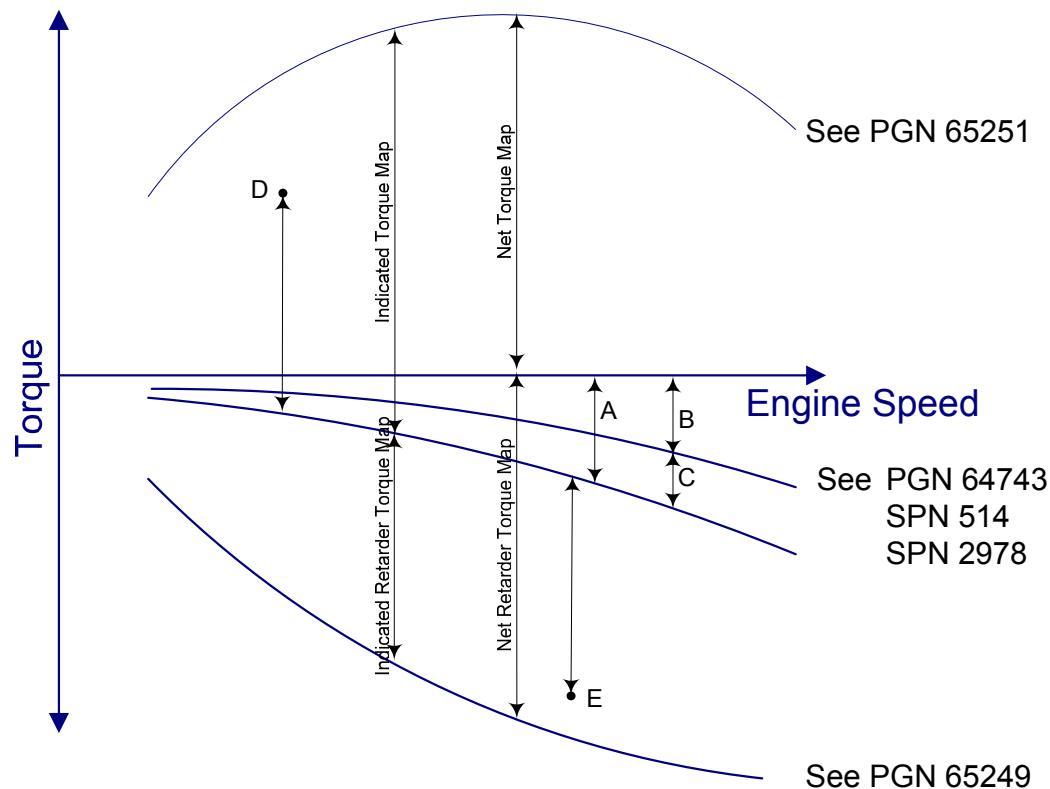


FIGURE 4 – TORQUE DEFINITIONS

A: Friction Torque Curve (includes the effects of SPN 2978, i.e., SPN 2978 is equal to 0xFB when transmitted by the engine). Since this includes the parasitic losses, this is not defined by SAE J1939 and it is not the friction torque map defined in the EC3 message.

B: Friction Torque Map in the EC3 message (does not include the effects of SPN 2978, i.e., SPN 2978 is supported by the engine)

C: SPN 2978, Estimated Engine Parasitic Losses – Percent Torque. This torque curve is intended to demonstrate that the indicated retarder torque map does not change when Friction Torque, as defined in Section 5.2.1.2, changes. Examples of why this might change include, but are not limited to, the fan changing state or a change in engine temperature. The torque curve depicted by adding C to B is not defined by SAE J1939 if SPN 2978 is supported by the engine.

D: Typical value of Actual Engine – Percent Torque (SPN 513). The intent of this point is to illustrate the relationship of this parameter to the friction torque curve. Other parameters that have the same relationship to the friction torque curve are Engine Demand – Percent Torque (SPN 2432), Driver's Demand Engine – Percent Torque (SPN 512), and Actual Maximum Available Engine – Percent Torque (SPN 3357).

E: Typical value of Actual Retarder – Percent Torque (SPN 520). The intent of this point is to illustrate the relationship of this parameter to the friction torque curve. Other parameters that have the same relationship to the friction torque curve

are Intended Retarder Percent Torque (SPN 1085), Drivers Demand Retarder – Percent Torque (SPN 1715), and Actual Maximum Available Retarder – Percent Torque (SPN 1717).

Note 1: The purposes of A, B, & C are to:

- (1) Refer to an instantaneous point along the torque curve, although the value of friction torque along these curves at different engine speeds may not be known.
- (2) Illustrate the frictional effects when SPN 2978 is supported or not.
- (3) Illustrate how the frictional effects are used to determine net torque.

Note 2: Although SPN 514 and SPN 2978 are shown in the graph as having negative values, typical values for these parameters are positive because they are defined to be loss torque.

Note 3: This figure applies to engine based retarders only (compression release and/or exhaust).

5.2.2 ASCII Parameters

This section describes the standard practices for ASCII data parameters. SAE J1939 has three (3) standard ASCII SLOT Types for different data length designation techniques, which are summarized in Table 4. Some of the ASCII SLOT Types use a delimiter technique for data length designation which may reduce the ASCII characters available for parameter data. The ASCII SLOT Types are discussed individually in more detail in the sections 5.2.1.4, 5.2.1.7, and 5.2.1.8.

The SLOT Table in Appendix A may have multiple ASCII SLOTS for the same ASCII SLOT Type to accommodate different maximum bytes allowed. The numerical designator in the ASCII SLOT Name reflects the maximum bytes allowed for an ASCII SLOT. For example, the ASCII SLOT 'SAEatad0200' has a maximum length of 200 bytes while the ASCII SLOT 'SAEatad0025' has a maximum length of 25 bytes.

TABLE 4 - Summary of ASCII SLOT Types

ASCII SLOT Type	Description	Data Length Indication	Delimiter Character included in Data Length?	Any Characters not allowed within the Data?	Required to fill Data to a specific length?
Fixed Length ASCII	The Data length is a fixed or constant number of bytes	Fixed number of bytes of data	No. The length indicates required data space for parameter data.	No. All of the ASCII characters may be used in the Data	Yes, must provide data in all of the required number of bytes
Character Delimited, Variable Length ASCII	The Data length may vary within defined limits and a specific ASCII character is placed following the Data to indicate the end of the parameter data	Length indicated by the delimiter character (always required).	No. The length indicates allowed data space for parameter data.	Yes. The delimiter character is not allowed within the parameter data, since it will be interpreted as the delimiter	No, unless the ASCII data SPN definition has a minimum data length of 1 or more characters
Byte Count Delimited, Variable Length ASCII	The Data length may vary within defined limits and a separate data parameter (SPN) within the PGN data field specifies the byte length of the ASCII Data	Separate SPN that specifies the ASCII data byte length	No. The length indicates allowed data space for parameter data.	No. All of the ASCII characters may be used in the Data	No, unless the ASCII data SPN definition has a minimum data length of 1 or more characters

5.2.1.4 ASCII Characters

The character values for ASCII Characters are specified in Section 5.1.3 of J1939-71. By default, only the printable ASCII characters are allowed in the data for ASCII parameters. The ASCII control characters, or non-printable ASCII characters, are not allowed in the data for an ASCII parameter, unless the ASCII parameter definition explicitly states otherwise. SPN 162 and SPN 163 are examples of ASCII parameters with explicit statements allowing the use of ASCII control characters in the parameter data.

5.2.1.5 ASCII Byte Order

The standard practice for the ordering of data bytes for ASCII data parameters is defined in Section 5.1.2 of J1939-71.

5.2.1.6 ASCII SLOT Type - Fixed Length ASCII

The Fixed Length ASCII SLOT Type defines an ASCII data parameter with a fixed, or non-varying, number of ASCII characters in the data field. All ASCII characters are available for use in the SPN data with this type of ASCII SLOT.

Some examples of SPNs using a fixed length ASCII SLOT Type are SPNs 162, 3620, and 4254.

5.2.1.6.1 SPN Data Definition for Fixed Length ASCII

An SPN using a fixed length ASCII SLOT Type has the following data definition characteristics:

- The 'Resolution' property indicates "ASCII"
- The 'Data Length' property is a fixed byte length, such as "5 bytes"

All ASCII characters are available for use in the ASCII data with this type of ASCII SLOT.

The 'Data Length' property defines the required byte length of the data for this SPN. If it is possible to have actual SPN data that is shorter than the required data length, then the SPN data definition should specify the acceptable ASCII character(s) for an application to use to fill or pad the remaining data bytes. The definition should indicate if there is a standard for preference for inserting the pad or fill characters before or after the actual SPN data.

5.2.1.6.2 PGN Data Field Details for Fixed Length ASCII Parameters

Within the PGN data field, the specified number of bytes of data is required in the data field position for the fixed length ASCII data SPN, whether the source application supports the SPN or not.

The data for a subsequent parameter shall immediately follow the required number of data bytes.

If the source application is reporting data for the SPN, then the source application must fill each of the data bytes for the SPN. If the actual SPN data is shorter than the required data length, then the source application is required to fill any remaining data bytes. The remaining data bytes shall be filled according to the SPN definition. If the SPN definition does not specify the data fill method, then the application shall fill the remaining bytes as appropriate for the data content.

If the source application does not support the SPN, then the source application is still required to fill each of the SPN data bytes with the "not available" value.

5.2.1.7 ASCII SLOT Type - Character Delimited, Variable Length ASCII

The Character Delimited, Variable Length ASCII SLOT Type defines an ASCII data parameter with a varying number of ASCII characters in the data field, and uses a specific ASCII character (delimiter) to indicate the end of the ASCII text for the parameter. All ASCII characters except for the delimiter character are permitted in the SPN data with this type of ASCII SLOT. The delimiter character is not permitted in the SPN data because it will be interpreted as the end of data indicator.

The delimiter character is not considered part of the data for the parameter. Consequently, the delimiter character is not included in the Data Length maximum byte length value in the SLOT definition. The delimiter is a mechanism within the PGN data content to denote the end of the parameter data for the variable length ASCII parameter. However, this fundamental perspective should not be seen as restricting how the parameter data is handled internally by an application.

Some examples of SPNs using a character delimited, variable length ASCII SLOT Types are SPNs 237 and 2902.

5.2.1.7.1 SPN Data Definition for Character Delimited, Variable Length ASCII

An SPN using a Character Delimited, Variable Length ASCII SLOT Type has the following data definition characteristics:

- The 'Resolution' property indicates "ASCII"
- The 'Data Length' property indicates a variable length, such as "Variable - up to 200 characters"
- The 'Data Length' property indicates the delimiter character, such as "followed by an '*' delimiter"

All ASCII characters, except for the delimiter character, are available for use in the SPN data with this type of ASCII SLOT. The delimiter character is not permitted in the SPN data for this type of ASCII SLOT because it will be interpreted as the end of data indicator. The asterisk (*) character is the standard delimiter character for J1939 parameters of this SLOT type. There is a SLOT type that uses the NULL character (value 0) as the delimiter character. The SLOT type with

a NULL delimiter character is appropriate when there is a need to have the asterisk character available as a valid data character rather than a delimiter.

The 'Data Length' property defines the maximum length available for the ASCII data for the SPN. There is no minimum data length required for the data, unless the Data Length property explicitly states otherwise. The delimiter character is not included in the maximum data length value in the 'Data Length' property. The delimiter character is specified within the SLOT definition and SPN definition because it places a restriction on the allowed ASCII characters for the SPN data. It is included in the 'Data Length' property since this property appears in the PGN definition content.

The delimiter character is not considered part of the data for the parameter. This delimiter character perspective is not meant to restrict how the parameter data is handled internally by an application. An application may choose to include the delimiter as part of the parameter data within its memory storage; or alternately, an application may choose to add the delimiter as the parameter data is placed into the PGN data structure and to remove the delimiter as the parameter data is extracted from the PGN data structure and place into memory/storage. This fundamental perspective about the delimiter not being part of the parameter data is important when the SPN data is exchanged through means other than the PGN, such as through Memory Access Protocol with SPN spatial addressing. Since the delimiter character is not part of the parameter data, then the delimiter character shall not be included when exchanged through other means. For Memory Access Protocol, the content of the DM16 Binary Data Transfer PGN shall not include the delimiter character.

5.2.1.7.2 PGN Data Field Details for Character Delimited, Variable Length ASCII

Within the PGN data field, the maximum data length defines the maximum number of bytes available for the ASCII data for this SPN in the data field position. The designated delimiter character shall immediately follow the last valid byte of ASCII data for the SPN in the PGN data field. The maximum data length does not define the required number of bytes for the data. A source application should not fill or pad the ASCII data for this type of SPN just to occupy the maximum length allowed. The delimiter character denotes the end of the data for the ASCII data SPN and indicates the starting position for a subsequent parameter. The delimiter is a mechanism within the PGN data content to denote the end of the parameter data for the variable length ASCII parameter.

The data for a subsequent parameter shall immediately follow the delimiter character.

The delimiter character is always required after a delimited variable length ASCII data field within the PGN data field, including situations when

- the delimited variable length ASCII parameter is not support by the source application
- the delimited variable length ASCII parameter is the only parameter in the data field
- the delimited variable length ASCII parameter data is zero (0) bytes or characters in length
- the delimited variable length ASCII parameter is the last parameter in the PGN data field
- the delimited variable length ASCII parameter data uses the maximum data length available for the SPN

It is not necessary to include ASCII text for a delimited Variable Length ASCII parameter; however, the delimiter is always required. In other words, it is acceptable to transmit zero-length ASCII text for a variable length ASCII parameter as long as the delimiter character is included in the PGN data.

The asterisk (*) character is the standard delimiter character for J1939 parameters of this SLOT type. There is a SLOT type that uses the NULL character (Hex value 0) as the delimiter character. The SLOT type with a NULL delimiter character is appropriate when there is a need to have the asterisk character available as a valid data character rather than a delimiter.

Several examples are provided below to illustrate the PGN data field content for several situations. For these examples the letters 'a' through 'e' represent the data for 5 consecutive variable length ASCII parameters (asterisk * delimited) within the PGN data field.

Example 1: Data provided for each parameter	aaaa*bbb*c*dddd*eee*
Example 2: Data only for parameters 'a' and 'b'	aaaaaaaa*bbbbbbbbbbbb****
Example 3: Data only for parameter 'a' and 'd'	*bbbbbbbb**dddd**
Example 4: Data only for parameter 'e'	****e*****

5.2.1.8 ASCII SLOT Type - Byte Count Delimited, Variable Length ASCII

The Byte Count Delimited, Variable Length ASCII SLOT Type defines an ASCII data parameter (SPN) with a varying number of ASCII characters in the data field, and relies upon a separate parameter (SPN) to report the ASCII data parameter byte length. The ASCII data SPN and the separate ASCII data byte length SPN must be transmitted in the same PGN, since it is possible for the length of the ASCII data to vary from one instance of the SPN data to another instance of the SPN data. All ASCII characters are permitted in the SPN data with this type of ASCII SLOT.

Special design considerations must be recognized by any application that is the source of a PGN with an SPN of the this ASCII SLOT type. One design consideration involves maintaining synchronization between the value for the associated Number of Bytes SPN and the length of the ASCII data SPN. Another design consideration involves the value reported for the Data Length SPN value if the ASCII parameter is not available or supported by the source.

Some examples of SPNs using a byte count delimited, variable length ASCII SLOT Type are SPNs 509 and 3075. SPN 509 is the ASCII data SPN and SPN 3070 reports the byte length of SPN 509. Similarly, SPN 3075 is the ASCII data SPN and SPN 3072 reports the byte length of SPN 3075.

5.2.1.8.1 SPN Data Definition for Byte Count Delimited, Variable Length ASCII

An SPN using a Variable Length ASCII with Byte Count Parameter SLOT data type has the following data definition characteristics:

- The 'Resolution' property indicates "ASCII"
- The 'Data Length' property indicates a variable length, such as "Variable - up to 100 characters"
- The 'Data Length' property does not specify a delimiter character
- The Description Notes identify the Number of Bytes SPN that reports the ASCII data byte length

All ASCII characters are available for use in the ASCII data with this type of ASCII SLOT.

The 'Data Length' property defines the maximum length available for the ASCII data for the SPN. There is no minimum data length required for the ASCII data, unless the Data Length property explicitly states otherwise. A source application should not fill or pad the ASCII data for this type of SPN just to occupy the maximum length allowed.

5.2.1.8.2 PGN Data Field Details for Byte Count Delimited, Variable Length ASCII

Within the PGN data field, the maximum data length defines the maximum number of bytes available for the ASCII data for this SPN in the data field position. The maximum data length does not define the required number of bytes for the data. A source application should not fill or pad the ASCII data for this type of SPN just to occupy the maximum length allowed.

The Number of Bytes SPN shall be positioned somewhere before the ASCII data SPN within the PGN data field to enable recipient applications to determine the end of the data for the ASCII data SPN. The source application must make sure the value in the Number of Bytes SPN is correct for the length of the instance of ASCII data SPN. The Number of Bytes SPN denotes the end of the ASCII data SPN and indicates the starting position for a subsequent parameter. The Number of Bytes SPN is the mechanism within the PGN data content to denote the end of the data for the variable length ASCII parameter.

The data for a subsequent parameter shall immediately follow the specified number of bytes after the starting byte position for the ASCII data SPN.

5.3 Parameter Group Definitions

Parameter Groups (PGNs) for use on the SAE J1939 network may be found in Appendix C. All undefined bits are to be transmitted with a value of "1." All undefined bits should be received as "don't care" (either masked out or ignored). This permits them to be defined and used in the future without causing any incompatibilities.

Messages that are requesting control over the receiving device (TSC1, TC1) are transmitted at high rate only during the time when the control is active, but may be optionally sent at a slow rate as a "heartbeat." For TSC1, it is expected that

the transmitting device indicate to the receiving device that it no longer requests control by sending at least one broadcast with the override control modes set to 00. In the absence of continued broadcasts from a requesting module, the receiving device shall default to its normal mode after two update periods.

The size of the CAN data field is 8 bytes. Parameter groups that are 0-8 data bytes in length use the services of the Data Link layer (Refer to SAE J1939-21). Parameter groups that exceed 8 data bytes or parameter group definitions that are variable in length and may exceed 8 data bytes shall utilize the services of the Transport Protocol. (Refer to SAE J1939-21.)

5.4 Application Notes

5.4.1 Parameters with Multiple Sources

Each parameter received by a node for control purposes shall be configurable by the system integrator to identify the primary source of the data, as well as the secondary source, if applicable. It is to be expected that the system integrator configure each receiving device on a network identically. A secondary source of data is defined to be a device on the network that measures the data independently of the primary source of that data.

5.4.2 Conventions for Parameter Placement Notation and Unspecified Bits in Message Definitions

This section explains the various notations used by J1939 documents to specify the position of parameter data within the PGN data field and illustrates the bit placement associated with the notations. This section also explains how to deal with the unspecified bits in the data field definition. The information in this section is intended to aid the reader in determining the proper placement of parameter data based upon the Start Position and Length attributes specified in the PGN definition. The information in this section is also intended to serve as a guide for how to properly define the Start Position attribute to define the placement of parameter data in a PGN.

5.4.3 Terminology for Parameter Placement

5.4.3.1 Parameter Data Length Classification Terminology

Three different classifications of parameters have been defined for the purposes of discussing parameter placement. The classifications are based upon the parameter data length. The three classifications are fractional byte length, integer byte length, and variable byte length. The 'Start Position' notation is explained according to each of the parameter data length classifications.

Fractional Byte Length: Term used to classify a parameter with a fixed data length where the data length is not an integer number of bytes. A parameter with a data length of 2 bits, a parameter with a data length of 5 bits, and a parameter with a data length of 10 bits are examples of fractional byte length parameters.

Integer Byte Length: Term used to classify a parameter with a fixed data length where the data length is an integer number of bytes. A parameter with a data length of 1 byte, a parameter with a data length of 2 bytes, and a parameter with a data length of 8 bits are examples of integer byte length parameters.

Variable Byte Length: Term used to classify a parameter with a variable data length that is an integer number of bytes. A parameter with a data length of "Variable - up to 200 characters" is an example of a variable byte length parameter. Alphanumeric or textual data parameters are the primary examples of variable byte length parameters.

5.4.3.2 Start Position Terminology

The following terms are used throughout the parameter placement to describe the 'Start Position' notation style.

Fixed: Term used to describe a 'Start Position' notation that defines an absolute or fixed position for the placement of the parameter data in the data field. Some examples of fixed start position notations are '3', '5.4', '1-2', and '1.7-2',

Equation: Term used to describe a 'Start Position' notation that defines the placement of the parameter data using an equation rather than an absolute position. Equation start position notations are appropriate when the parameter data length is variable, when the PGN data field has multiple variable length parameters, or when there are fixed length parameters after variable length parameters in the data field. Some examples of equation start position notations are '14-n', '2 to n', '5 to A', and 'A+1 to B'.

Field: Term used to describe a 'Start Position' notation that defines the placement of the parameter data in terms of its relative sequence in the data field rather than with an absolute position or equation. Field start position notations are appropriate when the PGN data field has multiple consecutive variable length parameters in the data field or the parameter is repeated in the data field. The placement order of fields follows the alphabetical sequence of the start positions. Some examples of field start position notations are 'a', 'b', and 'c'.

5.4.3.3 Start Position Diagrams

Illustrations are included for many of the parameter placement notation styles to help clarify the parameter placement practices and the transmission order of the data over the J1939 data link. These illustrations include one or more of the following diagrams.

Data Definition: The Data diagram serves to illustrate the parameter data bits for the example data, shown where the data bits go highest order bit to lowest order significant bit in a left to right manner. Individual bits are identified with a 'b' followed by a number. The 'b' is the abbreviation for 'bit' and the number denotes the significance order of the bit, where bits with lower significance have a lower number value. This diagram serves as a convenient way of discussing bit placement for the J1939 data order practices. In the ASCII examples, the 'b' identifier may be preceded by a 'c' plus a number to designate the character instance.

Placement: The Placement diagram illustrates the placement of the parameter bits using a common view of data in memory, where the bytes go most significant to least significant in a left to right manner and the bits within a byte go highest order to lowest order in a left to right manner. This diagram serves as a convenient way of discussing bit placement for the J1939 data order practices.

Transmission Order: The Transmission Order diagram illustrates the parameter data bits in the order they are transmitted over the J1939 data link. As specified in J1939-21 Section 5.1.1, the data is transmitted in increasing byte order (i.e. byte 1, byte 2, byte 3, etc.) with the bits within a byte transmitted highest order bit first (i.e. bit 8, bit 7, bit 6, etc.).

5.4.4 Guidelines for Parameter Placement

The following guidelines provide the basis for the parameter data placement conventions. These guidelines and the conventional parameter placement methods should be applied when defining the placement of parameters in PGNs.

1. Parameters with less than 8 bits should reside within a byte boundary
2. Parameters with more than 8 bits should either start or stop on a whole byte boundary
3. Only parameters with more than 8 bits should span a byte boundary
4. ASCII parameters, variable length parameters, and parameters with repeating data fields should start and stop on whole byte boundaries
5. Byte ordering rules are specified in 5.1.2 Message Format.

5.4.5 Start Position Notation and Parameter Placement

The 'Start Position' specified for a parameter in the PGN definition and the 'Length' attribute of the parameter describes the placement of the parameter data into the PGN data field. Generally, the 'Start Position' notation reflects the bit position for the lowest order bit of the parameter data within the byte. When the parameter data is confined to a single byte, then the 'Start Position' consists of one numerical value declaring the position for the lowest order bit of the parameter data. When the parameter data spans one or more byte boundaries, then the 'Start Position' consists of two numerical values; each declaring the position for the lowest order bit of the parameter data in the lowest and highest order bytes. For numerical start position notation, the integer value identifies the byte and the decimal value identifies the bit

position (1 to 8, with 1 as the lowest order bit) within the byte. When the start position value does not include a decimal value, then the parameter data consumes the entire byte.

The 'Start Position' notation has several formats to accommodate the different parameter data length types and the different parameter placement needs. For the purposes of parameter placement discussion, parameter data length is classified as fractional byte length (2 bits, 4 bits, 10 bits, etc.), integer byte length (1 byte, 2 byte, etc.), and variable byte length. Each of these parameter length classifications have different requirements when it comes to specifying the position data field position of the data. This section explains the 'Start Position' notation according to each of the parameter data length classifications.

5.4.6 Start Position Notation for Fractional Byte Length Parameters

Fractional byte length parameters are parameters with a data length that is not an integer number of bytes, e.g. 2 bits, 5 bits, 10 bits, etc. The information in Table 5 presents the 'Start Position' notations used with fractional byte length parameters and explains the respective parameter placement. Figure 5 through **Error! Reference source not found.** show examples of these 'Start Position' notations and illustrate the parameter placement.

The following guidelines explain how to determine data placement from the 'Start Position' and 'Length' attributes for a parameter with Fractional Byte Length data.

1. In the Start Position notation, the number before the decimal point identifies the byte and the number after the decimal point identifies the bit position within that byte.
2. If the data length is less than 1 byte and all data bits are within the same byte, then the Start Position consists of one numerical value.
3. If the data length is larger than 1 byte or the data spans a byte boundary, then the Start Position consists of two numerical values separated by a comma or dash. The number before the comma or dash is the first position designation and the number after the comma or dash is the second position designation.
4. If a position designation in the Start Position does not have a decimal value, then the start bit is at bit 1 (one) in that byte. For example, a position designation of '2' is equivalent to the position designation '2.1'. This abbreviated style is only used when the data occupies the whole byte. In Table 5, a designation of "R" is equivalent to the designation "R.1", and a designation of "S" is equivalent to the designation "S.1". This is illustrated in Figure 7 through Figure 9. In Figure 7, the second position designation is '2', so the lowest order data bit placed into byte 2 will be positioned at bit 1.
5. For fractional byte length data, the least significant data bit is always positioned at the first position designation, and each next higher order data bit is placed into the next higher order data field bit position. In Table 5, "R.x" represents the first position designation, so the least significant bit of the data is placed at bit 'x' of byte 'R', the next higher order bit of the data is placed at bit 'x+1' of byte 'R', etc. This is illustrated in Figure 5 through Figure 9.
6. When higher order data bit placement reaches a byte boundary and the next higher data field byte is an intermediate byte between the bytes specified in the first and second position designations, then the next higher order data bit is placed at bit 1 of the next higher order data field byte and additional higher order data bits are placed in next higher order fashion from that point. This is illustrated in Figure 9. In Figure 9, the Start Position notation identifies byte 6 in the first position designation and byte 8 in the second position designation, so byte 7 is an intermediate byte. When bit placement reaches byte 7, the next higher order data bit (bit 'b9'), is placed at bit 1 of byte 7 and the next higher order data bits are placed into byte 7 in next higher order fashion from that point.
7. When higher order data bit placement reaches a byte boundary and the next higher data field byte is the byte identified in the second position designation in the Start Position, then the number after the decimal in the second position designation indicates the bit position in that byte where the next higher order data bit is placed in the byte and any remaining higher order data bits are to be placed in next higher order fashion from that point. In Table 5, "S.w" represents the second position designation, so when data bit placement reaches byte 'S' of the data field, the next higher order bit of the data is placed at bit 'w' of byte 'S', the next higher order bit of data after that is placed at bit 'w+1' of byte 'S', etc. This is illustrated in Figure 6, Figure 8 and Figure 9. In Figure 9, the second position designation is '8.6'. When bit placement gets to byte 8, then next higher order data bit, bit 'b17', is placed at bit 6 of byte 8 and the last two bits, 'b18' and 'b19', are placed at bit 7 and bit 8 of byte 8, respectively.

TABLE 5 - START POSITION NOTATION FOR FRACTIONAL BYTE LENGTH PARAMETERS

Start Position	Length	Interpretation	Example Illustration
R.x	Y bits (Y less than 8)	Fixed position of the data within a byte boundary for a fractional byte length parameter with less than 8 bits. The parameter occupies 'Y' number of bits of byte 'R' with the least significant bit of the parameter data at bit 'x' in byte 'R' and the most significant bit of the parameter data is at bit ('x' + ('Y'-1)) in byte 'R'.	Figure 5
R.x-S.w	Y bits (Y less than 8)	Fixed position of the data across a byte boundary for a fractional byte length parameter with less than 8 bits. The parameter occupies the most significant bits of byte 'R' from bit 'x' to bit 8 and the remaining number of data bits start from bit 'w' in byte 'S'. The least significant bit of the parameter data is placed at bit 'x' in byte 'R'.	Figure 6
R.x-S	Y bits (Y greater than 8)	Fixed position of a fractional byte length parameter with more than 8 bits where the data crosses a byte boundary and stops on a whole byte. The parameter occupies the most significant bits of byte 'R' from bit 'x' to bit 8 plus all whole bytes up to 'S'.	Figure 7
R-S.w	Y bits (Y greater than 8)	Fixed position of a fractional byte length parameter with more than 8 bits where the data crosses a byte boundary and starts on a whole byte. The parameter occupies all whole bytes from 'R' up to 'S' and the remaining modulo-8 number of bits starting from bit 'w' in byte 'S'.	Figure 8, Figure 9**

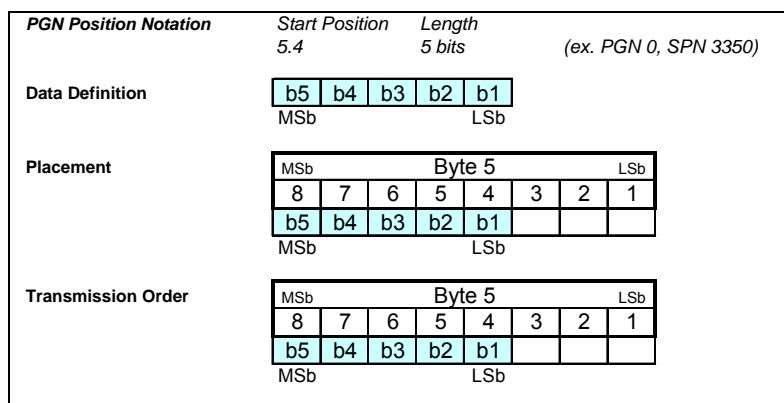


FIGURE 5 - FRACTIONAL BYTE (LESS THAN 1 BYTE) WITHIN BYTE BOUNDARY

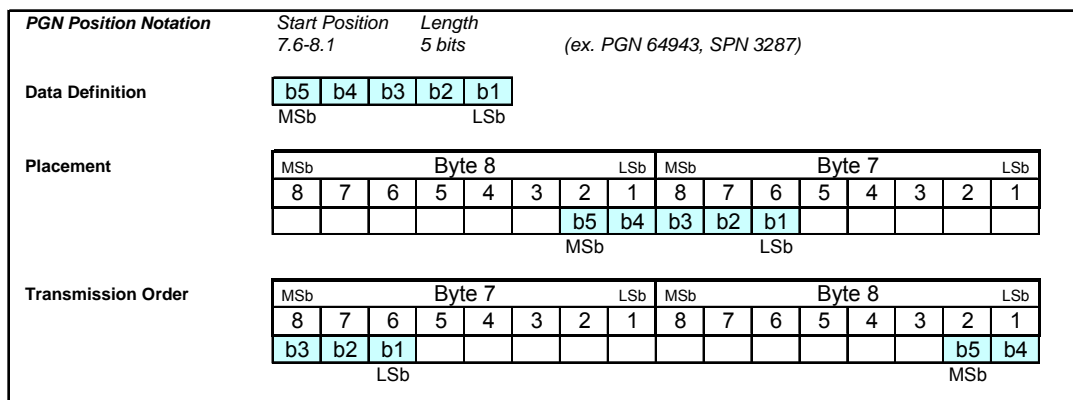


FIGURE 6 - FRACTIONAL BYTE (LESS THAN 1 BYTE) ACROSS BYTE BOUNDARY

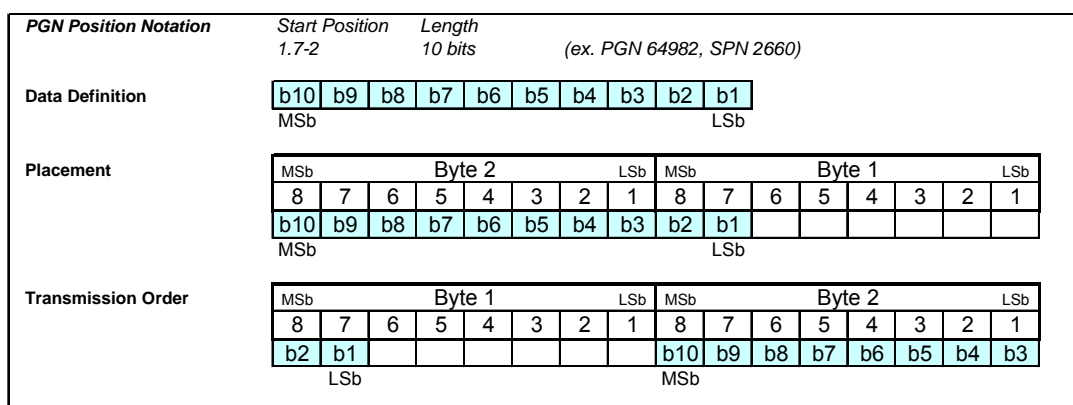


FIGURE 7 - FRACTIONAL BYTE (LARGER THAN 1 BYTE) ENDING ON BYTE BOUNDARY

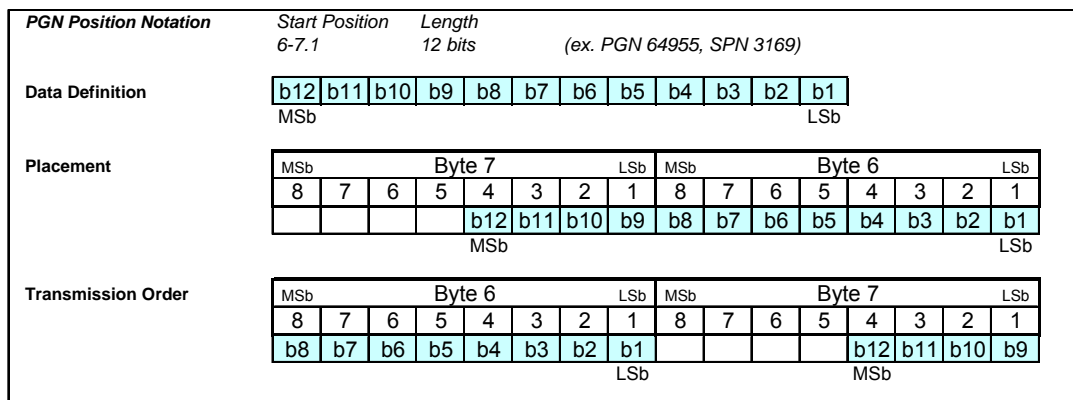
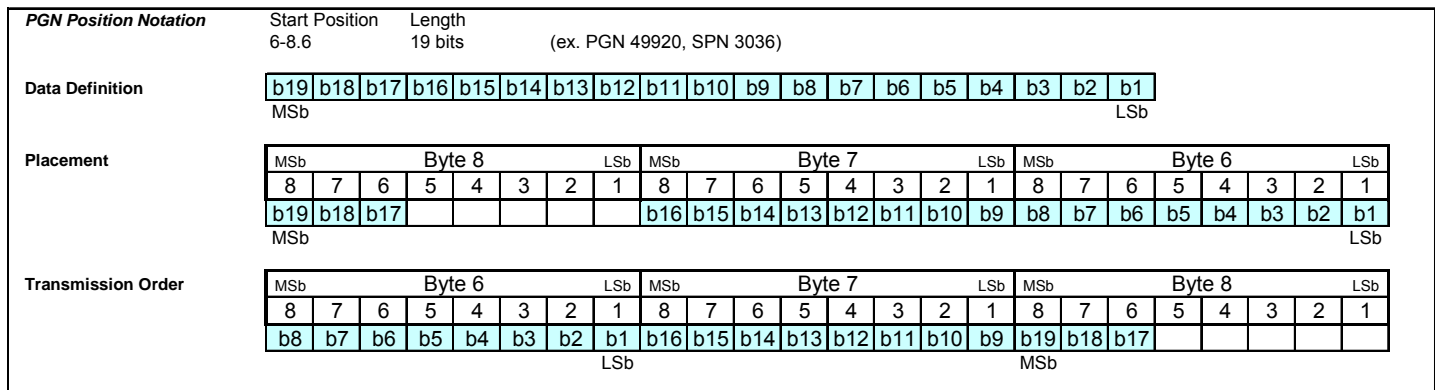


FIGURE 8 - FRACTIONAL BYTE (LARGER THAN 1 BYTE) STARTING ON BYTE BOUNDARY



**** Note:** This placement method is used in the various Diagnostics Messages in J1939-73 when passing the SPN number in the data field. The use of this fractional byte placement model should be limited to passing the SPN number in the DMx messages.

FIGURE 9 - FRACTIONAL BYTE (LARGER THAN 1 BYTE) STARTING ON BYTE BOUNDARY

5.4.7 Start Position Notation for Integer Byte Length Parameters

The information in Table 6 and Table 7 presents 'Start Position' notations used with parameters with integer byte length. Examples of these 'Start Position' notations are illustrated in Figure 10 through Figure 13. Integer byte length parameters are parameters with a fixed data length in whole bytes, e.g. 1 byte, 2 bytes, 4 bytes, 16 bits, etc. The placement of the data bytes for integer byte length parameters larger than 1 byte depends upon whether the parameter is non-alphanumeric (e.g. scaled data or state list) or alphanumeric. As noted in 5.1.2 Message Format, the placement or ordering of the data bytes for multiple byte parameters differs between alphanumeric and all other data types. The parameter definition must be referenced to determine if the parameter is non-alphanumeric or alphanumeric data.

TABLE 6 - START POSITION NOTATION FOR INTEGER BYTE LENGTH PARAMETERS (NON-ALPHANUMERIC)

Start Position	Length	Interpretation	Example Illustration
R	1 byte or 8 bits	Fixed position of a one byte data parameter within a whole byte. The parameter occupies the entire byte 'R'.	Figure 10
R-S R, S R	Y bytes or 16 bits	Fixed position of a multiple byte data. Since this parameter is non-alphanumeric data (based upon parameter definition), the data is positioned so the Least Significant Byte is transmitted first, per 5.1.2. The parameter occupies 'Y' number of bytes from byte 'R' through byte 'S'.	Figure 11, Figure 12

TABLE 7 - START POSITION NOTATION FOR INTEGER BYTE LENGTH PARAMETERS (ALPHANUMERIC)

Start Position	Length	Interpretation	Example Illustration
R	1 byte or 8 bits	Fixed position of a one byte data parameter within a whole byte. The parameter occupies the entire byte 'R'.	Figure 10
R-S	Y bytes	Fixed position of a multiple byte data. Since this parameter is alphanumeric data (based upon parameter definition), the data is positioned so the Most Significant Byte is transmitted first, per 5.1.2. The parameter occupies 'Y' number of bytes from byte 'R' through byte 'S'.	Figure 13
'n'	Y bytes	Field position of a multiple byte data. Since this parameter is alphanumeric data (based upon parameter definition), the data is positioned so the Most Significant Byte is transmitted first, per 5.1.2. The parameter occupies 'Y' number of bytes from the point that the field starts (i.e. in the first byte following the previous field). Example (PGN 64912, SPN 3560 and 3561) <div style="display: flex; justify-content: space-between;"> <div>Start Position</div> <div>Length</div> </div> <div style="display: flex; justify-content: space-between;"> <div>a</div> <div>2 bytes (SPN 3560)</div> </div> <div style="display: flex; justify-content: space-between;"> <div>b</div> <div>2 bytes (SPN 3561)</div> </div> <p><i>The structure of these two parameters repeats in the data field. The 2 bytes of data for SPN 3561 (field 'b') is placed in the 2 bytes following the last byte of SPN 3560 (field 'a').</i></p>	

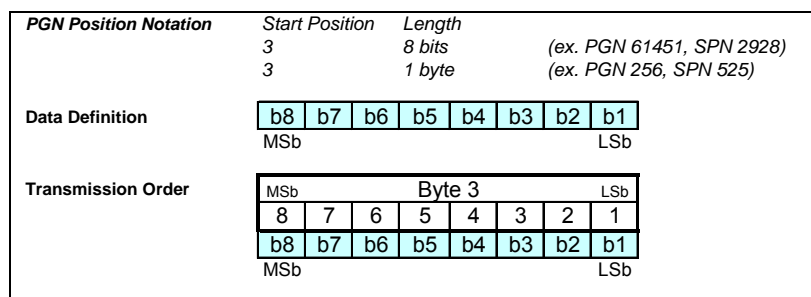


FIGURE 10 - SINGLE BYTE DATA PLACEMENT (NON-ALPHANUMERIC AND ALPHANUMERIC)

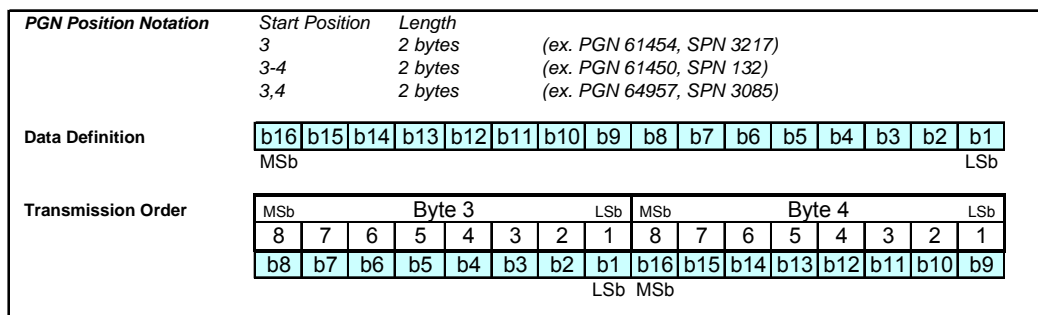


FIGURE 11 - MULTIPLE BYTE PLACEMENT (NON-ALPHANUMERIC DATA)

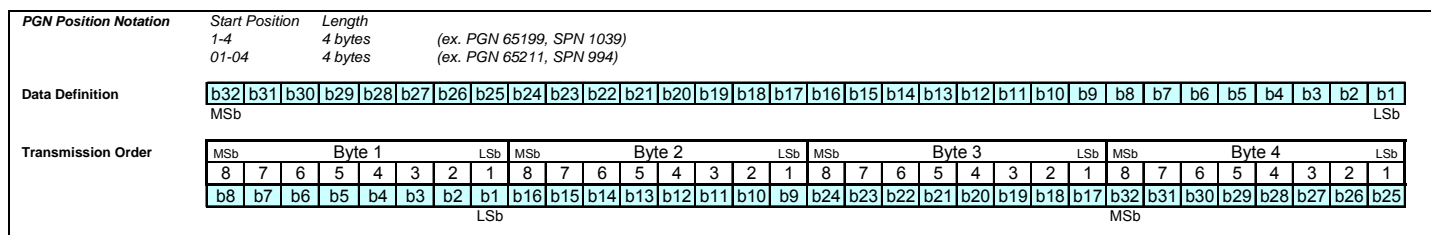


FIGURE 12 - MULTIPLE BYTE PLACEMENT (NON-ALPHANUMERIC DATA)

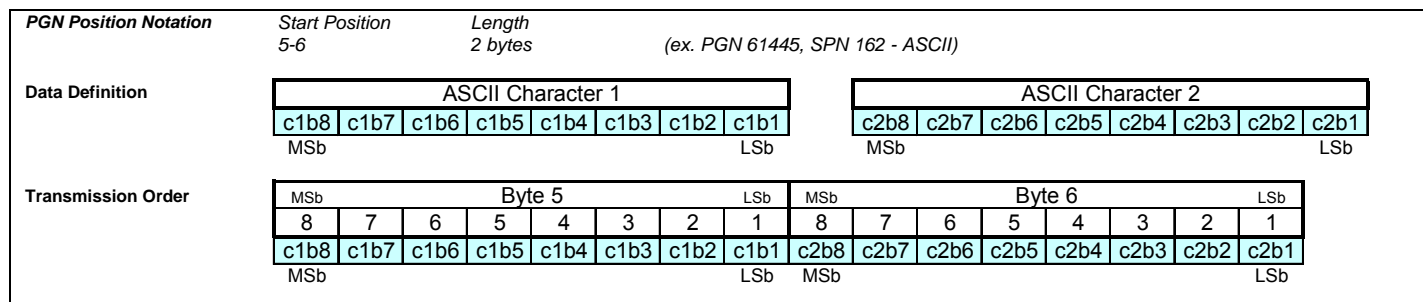


FIGURE 13 - MULTIPLE BYTE PLACEMENT (ALPHANUMERIC DATA)

5.4.8 Start Position Notation for Variable Length Parameters

The information in Table 8 present 'start position' notations used with variable length parameters. Alphanumeric or textual data parameters are the primary examples of variable byte length parameters. The 'starting position' is typically denoted using letters and equations to explain the position of the content within the message data field.

TABLE 8 - START POSITION NOTATION FOR VARIABLE LENGTH PARAMETERS

Start Position	Length	Interpretation										
R-'N'	Variable – up to Y characters ("*" delimited)	<p>The parameter starts at byte 'R' and continues through some variable number of bytes where the end is denoted by an asterisk character in the data stream. The length of the parameter does not include the "*" delimiter.</p> <p>Example (PGN 65242, SPN 234)</p> <table><tr><td>Start Position</td><td>Length</td></tr><tr><td>2-N</td><td>Variable - up to 200 characters ("*" delimited)</td></tr></table> <p><i>Parameter starts at byte 2 and continues up to the asterisk character (at byte 203 at the highest).</i></p>	Start Position	Length	2-N	Variable - up to 200 characters ("*" delimited)						
Start Position	Length											
2-N	Variable - up to 200 characters ("*" delimited)											
R to 'N'	Variable – up to Y characters	<p>Equations define the starting position of two consecutive variable length parameters. The first parameter starts at byte 'R' and continues through some variable number of bytes. And the second parameter starts at the first byte last character of the first parameter and continues through some variable number of bytes.</p> <p>Example (PGN 64958, SPNs 3074 and 3075)</p> <table><tr><td>Start Position</td><td>Length</td></tr><tr><td>2</td><td>1 byte (Number of bytes in SPN 3074)</td></tr><tr><td>3</td><td>1 byte (Number of bytes in SPN 3075)</td></tr><tr><td>5 to A</td><td>Variable - up to 100 characters (SPN 3074)</td></tr><tr><td>A+1 to B</td><td>Variable - up to 100 characters (SPN 3075)</td></tr></table> <p><i>First variable length parameter starts at byte 5 and continues through the number of bytes specified in Byte 2. The second variable length parameter starts at first byte after SPN 3074 data and continues through the number of bytes specified in Byte 3.</i></p>	Start Position	Length	2	1 byte (Number of bytes in SPN 3074)	3	1 byte (Number of bytes in SPN 3075)	5 to A	Variable - up to 100 characters (SPN 3074)	A+1 to B	Variable - up to 100 characters (SPN 3075)
Start Position	Length											
2	1 byte (Number of bytes in SPN 3074)											
3	1 byte (Number of bytes in SPN 3075)											
5 to A	Variable - up to 100 characters (SPN 3074)											
A+1 to B	Variable - up to 100 characters (SPN 3075)											
'N'+1 to 'P'	Variable – up to Y characters											
'n'	Variable – up to Y characters ("*" delimited)	<p>Field position of a variable length data parameter. The parameter is the nth ordered field. The parameter occupies the first data byte following the previous parameter and continues some variable number of bytes where the end is denoted by an asterisk character in the data stream. The length of the parameter does not include the "*" delimiter.</p> <p>Example (PGN 64965, SPN 2903)</p> <table><tr><td>Start Position</td><td>Length</td></tr><tr><td>c</td><td>Variable - up to 200 characters ("*" delimited)</td></tr></table> <p><i>Parameter is the 3rd field and continues up to the asterisk delimiter character (201 bytes beyond start of 3rd field at the highest). The starting byte number depends upon the length of the data before this field.</i></p>	Start Position	Length	c	Variable - up to 200 characters ("*" delimited)						
Start Position	Length											
c	Variable - up to 200 characters ("*" delimited)											

5.4.9 Unspecified Bits in the PGN Data Field Definition

Unspecified bits are the bits within the PGN data field byte length that are not assigned to a parameter or are not used by the data for the collection of parameters (SPNs) in the PGN. In the J1939 PGN definitions, the unspecified bits are typically not shown or explicitly identified in the PGN definition.

The 'Data Length' property of the PGN definition specifies the minimum and maximum byte length of the data field for the PGN. The transmitted data field must be at least the minimum length specified by the 'Data Length' property for the PGN, and all unspecified bit within the transmitted data field must be filled with a value of one (1). This standard makes it possible to assign unspecified bits to parameters at some future time.

5.4.9.1 Unspecified Bits - Illustrated Example

An example of unspecified bits is provided in Figure 14 using an example PGN 12345. The top section of Figure 14 shows the PGN Data Length and PGN content definition for the PGN. There are 36 Unspecified Bits in the PGN definition in this example. The unspecified bits are bit 5 to bit 8 of byte 2 (4 bits total) and all bits in byte 4 through byte 8 (32 bits total).

The PGN definition indicates SPN_1 is a 1 byte parameter with a data start position at byte 1. Since SPN_1 occupies all the bits in byte 1, there are no unspecified bits in byte 1. Next, the PGN definition indicates SPN_2 is a 4 bit parameter with a starting position of '2.1' which means the data for SPN_2 occupies bit 1 to bit 4 of byte 2. The next parameter in the PGN definition has a starting position in byte 3, which means bit 5 through bit 8 of byte 2 are Unspecified Bits. The third parameter in the PGN definition indicates SPN_3 is a 2 byte parameter with a data start position of '3- 4'. Since SPN_3 occupies all the bits in bytes 3 and 4, there are no unspecified bits in byte 3 or byte 4. Finally, the PGN 'Data Length' property indicates the PGN has a message data field length of 8 bytes, but the PGN definition only lists parameter content through byte 4. All of the bits in byte 5 through byte 8 are Unspecified Bits. When transmitted, the message data field for this PGN must be 8 bytes in length, as specified by the PGN Data Length property. The 36 Unspecified Bits must be filled each with a one (1), and the other 28 bits for the data for SPNs SPN_1, SPN_2, and SPN_3 must be filled appropriately.

PGN 12345 Example J1939 PGN Message

Data Length: 8

Start Position	Length	Parameter Name	SPN
1	1 byte	Example Parameter 1	SPN_1
2.1	4 bits	Example Parameter 2	SPN_2
3-4	2 bytes	Example Parameter 3	SPN_3

MSbByte 1LSb								MSbByte 2LSb								MSbByte 3LSb								MSbByte 4LSb							
8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
b8	b7	b6	b5	b4	b3	b2	b1	1	1	1	1	b4	b3	b2	b1	b8	b7	b6	b5	b4	b3	b2	b1	b16	b15	b14	b13	b12	b11	b10	b9
SPN_1								Unspecified Bits				SPN_2				SPN_3															
MSbByte 5LSb								MSbByte 6LSb								MSbByte 7LSb								MSbByte 8LSb							
8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Unspecified Bits																															

FIGURE 14 - UNSPECIFIED BITS EXAMPLE

6. NOTES

6.1 Marginal Indicia

The (R) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. (R) is not used in original publications, nor in documents that contain editorial changes only.

APPENDIX A SLOTS

	SLOT Name	SLOT Type	Scaling	Range	Offset	Length	SLOT Identifier
	Diagnostic						202
	SAEac01	Acceleration	1/2048 m/s ² per bit	-15.687 to +15.687 m/s ²	-15.687 m/s ²	2 bytes	115
	SAEac02	Acceleration	0.1 m/s ² per bit	-12.5 to +12.5 m/s ²	-12.5 m/s ²	1 byte	140
	SAEac03	Acceleration	0.01 m/s ² per bit	-320 to +322.55 m/s ²	-320 m/s ²	2 bytes	303
	SAEad01	Angle/Direction	10 ⁻⁷ deg/bit	-210 to 211.1008122 deg	-210 deg	4 bytes	7
(R)	SAEad02	Angle/Direction	0.1 sec/bit	-3276.8 to 3148.7 sec	-3,276.8 sec	2 bytes	10
	SAEad03	Angle/Direction	1/1024 rad per bit	-31.374 to +31.374 rad	-31.374 rad	2 bytes	113
	SAEad04	Angle/Direction	1/128 deg/bit	-200 to 301.99 deg	-200 deg	2 bytes	8
	SAEad05	Angle/Direction	1/128 deg/bit	0 to 501.99 deg	0	2 bytes	9
	SAEad06	Angle/Direction	1 deg/bit	-125 to 125 deg	-125 deg	1 byte	11
	SAEad07	Angle/Direction	1/256 deg/bit	-125 to 125 deg	-125 deg	2 bytes	136
	SAEad08	Angle/Direction	0.002 deg/bit	-64 to 64.51 deg	-64	2 bytes	242
	SAEad09	Angle/Direction	0.1 deg/bit	-12.5 to 12.5 deg	-12.5 deg	1 byte	244
	SAEad10	Angle/Direction	0.5 deg/bit	-65 to 60 deg	-65 deg	1 byte	248
	SAEad11	Angle/Direction	1/32768 deg/bit	-250 to 250.9999 deg	-250 deg	3 bytes	294
	SAEatad0005	ASCII, text (variable, "" delimited)	ASCII	0 to 255 per byte	0	Variable - up to 5 bytes followed by an "" delimiter	109
	SAEatad0025	ASCII, text (variable, "" delimited)	ASCII	0 to 255 per byte	0	Variable - up to 25 bytes followed by an "" delimiter	271
	SAEatad0032	ASCII, text (variable, "" delimited)	ASCII	0 to 255 per byte	0	Variable - up to 32 bytes followed by an "" delimiter	291
	SAEatad0200	ASCII, text (variable, "" delimited)	ASCII	0 to 255 per byte	0	Variable - up to 200 bytes followed by an "" delimiter	108
	SAEatad1728	ASCII, text (variable, "" delimited)	ASCII	0 to 255 per byte	0	Variable - up to 1728 bytes followed by an "" delimiter	111
	SAEatf0001	ASCII, text (fixed length)	ASCII	0 to 255 per byte	0	1 byte	94
	SAEatf0002	ASCII, text (fixed length)	ASCII	0 to 255 per byte	0	2 bytes	131
	SAEatf0004	ASCII, text (fixed length)	ASCII	0 to 255 per byte	0	4 bytes	212
	SAEatf0005	ASCII, text (fixed length)	ASCII	0 to 255 per byte	0	5 bytes	273
	SAEatf0007	ASCII, text (fixed length)	ASCII	0 to 255 per byte	0	7 bytes	110
(R)	SAEatf0008	ASCII, text (fixed length)	ASCII	0 to 255 per byte	0	8 bytes	339
	SAEatf0016	ASCII, text (fixed length)	ASCII	0 to 255 per byte	0	16 bytes	282
	SAEatnd0200	ASCII, text (variable, NULL delimited)	ASCII	0 to 255 per byte	0	Variable - up to 200 bytes followed by an NULL delimiter	258
	SAEatvn0100	ASCII, text (variable, non-delimited)	ASCII	0 to 255 per byte	0	Variable - up to 100 bytes	228
	SAEba01	Brake Applications	1 brake appl/bit	0 to 4,227,858,431 appl	0	4 bytes	81

SLOT Name	SLOT Type	Scaling	Range	Offset	Length	SLOT Identifier
SAEbm05	Bit mapped	5 bit bit-mapped	bit-mapped	0	5 bits	292
SAEbm08	Bit mapped	8 bit bit-mapped	bit-mapped	0	8 bits	275
SAEbm16	Bit mapped	16 bit bit-mapped	bit-mapped	0	16 bits	276
SAEbm64	Bit mapped	64 bit bit-mapped	bit-mapped	0	64 bits	278
SAEbs01	Bit Field	2 states/1 bit	0 to 1	0	1 bit	86
SAEbs02	Bit Field	4 states/2 bit	0 to 3	0	2 bits	87
SAEbs03	Bit Field	8 states/3 bit	0 to 7	0	3 bits	88
SAEbs04	Bit Field	16 states/4 bit	0 to 15	0	4 bits	89
SAEbs05	Bit Field	32 states/5 bit	0 to 31	0	5 bits	90
SAEbs06	Bit Field	64 states/6 bit	0 to 63	0	6 bits	91
SAEbs07	Bit Field	128 states/7 bit	0 to 127	0	7 bits	92
SAEbs08	Bit Field	256 states/8 bit	0 to 255	0	8 bits	93
SAEbs11	Bit Field	2047 states/11bit	0 to 2047	0	11 bits	218
SAEbs12	Bit Field	4095 states/12bit	0 to 4095	0	12 bits	281
SAEbs21	Bit Field	2097151 states/21bit	0 to 2097151	0	21 bits	217
SAEbs24	Bit Field	16777215 states/24bit	0 to 16777215	0	24 bits	280
SAEbs32	Bit Field	4294967296 states/32bit	0 to 4294967296	0	32 bits	245
SAEby01	Number of bytes	1 byte/bit	0 to 250 bytes	0	1 byte	239
SAEca01	Capacity, Battery	1 mAh/bit	0 to 64255mAh (64.255Ahr)	0	2 bytes	211
SAEcb01	Control byte	1 count/bit	0 to 255	0	1 byte	120
SAEcd01	Calendar, days	0.25 days/bit	0 to 62.5 days	0	1 byte	60
SAEcm01	Calendar, months	1 month/bit	0 to 250 months	0	1 byte	62
SAEco01	Conductivity	5 microSiemens/mm	0 to 1250 microSiemens/mm	0	1 byte	255
SAEct01	Count	1 turn/bit	-32 to 29 turns	-32 turns	6 bits	141
SAEct02	Count	1 count/bit	0 to 250	0	1 byte	129
(R) SAEct03	Count (no error, N/A)	1 count/bit	0 to 255	0	1 byte	133
SAEct04	Count	1 count/bit	0 to 64,255	0	2 bytes	12
(R) SAEct05	Count (no error, N/A)	1 count/bit	0 to 65,535	0	2 bytes	208
SAEct06	Count	1 count/bit	0 to 16,777,216	0	3 bytes	207
(R) SAEct07	Count (no error, N/A)	1 count/bit	0 to 4,294,967,295	0	4 bytes	209
(R) SAEct08	Count (no error, N/A)	1 count/bit	0 to 15	0	4 bits	220
SAEct09	Count	1 count/bit	-125 to 125	-125	1 byte	230
(R) SAEct10	Count (no error, N/A)	1 count/bit	0 to 31	0	5 bits	232
(R) SAEct11	Count (no error, N/A)	1 count/bit	0 to 4095	0	12 bits	233
(R) SAEct12	Count (no error, N/A)	1 count/bit	0 to 127	0	7 bits	260
SAEct13	Count	1 count/bit	-32128 to 32127	-32128	2 bytes	306
(R) SAEct14	Count	1 count/bit	0 to 4,211,081,215	0	4 bytes	340
SAEew01	Calendar, weeks	1 week/bit	-125 to 125 weeks	-125 weeks	1 byte	65
SAEcy01	Calendar, years	1 year/bit	1985 to 2235 years	1985 years	1 byte	66
SAEcy02	Calendar, years	1 year/bit	2000 to 2061 years	2000 years	6 bits	284
SAEde01	Dielectricity	0.1/bit	0 to 25.0	0	1 byte	139
SAEde02	Dielectricity	1/8192 per bit	0 to 7.844	0	2 bytes	307
SAEdn01	Density	0.08 g/L per bit	0 to 20.0 g/L	0	1 byte	287
SAEdn02	Density	0.00003052 g/cc per bit	0 to 1.961 g/cc	0	2 bytes	302
SAEds02	Distance	100 mm/bit	-209.7152 to 211.3929215 m	-209.7152 m	4 bytes	142
SAEds03	Distance	0.1 mm/bit	-3,200 to 3,225.5 mm	-3,200 mm	2 bytes	13
SAEds04	Distance	0.1 mm/bit	0 to 6,425.5 mm (0 to 6.4255 m)	0	2 bytes	14
SAEds05	Distance	0.001 m/bit	0 to 4,211,081.215 m	0	4 bytes	126
SAEds06	Distance	0.125 m/bit	-2500 to 5531.875 m	-2500 m	2 bytes	39
SAEds07	Distance	1 m/bit	0 to 250 m	0	1 byte	95
SAEds08	Distance	1 m/bit	-125 to 125 m	-125 m	1 byte	15
SAEds09	Distance	5 m/bit	0 to 21,055,406 km	0	4 bytes	38
SAEds10	Distance	0.125 km/bit	0 to 526,385,151.9 km	0	4 bytes	36
SAEds11	Distance	5 km/bit	-160,635 to 160,640 km	-160,635 km	2 bytes	37
SAEds12	Distance	1 mm/bit	0 to 64,255 mm	0	2 bytes	231

	SLOT Name	SLOT Type	Scaling	Range	Offset	Length	SLOT Identifier
(R)	SAEds13	Distance	10 mm/bit	0 to 2500 mm (0 to 2.500 m)	0	1 byte	234
	SAEds14	Distance	1 mm/bit	-32000 to 32255 mm (-32.000 to 32.255 m)	-32000 mm	2 bytes	235
	SAEds15	Distance	1 km/bit	0 to 64,255 km	0	2 bytes	270
	SAEdv01	Dynamic viscosity	0.015625 Cp per bit	0 to 1003.984375 Cp	0	2 bytes	301
	SAEec01	Electrical Current	0.05 A/bit	-1600 to 1612.75 A	-1600 A	2 bytes	104
	SAEec02	Electrical Current	1 A/bit	-125 to 125 A	-125 A	1 byte	40
	SAEec03	Electrical Current	1 A/bit	0 to 250 A	0	1 byte	41
	SAEec04	Electrical Current	1 A/bit	0 to 64,255 Amps	0	2 bytes	146
	SAEec05	Electrical Current	0.05 A/bit	0 to 3212.75 A	0	2 bytes	250
	SAEec06	Electrical Current	0.001 A/bit	0 to 64,255 A	0	2 bytes	143
(R)	SAEef01	Energy, Fuel	1/256 MJ/Nm^3 per bit	0 to 250.996 MJ/Nm^3	0	2 bytes	323
(R)	SAEeg01	Economy, gaseous	1/512 km/kg per bit	0 to 125.498046875 km/kg	0	2 bytes	17
(R)	SAEel01	Economy, liquid	1/512 km/L per bit	0 to 125.498046875 km/L	0	2 bytes	16
	SAEen01	Energy	1 kWh/bit	0 to 4211081215 kWh	0	4 bytes	150
	SAEer01	Energy, reactive	1 kVArh/bit	0 to 4211081215 kVArh	0	4 bytes	257
	SAEev01	Electrical Voltage	0.05 V/bit	0 to 3212.75 V	0	2 bytes	80
	SAEev02	Electrical Voltage	1 V/bit	0 to 64,255 Volts	0	2 bytes	145
	SAEev03	Electrical Voltage	0.01 V/bit	0 to 642.55 Volts	0	2 bytes	221
	SAEev04	Electrical Voltage	0.05 V/bit	-1606.00 to 1606.75 V	-1606.00 V	2 bytes	249
	SAEev05	Electrical Voltage	1/128 V/bit	0 to 32,899,071 V	0	4 bytes	252
	SAEfg01	Flow rate, gaseous	0.05 kg/h per bit	0 to 3212.75 kg/h	0	2 bytes	18
	SAEfg02	Flow rate, gaseous	0.2 kg/h per bit	0 to 12851 kg/h per bit	0	2 bytes	262
	SAEfl01	Flow rate, liquid	0.05 L/h per bit	0 to 3,212.75 L/h	0	2 bytes	42
	SAEfl02	Flow rate, liquid	0.001 L/h per bit	0 to 4,211,081.215 L/h	0	4 bytes	321
	SAEfm00	FMI	Binary	0 to 31	0	5 bits	215
	SAEfm01	Flow rate, mass	0.3 g/h per bit	0 to 19276.5 g/h	0	2 bytes	272
	SAEfm02	Flow rate, mass	0.05 g/m per bit	0 to 3212.75 g/m	0	2 bytes	317
(R)	SAEfm03	Flow rate, mass	0.005 g/s per bit	0 to 321.275 g/s	0	2 bytes	336
	SAEfq01	Frequency	1/128 Hz/bit	0 to 501.9921875 Hz	0	2 bytes	144
	SAEfq02	Frequency	0.1 MHz/bit	0 to 6425.5 MHz	0	2 bytes	320
	SAEfr01	Force	5 N/bit	0 to 321,275 N	0	2 bytes	43
	SAEfr02	Force	10 N/bit	-320,000 to 322,550 N	-320,000 N	2 bytes	127
	SAEfr03	Force	1000 N/bit	-100 kN to 150 kN	-100 kN	1 byte	135
	SAEfug01	Fuel Used, gaseous	0.5 kg/bit	0 to 2,105,540,607.5 kg	0	4 bytes	21
	SAEful01	Fuel Used, liquid	0.5 L/bit	0 to 2,105,540,607.5 L	0	4 bytes	20
	SAEful02	Fuel Used, liquid	0.001 L/bit	0 to 4,211,081.215 L	0	4 bytes	300
	SAEfv01	Flow rate, volumetric	0.1 m^3/h per bit	0 to 6425.5 m^3/h	0	2 bytes	19
	SAEgf01	Group Function	1 count/bit	0 to 255	0	1 byte	121
	SAEgg01	Governor gain	1/1280 %/rpm per bit	0 to 50.2 %/rpm	0	2 bytes	22
	SAEgr01	Gear Ratio	0.01/bit	0 to 642.55	0	2 bytes	23
	SAEgv01	Gear Value	1 gear value/bit	-125 to 125	-125	1 byte	24
	SAEgv02	Gear Value	1 gear value/bit	0 to 250	0	1 byte	101
(R)	SAEid01	Identifier, component/software	1 ID/bit	0 to 250 ID	0	1 byte	25
	SAEid02	Identifier, component/software	1 ID/bit	0 to 16449635	0	3 bytes	325
	SAEie01	Inertia	0.004 kg-m^2/bit	0 to 257.02 kg-m^2	0	2 bytes	112
(R)	SAEio01	Intensity, optical	0.4 mW/cm^2 per bit	0 to 100 mW/cm^2	0	1 byte	204
	SAEkv01	Kinematic viscosity	1 mm^2/s per bit	0 to 250 mm^2/s	0	1 byte	26
	SAElg01	Lambda signal gain	0.5%/bar per bit	0 to 125%/bar	0	1 byte	297
	SAEma01	Mass	4 g/bit	0 to 1000 g	0	1 byte	286
	SAEmc01	Mass	0.5 kg/bit	0 to 32,127.5 kg	0	2 bytes	27
	SAEmc02	Mass	2 kg/bit	0 to 128,510 kg	0	2 bytes	28
	SAEmc03	Mass	10 kg/bit	0 to 642,550 kg	0	2 bytes	29
	SAEmc04	Mass	0.10 kg/bit	0 to 6425.5 kg	0	2 bytes	226
	SAEmc05	Mass	0.10 g/bit	0 to 6425.5 g	0	2 bytes	227
	SAEmc06	Mass	2 kg/bit	0 to 32,899,070 kg	0	3 bytes	122

	SLOT Name	SLOT Type	Scaling	Range	Offset	Length	SLOT Identifier
	SAEmc07	Mass	2 kg/bit	-16,449,535 to 16,449,535 kg	-16,449,535	3 bytes	267
	SAEmd01	Manufacturer defined	0 to 255 per byte	manufacturer defined	manufacturer defined	Variable	283
(R)	SAEms01	Mass Concentration	0.0125 mg/m ³ per bit	0 to 803.1875 mg/m ³	0	2 bytes	337
	SAEnm01	Name (long)	1 count/bit	0 to (2 ⁶⁴ - 1)	0	8 bytes	159
	SAEOC00	OC	Binary	0 to 127	0	7 bits	216
	SAEpa01	Power, Apparent	1 VA/bit	-2,000,000,000 to +2,211,081,215 VA	-2,000,000,000 VA	4 bytes	148
	SAEpc01	Percent, position/level	0.0025 %/bit	0 to 160.6375 %	0	2 bytes	30
	SAEpc02	Percent, position/level	0.1 %/bit	0 to 102 %	0	10 bits	205
	SAEpc03	Percent, position/level	0.4 %/bit	0 to 100 %	0	1 byte	44
	SAEpc04	Percent, position/level	0.8 %/bit	-100 to 100 %	-100 %	1 byte	128
	SAEpc05	Percent, position/level	1 %/bit	-125 to 125 %	-125 %	1 byte	45
	SAEpc06	Percent, position/level	1 %/bit	0 to 250 %	0	1 byte	46
	SAEpc07	Percent, position/level	0.1 %/bit	-100 to 100 %	-100	2 bytes	251
	SAEpc08	Percent, position/level	0.0078125 %/bit	-251 to 250.99 %	-251	2 bytes	256
	SAEpc09	Percent, position/level	0.004%/bit	-125 to 132.02%	-125	2 bytes	264
	SAEpc10	Percent, position/level	0.125%/bit	0 to 0.875%	0	4 bits	268
	SAEpc15	Percent, concentration	0.25 %/bit	0 to 62.5 %	0	1 byte	254
(R)	SAEpc16	Percent	0.000514 %/bit	-12% to 21%	-12 %	2 bytes	237
	SAEpc17	Percent, gain	0.1 %/bit	-100 to 100 %	-100	2 bytes	295
	SAEpc18	Percent	0.5%/bit	0 to 125%	0	1 byte	299
	SAEpc19	Percent, droop	0.04%/bit	0 to 10%	0	1 byte	308
(R)	SAEpc20	Percent	0.001 %/bit	-32% to 32.255%	-32	2 bytes	334
	SAEpd01	Proprietary Data	Manufacturer Determined	Manufacturer Determined	Manufacturer Determined	64 to 14,280 bits	154
	SAEpf01	Power Factor	1/16384 per bit	-1.00000 to +2.921814	-1	2 bytes	151
(R)	SAEpg00	PGN	Binary	0 to 16,777,215	0	3 bytes	116
	SAEpp01	Parts Per Million	0.05 ppm/bit	-200 to 3012.75 ppm	-200 ppm	2 bytes	236
(R)	SAEpp02	Parts Per Million	1 ppm/bit	-125 to 125 ppm	-125 ppm	1 byte	296
(R)	SAEpp03	Parts Per Million	0.1 ppm/bit	-200 to 6225.5 ppm	-200 ppm	2 bytes	348
	SAEpr01	Pressure	1/128 kPa/bit	-250 kPa TO 251.99 kPa	-250 kPa	2 bytes	52
	SAEpr02	Pressure	0.05 kPa/bit	0 to 12.5 kPa	0	1 byte	48
	SAEpr03	Pressure	0.1 kPa/bit	0 to 6,425.5 kPa	0	2 bytes	85
	SAEpr04	Pressure	0.125 kPa/bit	0 to +8031.875 kPa (0 to 1164.62 psi)	0	2 bytes	138
	SAEpr05	Pressure	0.5 kPa/bit	0 to 125 kPa	0	1 byte	54
	SAEpr06	Pressure	0.5 kPa/bit	0 to 32,127.5 kPa	0	2 bytes	50
	SAEpr07	Pressure	2 kPa/bit	0 to 500 kPa	0	1 byte	53
	SAEpr08	Pressure	2 kPa/bit	0 to 128,510 kPa	0	2 bytes	106
(R)	SAEpr09	Pressure	1/256 MPa/bit	0 to 250.996 Mpa	0	2 bytes	51
	SAEpr10	Pressure	4 kPa/bit	0 to 1000 kPa	0	1 byte	47
	SAEpr11	Pressure	5 kPa/bit	0 to 1,250 kPa	0	1 byte	1
	SAEpr12	Pressure	5 kPa/bit	0 to 321,275 kPa	0	2 bytes	130
	SAEpr13	Pressure	8 kPa/bit	0 to 2,000 kPa	0	1 byte	2
	SAEpr14	Pressure	16 kPa/bit	0 to 4000 kPa	0	1 byte	49
	SAEpr15	Pressure	100 kPa/bit	0 to 25 MPa	0	1 byte	161
	SAEpr16	Pressure	50 kPa/bit	0 to 12,500 kPa	0	1 byte	229
	SAEpr17	Pressure	1.64 kPa/bit	-7 to 403 kPa	-7 kPa	1 byte	246
(R)	SAEprc01	Pressure Rate Change	0.1 Pa/s per bit	0 Pa/s to 6425.5 Pa/s	0	2 bytes	162
	SAEpt01	Power, Reactive	1 VAr/bit	-2,000,000,000 to +2,211,081,215 VAr	-2,000,000,000 Var	4 bytes	149
(R)	SAEpw01	Power, Real	1 W/bit	-2,000,000,000 to +2,211,081,215 Watts	-2,000,000,000 Watts	4 bytes	147
	SAEpw02	Power, Real	2 W/bit	0 to 128,510 W	0	2 bytes	107
	SAEpw03	Power, Real	0.5 kW/bit	0 to 32,127.5 kW	0	2 bytes	55
(R)	SAEpw04	Power, Real	0.5 W/bit	0 to 32127.5 W	0 W	2 bytes	305
	SAEr01	Ratio	0.001/bit	0 to 64.255	0	2 bytes	32
	SAEr02	Ratio	0.1/bit	0 to 25.0	0	1 byte	31
	SAEr03	Ratio	1/bit	0 to 250	0	1 byte	56
	SAEr04	Ratio	1/8192 per bit	-3.92 to +3.92	-3.92	2 bytes	318
	SAEra01	Range	1 range/bit	-32 to 29 ranges	-32 ranges	6 bits	263
	SAErc01	Road Curvature	1/128 1/km per bit	-250 to 251.992 1/km	-250 1/km	2 bytes	96
	SAErc02	Road Curvature	1/128 deg per bit	-90 to 90 deg	-90 deg	2 bytes	261

	SLOT Name	SLOT Type	Scaling	Range	Offset	Length	SLOT Identifier
	SAEre01	Record	1 record/bit	0 to 250 records	0	1 byte	33
	SAErs01	Resistance	0.1 ohm/bit	0 to 6425.5 ohm	0	2 bytes	290
	SAErv01	Revolutions	1000 r/bit	0 to 4,211,081,215,000 r	0	4 bytes	34
	SAEsa01	Source Address	1 source address/bit	0 to 255	0	1 byte	35
	SAEse01	Selection	1 selection/bit	0 to 255	0	1 byte	259
	SAEsg01	Specific Gravity	0.0001/bit	0 to 6.4255	0	2 bytes	82
	SAEsg02	Signal gain	0.5%/bar per bit	0 to 125%/bar	0	1 byte	298
(R)	SAEsg03	Signal gain	0.5 dBm per bit	-125 to 0 dBm	0	1 byte	326
	SAEsh01	Specific Humidity	0.01 g/kg per bit	0 to 642.55 g/kg	0	2 bytes	285
	SAESP00	SPN	Binary	0 to 524,287	0	19 bits	214
	SAEsr01	Specific Resistance	0.1 Mohm*m/bit	0 to 25 Mohm*m	0	1 byte	83
	SAEst01	Step	1 step/bit	0 to 250 steps	0	1 byte	84
	SAEtc01	Trouble code	1 trouble code/bit	0 to 250	0	1 byte	274
	SAEtd01	Transfer Data	Request Dependent	9 to 1777 bytes of data	Request Dependent	72 to 14,216 bits	155
	SAEtd02	Transport Data	Request Dependent	9 to 1784 bytes of data	Request Dependent	72 to 14,272 bits	158
	SAEtd03	Test data	Not defined	Not defined	Not defined	2 bytes	277
(R)	SAEtm01	Time	0.01 ms/bit	0 to 642.55 ms	0	2 bytes	57
	SAEtm02	Time	1 ms/bit	0 to 64.255 s	0	2 bytes	132
	SAEtm03	Time	0.1 s/bit	0 to 25 s	0	1 byte	59
	SAEtm04	Time	0.25 s/bit	0 to 62.5 s	0	1 byte	63
	SAEtm05	Time	1 s/bit	0 to 64.255 s	0	2 bytes	64
	SAEtm06	Time	1 s/bit	0 to 4,211,081,215 s	0	4 bytes	6
	SAEtm07	Time	1 min/bit	-125 to 125 mins	-125 min	1 byte	99
	SAEtm08	Time	1 min/bit	0 to 250 mins	0	1 byte	61
	SAEtm09	Time	0.05 hr/bit	0 to 210,554,060.75 hr	0	4 bytes	58
	SAEtm10	Time	1 hr/bit	-125 to 125 hr	-125 hr	1 byte	4
	SAEtm11	Time	1 hr/bit	0 to 250 hr	0	1 byte	3
	SAEtm12	Time	1 hr/bit	-32,127 to 32,128 hr	-32,127 hr	2 bytes	5
(R)	SAEtm13	Time	51.2 us/bit	0 to 3.289856 s	0	2 bytes	206
(R)	SAEtm14	Time	0.1 hr/bit	0 to 6,425.5 hours	0	2 bytes	224
(R)	SAEtm15	Time	1 min/bit	0 to 64,255 mins	0	2 bytes	238
	SAEtm16	Time	0.5 ms/bit	0 to 125 ms	0	1 byte	241
	SAEtm17	Time	1 ms/bit	0 to 250 ms	0	1 byte	247
	SAEtm18	Time	0.1 us/bit	0 to 6425.5 us	0	2 bytes	319
(R)	SAEtm19	Time	0.05 s/bit	0 to 12.5 s	0	1 byte	322
(R)	SAEtm20	Time	0.01 s/bit	0 to 642.55 s	0	2 bytes	333
	SAEtp01	Temperature	1 deg C/bit	-40 to 210 deg C	-40 deg C	1 byte	67
	SAEtp02	Temperature	0.03125 deg C/bit	-273 to 1734.96875 deg C	-273 deg C	2 bytes	68
	SAEtq01	Torque	1 Nm/bit	-32,000 to 32,255 Nm	-32,000 Nm	2 bytes	69
	SAEtq02	Torque	1 Nm/bit	0 to 64,255 Nm	0	2 bytes	70
	SAEtq03	Torque	2 Nm/bit	0 to 128,510 Nm	0	2 bytes	98
	SAEtq04	Torque	30 Nm/bit	0 to 7500 Nm	0	1 byte	137
	SAEva01	Velocity, angular	1/8192 rad/s per bit	-3.92 to +3.92 rad/s	-3.92 rad/s	2 bytes	114
	SAEva02	Velocity, angular	0.002 deg/sec per bit	-64 to 64.51 deg/sec	-64 deg/sec	2 bytes	243
	SAEva03	Velocity, angular	1/128 deg/sec per bit	-250 to 250.992 deg/sec	-250 deg/sec	2 bytes	288
	SAEvd01	VariantData	Variant Determined	Variant Determined	Variant Determined	4 bytes	134
	SAEvl01	Velocity, linear	0.001 m/s per bit	0 to 64.255 m/s	0	2 bytes	125
	SAEvl02	Velocity, linear	1/256 km/h per bit	0 to 250.996 km/h	0	2 bytes	71
	SAEvl03	Velocity, linear	1/128 km/h per bit	-250 to 251.992 km/h	-250 km/h	2 bytes	72
	SAEvl04	Velocity, linear	1/16 km/h per bit	-7.8125 to 7.8125 km/h	-7.8125 km/h	1 byte	74
	SAEvl05	Velocity, linear	1 km/h per bit	0 to 250 km/h	0	1 byte	73
	SAEvm01	Velocity, magnitude	2 m/h per bit	0 to 128510 m/h	0	2 bytes	219
	SAEvm1	Volume	0.5 L/bit	0 to 2,105,540,607.5 L	0	4 bytes	75
	SAEvm2	Volume	0.5 L/bit	0 to 32127.5 liters	0	2 bytes	222
	SAEvm3	Volume	0.5 L/bit	-62.5 to 62.5 L	-62.5 L	1 bytes	225

SLOT Name	SLOT Type	Scaling	Range	Offset	Length	SLOT Identifier
SAEvr01	Velocity, rotational	0.125 rpm/bit	0 to 8,031.875 rpm	0	2 bytes	76
SAEvr02	Velocity, rotational	0.5 rpm/bit	0 to 32,127.5 rpm	0	2 bytes	78
SAEvr03	Velocity, rotational	4 rpm/bit	0 to 257,020 rpm	0	2 bytes	77
SAEvr04	Velocity, rotational	10 rpm/bit	0 to 2,500 rpm	0	1 byte	79
SAEvr05	Velocity, rotational	32 rpm/bit	0 to 8,000 rpm	0	1 byte	97
SAEvr06	Velocity, rotational	1 rpm/bit	0 to 64255 rpm	0	2 bytes	223

APPENDIX B SPNs

SPN 16 *Engine Fuel Filter (Suction Side) Differential Pressure (see also SPN 1382)*

Differential pressure measured across the fuel filter located between the fuel tank and the supply pump. See Figures SPN16_A & SPN16_B.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 16	
PGN reference:		

(R) SPN 20 *Engine Extended Range Coolant Pressure*

Gage pressure of liquid found in engine cooling system.

See also SPN 109 for alternate SLOT.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65172	

SPN 21 *Engine ECU Temperature (use SPN 1136)*

Temperature of the engine electronic control unit.

(21, 1207 are not to be used - obsolete)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 22 *Engine Extended Crankcase Blow-by Pressure*

Differential crankcase blow-by pressure as measured through a tube with a venturi.

(1264 not to be used – obsolete)

Data Length:	1 byte	
Resolution:	0.05 kPa/bit, 0 offset	
Data Range:	0 to 12.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65263	

SPN 27 Engine Exhaust Gas Recirculation 1 Valve Position

The position of the exhaust gas recirculation valve expressed as a percentage of full travel. Zero percent means the valve is closed and no exhaust gas is flowing into the intake air stream. One hundred percent means the valve is fully opened.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 27	
PGN reference:	64916	

SPN 29 Accelerator Pedal Position 2

The ratio of actual position of the second analog engine speed/torque request input device (such as an accelerator pedal or throttle lever) to the maximum position of the input device. This parameter is intended for secondary accelerator control in an application. If an application has only one accelerator control, use SPN 91.

In marine applications, this will typically be the operator's second throttle lever.

If a low idle validation switch is used in conjunction with accelerator pedal position 2, use Accelerator Pedal Low Idle Switch 2, SPN 2970.

NOTE—See SPNs 91 and 974 for additional accelerator position parameters.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61443	

SPN 38 Fuel Level 2

Ratio of volume of fuel to the total volume of fuel in the second or right-side storage container. When Fuel Level 2 is not used, Fuel Level 1 (SPN 96) represents the total fuel in all fuel storage containers.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65276	

SPN 39 Tire Pressure Check Interval

The interval at which the system will check the tire pressures (e.g., 5, 10, 15 min.).

NOTE - A value of 0 indicates continuous (real time) pressure readings.

Data Length:	1 byte	
Resolution:	1 min/bit, 0 offset	
Data Range:	0 to 250 mins	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65144	

SPN 46 *Pneumatic Supply Pressure*

The pneumatic pressure in the main reservoir, sometimes referred to as the wet tank.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65198	

SPN 51 *Engine Throttle Valve 1 Position*

The position of the valve used to regulate the supply of a fluid, usually air or fuel/air mixture, to an engine. 0% represents no supply and 100% is full supply.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65266	

SPN 52 *Engine Intercooler Temperature*

Temperature of liquid found in the intercooler located after the turbocharger.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65262	

SPN 53 *Transmission Synchronizer Clutch Value*

The current modulated value for the air supply to the synchronizer clutch.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65221	

SPN 54 *Transmission Synchronizer Brake Value*

The current modulated value for the air supply to the synchronizer brake.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65221	

SPN 59 Transmission Shift Finger Gear Position

The current position of the shift finger in the gear direction.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65223	

SPN 60 Transmission Shift Finger Rail Position

The current position of the shift finger in the rail direction.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65223	

SPN 69 Two Speed Axle Switch

Switch signal which indicates the current axle range.

00 - Low speed range
 01 - High speed range
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 70 Parking Brake Switch

Switch signal which indicates when the parking brake is set. In general the switch actuated by the operator's park brake control, whether a pedal, lever or other control mechanism (see also SPN 619 and 5275).

00 - Parking brake not set
 01 - Parking brake set
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 5275	
PGN reference:	65265	

SPN 72 Engine Blower Bypass Valve Position

Relative position of the blower bypass valve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65277	

SPN 73 Auxiliary Pump Pressure

Gage pressure of auxiliary water pump driven as a PTO device.

Data Length:	1 byte	
Resolution:	16 kPa/bit, 0 offset	
Data Range:	0 to 4000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65278	

SPN 74 Maximum Vehicle Speed Limit

Maximum vehicle velocity allowed.

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65261	

SPN 75 Steering Axle Temperature

Temperature of lubricant in steering axle.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65273	

SPN 79 Road Surface Temperature

Indicated temperature of road surface over which vehicle is operating.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65269	

SPN 80 Washer Fluid Level

Ratio of volume of liquid to total container volume of fluid reservoir in windshield wash system.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65276	

SPN 81 Engine Diesel Particulate Filter Intake Pressure

Exhaust back pressure as a result of particle accumulation on filter media placed in the exhaust stream. See SPN 3609 for better resolution.

Data Length:	1 byte	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 125 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65270	

SPN 82 Engine Air Start Pressure

Gage pressure of air in an engine starting system that utilizes compressed air to provide the force required to rotate the crankshaft.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65246	

SPN 84 Wheel-Based Vehicle Speed

Speed of the vehicle as calculated from wheel or tailshaft speed.

Data Length:	2 bytes	
Resolution:	1/256 km/h per bit, 0 offset	
Data Range:	0 to 250.996 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 86 Cruise Control Set Speed

Value of set (chosen) velocity of velocity control system.

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 87 Cruise Control High Set Limit Speed

Maximum vehicle velocity at which cruise can be set.

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65261	

SPN 88 Cruise Control Low Set Limit Speed

Minimum vehicle velocity at which cruise can be set or minimum vehicle velocity for cruise operation before it will exit cruise control operation.

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65261	

SPN 90 Power Takeoff Oil Temperature

Temperature of lubricant in device used to transmit engine power to auxiliary equipment.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65264	

SPN 91 Accelerator Pedal Position 1

The ratio of actual position of the analog engine speed/torque request input device (such as an accelerator pedal or throttle lever) to the maximum position of the input device. This parameter is intended for the primary accelerator control in an application. If an application has only one accelerator control, use SPN 91.

For on-highway vehicles, this will typically be the operator's accelerator pedal. Although it is used as an input to determine powertrain demand, it also provides anticipatory information to transmission and ASR algorithms about driver actions.

In marine applications, this will typically be the operator's throttle lever.

If a low idle validation switch is used in conjunction with accelerator pedal position 1, use Accelerator Pedal Low Idle Switch 1, SPN 558.

NOTE—See SPNs 29 and 974 for additional accelerator position parameters. SPN 28 is an additional diagnostic SPN for accelerator position.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61443	

SPN 92 Engine Percent Load At Current Speed

The ratio of actual engine percent torque (indicated) to maximum indicated torque available at the current engine speed, clipped to zero torque during engine braking.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: 0 to 125%
Type:	Status	
Supporting Information:		
PGN reference:	61443	

SPN 94 Engine Fuel Delivery Pressure

Gage pressure of fuel in system as delivered from supply pump to the injection pump. See also SPN 5578 for Fuel Delivery Absolute Pressure.

See Figures SPN16_A & SPN16_B.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65263	

SPN 95 Engine Fuel Filter Differential Pressure

Change in fuel delivery pressure, measured across the filter, due to accumulation of solid or semisolid matter on the filter element. See Figures SPN16_A & SPN16_B.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65276	

SPN 96 Fuel Level 1

Ratio of volume of fuel to the total volume of fuel storage container.

When Fuel Level 2 (SPN 38) is not used, Fuel Level 1 represents the total fuel in all fuel storage containers. When Fuel Level 2 is used, Fuel Level 1 represents the fuel level in the primary or left-side fuel storage container.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65276	

SPN 97 Water In Fuel Indicator

Signal which indicates the presence of water in the fuel.

00 - No
 01 - Yes
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65279	

SPN 98 Engine Oil Level

Ratio of current volume of engine sump oil to maximum required volume.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65263	

SPN 99 Engine Oil Filter Differential Pressure

Change in engine oil pressure, measured across the filter, due to the filter and any accumulation of solid or semisolid material on or in the filter.

Data Length:	1 byte	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 125 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65276	

SPN 100 Engine Oil Pressure

Gage pressure of oil in engine lubrication system as provided by oil pump.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65263	

SPN 101 Engine Crankcase Pressure

Gage pressure inside engine crankcase.

Data Length:	2 bytes	
Resolution:	1/128 kPa/bit, -250 kPa offset	
Data Range:	-250 kPa TO 251.99 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65263	

SPN 102 Engine Intake Manifold #1 Pressure

The gage pressure measurement of the air intake manifold. If there are multiple air pressure sensors in the intake stream, this is the last one in flow direction before entering the combustion chamber. This should be the pressure used to drive gauges and displays. See also SPNs 1127-1130 and SPN 3562 for alternate range and resolution. If there is only one pressure measurement of the air intake manifold to report and this range and resolution is adequate, this parameter should be used.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65270	

SPN 103 Engine Turbocharger 1 Speed

Rotational velocity of rotor in the turbocharger.

Data Length:	2 bytes	
Resolution:	4 rpm/bit, 0 offset	
Data Range:	0 to 257,020 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65245	

SPN 104 Engine Turbocharger Lube Oil Pressure 1

Gage pressure of oil in turbocharger lubrication system.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65245	

SPN 105 Engine Intake Manifold 1 Temperature

Temperature of pre-combustion air found in intake manifold of engine air supply system.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65270	

SPN 106 Engine Air Intake Pressure

Absolute air pressure at input port to intake manifold or air box.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65270	

SPN 107 Engine Air Filter 1 Differential Pressure

Change in engine air system pressure, measured across the filter, due to the filter and any accumulation of solid foreign matter on or in the filter.

This is the measurement of the first filter in a multiple air filter system. In a single air filter application, this is the only SPN used. Filter numbering follows the guidelines noted in section, Naming Convention For Engine Parameters.

Data Length:	1 byte	
Resolution:	0.05 kPa/bit, 0 offset	
Data Range:	0 to 12.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65270	

SPN 108 Barometric Pressure

Absolute air pressure of the atmosphere. See Figures SPN16_A & SPN16_B.

Data Length:	1 byte	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 125 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65269	

(R) SPN 109 Engine Coolant Pressure

Gage pressure of liquid found in engine cooling system.

See SPN 20 for alternate SLOT.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65263	

SPN 110 Engine Coolant Temperature

Temperature of liquid found in engine cooling system.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65262	

SPN 111 Engine Coolant Level

Ratio of volume of liquid found in engine cooling system to total cooling system volume. Typical monitoring location is in the coolant expansion tank.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65263	

SPN 112 Engine Coolant Filter Differential Pressure

Change in coolant pressure, measured across the filter, due to the filter and any accumulation of solid or semisolid matter on or in the filter.

Data Length:	1 byte	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 125 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65270	

SPN 114 Net Battery Current

Net flow of electrical current into/out of the battery or batteries.

Data Length:	1 byte	
Resolution:	1 A/bit, -125 A offset	
Data Range:	-125 to 125 A	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65271	

SPN 115 Alternator Current

Measure of electrical current flow from the alternator. Alternator Current (High Range/Resolution) parameter SPN 1795 has a higher range and resolution of the same parameter.

Data Length:	1 byte	
Resolution:	1 A/bit, 0 offset	
Data Range:	0 to 250 A	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65271	

SPN 116 Brake Application Pressure

Gage pressure of compressed air or fluid in vehicle braking system measured at the brake chamber when brake shoe (or pad) is placed against brake drum (or disc).

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65274	

SPN 117 Brake Primary Pressure

Gage pressure of air in the primary, or supply side, of the air brake system.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65274	

SPN 118 Brake Secondary Pressure

Gage pressure of air in the secondary, or service side, of the air brake system.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65274	

SPN 119 Hydraulic Retarder Pressure

Gage pressure of oil in hydraulic retarder system.

Data Length:	1 byte	
Resolution:	16 kPa/bit, 0 offset	
Data Range:	0 to 4000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65275	

SPN 120 Hydraulic Retarder Oil Temperature

Temperature of oil found in a hydraulic retarder.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65275	

SPN 123 Clutch Pressure

Gage pressure of oil within a wet clutch.

Data Length:	1 byte	
Resolution:	16 kPa/bit, 0 offset	
Data Range:	0 to 4000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65272	

(R) SPN 124 Transmission Oil Level 1

First instance of a transmission oil level indicator. Conveys the ratio of volume of transmission sump oil to recommended volume.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65272	

SPN 126 Transmission Filter Differential Pressure

Change in transmission fluid pressure, measured after the filter, due to accumulation of solid or semisolid material on or in the filter.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65272	

SPN 127 Transmission Oil Pressure

Gage pressure of lubrication fluid in transmission, measured after pump.

Data Length:	1 byte	
Resolution:	16 kPa/bit, 0 offset	
Data Range:	0 to 4000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65272	

SPN 129 Engine Injector Metering Rail 2 Pressure (duplicate, use SPN 1349)

The gage pressure of fuel in the metering rail #2 as delivered from the supply pump to the injector metering intake. See Figure SPN16_A for fuel system related parameters. Although the figure does not show rail #2 it does show the relationship of rail pressure to other signals.

(Obsolete - use SPN 1349)

Data Length:	2 bytes	
Resolution:	1/256 MPa/bit, 0 offset	
Data Range:	0 to 250.996 Mpa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 132 Engine Intake Air Mass Flow Rate

Mass flow rate of fresh air entering the engine air intake, before any EGR mixer, if used. Flow rate of fresh air conducted to the engine cylinders to support combustion.

Data Length:	2 bytes	
Resolution:	0.05 kg/h per bit, 0 offset	
Data Range:	0 to 3212.75 kg/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61450	

SPN 136 Auxiliary Vacuum Pressure Reading

Identifies the current vacuum pressure (relative to atmosphere) that is configured uniquely per application. Not to be used in place of defined parameters.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65143	

SPN 137 Auxiliary Gage Pressure Reading 1

Identifies the current gage pressure (relative to atmosphere) that is configured uniquely per application. Not to be used in place of defined parameters.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65143	

SPN 138 Auxiliary Absolute Pressure Reading

Identifies the current absolute pressure (relative to 0 pressure) that is configured uniquely per application. Not to be used in place of defined parameters.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65143	

SPN 141 Trailer, Tag Or Push Channel Tire Pressure Target

The tire pressure control system's target gage pressure for the trailer, tag, or push group of tires.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65145	

SPN 142 Drive Channel Tire Pressure Target

The tire pressure control system's target gage pressure for the drive group of tires.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65145	

SPN 143 Steer Channel Tire Pressure Target

The tire pressure control system's target gage pressure for the steer group of tires.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65145	

SPN 144 Trailer, Tag Or Push Channel Tire Pressure

The latest gage pressure reading of the trailer, tag, or push group of tires, as opposed to the pressure in each tire.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65146	

SPN 145 Drive Channel Tire Pressure

The latest gage pressure reading of the drive group of tires, as opposed to the pressure in each tire.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65146	

SPN 146 Steer Channel Tire Pressure

The latest gage pressure reading of the steer group of tires, as opposed to the pressure in each tire.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65146	

SPN 156 Engine Injector Timing Rail 1 Pressure

The gage pressure of fuel in the timing rail delivered from the supply pump to the injector timing intake.

Data Length:	2 bytes	
Resolution:	1/256 MPa/bit, 0 offset	
Data Range:	0 to 250.996 Mpa	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 16	
PGN reference:	65243	

SPN 157 Engine Injector Metering Rail 1 Pressure

The gage pressure of fuel in the primary, or first, metering rail as delivered from the supply pump to the injector metering intake. See Figure SPN16_A.

Data Length:	2 bytes	
Resolution:	1/256 MPa/bit, 0 offset	
Data Range:	0 to 250.996 Mpa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65243	

SPN 158 Keyswitch Battery Potential

Battery potential measured at the input of the electronic control unit supplied through a keyswitch or similar switching device.

Data Length:	2 bytes	
Resolution:	0.05 V/bit, 0 offset	
Data Range:	0 to 3212.75 V	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65271	

SPN 159 Engine Gas Supply Pressure

Gage pressure of gas supply to fuel metering device.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65277	

SPN 160 Main Shaft Speed

Rotational velocity of the first intermediate shaft of the transmission.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 161 Transmission Input Shaft Speed

Rotational velocity of the primary shaft transferring power into the transmission. When a torque converter is present, it is the output of the torque converter.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 5052	
PGN reference:	61442	

SPN 162 Transmission Requested Range

Range selected by the operator. Characters may include P, Rx, Rx-1...R2, R1, R, Nx, Nx-1...N2, N1, N, D, D1, D2..., Dx, L, L1, L2..., Lx-1, 1, 2, 3,... If only one displayed character is required, the second character shall be used and the first character shall be a space (ASCII 32) or a control character (ASCII 0 to 31). If the first character is a control character, refer to the manufacturer's application document for definition.

Data Length:	2 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61445	

SPN 163 *Transmission Current Range*

Range currently being commanded by the transmission control system. Characters may include P, Rx, Rx-1...R2, R1, R, Nx, Nx-1...N2, N1, N, D, D1, D2..., Dx, L, L1, L2..., Lx-1, 1, 2, 3,... If only one displayed character is required, the second character shall be used and the first character shall be a space (ASCII 32) or a control character (ASCII 0 to 31). If the first character is a control character, refer to the manufacturer's application document for definition.

Data Length:	2 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61445	

SPN 164 *Engine Injection Control Pressure*

The gage pressure of the engine oil in the hydraulic accumulator that powers an intensifier used for fuel injection.

Data Length:	2 bytes	
Resolution:	1/256 MPa/bit, 0 offset	
Data Range:	0 to 250.996 Mpa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65243	

SPN 165 *Compass Bearing*

Present compass bearing of vehicle.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, 0 offset	
Data Range:	0 to 501.99 deg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65256	

SPN 166 *Engine Rated Power*

Net brake power that the engine will deliver continuously, specified for a given application at a rated speed.

Data Length:	2 bytes	
Resolution:	0.5 kW/bit, 0 offset	
Data Range:	0 to 32,127.5 kW	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65214	

SPN 167 *Charging System Potential (Voltage)*

Electrical potential measured at the charging system output. The charging system may be any device charging the batteries. This includes alternators, generators, solid state charger and other charging devices.

Data Length:	2 bytes	
Resolution:	0.05 V/bit, 0 offset	
Data Range:	0 to 3212.75 V	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65271	

SPN 168 *Battery Potential / Power Input 1*

This parameter measures the first source of battery potential as measured at the input of the ECM/actuator etc. coming from one or more batteries, irrespective of the distance between the component and the battery. This SPN is also used when ECM's are interconnected in a series configuration, where the source of power is coming directly or indirectly from the same battery/batteries.

Data Length:	2 bytes	
Resolution:	0.05 V/bit, 0 offset	
Data Range:	0 to 3212.75 V	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65104	
PGN reference:	65271	

SPN 169 *Cargo Ambient Temperature*

Temperature of air inside vehicle container used to accommodate cargo.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65276	

SPN 170 *Cab Interior Temperature*

Temperature of air inside the part of the vehicle that encloses the driver and vehicle operating controls.

Note: See also SPN 1691. SPN 1662 is an additional diagnostic SPN associated with cab temperature.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65269	

SPN 171 *Ambient Air Temperature*

Temperature of air surrounding vehicle.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65269	

SPN 172 *Engine Air Intake Temperature*

Temperature of air entering vehicle air induction system.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65269	

SPN 173 Engine Exhaust Gas Temperature

Temperature of combustion byproducts leaving the engine. See SPNs 2433 and 2434 for engines with more than one exhaust gas temperature measurement.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65270

SPN 174 Engine Fuel Temperature 1

Temperature of fuel (or gas) passing through the first fuel control system. See SPN 3468 for the second control system

Data Length: 1 byte
 Resolution: 1 deg C/bit, -40 deg C offset
 Data Range: -40 to 210 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65262

SPN 175 Engine Oil Temperature 1

Temperature of the engine lubricant.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65262

SPN 176 Engine Turbocharger Oil Temperature

Temperature of the turbocharger lubricant.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65262

(R) SPN 177 Transmission Oil Temperature 1

First instance of transmission lubricant temperature.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65272

SPN 180 Trailer Weight

Total mass of freight-carrying vehicle designed to be pulled by truck, including the weight of the contents.

Data Length:	2 bytes	
Resolution:	2 kg/bit, 0 offset	
Data Range:	0 to 128,510 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65258	

SPN 181 Cargo Weight

The mass of freight carried.

Data Length:	2 bytes	
Resolution:	2 kg/bit, 0 offset	
Data Range:	0 to 128,510 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65258	

SPN 182 Engine Trip Fuel

Fuel consumed during all or part of a journey. See SPN 5053 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65257	

SPN 183 Engine Fuel Rate

Amount of fuel consumed by engine per unit of time.

NOTE - See SPN 1600 for alternate resolution.

Data Length:	2 bytes	
Resolution:	0.05 L/h per bit, 0 offset	
Data Range:	0 to 3,212.75 L/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65266	

(R) SPN 184 Engine Instantaneous Fuel Economy

Current fuel economy at current vehicle velocity.

0xFB00 = Infinite (for example, during engine motoring)

Data Length:	2 bytes	
Resolution:	1/512 km/L per bit, 0 offset	
Data Range:	0 to 125.498046875 km/L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65266	

SPN 185 Engine Average Fuel Economy

Average of instantaneous fuel economy for that segment of vehicle operation of interest.

Data Length:	2 bytes	
Resolution:	1/512 km/L per bit, 0 offset	
Data Range:	0 to 125.498046875 km/L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65266	

SPN 186 Power Takeoff Speed

Rotational velocity of device used to transmit engine power to auxiliary equipment.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65264	

SPN 187 Power Takeoff Set Speed

Rotational velocity selected by operator for device used to transmit engine power to auxiliary equipment.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65264	

SPN 188 Engine Speed At Idle, Point 1 (Engine Configuration)

Stationary low idle speed of engine which includes influences due to engine temperature (after power up) and other stationary changes (calibration offsets, sensor failures, etc). This parameter is point 1 of the engine configuration map (see PGN 65251).

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 189 Engine Rated Speed

The maximum governed rotational velocity of the engine crankshaft under full load conditions. Note that the engine speed at point 2 (SPN 528) is equal to rated engine speed only in the case when the engine has not been derated. Please also reference PGN 65251.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65214	

SPN 190 Engine Speed

Actual engine speed which is calculated over a minimum crankshaft angle of 720 degrees divided by the number of cylinders.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61444	

SPN 191 Transmission Output Shaft Speed

Calculated speed of the transmission output shaft.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61442	

SPN 233 Unit Number (Power Unit)

Owner assigned unit number for the power unit of the vehicle.

NOTE: The ASCII character "*" is reserved as a delimiter.

Data Length:	Variable - up to 200 bytes followed by an "*" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65259	

SPN 234 Software Identification

Software identification of an electronic module. As an example, this parameter may be represented with ASCII characters MMDDYYaa where MM is the month, DD is the day, YY is the year, and aa is the revision number.

NOTE The ASCII character "*" is reserved as a delimiter.

Data Length:	Variable - up to 200 bytes followed by an "*" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65242	

SPN 235 Engine Total Idle Hours

Accumulated time of operation of the engine while under idle conditions.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65244	

SPN 236 Engine Total Idle Fuel Used

Accumulated amount of fuel used during vehicle operation while under idle conditions.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65244	

SPN 237 Vehicle Identification Number

Vehicle Identification Number (VIN) as assigned by the vehicle manufacturer.

NOTE The ASCII character "*" is reserved as a delimiter.

Data Length:	Variable - up to 200 bytes followed by an "*" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65260	

SPN 241 Tire Pressure

Pressure at which air is contained in cavity formed by tire and rim.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65268	

SPN 242 Tire Temperature

Temperature at the surface of the tire sidewall.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65268	

SPN 244 Trip Distance

Distance traveled during all or part of a journey.

NOTE See SPN 918 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65248	

SPN 245 *Total Vehicle Distance*

Accumulated distance traveled by vehicle during its operation.

NOTE See SPN 917 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65248	

SPN 246 *Total Vehicle Hours*

Accumulated time of operation of vehicle.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65255	

SPN 247 *Engine Total Hours of Operation*

Accumulated time of operation of engine.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65253	

SPN 248 *Total Power Takeoff Hours*

Accumulated time of operation of power takeoff device.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65255	

SPN 249 *Engine Total Revolutions*

Accumulated number of revolutions of engine crankshaft during its operation.

Data Length:	4 bytes	
Resolution:	1000 r/bit, 0 offset	
Data Range:	0 to 4,211,081,215,000 r	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65253	

SPN 250 Engine Total Fuel Used

Accumulated amount of fuel used during vehicle operation. See SPN 5054 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65257	

SPN 354 Relative Humidity

Measures humidity of combustion air prior to entry into turbocharger

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65164	

SPN 407 Axle Group Full Weight Calibration

The full weight calibration measurement of an axle group

Data Length:	2 bytes	
Resolution:	2 kg/bit, 0 offset	
Data Range:	0 to 128,510 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64873	

SPN 408 Axle Group Empty Weight Calibration

The empty weight calibration measurement of an axle group

Data Length:	2 bytes	
Resolution:	2 kg/bit, 0 offset	
Data Range:	0 to 128,510 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64873	

SPN 409 Axle Group Weight

Total mass imposed on the road surface by all the tires in the axle group

Data Length:	2 bytes	
Resolution:	2 kg/bit, 0 offset	
Data Range:	0 to 128,510 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64874	

SPN 411 Engine Exhaust Gas Recirculation 1 Differential Pressure

Differential pressure across the Exhaust Gas Recirculation (EGR) system

Data Length: 2 bytes
 Resolution: 1/128 kPa/bit, -250 kPa offset
 Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - SPN 27
 PGN reference: 65188

SPN 412 Engine Exhaust Gas Recirculation 1 Temperature

Temperature of Recirculated Exhaust Gas. This should not be used for Exhaust Gas Recirculation Mixer Intake Temperature. See SPN 5020.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - SPN 27
 PGN reference: 65188

SPN 413 Net Vehicle Weight Change

Identifies the net vehicle weight change from the time of last vehicle net weight zeroing.

Data Length: 3 bytes
 Resolution: 2 kg/bit, -16,449,535 offset
 Data Range: -16,449,535 to 16,449,535 kg Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64872

SPN 417 Gross Combination Weight

Total weight of the truck and all the trailers with on-board scales.

Data Length: 3 bytes
 Resolution: 2 kg/bit, 0 offset
 Data Range: 0 to 32,899,070 kg Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64872

SPN 441 Auxiliary Temperature 1

Temperature measured by auxiliary temperature sensor #1. Not to be used in place of existing SPNs.

Data Length: 1 byte
 Resolution: 1 deg C/bit, -40 deg C offset
 Data Range: -40 to 210 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65164

SPN 442 Auxiliary Temperature 2

Temperature measured by auxiliary temperature sensor #2. Not to be used in place of existing SPNs.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65164	

SPN 444 Battery Potential / Power Input 2

This parameter measures the second source of battery potential as measured at the input of the ECM/actuator etc. coming from one or more batteries, irrespective of the distance between the component and the battery. This SPN is also used when ECM's are interconnected in a series configuration, where the source of power is coming directly or indirectly from the same battery/batteries.

Data Length:	2 bytes	
Resolution:	0.05 V/bit, 0 offset	
Data Range:	0 to 3212.75 V	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65104	
PGN reference:	65165	

SPN 509 Milepost Identification

Used to identify the milepost as detected by a milepost sensor. The length of the ASCII text for this parameter must be reported using SPN 3070 (Number of bytes in the Milepost Identification).

Data Length:	Variable - up to 100 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64959	

SPN 512 Driver's Demand Engine - Percent Torque

The requested torque output of the engine by the driver. It is based on input from the following requestors external to the powertrain: operator (via the accelerator pedal), cruise control and/or road speed limit governor. Dynamic commands from internal powertrain functions such as smoke control, low- and high-speed engine governing; ASR and shift control are excluded from this calculation. The data is transmitted in indicated torque as a percent of the reference engine torque. See PGN 65251 for the engine configuration message. Several status bits are defined separately to indicate the request which is currently being honored. This parameter may be used for shift scheduling.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:	See Appendix D - SPN 512	
PGN reference:	61444	

SPN 513 *Actual Engine - Percent Torque*

The calculated output torque of the engine. The data is transmitted in indicated torque as a percent of reference engine torque (see the engine configuration message, PGN 65251). The engine percent torque value will not be less than zero and it includes the torque developed in the cylinders required to overcome friction.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	61444	

(R) SPN 514 *Nominal Friction - Percent Torque*

The calculated torque that indicates the amount of torque required by the basic engine itself added by the loss torque of accessories. It contains the frictional and thermodynamic loss of the engine itself, pumping torque loss (SPN 5398), and the losses of fuel, oil and cooling pumps. The data is transmitted in indicated torque as a percent of reference engine torque (see the engine configuration message, PGN 65251).

The realization can be done by a map dependent on engine speed and engine temperature and an offset value for additional loss torques.

See SPN 2978 for an indicator that describes the possible inclusion of engine parasitic losses such as cooling fan, etc. in this parameter value.

Note: Refer to section 5.2.1.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65247	

SPN 515 *Engine's Desired Operating Speed*

An indication by the engine of the optimal operating speed of the engine for the current existing conditions. These conditions may include the torque generated to accommodate powertrain demands from the operator (via the accelerator pedal), cruise control, road speed limit governors, or ASR. Dynamic commands from functions such as smoke control or shift control are excluded from this calculation.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: (upper byte resolution = 32 rpm/bit)
Type:	Status	
Supporting Information:		
PGN reference:	65247	

SPN 517 *Navigation-Based Vehicle Speed*

Speed of the vehicle as calculated from a device such as a Global Positioning System (GPS).

Data Length:	2 bytes	
Resolution:	1/256 km/h per bit, 0 offset	
Data Range:	0 to 250.996 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65256	

SPN 518 Engine Requested Torque/Torque Limit

Parameter provided to the engine or retarder in the torque/speed control message for controlling or limiting the output torque.

Requested torque to the engine is measured in indicated torque as a percentage of reference engine torque (see the engine configuration message, PGN 65251). This is the engine torque at which the engine is expected to operate if the torque control mode is active or the engine torque which the engine is not expected to exceed if the torque limit mode is active.

Zero torque can be requested which implies zero fuel and, according to Figures SPN512_A and SPN512_B, the engine will not be allowed to stall. The actual engine percent torque (SPN 513) should be zero and the engine should decelerate until the low idle governor kicks in, at which time the actual engine percent torque will be calculated as shown in Figures SPN512_A and SPN512_B and the engine torque mode bits (SPN 899) should be equal to 0000b - Low Idle Governor.

Requested torque to the retarder is measured in indicated torque as a percentage of reference retarder torque (see the retarder configuration message, PGN 65249). The logic used in enabling or disabling the retarder is based on the override control mode priority bits (SPN 897).

A zero torque request to the retarder is a disable request, and is used by a J1939 node to prevent the retarder from being activated by other combinations of inputs outside of J1939 commands. The Torque Limit Mode is commonly used for this purpose.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125% engine torque requests, -125% to 0% for retarder torque requests
Type:	Status	
Supporting Information:	See Appendix D - SPN 518	
PGN reference:	0	

SPN 519 Engine's Desired Operating Speed Asymmetry Adjustment

This byte is utilized in transmission gear selection routines and indicates the engine's preference of lower versus higher engine speeds should its desired speed not be achievable. This is a scaled ratio such that 125 represents an equal preference for a speed lower or higher than the engine's indicated desired speed. The higher the asymmetry adjustment value is above 125, the more the engine prefers to be operated at or above its indicated desired speed. Conversely, the lower the asymmetry adjustment value is below 125, the more the engine prefers to operate at or below its indicated desired speed. Typically, the engine's asymmetry adjustment will be predicated on fuel consumption considerations, and under these conditions, the method for computing the asymmetry adjustment is indicated in Figure SPN519_A. The engine may include other factors into its asymmetry adjustment calculation such as temperatures, pressures, and other operating parameters.

Data Length:	1 byte	
Resolution:	1/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 519	
PGN reference:	65247	

(R) SPN 520 Actual Retarder - Percent Torque

Actual braking torque of the retarder as a percent of retarder configuration reference torque SPN 556.

Note: Refer to section 5.2.1.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125% to 0 %
Type:	Measured	
Supporting Information:		
PGN reference:	61440	

SPN 521 Brake Pedal Position

Ratio of brake pedal position to maximum pedal position. Used for electric brake applications. 0% means no braking. Also when there are two brake pedals on the machine (Left Brake Pedal Position SPN 3033 and Right Brake Pedal Position SPN 3032) the maximum of the two should be transmitted for Brake Pedal Position.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61441	

SPN 522 Percent Clutch Slip

Parameter which represents the ratio of input shaft speed to current engine speed (in percent).

Percent Clutch Slip = ((Engine rpm - Input shaft rpm)/(Engine rpm)) x 100

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61442	

SPN 523 Transmission Current Gear

The gear currently engaged in the transmission or the last gear engaged while the transmission is in the process of shifting to the new or selected gear. Transitions toward a destination gear will not be indicated. Once the selected gear has been engaged then Transmission Current Gear (SPN 523) will reflect that gear.

Data Length:	1 byte	
Resolution:	1 gear value/bit, -125 offset	
Data Range:	-125 to 125	Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.
Type:	Measured	
Supporting Information:		
PGN reference:	61445	

SPN 524 Transmission Selected Gear

The gear that the transmission will attempt to achieve during the current shift if a shift is in progress, or the next shift if one is pending (i.e., waiting for torque reduction to initiate the shift).

Data Length:	1 byte	
Resolution:	1 gear value/bit, -125 offset	
Data Range:	-125 to 125	Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.

Type: Status
 Supporting Information:
 PGN reference: 61445

SPN 525 Transmission Requested Gear

Gear requested by the operator, ABS, or engine.

Negative values are reverse gears, positive values are forward gears, zero is neutral, parameter specific indicators are listed below.

Parameter specific values for this parameter are as follows:

0xFD (253 dec) = Hold current gear
 0xFC (252 dec) = Forward Drive Position
 0xFB (251 dec) = 'Park' position
 0xFA (250 dec) = Forward 'Low' position
 0xF9 (249 dec) = Upshift 1 gear from current position
 0xF8 (248 dec) = Upshift 2 gears from current position
 0xF7 (247 dec) = Downshift 1 gear from current position
 0xF6 (246 dec) = Downshift 2 gears from current position
 0xF5 (245 dec) = D-1: 1st forward selector position referenced from 'Drive'
 0xF4 (244 dec) = D-2: 2nd forward selector position referenced from 'Drive'
 0xF3 (243 dec) = D-3: 3rd forward selector position referenced from 'Drive'
 0xF2 (242 dec) = D-4: 4th forward selector position referenced from 'Drive'
 0xF1 (241 dec) = D-5: 5th forward selector position referenced from 'Drive'
 0xF0 (240 dec) = D-6: 6th forward selector position referenced from 'Drive'
 0xEF (239 dec) = D-7: 7th forward selector position referenced from 'Drive'
 0xEE (238 dec) = Between two shift selector positions (if detail is unknown)
 0xED (237 dec) = Between two reverse shift selector positions
 0xEC (236 dec) = Between two forward shift selector positions
 0xEB (235 dec) = Between D-7 and D-6 shift selector positions
 0xEA (234 dec) = Between D-6 and D-5 shift selector positions
 0xE9 (233 dec) = Between D-5 and D-4 shift selector positions
 0xE8 (232 dec) = Between D-4 and D-3 shift selector positions
 0xE7 (231 dec) = Between D-3 and D-2 shift selector positions
 0xE6 (230 dec) = Between D-2 and D-1 shift selector positions
 0xE5 (229 dec) = Between D-1 and 'Drive' shift selector positions
 0xE4 (228 dec) = Between 'Drive' and 'Neutral' shift selector positions
 0xE3 (227 dec) = Between 'Neutral' and 'Reverse' shift selector positions
 0xE2 (226 dec) = Between 'Reverse' and 'Park' shift selector positions
 0xE1 (225 dec) = Press of momentary button to reselect current position
 0xE0 (224 dec) = Position unknown and/or no buttons pressed
 0xDF (223 dec) = Reverse Selector Position

0xDE - 0xBE (222 dec - 190 dec) = Reserved

0x3C - 0x00 (60 dec - 0 dec) = Reserved

Forward selector position from drive (0xF5 to 0xEF) – Indicates shift selector position in reference to the 'Drive' position on the selector. It is possible that the shift selector software may not know the number of forward ranges. The shift

selector may identify the position selected by the operator while the transmission ECU determines what range or gear that represents. If there is a digital display, the transmission ECU would communicate what is to be displayed via another message such as ETC#2 or ETC#7.

For example: Consider a vehicle with a 5-speed automatic transmission with the shift lever on the column. Suppose that shift selector has a limited number of positions, such that having positions for D-4-3-2-1 is not an option. For this example, assume there are only have enough lever positions for D-3-2-1. Pulling the lever into "D" will put the transmission in 5th (highest gear). It is desired that pulling the lever to the physical "3" position will limit the transmission to a maximum range of 3rd gear.

When the selector is pulled down into "3", the shifter selector itself has no way of correlating this physical lever position to the desired gear; it would have to be calibrated with software to tell it this information. If not calibrated, the shift selector cannot directly command the transmission to go to 3rd gear; it only knows it's one notch below drive.

However, if "D-1" (lever position, as opposed to desired gear) is broadcast by the selector, the transmission ECU can receive this and then make the determination of what range is desired. The benefit is that no specific calibration of the shift selector is required.

Between selector positions (0xEE to 0xE2) – Indicates the shift selector is not in an appropriate position. If a lever-type shift selector with a mechanical display is stuck between detents, it may appear to the operator that it is in the desired position when in fact it is not. The shift selector may be capable of reporting only that it is between positions or that it is between forward or reverse positions. If known, the transmission ECU may respond differently depending on which positions are involved.

Reselect current position (0xE1) - If the TC1 message continues to send the position last selected, then a capability to reselect the same position is required. For example: If a 'Neutral to Drive' shift is selected and that shift is inhibited (say for high engine speed), it may be necessary for the operator to reselect 'Drive' after the inhibit conditions pass in order for the transmission ECU to honor the request.

Position unknown and/or no buttons pressed (0xE0) - A push-button style shift selector with momentary contact buttons may send this indicator after initialization before any buttons are pressed, or before the transmission ECU determines and communicates the initial selection. This indicator could also be sent between button presses as an alternative to sending the last button press.

Data Length:	1 byte	
Resolution:	1 gear value/bit, -125 offset	
Data Range:	-125 to 125	Operational Range: -64 to 64
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 526 *Transmission Actual Gear Ratio*

Actual ratio of input shaft speed to output shaft speed.

Data Length:	2 bytes	
Resolution:	0.001/bit, 0 offset	
Data Range:	0 to 64.255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61445	

SPN 527 *Cruise Control States*

This parameter is used to indicate the current state, or mode, of operation by the cruise control device. This is a status parameter.

000 - Off/Disabled
 001 - Hold
 010 - Accelerate
 011 - Decelerate
 100 - Resume
 101 - Set
 110 - Accelerator Override
 111 - Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 527	
PGN reference:	65265	

SPN 528 *Engine Speed At Point 2 (Engine Configuration)*

Engine speed of point 2 of the engine torque map (see PGN 65251 and supporting document). In engine configuration mode 1 and 3, point 2 is defined as the kick-in point from which torque is reduced to zero. In mode 2 (see Table PGN65251_A), there are no special requirements for the definition of this point.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 529 *Engine Speed At Point 3 (Engine Configuration)*

Engine speed of point 3, 4, and 5 of the engine torque map (see PGN 65251 and supporting document). It is recommended that one of these points indicate the peak torque point for the current engine torque map. Points 3, 4, and 5 are optional and lie between idle and point 2.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 530 *Engine Speed At Point 4 (Engine Configuration)*

Engine speed of point 3, 4, and 5 of the engine torque map (see PGN 65251 and supporting document). It is recommended that one of these points indicate the peak torque point for the current engine torque map. Points 3, 4, and 5 are optional and lie between idle and point 2.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 531 Engine Speed At Point 5 (Engine Configuration)

Engine speed of point 3, 4, and 5 of the engine torque map (see PGN 65251 and supporting document). It is recommended that one of these points indicate the peak torque point for the current engine torque map. Points 3, 4, and 5 are optional and lie between idle and point 2.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 532 Engine Speed At High Idle, Point 6 (Engine Configuration)

Engine speed of high idle (point 6) of the engine torque map (see PGN 65251 and supporting document). In engine configuration mode 3 (see Figure PGN65251_C), point 6 is not defined by the engine torque map but by the governor characteristic and the zero torque line.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 533 Engine Maximum Momentary Override Speed, Point 7 (Engine Configuration)

The maximum engine speed above high idle allowed by the engine control during a momentary high idle override. This duration of the override is limited by the maximum momentary override time limit, SPN 534.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 534 Engine Maximum Momentary Override Time Limit (Engine Configuration)

The maximum time limit allowed to override the engine's high idle speed.

Data Length:	1 byte	
Resolution:	0.1 s/bit, 0 offset	
Data Range:	0 to 25 s	Operational Range: 0 to 25 sec, 0 = no override of high idle allowed, 255 = not applicable (no time restriction)
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 535 Engine Requested Speed Control Range Lower Limit (Engine Configuration)

The minimum engine speed that the engine will allow when operating in a speed control/limit mode.

Data Length:	1 byte	
Resolution:	10 rpm/bit, 0 offset	
Data Range:	0 to 2,500 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 536 Engine Requested Speed Control Range Upper Limit (Engine Configuration)

The maximum engine speed regardless of load that the engine will allow when operating in a speed control/limit mode, excluding any maximum momentary engine override speed, if supported.

Data Length:	1 byte	
Resolution:	10 rpm/bit, 0 offset	
Data Range:	0 to 2,500 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 537 Engine Requested Torque Control Range Lower Limit (Engine Configuration)

The minimum engine torque that the engine will allow when operating in a torque control/limit mode.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 538 Engine Requested Torque Control Range Upper Limit (Engine Configuration)

The maximum engine torque that the engine will allow when operating in a torque control/limit mode.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 539 Engine Percent Torque At Idle, Point 1 (Engine Configuration)

The torque limit that indicates the available engine torque which can be provided by the engine at idle speed. This parameter may be influenced by engine temperature (after power up) and other stationary changes (calibration offsets, sensor failures, etc.) See also SPN 188. The data is transmitted in indicated torque as a percent of the reference engine torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 540 Engine Percent Torque At Point 2 (Engine Configuration)

The torque limit that indicates the available engine torque which can be provided by the engine at point 2 of the engine map (see PGN 65251 and supporting documents). In engine configuration mode 1 and 3 (see Table PGN65251_A see PGN 65251), point 2 is defined as the kick-in point from which torque is reduced to zero. In mode 2, there are no special requirements for the definition of this point. The data is transmitted in indicated torque as a percent of the reference engine torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 541 Engine Percent Torque At Point 3 (Engine Configuration)

The torque limit that indicates the available engine torque which can be provided by the engine at point 3, 4, and 5 of the engine map (see PGN 65251 and supporting documents).. It is required that one of these points indicate the peak torque point for the current engine torque map. Points 3, 4, and 5 lie between idle and point 2. The data is transmitted in indicated torque as a percent of the reference engine torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 542 Engine Percent Torque At Point 4 (Engine Configuration)

The torque limit that indicates the available engine torque which can be provided by the engine at point 3, 4, and 5 of the engine map (see PGN 65251 and supporting documents). It is required that one of these points indicate the peak torque point for the current engine torque map. Points 3, 4, and 5 lie between idle and point 2. The data is transmitted in indicated torque as a percent of the reference engine torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 543 Engine Percent Torque At Point 5 (Engine Configuration)

The torque limit that indicates the available engine torque which can be provided by the engine at point 3, 4, and 5 of the engine map (see PGN 65251 and supporting documents). It is required that one of these points indicate the peak torque point for the current engine torque map. Points 3, 4, and 5 lie between idle and point 2. The data is transmitted in indicated torque as a percent of the reference engine torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 544 Engine Reference Torque (Engine Configuration)

This parameter is the 100% reference value for all defined indicated engine torque parameters. It is only defined once and doesn't change if a different engine torque map becomes valid.

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 545 Engine Gain (Kp) Of The Endspped Governor (Engine Configuration)

The endspeed governor is defined as a linear line with the following equations (Capital letters mean physical values, small letters mean normalized values). Refer to Figures PGN65251_A and PGN65251_B.

The gain KP/kp is defined as a positive value. The factor 4096 is necessary for realizing flat curves with sufficient resolution as well as very steep curves.

$KP = \text{delta Torque} / \text{delta Speed}$

$kp \text{ (normalized)} = KP * 250/100\% * 8031 \text{ rpm}/64255 * 4096 = KP * 1280 \text{ rpm}/\%$

Data Length:	2 bytes	
Resolution:	1/1280 %/rpm per bit, 0 offset	
Data Range:	0 to 50.2 %/rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 546 Retarder Speed At Idle, Point 1 (Retarder Configuration)

Please reference PGN 65249

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 547 Retarder Speed At Peak Torque, Point 5 (Retarder Configuration)

Please reference PGN 65249

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 548 *Maximum Retarder Speed, Point 2 (Retarder Configuration)*

Maximum speed of retarder (Please reference PGN 65249).

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 549 *Retarder Speed At Point 3 (Retarder Configuration)*

Retarder speed of point 3 of the engine retarder torque map. Please reference PGN 65249.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 550 *Retarder Speed At Point 4 (Retarder Configuration)*

Retarder speed of point 4 of the engine retarder torque map. Please reference PGN 65249.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 551 *Percent Torque At Idle, Point 1 (Retarder Configuration)*

The torque limit that indicates the available retarder torque which can be provided by the retarder at idle speed. The data is transmitted in indicated torque as a percent of the reference retarder torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125 to 0%
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 552 *Percent Torque At Maximum Speed, Point 2 (Retarder Configuration)*

The torque limit that indicates the available retarder torque which can be provided by the retarder at its maximum speed. Please reference PGN 65249. The data is transmitted in indicated torque as a percent of the reference retarder torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125 to 0%
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 553 *Percent Torque At Point 3 (Retarder Configuration)*

The torque limit that indicates the available retarder torque which can be provided by the retarder at points 3 and 4 of the retarder torque map. Please reference PGN 65249. The data is transmitted in indicated torque as a percent of the reference retarder torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125 to 0%
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 554 *Percent Torque At Point 4 (Retarder Configuration)*

The torque limit that indicates the available retarder torque which can be provided by the retarder at points 3 and 4 of the retarder torque map. Please reference PGN 65249. The data is transmitted in indicated torque as a percent of the reference retarder torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125 to 0%
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 555 *Percent Torque At Peak Torque, Point 5 (Retarder Configuration)*

The torque limit that indicates the available retarder torque which can be provided by the retarder at point 5 of the retarder torque map. Please reference PGN 65249. The data is transmitted in indicated torque as a percent of the reference retarder torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125 to 0%
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 556 *Reference Retarder Torque (Retarder Configuration)*

This parameter is the 100% reference value for all defined indicated retarder torque parameters. It is only defined once and doesn't change if a different retarder torque map becomes valid.

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 557 Retarder Control Method (Retarder Configuration)

This parameter identifies the number of steps used by the retarder.

Data Length:	1 byte	
Resolution:	1 step/bit, 0 offset	
Data Range:	0 to 250 steps	Operational Range: 0: continuous control, 1 On/Off control, 2 to 250: Number of steps
Type:	Measured	
Supporting Information:		
PGN reference:	65249	

SPN 558 Accelerator Pedal 1 Low Idle Switch

Switch signal which indicates the state of the accelerator pedal 1 low idle switch. The low idle switch is defined in SAE Recommended Practice J1843.

00 - Accelerator pedal 1 not in low idle condition
 01 - Accelerator pedal 1 in low idle condition
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61443	

SPN 559 Accelerator Pedal Kickdown Switch

Switch signal which indicates whether the accelerator pedal kickdown switch is opened or closed. The kickdown switch is defined in SAE J1843.

00 - Kickdown passive
 01 - Kickdown active
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61443	

SPN 560 Transmission Driveline Engaged

Driveline engaged indicates the transmission controlled portion of the driveline is engaged sufficiently to allow a transfer of torque through the transmission. Driveline engaged is ACTIVE whenever the transmission is in gear and the clutch (if controlled by the transmission controller) is less than 100% clutch slip (clutch able to transfer torque). This parameter should be used in conjunction with the parameter "Shift in Process" (SPN 574). While a shift is in process, the receiver should not assume that the driveline is either fully engaged or disengaged (i.e., cruise control).

00 - Driveline disengaged

01 - Driveline engaged

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61442

SPN 561 ASR Engine Control Active

State signal which indicates that ASR engine control has been commanded to be active. Active means that ASR actually tries to control the engine. This state signal is independent of other control commands to the engine (e.g., from the transmission) which may have higher priority.

00 - ASR engine control passive but installed

01 - ASR engine control active

10 - Reserved

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61441

SPN 562 ASR Brake Control Active

State signal which indicates that ASR brake control is active. Active means that ASR actually controls wheel brake pressure at one or more wheels of the driven axle(s).

00 - ASR brake control passive but installed

01 - ASR brake control active

10 - Reserved

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61441

SPN 563 Anti-Lock Braking (ABS) Active

State signal which indicates that the ABS is active. The signal is set active when wheel brake pressure actually starts to be modulated by ABS and is reset to passive when all wheels are in a stable condition for a certain time. The signal can also be set active when driven wheels are in high slip (e.g., caused by retarder). Whenever the ABS system is not fully operational (due to a defect or during off-road ABS operation), this signal is only valid for that part of the system that is

still working. When ABS is switched off completely, the flag is set to passive regardless of the current wheel slip conditions.

00 - ABS passive but installed

01 - ABS active

10 - Reserved

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61441

SPN 564 ***Differential Lock State - Central***

State used which indicates the condition of the central differential lock. The differential locks are located as defined in attached figure SPN564_A.

00 Differential lock disengaged

01 Differential lock engaged

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 564

PGN reference: 61446

SPN 565 ***Differential Lock State - Central Front***

State used which indicates the condition of the central front differential lock. The differential locks are located as defined in figure SPN564_A.

00 Differential lock disengaged

01 Differential lock engaged

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61446

SPN 566 ***Differential Lock State - Central Rear***

State used which indicates the condition of the central rear differential lock. The differential locks are located as defined in figure SPN564_A.

00 Differential lock disengaged
01 Differential lock engaged
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61446

Operational Range: same as data range

SPN 567 ***Differential Lock State - Front Axle 1***

State used which indicates the condition of the front axle 1 differential lock. The differential locks are located as defined in figure SPN564_A.

00 Differential lock disengaged
01 Differential lock engaged
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61446

Operational Range: same as data range

SPN 568 ***Differential Lock State - Front Axle 2***

State used which indicates the condition of the front axle 2 differential lock. The differential locks are located as defined in figure SPN 564_A.

00 Differential lock disengaged
01 Differential lock engaged
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61446

Operational Range: same as data range

SPN 569 Differential Lock State - Rear Axle 1

State used which indicates the condition of the rear axle 1 differential lock. The differential locks are located as defined in figure SPN 564_A.

00 Differential lock disengaged
 01 Differential lock engaged
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61446

Operational Range: same as data range

SPN 570 Differential Lock State - Rear Axle 2

State used which indicates the condition of the rear axle 2 differential lock. The differential locks are located as defined in figure SPN 564_A.

00 Differential lock disengaged
 01 Differential lock engaged
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61446

Operational Range: same as data range

SPN 571 Retarder Enable - Brake Assist Switch

Switch signal which indicates whether the operator wishes the retarder to be enabled for vehicle braking assist. The retarder does not check this switch, nor does the enabling of this switch engage the retarder. When this switch is "enabled," the devices constructing TSC1 – destination retarder messages may command retarder torque for braking. For example, the cruise control should not request retarder torque if this switch is not "enabled." The switch exists to prevent the engine retarder from being asked to be engaged via TSC1 in a noise sensitive area. See also SPN 572

00 Retarder - brake assist disabled
 01 Retarder - brake assist enabled
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 61440

Operational Range: same as data range

SPN 572 Retarder Enable - Shift Assist Switch

Switch signal which indicates whether the operator wishes the retarder to be enabled for transmission shift assist. The retarder does not check this switch, nor does the enabling of this switch engage the retarder. When this switch is "enabled," the transmission may activate the retarder (via the TSC1 message) to increase the rate of engine deceleration to assist in shift control. The switch exists to prevent the engine retarder from being asked to be engaged via TSC1 in a noise sensitive area. See SPN 571.

00 Retarder - shift assist disabled
 01 Retarder - shift assist enabled
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61440	

SPN 573 Transmission Torque Converter Lockup Engaged

State signal which indicates whether the torque converter lockup is engaged.

00 Torque converter lockup disengaged
 01 Torque converter lockup engaged
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61442	

SPN 574 Transmission Shift In Process

Indicates that the transmission is in process of shifting from the current gear to the selected gear. This state is generally ACTIVE during the entire time that the transmission controls the vehicle. This includes any transmission clutch control, all engine control sequences, pulling to transmission neutral, and engaging the destination gear (e.g., until it is no longer sending commands and/or limits to the engine). See also SPN 560. (See Figure SPN574_A)

00 - Shift is not in process
 01 - Shift in process
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 574	
PGN reference:	61442	

SPN 575 ABS Off-road Switch

Switch signal which indicates the position of the ABS off-road switch.

00 - ABS off-road switch passive
 01 - ABS off-road switch active
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 61441

Operational Range: same as data range

SPN 576 ASR Off-road Switch

Switch signal which indicates the position of the ASR off-road switch.

00 - ASR off-road switch passive
 01 - ASR off-road switch active
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 61441

Operational Range: same as data range

SPN 577 ASR "Hill Holder" Switch

Switch signal which indicates the position of the ASR "hill holder" switch.

00 - ASR "hill holder" switch passive
 01 - ASR "hill holder" switch active
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 61441

Operational Range: same as data range

SPN 578 Drive Axle Temperature

Temperature of axle lubricant in drive axle.

Data Length: 1 byte
 Resolution: 1 deg C/bit, -40 deg C offset
 Data Range: -40 to 210 deg C
 Type: Measured
 Supporting Information:
 PGN reference: 65273

Operational Range: same as data range

SPN 579 Drive Axle Lift Air Pressure

Gage pressure of air in system that utilizes compressed air to provide force between axle and frame.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65273	

SPN 580 Altitude

Altitude of the vehicle referenced to sea level at standard atmospheric pressure and temperature.

Data Length:	2 bytes	
Resolution:	0.125 m/bit, -2500 m offset	
Data Range:	-2500 to 5531.875 m	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65256	

SPN 581 Transmission Gear Ratio

The transmission configuration describes the number of forward gears, the number of reverse gears, and the ratio of each gear with the following resolution.

Data Length:	2 bytes	
Resolution:	0.001/bit, 0 offset	
Data Range:	0 to 64.255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65250	

SPN 582 Axle Weight

Total mass imposed by the tires on the road surface at the specified axle.

Data Length:	2 bytes	
Resolution:	0.5 kg/bit, 0 offset	
Data Range:	0 to 32,127.5 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65258	

SPN 583 Pitch

Pitch (rotation about the y-axis) of the vehicle as calculated by the navigation device(s). The pitch angle for an angle of ascent is reported with a positive value. This parameter is defined according to a Z-Down axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Down Axis System has positive X directed forward, positive Y to the right, and positive Z directed down.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: -200 deg (DECENT) to +301.992 deg (ASCENT)
Type:	Measured	
Supporting Information:		
PGN reference:	65256	

SPN 584 Latitude

Latitude position of the vehicle.

Data Length:	4 bytes	
Resolution:	10 ⁻⁷ deg/bit, -210 deg offset	
Data Range:	-210 to 211.1008122 deg	Operational Range: -210 deg (SOUTH) to +211.108122 deg (NORTH)
Type:	Measured	
Supporting Information:		
PGN reference:	65267	

SPN 585 Longitude

Longitude position of the vehicle.

Data Length:	4 bytes	
Resolution:	10 ⁻⁷ deg/bit, -210 deg offset	
Data Range:	-210 to 211.1008122 deg	Operational Range: -210 deg (WEST) to +211.108122 deg (EAST)
Type:	Measured	
Supporting Information:		
PGN reference:	65267	

SPN 586 Make

Make of the component corresponding to the codes defined in the American Trucking Association Vehicle Maintenance Reporting Standard (ATA/VMRS).

Note: This parameter is to be transmitted as a 5 character ASCII string; as a zero length string, if not available. For example, International is transmitted as INTXX.

Data Length:	Variable - up to 5 bytes followed by an "*" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65259	

SPN 587 Model

Model of the component.

NOTE - The ASCII character "*" is reserved as a delimiter.

Data Length:	Variable - up to 200 bytes followed by an "*" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65259	

SPN 588 Serial Number

Serial number of the component.

NOTE - The ASCII character "" is reserved as a delimiter.

Data Length:	Variable - up to 200 bytes followed by an "" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65259	

SPN 589 Alternator Speed

Actual rotation speed of the alternator.

Data Length:	2 bytes	
Resolution:	0.5 rpm/bit, 0 offset	
Data Range:	0 to 32,127.5 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65237	

SPN 590 Engine Idle Shutdown Timer State

Status signal which indicates the current mode of operation of the idle shutdown timer system. See Figure SPN590_A.

00 - Inactive
 01 - Active
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 590	
PGN reference:	65252	

SPN 591 Engine Idle Shutdown Timer Function

Parameter which indicates the configuration of the idle shutdown timer system.

00 - Disabled in calibration
 01 - Enabled in calibration
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65252	

SPN 592 Engine Idle Shutdown Timer Override

Status signal which indicates the status of the override feature of the idle shutdown timer system. See Figure SPN590_A.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65252	

SPN 593 Engine Idle Shutdown has Shutdown Engine

Status signal which identifies whether or not the engine has been shutdown by the idle shutdown timer system. See Figure SPN590_A.

00 - No
01 - Yes
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65252	

SPN 594 Engine Idle Shutdown Driver Alert Mode

Status signal which indicates the status of the driver alert mode of the idle shutdown timer system. While the driver alert mode is active, the idle shutdown timer may be overridden. See Figure SPN590_A.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65252	

SPN 595 **Cruise Control Active**

Cruise control is switched on. It is not ensured that the engine is controlled by cruise control, as in the case of a large driver's demand the engine is controlled by the driver while cruise control is active (maximum selection of cruise control and driver's demand). The cruise control is set to 0 if a switch off condition occurs.

00 - Cruise control switched off
 01 - Cruise control switched on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 596 **Cruise Control Enable Switch**

Switch signal which indicates that it is possible to manage the cruise control function.

00 - Cruise control disabled
 01 - Cruise control enabled
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 597 **Brake Switch**

Switch signal which indicates that the driver operated brake foot pedal is being pressed. This brake foot pedal is controlling the vehicles' service brake (total vehicle braking application, not park brakes). It is necessary for safe drivetrain behavior that the switch activates before the physical braking components are activated (i.e. Disengage the cruise control function prior to the activation of friction brakes).

00 - Brake pedal released
 01 - Brake pedal depressed
 10 - Error
 11 - Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 598 Clutch Switch

Switch signal which indicates that the clutch pedal is being pressed. It is necessary for a safe drivetrain behavior that the clutch switch is set before the clutch is opened (cruise control function).

00 - Clutch pedal released
 01 - Clutch pedal depressed
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65265

Operational Range: same as data range

SPN 599 Cruise Control Set Switch

Switch signal of the cruise control activator which indicates that the activator is in the position "set."

00 - Cruise control activator not in the position "set"
 01 - Cruise control activator in position "set"
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65265

Operational Range: same as data range

SPN 600 Cruise Control Coast (Decelerate) Switch

Switch signal of the cruise control activator which indicates that the activator is in the position "coast (decelerate)."

00 - Cruise control activator not in the position "coast"
 01 - Cruise control activator in position "coast"
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65265

Operational Range: same as data range

SPN 601 Cruise Control Resume Switch

Switch signal of the cruise control activator which indicates that the activator is in the position "resume."

00 - Cruise control activator not in the position "resume"

01 - Cruise control activator in position "resume"

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65265

SPN 602 Cruise Control Accelerate Switch

Switch signal of the cruise control activator which indicates that the activator is in the position "accelerate."

00 - Cruise control activator not in the position "accelerate"

01 - Cruise control activator in position "accelerate"

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65265

SPN 604 Transmission Neutral Switch

Identifies the status of the switch that indicates neutral.

00 - Off

01 - On

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65219

SPN 605 Refrigerant High Pressure Switch

Switch signal which indicates the position of the high pressure switch in the coolant circuit of an air conditioning system. When the switch is enabled, the pressure inside the circuit is too high and the compressor clutch may be disengaged.

00 - Pressure normal

01 - Pressure too high, compressor clutch may be disengaged

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65252

SPN 606 Engine Momentary Overspeed Enable

Command signal used to indicate that the engine speed may be boosted up to the maximum engine overspeed value to accommodate transmission downshifts. The maximum time for overspeed is limited by the time defined in the engine configuration message (see PGN 65,251). The transmission module must command a "override disabled" state at least once before the engine will accept a subsequent request for overspeed.

00 Momentary engine overspeed is disabled

01 Momentary engine overspeed is enabled

10 Reserved

11 Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61442

SPN 607 Progressive Shift Disable

Command signal used to indicate that progressive shifting by the engine should be disallowed.

00 Progressive shift is not disabled

01 Progressive shift is disabled

10 Reserved

11 Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61442

SPN 619 Parking Brake Actuator

Signal which indicates the current state of the actuator(s) that control the parking brake (see also SPN 70 and 5275).

- 00 - Parking brake actuator inactive
- 01 - Parking brake actuator active
- 10 - Error
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 5275	
PGN reference:	65274	

SPN 626 Engine Start Enable Device 1

Devices that assist an Engine in starting, e.g. intake heaters and ether. Primary starting aid.
Parameter indicating whether the start enable device 1 is ON or OFF

- 00 - start enable OFF
- 01 - start enable ON
- 10 - reserved
- 11 - not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64966	

SPN 632 Engine Fuel Shutoff 1 Control

Control setting for fuel shutoff 1. The second instance is SPN 2807. For a single fuel shutoff system, this represents its commanded position. For a dual fuel shutoff system, this SPN is representative of the upstream fuel shutoff commanded position. When fuel (gas) is desired at the engine, the fuel shutoff is opened. Otherwise, it is closed.

- 00 = Open (fuel supplied to engine)
- 01 = Closed (no fuel supplied to engine)
- 10 = Reserved
- 11 = Don't care / take no action

In addition to communicating desired action of fuel shutoff 1 and its driver status, this new SPN can be used to communicate whether fuel shutoff 1 feedback position (if available) matches the commanded position, through the use of FMIs.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64914	

SPN 633 Engine Fuel Actuator 1 Control Command

The control command to fuel actuator 1, normalized to percent, where 0% represents fully closed and 100% represents fully open. Typically, this fuel actuator is used to regulate low pressure natural gas flow rate, mixing into the air flow, which together then come into the engine. Using the standard convention for determining the position. Left/front is #1 and right/rear is #2 (SPN 1244).

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: 0 to 100%
Type:	Status	
Supporting Information:		
PGN reference:	61466	

SPN 641 Engine Variable Geometry Turbocharger Actuator #1

Actuator that controls the variable geometry turbocharger geometry. The control command to the actuator, normalized to percent, where 0% nominally represents fully closed (smallest turbocharger geometry) and 100% represents fully open (largest geometry turbocharger).

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64931	

SPN 649 Engine Exhaust Back Pressure Regulator Control Command

The control command to the Engine Exhaust Back Pressure Regulator, normalized to percent. 100 percent means the regulator is fully closed, providing the maximum restriction to exhaust gas flow from the engine. Zero percent means the regulator is fully open, providing the minimum available restriction.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: 0 to 100%
Type:	Status	
Supporting Information:		
PGN reference:	61486	

SPN 681 Transmission Gear Shift Inhibit Request

Command signal to inhibit gear shifts.

00 Gear shifts are allowed (disable function)
 01 Gear shifts are inhibited (enable function)
 10 Reserved
 11 Take no action (leave function as is)

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 682 Transmission Torque Converter Lockup Disable Request

Command signal to prevent torque converter lockup, which may cause problems in certain circumstances for ASR.

00 Allow torque converter lockup
 01 Disable torque converter lockup
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 683 Disengage Driveline Request

Command signal used to simply disengage the driveline, e.g., to prevent engine drag torque from causing high wheel slip on slippery surfaces.

00 Allow driveline engagement
 01 Disengage driveline
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 684 Requested Percent Clutch Slip

Parameter which represents the percent clutch slip requested by a device.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 685 Disengage Differential Lock Request - Front Axle 1

Command signal used to disengage the various differential locks, e.g., to allow an undistributed individual wheel control by ABS. The differential locks are located as defined in Figure SPN564_A.

00 Engage differential lock
 01 Disengage differential lock
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 686 Disengage Differential Lock Request - Front Axle 2

Command signal used to disengage the various differential locks, e.g., to allow an undistributed individual wheel control by ABS. The differential locks are located as defined in Figure SPN564_A.

00 Engage differential lock
 01 Disengage differential lock
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 687 Disengage Differential Lock Request - Rear Axle 1

Command signal used to disengage the various differential locks, e.g., to allow an undistributed individual wheel control by ABS. The differential locks are located as defined in Figure SPN564_A.

00 Engage differential lock
 01 Disengage differential lock
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 688 Disengage Differential Lock Request - Rear Axle 2

Command signal used to disengage the various differential locks, e.g., to allow an undistributed individual wheel control by ABS. The differential locks are located as defined in Figure SPN564_A.

00 Engage differential lock
 01 Disengage differential lock
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 689 *Disengage Differential Lock Request - Central*

Command signal used to disengage the various differential locks, e.g., to allow an undistributed individual wheel control by ABS. The differential locks are located as defined in Figure SPN564_A.

00 Engage differential lock
 01 Disengage differential lock
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 690 *Disengage Differential Lock Request - Central Front*

Command signal used to disengage the various differential locks, e.g., to allow an undistributed individual wheel control by ABS. The differential locks are located as defined in Figure SPN564_A.

00 Engage differential lock
 01 Disengage differential lock
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 691 *Disengage Differential Lock Request - Central Rear*

Command signal used to disengage the various differential locks, e.g., to allow an undistributed individual wheel control by ABS. The differential locks are located as defined in Figure SPN564_A.

00 Engage differential lock
 01 Disengage differential lock
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 695 Engine Override Control Mode

The override control mode defines which sort of command is used:

00 Override disabled - Disable any existing control commanded by the source of this command.

01 Speed control - Govern speed to the included "desired speed" value.

10 Torque control - Control torque to the included "desired torque" value.

11 Speed/torque limit control - Limit speed and/or torque based on the included limit values. The speed limit governor is a droop governor where the speed limit value defines the speed at the maximum torque available during this operation.

If a device wants to know whether it has access to the engine, there are several possibilities:

- a. Comparing its command with the actual engine broadcasts.
- b. Looking at command modes from other devices.
- c. Looking to the engine and retarder torque mode.

Remarks:

- a. The realization of a torque limit (minimum selection) is possible by setting the speed limit to a high value (0xFAFF).
- b. The realization of a speed limit (minimum selection) is possible by setting the torque limit to a high value (0xFA).
- c. Limiting the retarder torque means to limit the magnitude of the torque request. As the brake torque is represented by negative torque values, the limitation must be done by a maximum selection of the requested torque and the retarder internal torque signals.
- d. For torque increasing functions, time limits for the torque or speed value (command) and the direct modes are desirable.
- e. The selection of which device has control of the engine's speed or torque depends on the override mode priority (see SPN 897) with the highest priority device gaining control. In the case of two devices with identical priority, the engine responds to speed/torque control commands over speed/torque limit commands and will act on the speed or torque commands on a first come, first served basis. The torque limit will be a "lowest wins" selection (e.g., if one device commands 60% limit and another 80% limit, then the engine will limit torque to 60%). Figure SPN695_A provides a flowchart of the torque/speed control priority selection logic.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 695

PGN reference: 0

SPN 696 Engine Requested Speed Control Conditions

This mode tells the engine control system the governor characteristics that are desired during speed control. The four characteristics defined are:

00 Transient Optimized for driveline disengaged and non-lockup conditions

01 Stability Optimized for driveline disengaged and non-lockup conditions

10 Stability Optimized for driveline engaged and/or in lockup condition 1 (e.g., vehicle driveline)

11 Stability Optimized for driveline engaged and/or in lockup condition 2 (e.g., PTO driveline)

00b - This speed governor gain selection is adjusted to provide rapid transition between speed setpoints. RPM overshoot and undershoot may be greater than what is seen when the "speed control characteristic" is set to be stability optimized.

01b - This control condition has been optimized to minimize rpm overshoot and undershoot given an expected plant consisting of the engine and its accessory loads. This gain adjustment is not intended to compensate for driveline characteristics. This characteristic is most appropriate when no driveline is connected.

10b - This control condition has been optimized to minimize rpm overshoot and undershoot given a more complex plant. For instance, the more complex plant would contain the engine, its accessory loads and the driveline characteristics. As

an example, the driveline characteristics might include the effective spring mass relationship of pumps, tires, clutches, axles, driveshafts, and multiple gear ratios. This characteristic is most appropriate when a driveline is engaged.

11b - This speed control characteristic is available for applications requiring compensation for more than one driveline characteristic. It has been optimized to minimize rpm overshoot and undershoot given a more complex plant of the second variety. This more complex plant would again contain the engine, its accessory loads and a second driveline characteristic unique from the one described in speed control characteristic 10b.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	0	

SPN 701 Auxiliary I/O #01

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 702 Auxiliary I/O #02

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 703 Auxiliary I/O #03

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 704 Auxiliary I/O #04

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 705 Auxiliary I/O #05

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 706 Auxiliary I/O #06

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
01 - Auxiliary channel on
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 707 Auxiliary I/O #07

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
01 - Auxiliary channel on
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 708 Auxiliary I/O #08

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
01 - Auxiliary channel on
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 709 Auxiliary I/O #09

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 710 Auxiliary I/O #10

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 711 Auxiliary I/O #11

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 712 Auxiliary I/O #12

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 713 Auxiliary I/O #13

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 714 Auxiliary I/O #14

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 715 Auxiliary I/O #15

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 716 Auxiliary I/O #16

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off
 01 - Auxiliary channel on
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	65241	

SPN 723 Engine Speed 2

The engine speed as measured by speed sensor 2

Note: This is for the engine speed from the 2nd engine speed sensor. This may be different than SPN 190 when used in multiple engine speed sensor configurations. In an application with multiple engine speed sensors, SPN 190 data can be derived from any of the speed sensors.

Data Length:	2 bytes	
Resolution:	0.5 rpm/bit, 0 offset	
Data Range:	0 to 32,127.5 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61473	

SPN 740 Transmission Lockup Clutch Actuator

Identifies the status of the actuator that controls the lockup clutch.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65223

Operational Range: same as data range

SPN 748 Transmission Output Retarder

Identifies the status of the transmission output retarder.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65218

Operational Range: same as data range

SPN 767 Transmission Reverse Direction Switch

Identifies the status of the switch that indicates reverse direction.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65219

Operational Range: same as data range

SPN 768 *Transmission Range High Actuator*

Identifies the status of the range high actuator in the auxiliary unit.

00 -Off
01 -On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 769 *Transmission Range Low Actuator*

Identifies the status of the range low actuator in the auxiliary unit.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 770 *Transmission Splitter Direct Actuator*

Identifies the status of the splitter direct actuator in the auxiliary unit.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 771 *Transmission Splitter Indirect Actuator*

Identifies the status of the splitter indirect actuator in the auxiliary unit.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 772 *Transmission Shift Finger Rail Actuator 1*

Identifies the status of the actuator that moves the shift finger identified as rail actuator #1.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 773 *Transmission Shift Finger Gear Actuator 1*

Identifies the status of the actuator that moves the shift finger identified as gear actuator #1.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 778 Transmission High Range Sense Switch

Identifies the status of the switch that represents high range.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65219	

SPN 779 Transmission Low Range Sense Switch

Identifies the status of the switch that represents low range.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65219	

SPN 780 Transmission Shift Finger Neutral Indicator

Indicates the status of the shift finger in the neutral position.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 781 Transmission Shift Finger Engagement Indicator

Identifies the status of the shift finger in the engagement position.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 782 Transmission Shift Finger Center Rail Indicator

Identifies the status of the shift finger in the center rail position.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 783 Transmission Shift Finger Rail Actuator 2

Identifies the status of the actuator that moves the shift finger identified as rail actuator #2.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 784 Transmission Shift Finger Gear Actuator 2

Identifies the status of the actuator that moves the shift finger identified as gear actuator #2.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 786 Transmission Defuel Actuator

Identifies the status of the actuator that controls the engine defuel mechanism.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 787 Transmission Inertia Brake Actuator

Identifies the status of the actuator that controls the inertia brake.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65223	

SPN 788 *Transmission Clutch Actuator*

Identifies the status of the actuator that controls the clutch.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65223

Operational Range: same as data range

SPN 875 *Refrigerant Low Pressure Switch*

Switch signal which indicates the position of the low pressure switch in the coolant circuit of an air conditioning system. When the switch is enabled, the pressure inside the circuit is too low and the compressor clutch may be disengaged.

00 - Pressure normal
01 - Pressure too low, compressor clutch may be disengaged
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65252

Operational Range: same as data range

SPN 897 Override Control Mode Priority

This field is used as an input to the engine or retarder to determine the priority of the Override Control Mode received in the Torque/Speed Control message (see PGN 0). The default is 11 (Low priority). It is not required to use the same priority during the entire override function. For example, the transmission can use priority 01 (High priority) during a shift, but can set the priority to 11 (Low priority) at the end of the shift to allow traction control to also interact with the torque limit of the engine.

The four priority levels defined are:

- 00 Highest priority
- 01 High priority
- 10 Medium priority
- 11 Low priority

00b - Highest Priority = Used for situations that require immediate action by the receiving device in order to provide safe vehicle operation (i.e., braking systems). This level of priority should only be used in safety critical conditions.

01b - High Priority = Used for control situations that require prompt action in order to provide safe vehicle operation. An example is when the transmission is performing a shift and requires control of the engine in order to control driveline reengagement.

10b - Medium Priority = Used for powertrain control operations which are related to assuring that the vehicle is in a stable operating condition. An example is when the traction control system is commanding the engine in order to achieve traction stability.

11b - Low Priority = Used to indicate that the associated command desires powertrain control but is needed for function which improves the driver comfort which may be overridden by other devices. An example is cruise control or the non-critical part of a transmission shift to a new gear.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	0	

SPN 898 Engine Requested Speed/Speed Limit

Parameter provided to the engine from external sources in the torque/speed control message. This is the engine speed which the engine is expected to operate at if the speed control mode is active or the engine speed which the engine is not expected to exceed if the speed limit mode is active.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	0	

SPN 899 Engine Torque Mode

State signal which indicates which engine torque mode is currently generating, limiting, or controlling the torque. Note that the modes are not in prioritized order. Not all modes may be relevant for a given device. Some devices may not implement all functions. For typical priorities refer to Figures SPN512_A and SPN512_B for engine control. The data type of this parameter is measured.

Mode 0000b means "No request": engine torque may range from 0 to full load only due to low idle governor output.

Modes 0001b to 1110b indicate that there is either a torque request or the identified function is currently controlling the engine: engine torque may range from 0 (no fueling) to the upper limit.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 899	
PGN reference:	61444	

SPN 900 Retarder Torque Mode

State signal which indicates which retarder torque mode is currently generating, limiting, or controlling the torque. Note that the modes are not in prioritized order. Not all modes may be relevant for a given device. Some devices may not implement all functions. For typical priorities refer to Tables SPN518_A to SPN518_B for retarder control. The data type of this parameter is measured.

Mode 0000b means "No request": retarder torque = 0 (no braking).

Modes 0001b to 1110b indicate that there is either a torque request or the identified function is currently controlling the retarder: retarder torque may range from 0 (no braking) to the upper limit.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 899	
PGN reference:	61440	

SPN 901 Retarder Type

A vehicle retarder is a supplementary device to the wheel brakes for the driver to better control the vehicle. The wheel brakes used in the vehicle are not designed for continuous retarding operation. In a prolonged period of braking, the brakes can be thermally over-stressed, causing the braking effect to be reduced or even lead to complete braking system failure. The vehicle retarder is designed for continuous operation for braking during downhill operation and is also used for braking the vehicle to comply with speed limits and traffic conditions.

This parameter provides some indication of the retarder dynamics. It is used in the retarder configuration message. The data type of this parameter is measured.

0000 Electric/Magnetic
 0001 Hydraulic
 0010 Cooled Friction
 0011 Compression Release (Engine retarder)
 0100 Exhaust
 0101-1101 Not defined
 1110 Other
 1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information: See Appendix D - SPN 901

PGN reference: 65249

SPN 902 Retarder Location

This parameter defines whether the "torque/speed curve" defined by the retarder configuration message (PGN 65249) is dependent on engine rpm, output shaft rpm, or other parameter. The data type of this parameter is measured.

0000 (Primary) Engine Compression Release Brake (Engine rpm)
 0001 (Primary) Engine Exhaust Brake (Exhaust pressure)
 0010 (Primary) Transmission Input (Engine rpm)
 0011 (Secondary) Transmission Output (Output Shaft rpm)
 0100 (Secondary) Driveline (Output Shaft rpm)
 0101 Trailer (Vehicle speed)
 0110-1101 Not defined
 1110 Other
 1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65249

SPN 903 *Transmission Forward Direction Switch*

Identifies the status of the switch that indicates forward direction.

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65219	

SPN 904 *Front Axle Speed*

The average speed of the two front wheels.

Data Length:	2 bytes	
Resolution:	1/256 km/h per bit, 0 offset	
Data Range:	0 to 250.996 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65215	

SPN 905 *Relative Speed; Front Axle, Left Wheel*

The speed of the front axle, left wheel relative to the front axle speed, SPN 904.

Data Length:	1 byte	
Resolution:	1/16 km/h per bit, -7.8125 km/h offset	
Data Range:	-7.8125 to 7.8125 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65215	

SPN 906 *Relative Speed; Front Axle, Right Wheel*

The speed of the front axle, right wheel relative to the front axle speed, SPN 904.

Data Length:	1 byte	
Resolution:	1/16 km/h per bit, -7.8125 km/h offset	
Data Range:	-7.8125 to 7.8125 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65215	

SPN 907 *Relative Speed; Rear Axle #1, Left Wheel*

The speed of the rear axle #1, left wheel relative to the front axle speed, SPN 904.

Data Length:	1 byte	
Resolution:	1/16 km/h per bit, -7.8125 km/h offset	
Data Range:	-7.8125 to 7.8125 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65215	

SPN 908 ***Relative Speed; Rear Axle #1, Right Wheel***

The speed of the rear axle #1, right wheel relative to the front axle speed, SPN 904.

Data Length: 1 byte
 Resolution: 1/16 km/h per bit, -7.8125 km/h offset
 Data Range: -7.8125 to 7.8125 km/h Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65215

SPN 909 ***Relative Speed; Rear Axle #2, Left Wheel***

The speed of the rear axle #2, left wheel relative to the front axle speed, SPN 904.

Data Length: 1 byte
 Resolution: 1/16 km/h per bit, -7.8125 km/h offset
 Data Range: -7.8125 to 7.8125 km/h Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65215

SPN 910 ***Relative Speed; Rear Axle #2, Right Wheel***

The speed of the rear axle #2, right wheel relative to the front axle speed, SPN 904.

Data Length: 1 byte
 Resolution: 1/16 km/h per bit, -7.8125 km/h offset
 Data Range: -7.8125 to 7.8125 km/h Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65215

SPN 911 ***Service Component Identification***

Identification of component needing service. See Table SPN911_A.

Data Length: 1 byte
 Resolution: 1 ID/bit, 0 offset
 Data Range: 0 to 250 ID Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - SPN 911
 PGN reference: 65216

SPN 912 ***Service Component Identification***

Identification of component needing service. See Table SPN911_A.

Data Length: 1 byte
 Resolution: 1 ID/bit, 0 offset
 Data Range: 0 to 250 ID Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65216

SPN 913 Service Component Identification

Identification of component needing service. See Table SPN911_A.

Data Length:	1 byte	
Resolution:	1 ID/bit, 0 offset	
Data Range:	0 to 250 ID	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65216	

SPN 914 Service Distance

The distance which can be traveled by the vehicle before the next service inspection is required. A negative distance is transmitted if the service inspection has been passed. The component that requires service is identified by the service component identification (see SPN 911-913, 1379, and 1584).

Data Length:	2 bytes	
Resolution:	5 km/bit, -160,635 km offset	
Data Range:	-160,635 to 160,640 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65216	

SPN 915 Service Delay/Calendar Time Based

The time in weeks until the next vehicle service inspection is required. A negative value is transmitted if the service inspection has been passed. The component that requires service is identified by the service component identification (see SPN 911-913, 1379, and 1584).

Data Length:	1 byte	
Resolution:	1 week/bit, -125 weeks offset	
Data Range:	-125 to 125 weeks	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65216	

SPN 916 Service Delay/Operational Time Based

The time in vehicle operational time until the next vehicle service inspection is required. A negative value is transmitted if the service inspection has been passed. The component that requires service is identified by the service component identification (see SPN 911-913, 1379, and 1584).

Data Length:	2 bytes	
Resolution:	1 hr/bit, -32,127 hr offset	
Data Range:	-32,127 to 32,128 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65216	

SPN 917 High Resolution Total Vehicle Distance

Accumulated distance traveled by the vehicle during its operation.

NOTE - See SPN 245 for alternate resolution.

Data Length:	4 bytes	
Resolution:	5 m/bit, 0 offset	
Data Range:	0 to 21,055,406 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65217	

SPN 918 High Resolution Trip Distance

Distance traveled during all or part of a journey.

NOTE - See SPN 244 for alternate resolution.

Data Length:	4 bytes	
Resolution:	5 m/bit, 0 offset	
Data Range:	0 to 21,055,406 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65217	

SPN 927 Location

To identify to which of several similar devices (such as tires or fuel tanks) the information applies.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61446	

SPN 928 *Axle Location*

To identify to which of several similar devices (such as tires or fuel tanks) the information applies.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65258	

SPN 929 *Tire Location*

Identifies which tire is associated with the parametric data in this PGN.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65268	

SPN 930 Drive Axle Location

To identify to which of several similar devices (such as tires or fuel tanks) the information applies.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65273	

SPN 957 Number of Forward Gear Ratios

Number of forward gear ratios in the transmission, provided as part of the configuration.

Data Length:	1 byte	
Resolution:	1 gear value/bit, 0 offset	
Data Range:	0 to 250	Operational Range: 0 to 125 gear ratios
Type:	Measured	
Supporting Information:		
PGN reference:	65250	

SPN 958 Number of Reverse Gear Ratios

Number of reverse gear ratios in the transmission, provided as part of the transmission configuration.

Data Length:	1 byte	
Resolution:	1 gear value/bit, 0 offset	
Data Range:	0 to 250	Operational Range: 0 to 125 gear ratios
Type:	Measured	
Supporting Information:		
PGN reference:	65250	

SPN 959 Seconds

The seconds component of the current time of day. This should be reported as the seconds component of the current time at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the seconds component of the current time at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the time of day (SPNs 959, 960, and 961) is the current UTC time or a local time zone time. Refer to SPN 1602 for details.

Data Length:	1 byte	
Resolution:	0.25 s/bit, 0 offset	
Data Range:	0 to 62.5 s	Operational Range: 0 to 59.75 sec
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	65254	

SPN 960 Minutes

The minutes component of the current time of day. This should be reported as the minutes component of the current time at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the minutes component of the current time at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the time of day (SPNs 959, 960, and 961) is the current UTC time or a local time zone time. Refer to SPN 1602 for details.

Data Length:	1 byte	
Resolution:	1 min/bit, 0 offset	
Data Range:	0 to 250 mins	Operational Range: 0 to 59 min
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	65254	

SPN 961 Hours

The hour component of the current time of day. This should be reported as the hour component of the current time at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the hour component of the current time at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if time of day (SPNs 959, 960, and 961) is the current UTC time or a local time zone time. Refer to SPN 1602 for details.

Data Length:	1 byte	
Resolution:	1 hr/bit, 0 offset	
Data Range:	0 to 250 hr	Operational Range: 0 to 23 hr
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	65254	

SPN 962 Day

The day component of the current calendar date. This should be reported as the day component of the current date at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the day component of the current date at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the calendar date (SPNs 962, 963, and 964) is the current UTC date or a local time zone date. Refer to SPN 1602 for details.

NOTE - A value of 0 for the date is null. The values 1, 2, 3, and 4 are used to identify the first day of the month; 5, 6, 7, and 8 identify the second day of the month; etc.

Data Length:	1 byte	
Resolution:	0.25 days/bit, 0 offset	
Data Range:	0 to 62.5 days	Operational Range: 0.25 to 31.75 day
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	65254	

SPN 963 Month

The month component of the current calendar date. This should be reported as the month component of the current date at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the month component of the current date at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the calendar date (SPNs 962, 963, and 964) is the current UTC date or a local time zone date. Refer to SPN 1602 for details.

NOTE - A value of 0 for the month is null. The value 1 identifies January; 2 identifies February; etc.

Data Length:	1 byte	
Resolution:	1 month/bit, 0 offset	
Data Range:	0 to 250 months	Operational Range: 1 to 12 month
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	65254	

SPN 964 Year

The year component of the current calendar date. This should be reported as the year component of the current date at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the year component of the current date at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the calendar date (SPNs 962, 963, and 964) is the current UTC date or a local time zone date. Refer to SPN 1602 for details.

NOTE - A value of 0 for the year identifies the year 1985; a value of 1 identifies 1986; etc.

Data Length:	1 byte	
Resolution:	1 year/bit, 1985 years offset	
Data Range:	1985 to 2235 years	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	65254	

SPN 965 Number of Software Identification Fields

Number of software identification designators represented in the software identification parameter group.

Data Length:	1 byte	
Resolution:	1 step/bit, 0 offset	
Data Range:	0 to 250 steps	Operational Range: 0 to 125
Type:	Measured	
Supporting Information:		
PGN reference:	65242	

SPN 966 Engine Test Mode Switch

Switch signal which indicates the position of the engine test mode switch.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 967 Engine Idle Decrement Switch

Switch signal which indicates the position of the idle decrement switch.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 968 Engine Idle Increment Switch

Switch signal which indicates the position of the idle increment switch.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 969 Remote Accelerator Enable Switch

Switch signal which indicates that the remote accelerator has been enabled and controls the engine.

00 - Off
01 - On
10 - Error
11 - Not available

NOTE—The accelerator interlock switch (see SPN 972) must be disabled in order for the remote accelerator to perform engine control.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61441	

SPN 970 Engine Auxiliary Shutdown Switch

Switch signal which requests that all engine fueling stop.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61441	

SPN 971 Engine Derate Switch

Switch signal used to activate the torque limiting feature of the engine. The specific nature of torque limiting should be verified with the manufacturer.

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 61441

Operational Range: same as data range

SPN 972 Accelerator Interlock Switch

Switch signal used to disable the accelerator and remote accelerator inputs, causing the engine to return to idle.

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 61441

Operational Range: same as data range

SPN 973 Engine Retarder Selection

The position of the operator controlled selector, expressed as a percentage and determined by the ratio of the current position of the selector to its maximum possible position. Zero percent means no braking torque is requested by the operator from the engine while 100% means maximum braking.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 %
 Type: Measured
 Supporting Information:
 PGN reference: 61441

Operational Range: same as data range

SPN 974 Remote Accelerator Pedal Position

The ratio of actual position of the remote analog engine speed/torque request input device (such as an accelerator pedal or throttle lever) to the maximum position of the input device.

For example, in on-highway vehicles this could be an accelerator control device that is external to the drivers cab or an accelerator that is controlled by a hand lever from the operators seat.

The Remote Accelerator Enable Switch is SPN 969. This parameter enables the remote accelerator operation.

NOTE—See SPNs 29 and 91 for additional accelerator position parameters. If only one accelerator position exists on a vehicle, SPN 91 shall be used. SPN 28 is an additional diagnostic SPN for accelerator position.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61443	

SPN 975 Estimated Percent Fan Speed

Estimated fan speed as a ratio of the fan drive (current speed) to the fully engaged fan drive (maximum fan speed). A two state fan (off/on) will use 0% and 100% respectively. A three state fan (off/intermediate/on) will use 0%, 50% and 100% respectively. A variable speed fan will use 0% to 100%. Multiple fan systems will use 0 to 100% to indicate the percent cooling capacity being provided.

Note that the intermediate fan speed of a three state fan will vary with different fan drives, therefore 50% is being used to indicate that the intermediate speed is required from the fan drive.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65213	

SPN 976***PTO Governor State***

This parameter is used to indicate the current state or mode of operation by the power takeoff (PTO) governor. In lieu of support for PTO Drive Engagement parameters, this parameter may represent the status of a PTO drive. The broadcasting device must ensure that each achieved state is conveyed in at least one message broadcast before a transition to another state is allowed.

00000	Off/Disabled
00001	Hold
00010	Remote Hold
00011	Standby
00100	Remote Standby
00101	Set
00110	Decelerate/Coast
00111	Resume
01000	Accelerate
01001	Accelerator Override
01010	Preprogrammed set speed 1
01011	Preprogrammed set speed 2
01100	Preprogrammed set speed 3
01101	Preprogrammed set speed 4
01110	Preprogrammed set speed 5
01111	Preprogrammed set speed 6
10000	Preprogrammed set speed 7
10001	Preprogrammed set speed 8
10010	PTO set speed memory 1
10011	PTO set speed memory 2
10100-11110	Not defined
11111	Not available

Off/Disabled 00000b — Used to indicate that the PTO governor enable switch is in the off position.

Hold 00001b — Used to indicate that the PTO governor is active and currently maintaining a captured operating speed.

Remote Hold 00010b — Used to indicate that the remote PTO governor is active and the PTO governor is currently maintaining a captured operating speed.

Standby 00011b — Used to indicate that the PTO governor device enable switch is in the ON position and it is possible to manage the PTO governor.

Remote Standby 00100b — Used to indicate that the remote PTO governor device enable switch is in the ON position and it is possible to manage the PTO governor.

Set 00101b — Used to indicate that the PTO governor is establishing current speed as the operating speed (captured value).

Decelerate/Coast 00110b — Used to indicate that the PTO governor is in the process of ramping down, or coasting, from the current operating speed.

Resume 00111b — Used to indicate that the PTO governor is in the process of resuming the operating speed to a previously captured value.

Accelerate 01000b — Used to indicate that the PTO governor is in the process of ramping up the operating speed.

Accelerator Override 01001b—Used to indicate that the PTO governor is active but for the present time the engine is controlled by a large driver's demand.

Preprogrammed PTO Governor Set Speed 1 01010b—Used to indicate that the PTO device is establishing a first preprogrammed PTO governor set speed (user programmable) as the current operating speed.

Preprogrammed PTO Governor Set Speed 2 01011b—Used to indicate that the PTO device is establishing a second preprogrammed PTO governor set speed (user programmable) as the current operating speed.

Preprogrammed PTO Governor Set Speed 3 01100b —Used to indicate that the remote PTO device is establishing a third preprogrammed PTO governor set speed (user programmable) as the current operating speed.

Preprogrammed PTO Governor Set Speed 4 01101b —Used to indicate that the remote PTO device is establishing a fourth preprogrammed PTO governor set speed (user programmable) as the current operating speed.

Preprogrammed PTO Governor Set Speed 5 01110b —Used to indicate that the remote PTO device is establishing a fifth preprogrammed PTO governor set speed (user programmable) as the current operating speed.

Preprogrammed PTO Governor Set Speed 6 01111b—Used to indicate that the remote PTO device is establishing a sixth preprogrammed PTO governor set speed (user programmable) as the current operating speed.

Preprogrammed PTO Governor Set Speed 7 10000b —Used to indicate that the remote PTO device is establishing a seventh preprogrammed PTO governor set speed (user programmable) as the current operating speed.

Preprogrammed PTO Governor Set Speed 8 10001b —Used to indicate that the remote PTO device is establishing a eighth preprogrammed PTO governor set speed (user programmable) as the current operating speed.

PTO set speed memory 1 10010b —Used to indicate that PTO set speed memory one set state is active.

PTO set speed memory 2 10011b — Used to indicate that PTO set speed memory two set state is active.

Data Length: 5 bits

Resolution: 32 states/5 bit, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65265

SPN 977**Fan Drive State**

This parameter is used to indicate the current state or mode of operation by the fan drive.

0000 Fan off
 0001 Engine system—General
 0010 Excessive engine air temperature
 0011 Excessive engine oil temperature
 0100 Excessive engine coolant temperature
 0101 Excessive transmission oil temperature
 0110 Excessive hydraulic oil temperature
 0111 Default Operation
 1000 Reverse Operation
 1001 Manual control
 1010 Transmission retarder
 1011 A/C system
 1100 Timer
 1101 Engine brake
 1110 Other
 1111 Not available

Fan off 0000b —Used to indicate that the fan clutch is disengaged and the fan is inactive

Engine system—General 0001b —Used to indicate that the fan is active due to an engine system not otherwise defined.

Excessive engine air temperature 0010b —Used to indicate that the fan is active due to high air temperature.

Excessive engine oil temperature 0011b —Used to indicate that the fan is active due to high oil temperature.

Excessive engine coolant temperature 0100b —Used to indicate that the fan is active due to high coolant temperature.

Reverse Operation 1000b — Used to indicate that the fan is in reverse direction of operation compared to the normal direction of operation

Manual control 1001b —Used to indicate that the fan is active as requested by the operator.

Transmission retarder 1010b —Used to indicate that the fan is active as required by the transmission retarder.

A/C system 1011b —Used to indicate that the fan is active as required by the air conditioning system.

Timer 1100b —Used to indicate that the fan is active as required by a timing function.

Engine brake 1101b —Used to indicate that the fan is active as required to assist engine braking.

Excessive transmission oil temperature - 0101b - Used to indicate fan is active due to excessive transmission oil temperature.

Excessive hydraulic oil temperature - 0110b - Used to indicate fan is active due to excessive hydraulic oil temperature.

Default Operation - 0111b - Used to indicate fan is active due to a error condition resulting in default operation

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65213

SPN 978 Engine Remote PTO Governor Variable Speed Control Switch

Switch signal which indicates that the remote PTO governor toggle switch is in the enabled (ON) position. If the toggle switch is enabled and other conditions are satisfied then the remote PTO governor feature is activated and the PTO governor will control at a variable speed.

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65264	

SPN 979 Engine Remote PTO Governor Preprogrammed Speed Control Switch

Switch signal which indicates that the remote PTO governor toggle switch is in the enabled (ON) position. If the toggle switch is enabled and other conditions are satisfied then the remote PTO governor feature is activated and the PTO governor will control at the preprogrammed speed.

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65264	

SPN 980 Engine PTO Governor Enable Switch

Switch signal which indicates that the PTO governor toggle switch is in the enabled (ON) position and therefore it is possible to manage the PTO control function.

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65264	

SPN 981 Engine PTO Governor Accelerate Switch

Switch signal of the PTO control activator which indicates that the activator is in the position to "accelerate" the PTO governor set speed.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65264

Operational Range: same as data range

SPN 982 Engine PTO Governor Resume Switch

Switch signal of the PTO control activator which indicates that the activator is in the position to "resume" a previously established PTO governor set speed.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65264

Operational Range: same as data range

SPN 983 Engine PTO Governor Coast/Decelerate Switch

Switch signal of the PTO control activator which indicates that the activator is in the position to "coast/decelerate" the PTO governor set speed.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65264

Operational Range: same as data range

SPN 984 Engine PTO Governor Set Switch

Switch signal of the PTO control activator which indicates that the activator is in the position to "set" the engine PTO governor set speed.

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65264

Operational Range: same as data range

SPN 985 A/C High Pressure Fan Switch

Switch signal which indicates that the pressure in the coolant circuit of an air conditioning system is high and the fan may be engaged.

00 - Pressure normal
 01 - Pressure high, fan may be engaged
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65252

Operational Range: same as data range

SPN 986 Requested Percent Fan Speed

Fan speed as a ratio of the actual fan drive (current speed) to the fully engaged fan drive (maximum fan speed). A two state fan (off/on) will use 0% and 100% respectively. A three state fan (off/intermediate/on) will use 0%, 50% and 100% respectively. A variable speed fan will use 0% to 100%. Multiple fan systems will use 0 to 100% to indicate the percent cooling capacity being provided. Feedback to this request is provided using the estimated fan speed (see SPN 975).

Note that the intermediate fan speed of a three state fan will vary with different fan drives, therefore 50% is being used to indicate that the intermediate speed is required from the fan drive.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 %
 Type: Status
 Supporting Information:
 PGN reference: 57344

Operational Range: same as data range

SPN 988 ***Trip Group 1***

Command signal used to reset the PGNs and parameters as defined in Table SPN988_A.

00 Take no action
 01 Reset
 10 Reserved
 11 Not applicable

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 988	
PGN reference:	56832	

SPN 989 ***Trip Group 2 - Proprietary***

Command signal used to reset proprietary parameters associated with a trip but not defined within this document.

00 Take no action
 01 Reset
 10 Reserved
 11 Not applicable

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	56832	

SPN 990 ***Total Compression Brake Distance***

Total distance over which the compression brakes have been active for the life of the engine.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65212	

SPN 991 ***Trip Compression Brake Distance***

Total distance over which the compression brakes have been active since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65212	

SPN 992 Trip Service Brake Distance

Total distance over which the service brakes have been active since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65212	

SPN 993 Trip Service Brake Applications

Total number of times the service brakes have been activated since the last trip reset. Brake applications of less than 0.5 s are not counted and lengthy brake applications (longer than 0.5 s) are counted as a single event.

NOTE - Definition and resolution shall stay the same if brakes are applied by only the tractor, only the trailer or both.

Data Length:	4 bytes	
Resolution:	1 brake appl/bit, 0 offset	
Data Range:	0 to 4,227,858,431 appl	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65212	

SPN 994 Trip Fan On Time

Total time the fan has been on (due to an automatic trigger or manual trigger) since the last trip reset. The fan could be requested to be on by the engine system, a manual switch, and/or the A/C system. Whichever system requests the fan activation first shall have the time accumulated against it. The sum total of these three values shall equal the trip fan on time.

NOTE—If the fan has been requested to be on by a component that is not one of the defined categories, this time shall be accumulated in the Engine System category by default.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65211	

SPN 995 Trip Fan On Time Due to the Engine System

Total time the fan has been on due to engine triggers (i.e., excluding time on due to an operator manual switch or A/C system) since the last trip reset. For the time to be accumulated against the engine system, it is necessary that it be the first to request the fan activation or it be the only system requesting fan activation.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65211	

SPN 996 ***Trip Fan On Time Due to a Manual Switch***

Total time the fan has been on due to manual activation by the operator (i.e., excluding time on due to automatic triggers) since the last trip reset. For the time to be accumulated against the manual switch, it is necessary that it be the first to request the fan activation or it be the only system requesting fan activation.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65211	

SPN 997 ***Trip Fan On Time Due to the A/C System***

Total time the fan has been on due to the A/C system since the last trip reset. For the time to be accumulated against the A/C system, it is necessary that it be the first to request the fan activation or it be the only system requesting fan activation.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65211	

SPN 998 ***Trip Distance on VSL***

Total distance accumulated while the engine torque mode is road speed governing since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65210	

SPN 999 ***Trip Gear Down Distance***

Total distance accumulated while the vehicle has operated in the gear which is one gear down from top gear and exceeds a calibrated minimum time (typically the time to shift the transmission) since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65210	

SPN 1000 ***Trip Distance in Top Gear***

Total distance accumulated while the vehicle has operated in top gear for a calibrated minimum time since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65210	

SPN 1001 *Trip Drive Fuel Used*

Total fuel consumed while the engine speed is greater than zero, vehicle speed is greater than or equal to 2 km/h, and neither the PTO or the remote PTO is controlling the engine power output, since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1007 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65209	

SPN 1002 *Trip PTO Governor Moving Fuel Used*

Total fuel consumed while either the PTO or remote PTO governors are in the hold state, the engine speed is greater than zero, and vehicle speed is greater than or equal to 2 km/h, since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1008 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65209	

SPN 1003 *Trip PTO Governor Non-moving Fuel Used*

Total fuel consumed while either the PTO or remote PTO governors are in the hold state, the engine speed is greater than zero, and vehicle speed is less than 2 km/h, since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1009 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65209	

SPN 1004 *Trip Vehicle Idle Fuel Used*

Total fuel consumed while neither the PTO or remote PTO governor is in the hold state, the engine speed is greater than zero, and vehicle speed is less than 2 km/h, since the last trip reset.

In marine applications, this parameter is defined as the total fuel consumed while the engine speed is greater than zero, and less than or equal to 50 RPM greater than low idle, since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1010 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65209	

SPN 1005 ***Trip Cruise Fuel Used***

Total fuel consumed while the engine is in the cruise hold state since the last trip reset. If both cruise control and VSL (vehicle speed limiter) are commanding the same amount of fuel, the cruise control is deemed the active torque mode and fuel will be accumulated in "trip cruise fuel used" parameter. If fuel commanded due to the accelerator pedal position is larger than fuel commanded by cruise control (e.g., accelerator override torque mode), the cruise control is not deemed the active torque mode and fuel will not be accumulated in the "trip cruise fuel used" parameter.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1011 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65209	

SPN 1006 ***Trip Drive Fuel Economy***

Trip drive fuel economy is equal to the distance traveled by vehicle in the drive state (engine speed greater than zero, vehicle speed greater than or equal to 2 km/h, and neither the PTO or remote PTO governors are controlling engine power output) divided by trip drive fuel used (SPN 1001), since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1012 for alternate resolution.

Data Length:	2 bytes	
Resolution:	1/512 km/L per bit, 0 offset	
Data Range:	0 to 125.498046875 km/L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65209	

SPN 1007 ***Trip Drive Fuel Used (Gaseous)***

Total fuel consumed while the engine speed is greater than zero, vehicle speed is greater than or equal to 2 km/h, and neither the PTO or the remote PTO governors are controlling the engine power output, since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1001 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 kg/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65208	

SPN 1008 ***Trip PTO Governor Moving Fuel Used (Gaseous)***

Total fuel consumed while the PTO or remote PTO governors are in the hold state, the engine speed is greater than zero, and vehicle speed is greater than or equal to 2 km/h, since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1002 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 kg/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65208	

SPN 1009 Trip PTO Governor Non-moving Fuel Used (Gaseous)

Total fuel consumed while the PTO or remote PTO governors are in the hold state, the engine speed is greater than zero, and vehicle speed is less than to 2 km/h, since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1003 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 kg/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65208	

SPN 1010 Trip Vehicle Idle Fuel Used (Gaseous)

Total fuel consumed while neither the PTO or remote PTO governors are active, the engine speed is greater than zero, and vehicle speed is less than to 2 km/h, since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1004 for alternate resolution. Trip vehicle idle fuel while in fast idle (vehicle speed less than 2 km/h with engine speed greater than 700 rpm) shall be accumulated in the trip vehicle idle fuel category. All other fuel usage scenarios that do not fall directly in the categories defined shall be accumulated in trip drive fuel used.

Data Length:	4 bytes	
Resolution:	0.5 kg/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65208	

SPN 1011 Trip Cruise Fuel Used (Gaseous)

Total fuel consumed while the engine is in the cruise hold state since the last trip reset. If both cruise control and VSL (vehicle speed limiter) are commanding the same amount of fuel, the cruise control is deemed the active torque mode and fuel will be accumulated in "trip cruise fuel used" parameter. If fuel commanded due to the accelerator pedal position is larger than fuel commanded by cruise control (e.g., accelerator override torque mode), the cruise control is not deemed the active torque mode and fuel will not be accumulated in the "trip cruise fuel used" parameter.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1005 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 kg/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65208	

SPN 1012 Trip Drive Fuel Economy (Gaseous)

Trip drive fuel economy is equal to the distance traveled by vehicle in the drive state (engine speed greater than zero, vehicle speed greater than or equal to 2 km/h, and neither the PTO or remote PTO governors are controlling engine power output) divided by trip drive fuel used (SPN 1007), since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1006 for alternate resolution.

Data Length:	2 bytes	
Resolution:	1/512 km/kg per bit, 0 offset	
Data Range:	0 to 125.498046875 km/kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65208	

SPN 1013 Trip Maximum Engine Speed

Maximum engine speed achieved since the last trip reset.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65207	

SPN 1014 Trip Average Engine Speed

Average speed of the engine since the last trip reset.

NOTE — Excludes ignition-on time without the engine speed above zero. Includes idle, engine PTO governor (moving and non-moving), and drive operation.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1014	
PGN reference:	65207	

SPN 1015 Trip Drive Average Load Factor

Average engine load factor while engine speed is greater than zero, vehicle speed is greater than or equal to 2 km/h, and both the PTO (moving/non-moving) and remote PTO governors are not in the hold state, since the last trip reset. Engine operation during cruise control operation is included.

In marine applications, this parameter is defined as the average engine load factor while engine speed is greater than zero, since last trip reset.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65207	

SPN 1016 Total Drive Average Load Factor

Average engine load factor while engine speed is greater than zero, vehicle speed is greater than or equal to 2 km/h, and both the PTO (moving/non-moving) and remote PTO governors are not in the hold state, over the life of the engine. Engine operation during cruise control operation is included.

In marine applications, this parameter is defined as the average engine load factor while engine speed is greater than zero.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65207	

SPN 1017 Total Engine Cruise Time

Total time that the engine has operated in the cruise hold state, excluding time in accelerator override, over the life of the engine.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65207	

SPN 1018 Trip Maximum Vehicle Speed

Maximum vehicle speed achieved while the engine speed is greater than zero and the accelerator pedal position (APS) is at a value greater than 0%, since the last trip reset.

Data Length:	2 bytes	
Resolution:	1/256 km/h per bit, 0 offset	
Data Range:	0 to 250.996 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65206	

SPN 1019 Trip Cruise Distance

Total distance that the engine has operated in the cruise hold state, excluding time in accelerator override, since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65206	

SPN 1020 Trip Number of Hot Shutdowns

Total number of hot shutdowns since the last trip reset. A hot shutdown is based on operation at high load or high engine speed or for long operating periods without allowing the engine to cool sufficiently.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 64,255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65205	

SPN 1021 Trip Number of Idle Shutdowns

Total number of times the engine has been shutdown due to idling too long (at normal idle or fast idle) since the last trip reset.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 64,255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65205	

SPN 1022 Trip Number of Idle Shutdown Overrides

Total number of times an operator disables idle shutdown to prevent an engine shutdown, since the last trip reset.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 64,255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65205	

SPN 1023 Trip Sudden Decelerations

Total number of decelerations whenever the vehicle deceleration is more than XYZ km/h/sec (where XYZ is a calibratable threshold), since the last trip reset. A lengthy deceleration shall be counted as one sudden deceleration.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 64,255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65205	

SPN 1024 Trip Time in VSL

Total time accumulated when the engine has operated on the vehicle speed limiter (VSL) while not in the cruise hold state, since the last trip reset. The engine torque mode is equal to road speed governor during this operation.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65204	

SPN 1025 ***Trip Time in Top Gear***

Total time accumulated when the vehicle has operated in top gear for a calibrated minimum time, since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65204	

SPN 1026 ***Trip Time in Gear Down***

Total time accumulated when the vehicle has operated in one gear down from the top gear for a calibrated minimum time, since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65204	

SPN 1027 ***Trip Time in Derate by Engine***

Total time accumulated when the engine final fueling has been derated due to an engine protection algorithm, since the last reset.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65204	

SPN 1028 ***Total Engine PTO Governor Fuel Used***

Total fuel used while the PTO or remote PTO governors are in the hold state and engine speed is above zero, over the life of the engine.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1030 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65203	

SPN 1029 ***Trip Average Fuel Rate***

Average fuel rate, equal to trip fuel divided by trip time while the engine speed is above zero, since the last trip reset. This includes idle, engine PTO governor (both moving and non-moving) and drive operation but excludes ignition-on time while the engine speed is at zero rpm.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1031 for alternate resolution.

Data Length:	2 bytes	
Resolution:	0.05 L/h per bit, 0 offset	
Data Range:	0 to 3,212.75 L/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65203	

SPN 1030 ***Total Engine PTO Governor Fuel Used (Gaseous)***

Total fuel used while the PTO or remote PTO governors are in the hold state and engine speed is above zero, over the life of the engine.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1028 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.5 kg/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65202	

SPN 1031 ***Trip Average Fuel Rate (Gaseous)***

Average fuel rate, equal to trip fuel divided by trip time while the engine speed is above zero, since the last trip reset. This includes idle, engine PTO governor (both moving and non-moving) and drive operation but excludes ignition-on time while the engine speed is at zero rpm.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1029 for alternate resolution.

Data Length:	2 bytes	
Resolution:	0.05 kg/h per bit, 0 offset	
Data Range:	0 to 3212.75 kg/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65202	

SPN 1032 ***Total ECU Distance***

Total distance accumulated over the life of the ECU. When the ECU is replaced this value shall be reset.

Data Length:	4 bytes	
Resolution:	0.125 km/bit, 0 offset	
Data Range:	0 to 526,385,151.9 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65201	

SPN 1033 *Total ECU Run Time*

Total time accumulated over the life of the ECU, from ignition switch ON to ignition switch OFF. When the ECU is replaced this value shall be reset.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65201	

SPN 1034 *Trip Cruise Time*

Total time accumulated while the engine is in the cruise hold state, excluding time in accelerator override, since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65200	

SPN 1035 *Trip PTO Governor Time*

Total time accumulated while the engine is in the PTO or remote PTO governor hold state since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65200	

SPN 1036 *Trip Engine Running Time*

Total time accumulated while the engine speed is greater than zero since the last trip reset. Note that time with the ignition switch on but engine speed at zero is not included.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65200	

SPN 1037 *Trip Idle Time*

Total time accumulated while the engine speed is greater than zero, both the PTO and remote PTO governors are inactive, and the vehicle speed is less than 2 km/h, since the last trip reset.

In marine applications, this parameter is defined as the total time accumulated while the engine speed is greater than zero, and less than or equal to 50 RPM greater than low idle, since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65200	

SPN 1038 Trip Air Compressor On Time

Total time that the air compressor is on and compressing air since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65200	

SPN 1039 Trip Fuel (Gaseous)

Total fuel consumed (trip drive fuel + trip PTO governor moving fuel + trip PTO governor non-moving fuel + trip idle fuel) since the last trip reset.

Data Length:	4 bytes	
Resolution:	0.5 kg/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65199	

SPN 1040 Total Fuel Used (Gaseous)

Total fuel consumed (trip drive fuel + trip PTO governor moving fuel + trip PTO governor non-moving fuel + trip idle fuel) over the life of the engine.

Data Length:	4 bytes	
Resolution:	0.5 kg/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65199	

SPN 1081 Engine Wait to Start Lamp

Lamp signal which indicates that the engine is too cold to start and the operator should wait until the signal becomes inactive (turns off). See SPN 5416 for the lamp operating condition.

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65252	

SPN 1082 Engine Coolant Load Increase

Status of an event, external to the engine, that may increase the nominal temperature of the engine coolant liquid.

00 - No coolant load increase

01 - Coolant load increase possible

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61440

SPN 1083 Auxiliary I/O Channel #1

Auxiliary channel of data (16 bit) read by the ECU. This data is in A/D counts and is manufacturer specific. It may be configured uniquely per application.

Data Length: 2 bytes

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 64,255

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65241

SPN 1084 Auxiliary I/O Channel #2

Auxiliary channel of data (16 bit) read by the ECU. This data is in A/D counts and is manufacturer specific. It may be configured uniquely per application.

Data Length: 2 bytes

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 64,255

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65241

SPN 1085 Intended Retarder Percent Torque

Braking torque of retarder that the retarder is currently trying to achieve. This value takes into account all static limitations, but not the limitations due to the dynamic behavior of the retarder. This value, if unchanged over a certain time, can and will be reached by the actual retarder - percent torque (See SPN 520).

Data Length: 1 byte

Resolution: 1 %/bit, -125 % offset

Data Range: -125 to 125 %

Operational Range: -125 to 0%

Type: Status

Supporting Information: See Appendix D - SPN 1085

PGN reference: 61440

SPN 1086 *Parking and/or Trailer Air Pressure*

The pneumatic pressure in the circuit or reservoir for the parking brake and/or the trailer supply.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65198	

SPN 1087 *Service Brake Circuit 1 Air Pressure*

The pneumatic pressure in the primary service brake circuit or reservoir, supplying the rear axle.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65198	

SPN 1088 *Service Brake Circuit 2 Air Pressure*

The pneumatic pressure in the secondary service brake circuit or reservoir, supplying the front axle.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65198	

SPN 1089 *Auxiliary Equipment Supply Pressure*

The pneumatic pressure in the auxiliary circuit.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65198	

SPN 1090 *Air Suspension Supply Pressure*

The pneumatic pressure in the circuit for the electronically controlled air suspension system.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65198	

SPN 1091 Brake Application Pressure High Range, Front Axle, Left Wheel

The brake application pressure for the left wheel on the front axle.

Data Length:	1 byte	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 1,250 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65197	

SPN 1092 Brake Application Pressure High Range, Front Axle, Right Wheel

The brake application pressure for the right wheel on the front axle.

Data Length:	1 byte	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 1,250 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65197	

SPN 1093 Brake Application Pressure High Range, Rear Axle #1, Left Wheel

The brake application pressure for the left wheel on the rear axle #1.

Data Length:	1 byte	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 1,250 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65197	

SPN 1094 Brake Application Pressure High Range, Rear Axle #1, Right Wheel

The brake application pressure for the right wheel on the rear axle #1.

Data Length:	1 byte	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 1,250 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65197	

SPN 1095 Brake Application Pressure High Range, Rear Axle #2, Left Wheel

The brake application pressure for the left wheel on the rear axle #2.

Data Length:	1 byte	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 1,250 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65197	

SPN 1096 Brake Application Pressure High Range, Rear Axle #2, Right Wheel

The brake application pressure for the right wheel on the rear axle #2.

Data Length:	1 byte	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 1,250 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65197	

SPN 1097 Brake Application Pressure High Range, Rear Axle #3, Left Wheel

The brake application pressure for the left wheel on the rear axle #3.

Data Length:	1 byte	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 1,250 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65197	

SPN 1098 Brake Application Pressure High Range, Rear Axle #3, Right Wheel

The brake application pressure for the right wheel on the rear axle #3.

Data Length:	1 byte	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 1,250 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65197	

SPN 1099 Brake Lining Remaining, Front Axle, Left Wheel

The percentage of brake lining which can still be measured for the left wheel on the front axle. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65196	

SPN 1100 Brake Lining Remaining, Front Axle, Right Wheel

The percentage of brake lining which can still be measured for the right wheel on the front axle. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65196	

SPN 1101 Brake Lining Remaining, Rear Axle #1, Left Wheel

The percentage of brake lining which can still be measured for the left wheel on the rear axle #1. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65196	

SPN 1102 Brake Lining Remaining, Rear Axle #1, Right Wheel

The percentage of brake lining which can still be measured for the right wheel on the rear axle #1. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65196	

SPN 1103 Brake Lining Remaining, Rear Axle #2, Left Wheel

The percentage of brake lining which can still be measured for the left wheel on the rear axle #2. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65196	

SPN 1104 Brake Lining Remaining, Rear Axle #2, Right Wheel

The percentage of brake lining which can still be measured for the right wheel on the rear axle #2. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65196	

SPN 1105 Brake Lining Remaining, Rear Axle #3, Left Wheel

The percentage of brake lining which can still be measured for the left wheel on the rear axle #3. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65196	

SPN 1106 Brake Lining Remaining, Rear Axle #3, Right Wheel

The percentage of brake lining which can still be measured for the right wheel on the rear axle #3. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65196	

SPN 1107 Engine Protection System Timer State

Status signal which indicates the current mode of the engine protection system timer system. See Figure SPN1107_A.

00 - Inactive
 01 - Active
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1107	
PGN reference:	65252	

SPN 1108 Engine Protection System Timer Override

Status signal which indicates the status of the override feature of the engine protection system timer. See Figure SPN1107_A.

00 - Inactive
 01 - Active
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65252	

SPN 1109 Engine Protection System Approaching Shutdown

Status signal which indicates that engine shutdown is imminent. This engine protection signal can be a result of different systems failing, i.e., engine overheating. See Figure SPN1107_A.

00 - Not approaching
 01 - Approaching
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65252	

SPN 1110 Engine Protection System has Shutdown Engine

Status signal which indicates whether or not the engine protection system has shutdown the engine. See Figure SPN1107_A.

00 - No
 01 - Yes
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65252

Operational Range: same as data range

SPN 1111 Engine Protection System Configuration

Parameter which indicates the configuration of the engine shutdown system.

00 - Disabled in calibration
 01 - Enabled in calibration
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65252

Operational Range: same as data range

SPN 1113 Recommended Gear

The transmission calculates this gear continuously. In dangerous situations this gear may be selected to gain back vehicle control.

Data Length: 1 byte
 Resolution: 1 gear value/bit, -125 offset
 Data Range: -125 to 125

Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.

Type: Status
 Supporting Information:
 PGN reference: 65195

SPN 1114 *Lowest Possible Gear*

The transmission calculates this gear continuously. Together with the highest possible gear (see SPN 1115), it enables a management computer to know the exact range of available gears.

Data Length:	1 byte	
Resolution:	1 gear value/bit, -125 offset	
Data Range:	-125 to 125	Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.
Type:	Status	
Supporting Information:		
PGN reference:	65195	

SPN 1115 *Highest Possible Gear*

The transmission calculates this gear continuously. Together with the lowest possible gear (see SPN 1114), it enables a management computer to know the exact range of available gears.

Data Length:	1 byte	
Resolution:	1 gear value/bit, -125 offset	
Data Range:	-125 to 125	Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.
Type:	Status	
Supporting Information:		
PGN reference:	65195	

SPN 1116 *Engine Gaseous Fuel Correction Factor*

A correction to a predefined gaseous fuel energy (expressed in energy per unit volume) represented as a percentage. The actual fuel energy used to control the engine is the product of the gaseous fuel correction factor and the energy of the gas.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65194	

SPN 1117 *Engine Desired Rated Exhaust Oxygen*

The desired amount of oxygen in the exhaust at rated conditions represented as a percentage by volume with respect to the total volume of exhaust gases leaving the engine.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65193	

SPN 1118 Engine Desired Exhaust Oxygen

The desired amount of oxygen in the exhaust represented as a percentage by volume with respect to the total volume of exhaust gases leaving the engine.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65193	

SPN 1119 Engine Actual Exhaust Oxygen

The actual amount of oxygen in the exhaust represented as a percentage by volume with respect to the total volume of exhaust gases leaving the engine.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65193	

SPN 1120 Articulation Angle

Angle of deflection of an articulated transit vehicle (rotation angle about the vehicles z-axis). A right turn (clockwise) is indicated with a positive angle and a left turn is indicated with a negative angle. This parameter is defined according to a Z-Down axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Down Axis System has positive X directed forward, positive Y to the right, and positive Z directed down.

Data Length:	1 byte	
Resolution:	1 deg/bit, -125 deg offset	
Data Range:	-125 to 125 deg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65192	

SPN 1121 EBS Brake Switch

Switch signal which indicates that the brake pedal is being pressed. The EBS brake switch is independent of the brake light switch and has no provisions for external connections.

00 - Brake pedal is not being pressed
 01 - Brake pedal is being pressed
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61441	

SPN 1122 Engine Alternator Bearing 1 Temperature

Temperature of the bearing inside the alternator. Bearing 1 is the left or rear bearing.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65191	

SPN 1123 Engine Alternator Bearing 2 Temperature

Temperature of the bearing inside the alternator. Bearing 2 is the right or front bearing.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65191	

SPN 1124 Engine Alternator Winding 1 Temperature

Temperature of the windings inside the alternator.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65191	

SPN 1125 Engine Alternator Winding 2 Temperature

Temperature of the windings inside the alternator.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65191	

SPN 1126 Engine Alternator Winding 3 Temperature

Temperature of the windings inside the alternator.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65191	

SPN 1127 Engine Turbocharger 1 Boost Pressure

Gage pressure of air measured downstream of the compressor discharge side of the turbocharger. See also SPN 102 for alternate range and resolution. If there is only one boost pressure to report and the range and resolution in SPN 102 is adequate, then it should be used.

Data Length: 2 bytes
Resolution: 0.125 kPa/bit, 0 offset
Data Range: 0 to +8031.875 kPa (0 to 1164.62 psi) Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65190

SPN 1128 Engine Turbocharger 2 Boost Pressure

Gage pressure of air measured downstream of the compressor discharge side of the turbocharger. See also SPN 102 for alternate range and resolution. If there is only one boost pressure to report and the range and resolution in SPN 102 is adequate, then it should be used.

Data Length: 2 bytes
Resolution: 0.125 kPa/bit, 0 offset
Data Range: 0 to +8031.875 kPa (0 to 1164.62 psi) Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65190

SPN 1129 Engine Turbocharger 3 Boost Pressure

Gage pressure of air measured downstream of the compressor discharge side of the turbocharger. See also SPN 102 for alternate range and resolution. If there is only one boost pressure to report and the range and resolution in SPN 102 is adequate, then it should be used.

Data Length: 2 bytes
Resolution: 0.125 kPa/bit, 0 offset
Data Range: 0 to +8031.875 kPa (0 to 1164.62 psi) Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65190

SPN 1130 Engine Turbocharger 4 Boost Pressure

Gage pressure of air measured downstream of the compressor discharge side of the turbocharger. See also SPN 102 for alternate range and resolution. If there is only one boost pressure to report and the range and resolution in SPN 102 is adequate, then it should be used.

Data Length: 2 bytes
Resolution: 0.125 kPa/bit, 0 offset
Data Range: 0 to +8031.875 kPa (0 to 1164.62 psi) Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65190

SPN 1131 Engine Intake Manifold 2 Temperature

Temperature of pre-combustion air found in intake manifold of engine air supply system.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65189	

SPN 1132 Engine Intake Manifold 3 Temperature

Temperature of pre-combustion air found in intake manifold of engine air supply system.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65189	

SPN 1133 Engine Intake Manifold 4 Temperature

Temperature of pre-combustion air found in intake manifold of engine air supply system.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65189	

SPN 1134 Engine Intercooler Thermostat Opening

The current position of the thermostat used to regulate the temperature of the engine intercooler. A value of 0% represents the thermostat being completely closed and 100% represents the thermostat being completely open.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65262	

SPN 1135 Engine Oil Temperature 2

Temperature of the engine lubricant.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65188	

SPN 1136 Engine ECU Temperature

Temperature of the engine electronic control unit.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65188

SPN 1137 Engine Exhaust Gas Port 1 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65187

SPN 1138 Engine Exhaust Gas Port 2 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65187

SPN 1139 Engine Exhaust Gas Port 3 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65187

SPN 1140 Engine Exhaust Gas Port 4 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65187

SPN 1141 Engine Exhaust Gas Port 5 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65186

SPN 1142 Engine Exhaust Gas Port 6 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65186

SPN 1143 Engine Exhaust Gas Port 7 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65186

SPN 1144 Engine Exhaust Gas Port 8 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65186

SPN 1145 Engine Exhaust Gas Port 9 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65185

SPN 1146 Engine Exhaust Gas Port 10 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65185

SPN 1147 Engine Exhaust Gas Port 11 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65185

SPN 1148 Engine Exhaust Gas Port 12 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65185

SPN 1149 Engine Exhaust Gas Port 13 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65184

SPN 1150 Engine Exhaust Gas Port 14 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65184

SPN 1151 Engine Exhaust Gas Port 15 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65184

SPN 1152 Engine Exhaust Gas Port 16 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65184

SPN 1153 Engine Exhaust Gas Port 17 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65183

SPN 1154 Engine Exhaust Gas Port 18 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65183

SPN 1155 Engine Exhaust Gas Port 19 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65183

SPN 1156 Engine Exhaust Gas Port 20 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65183

SPN 1157 Engine Main Bearing 1 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65182

SPN 1158 Engine Main Bearing 2 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65182

SPN 1159 Engine Main Bearing 3 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65182

SPN 1160 Engine Main Bearing 4 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65182

SPN 1161 Engine Main Bearing 5 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65181

SPN 1162 Engine Main Bearing 6 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65181

SPN 1163 Engine Main Bearing 7 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65181

SPN 1164 Engine Main Bearing 8 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65181

SPN 1165 Engine Main Bearing 9 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65180

SPN 1166 Engine Main Bearing 10 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65180

SPN 1167 Engine Main Bearing 11 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65180

SPN 1168 Engine Turbocharger Lube Oil Pressure 2

Gage pressure of oil in turbocharger lubrication system.

Data Length: 1 byte
 Resolution: 4 kPa/bit, 0 offset
 Data Range: 0 to 1000 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65179

SPN 1169 Engine Turbocharger 2 Speed

Rotational velocity of rotor in the turbocharger.

Data Length: 2 bytes
 Resolution: 4 rpm/bit, 0 offset
 Data Range: 0 to 257,020 rpm Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65179

SPN 1170 Engine Turbocharger 3 Speed

Rotational velocity of rotor in the turbocharger.

Data Length: 2 bytes
 Resolution: 4 rpm/bit, 0 offset
 Data Range: 0 to 257,020 rpm Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65179

SPN 1171 Engine Turbocharger 4 Speed

Rotational velocity of rotor in the turbocharger.

Data Length: 2 bytes
 Resolution: 4 rpm/bit, 0 offset
 Data Range: 0 to 257,020 rpm Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65179

SPN 1172 Engine Turbocharger 1 Compressor Intake Temperature

Temperature of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65178

SPN 1173 Engine Turbocharger 2 Compressor Intake Temperature

Temperature of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65178

SPN 1174 Engine Turbocharger 3 Compressor Intake Temperature

Temperature of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65178

SPN 1175 Engine Turbocharger 4 Compressor Intake Temperature

Temperature of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65178

SPN 1176 Engine Turbocharger 1 Compressor Intake Pressure

Gage pressure of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
 Resolution: 1/128 kPa/bit, -250 kPa offset
 Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65177

SPN 1177 Engine Turbocharger 2 Compressor Intake Pressure

Gage pressure of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
 Resolution: 1/128 kPa/bit, -250 kPa offset
 Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65177

SPN 1178 Engine Turbocharger 3 Compressor Intake Pressure

Gage pressure of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
 Resolution: 1/128 kPa/bit, -250 kPa offset
 Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65177

SPN 1179 Engine Turbocharger 4 Compressor Intake Pressure

Gage pressure of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
 Resolution: 1/128 kPa/bit, -250 kPa offset
 Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65177

SPN 1180 Engine Turbocharger 1 Turbine Intake Temperature

Temperature of the combustion by-products entering the turbine side of the turbocharger.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65176

SPN 1181 Engine Turbocharger 2 Turbine Intake Temperature

Temperature of the combustion by-products entering the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65176

SPN 1182 Engine Turbocharger 3 Turbine Intake Temperature

Temperature of the combustion by-products entering the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65176

SPN 1183 Engine Turbocharger 4 Turbine Intake Temperature

Temperature of the combustion by-products entering the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65176

SPN 1184 Engine Turbocharger 1 Turbine Outlet Temperature

Temperature of the combustion by-products exiting the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65175

SPN 1185 Engine Turbocharger 2 Turbine Outlet Temperature

Temperature of the combustion by-products exiting the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65175

SPN 1186 Engine Turbocharger 3 Turbine Outlet Temperature

Temperature of the combustion by-products exiting the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65175

SPN 1187 Engine Turbocharger 4 Turbine Outlet Temperature

Temperature of the combustion by-products exiting the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65175

SPN 1188 Engine Turbocharger Wastegate Actuator 1 Position

Position of the wastegate drive. A value of 0% represents fully closed and a value of 100% represents fully open.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65174

SPN 1189 Engine Turbocharger Wastegate Actuator 2 Position

Position of the wastegate drive. A value of 0% represents fully closed and a value of 100% represents fully open.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65174

SPN 1190 Engine Turbocharger Wastegate Actuator 3 Position

Position of the wastegate drive. A value of 0% represents fully closed and a value of 100% represents fully open.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65174

SPN 1191 Engine Turbocharger Wastegate Actuator 4 Position

Position of the wastegate drive. A value of 0% represents fully closed and a value of 100% represents fully open.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65174	

SPN 1192 Engine Turbocharger Wastegate Actuator Control Air Pressure

Gage pressure of the air used to control the actuator which opens and closes the wastegate valve.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65174	

SPN 1193 Engine Operation Time Since Rebuild

The time in engine operation since the last engine rebuild.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65173	

SPN 1194 Anti-theft Encryption Seed Present Indicator

Indicates the presence of the encryption seed random number.

00 - Random number is not present
 01 - Random number is present
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	56320	

SPN 1195 *Anti-theft Password Valid Indicator*

Indicates the presence of a validated password.

00 - Password is not a validated password

01 - Password is a validated password

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 56320

SPN 1196 *Anti-theft Component Status States*

Indicates whether or not the component can be started.

00 Unlocked

01 Locked

10 Blocked

11 Not defined

00b - Unlocked = This state indicates that the component can be started without the end user being required to enter a password.

01b - Locked = This state indicates that the component can NOT be started (i.e., Unlocked) without the end user being required to enter a password.

10b - Blocked = This state indicates that a Lock or Unlock command cannot be executed because some other algorithm or command of higher priority is commanding differently.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 56320

SPN 1197 *Anti-theft Modify Password States*

This parameter is used to indicate whether a password request was successfully performed, or if the request could not be performed due to system constraints or if the request was not a valid request.

00 Ok
 01 Full_of_Passwords
 10 Empty_of_Passwords
 11 Not_valid

00b - Ok = This state indicates that the request was successfully performed.

01b - Full_Of_Passwords = This state indicates that the component can NOT store any additional passwords in its memory.

10b - Empty_Of_Passwords = This state indicates that the component would be empty of passwords (an unacceptable condition) if the password under which the end user is logged in, is deleted. Thus the delete password command is not successfully executed.

Note that if the Delete_Password command is sent to a component that does not currently have a password the Empty_Of_Passwords state indicator shall be used.

11b - Not_Valid = This state indicates that the request is not a valid one.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	56320	

SPN 1198 *Anti-theft Random Number*

A seven byte random numeric code provided by the component in response to an anti-theft request. This parameter is sent as a numeric value utilizing the full range of 0 to 0xFFFFFFFFFFFFFFF. The most significant byte is sent first, not following the rules of Table 1.

Data Length:	7 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	56320	

SPN 1199 *Anti-theft Encryption Indicator States*

This parameter is used to indicate if a random number seed is being requested, or if an encrypted password is being provided to the component.

00 Encryption_Seed_Request
 01 Encrypted_Code_Present
 10 Not defined
 11 Not_Available

00b - Encryption_Seed_Request = This state represents a request to the component to provide a random number seed.

01b - Encrypted_Code_Present = This state is used to indicate that an encrypted password is being provided to the component.

11b - Not_Available = This state is used to indicate that a random number is NOT being requested nor is an encrypted password being provided to the component.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	56576	

SPN 1200 *Anti-theft Desired Exit Mode States*

This parameter is used to specify the desired triggers that are to be used by the component in deciding when to transition to the Locked state.

00 Lock_Upon_Operator_Request
 01 Lock_When_Key_Off
 10 Not defined
 11 Not_Available

00b - Lock_Upon_Operator_Request—This state is used to indicate that the end user would have to manually enter a password to Lock the engine.

01b - Lock_When_Keyoff—This state is used to indicate that the component would automatically transition to the Locked state when the end user turns off the engine (i.e. without the end user being required to manually enter the password).

11b - Not_Available—This state is indicates that the option is not selectable or changeable by the operator via using current tool.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	56576	

SPN 1201 *Anti-theft Command States*

This parameter is used to identify the specific requests being sent to the component.

000 Add_Password
 001 Delete_Password
 010 Change_Password
 011 Lock_or_Unlock
 100 Check_Status
 101 Login
 110-111 Not defined

000b - Add_Password—This state represents a request to the component to add a password to the list of passwords that the component has stored as valid codes. This command will not be performed if the component has already stored, the maximum number of passwords that it is capable of storing. The Login command must precede this command.

001b - Delete_Password—This state represents a request to the component to delete the password (the same one used when the end-user logged in). See SPN 1197 for limitations.

010b - Change_Password—This state represents a request to the component to change the password (the same one that the end-user logged in with) to a different password, which is to be specified by the end user. The Login command must precede this command.

011b - Lock_Or_Unlock—This state represents a request to the component to change from the Locked state to the Unlocked state or from the Unlocked state to the Locked state.

100b - Check_Status—This state represents a request to check to see if the component is in the Locked or Unlocked state.

101b - Login—This state represents a request to validate the end user, before performing commands such as Add_Password and Change_Password.

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	56576	

SPN 1202 *Anti-theft Password Representation*

This parameter is the seven byte numeric code (i.e., 'encrypted password' or 'key') that is generated based on the encryption algorithm, the password supplied by the end user, and the random number seed given by the component. This parameter is sent as a numeric value utilizing the full range of 0 to 0xFFFFFFFFFFFFFFFF. The most significant byte is sent first, not following the rules of Table 1.

Data Length:	7 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	56576	

SPN 1203 Engine Auxiliary Coolant Pressure

Gage pressure of coolant found in the intercooler which is located after the turbocharger.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65172	

SPN 1204 Electrical Load

Electrical power delivered by the engine to the electrical system connected to the generator.

Data Length:	2 bytes	
Resolution:	0.5 kW/bit, 0 offset	
Data Range:	0 to 32,127.5 kW	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65171	

SPN 1205 Safety Wire Status

Status signal which indicates that the safety wire has been activated. When the safety wire is activated, the engine will not operate. This is used for maintenance purposes.

00 - Safety wire has not been activated
 01 - Safety wire has been activated
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65171	

SPN 1206 Engine Turning Gear Engaged

Status signal which indicates that the turning gear is engaged. The turning gear is used to turn the flywheel/crankshaft, for maintenance purposes, while the engine is not running.

00 - Not engaged
 01 - Engaged
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 1207 Engine ECU Temperature (OBSOLETE use SPN 1136)

Temperature of the engine electronic control unit.

(21, 1207 are not to be used - obsolete)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 1208 Engine Pre-filter Oil Pressure

Gage pressure of the engine oil before the oil reaches the oil filter.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65170	

(R) SPN 1209 Engine Exhaust Gas Pressure 1

Gage pressure of the exhaust gases as measured at the turbine intake of the turbocharger. This SPN to be used for inline engines or exhaust bank 1 of multiple bank engines. See SPN 5749 for exhaust bank 2.

Data Length:	2 bytes	
Resolution:	1/128 kPa/bit, -250 kPa offset	
Data Range:	-250 kPa TO 251.99 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64739	
PGN reference:	65170	

SPN 1210 Engine Fuel Rack Position

Measured position of the engine fuel rack. A value of 0% rack represents no fueling and a value of 100% rack represents maximum fueling.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65170	

SPN 1211 Engine Build Hours Reset

Command signal used to reset the engine rebuild hours.

00 Do not reset
01 Reset
10 Reserved
11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	56832	

SPN 1212 Engine Auxiliary Coolant Temperature

Temperature of coolant found in the intercooler which is located after the turbocharger.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65172	

SPN 1237 Engine Shutdown Override Switch

Switch signal which indicates the position of the engine shutdown override switch. This switch function allows the operator to override an impending engine shutdown.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65265	

SPN 1238 Traction Control Override Switch

Switch signal which indicates the position of the traction control override switch. The traction control override signal disables the automatic traction control function allowing the wheels to spin.

00 - Off
01 - On
10 - Error
11 - Not available or not installed

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61441	

SPN 1239 Engine Fuel Leakage 1

Status signal which indicates fuel leakage in the fuel rail of the engine. Location can be either before or after the fuel pump.

00 - no leakage detected

01 - leakage detected

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65169

SPN 1240 Engine Fuel Leakage 2

Status signal which indicates fuel leakage in the fuel rail of the engine. Location can be either before or after the fuel pump.

00 - no leakage detected

01 - leakage detected

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65169

SPN 1241 Engine Gas Mass Flow Rate 1

Gas mass flow rate delivered to an engine through its first fuel control system. See SPN 3467 for the second fuel control system.

Data Length: 2 bytes

Resolution: 0.05 kg/h per bit, 0 offset

Data Range: 0 to 3212.75 kg/h

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65170

SPN 1242 Instantaneous Estimated Brake Power

Estimate of the power developed by the engine.

Data Length: 2 bytes

Resolution: 0.5 kW/bit, 0 offset

Data Range: 0 to 32,127.5 kW

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65170

SPN 1243 *ABS Fully Operational*

Signal which indicates whether an ABS system is fully operational or whether its functionality is reduced by a defect or by an intended action (e.g., by activation of an ABS-off-road switch or during special diagnostic procedures). There are cases where the signal is necessary to fulfill legal regulations for special applications (e.g., switching off integrated retarders).

00 - Not Fully Operational

01 - Fully Operational

10 - Reserved

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61441

SPN 1244 *Engine Fuel Actuator 2 Control Command*

The control command to fuel actuator 2, normalized to percent, where 0% represents fully closed and 100% represents fully open. Typically, this fuel actuator is used to regulate low pressure natural gas flow rate, mixing into the air flow, which together then come into the engine. Using the standard convention for determining the position. Left/front is #1 (SPN 633) and right/rear is #2.

Data Length: 2 bytes

Resolution: 0.0025 %/bit, 0 offset

Data Range: 0 to 160.6375 %

Operational Range: 0 to 100%

Type: Status

Supporting Information:

PGN reference: 61466

SPN 1246 *Number of Engine Torque History Records*

Number of torque history records contained in the engine torque history PGN. A value of 0 is broadcast if no torque history records are stored in the ECU.

Data Length: 1 byte

Resolution: 1 record/bit, 0 offset

Data Range: 0 to 250 records

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65168

SPN 1247 *Engine Power*

Advertised engine power capability. Advertised power is what a customer will find on a sales sheet for an engine with a certain calibration.

Data Length: 2 bytes

Resolution: 0.5 kW/bit, 0 offset

Data Range: 0 to 32,127.5 kW

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65168

SPN 1248 Engine Peak Torque 1

Maximum torque output of the current ECU calibration when the engine operates on torque curve 1. For calibrations that support two torque curves, this parameter shall be assigned the value of the lower curve. For calibrations that support only one curve, this parameter should be used.

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1249 Engine Peak Torque 2

Maximum torque output of the current ECU calibration when the engine operates on torque curve 2. For calibrations that support two torque curves, this parameter shall be assigned the value of the higher curve. For calibrations that support only one curve, this parameter should be set to "not available".

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1250 Calibration Record Start Month

Calendar month timestamp when an ECU record was established.

NOTE - A value of 0 for the month is null. The value 1 identifies January; 2 identifies February; etc.

Data Length:	1 byte	
Resolution:	1 month/bit, 0 offset	
Data Range:	0 to 250 months	Operational Range: 1 to 12 month
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1251 Calibration Record Start Day

Calendar day timestamp when an ECU record was established.

NOTE - A value of 0 for the date is null. The values 1, 2, 3, and 4 are used to identify the first day of the month; 5, 6, 7, and 8 identify the second day of the month; etc.

Data Length:	1 byte	
Resolution:	0.25 days/bit, 0 offset	
Data Range:	0 to 62.5 days	Operational Range: 0.25 to 31.75 day
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1252 Calibration Record Start Year

Calendar year timestamp when an ECU record was established.

NOTE - A value of 0 for the year identifies the year 1985; a value of 1 identifies 1986; etc.

Data Length:	1 byte	
Resolution:	1 year/bit, 1985 years offset	
Data Range:	1985 to 2235 years	Operational Range: 1985 to 2235 year
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1253 Calibration Record Duration Time

Duration in hours for which the engine operated in the conditions captured in the current record.

Data Length:	4 bytes	
Resolution:	0.05 hr/bit, 0 offset	
Data Range:	0 to 210,554,060.75 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1254 Torque Limiting Feature Status

Status of an ECU feature which limits the torque output of the engine.

00 - Disabled
 01 - Enabled
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65168	

SPN 1255 Transmission Gear Ratio 1

Gear ratio value stored in the ECU that is used to define a range of transmission gears for which a limit is applied to the engine output torque. Transmission gear ratio 1 should be the numerically highest transmission gear ratio breakpoint that defines ratio ranges for torque limits.

Data Length:	2 bytes	
Resolution:	0.01/bit, 0 offset	
Data Range:	0 to 642.55	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1256 Engine Torque Limit 1, Transmission

Limit applied to the engine output torque during vehicle operation in transmission gear ratios numerically greater than transmission gear ratio 1 (see SPN 1255).

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1257 Transmission Gear Ratio 2

Gear ratio value stored in the ECU that is used to define a range of transmission gears for which a limit is applied to the engine output torque. Transmission gear ratio 2 should be the numerically highest transmission gear ratio breakpoint less than transmission gear ratio 1 (see SPN 1255) that defines ratio ranges for torque limits.

Data Length:	2 bytes	
Resolution:	0.01/bit, 0 offset	
Data Range:	0 to 642.55	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1258 Engine Torque Limit 2, Transmission

Limit applied to the engine output torque during vehicle operation in transmission gear ratios numerically less than or equal to transmission gear ratio 1 (see SPN 1255) and numerically greater than transmission gear ratio 2 (see SPN 1257). For example, with transmission gear ratio 1 equal to 12.0:1 and transmission gear ratio 2 equal to 5.0:1, vehicle operation in a transmission gear with a ratio of 6.0:1 will result in the application of engine torque limit 2, transmission.

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1259 Transmission Gear Ratio 3

Gear ratio value stored in the ECU that is used to define a range of transmission gears for which a limit is applied to the engine output torque. Transmission gear ratio 3 should be the numerically highest transmission gear ratio breakpoint less than transmission gear ratio 2 (see SPN 1257) that defines ratio ranges for torque limits.

Data Length:	2 bytes	
Resolution:	0.01/bit, 0 offset	
Data Range:	0 to 642.55	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1260 Engine Torque Limit 3, Transmission

Limit applied to the engine output torque during vehicle operation in transmission gear ratios numerically less than or equal to transmission gear ratio 2 (see SPN 1257) and numerically greater than transmission gear ratio 3 (see SPN 1259). For example, with transmission gear ratio 2 equal to 5.0:1 and transmission gear ratio 3 equal to 2.0:1, vehicle operation in a transmission gear with a ratio of 3.0:1 will result in the application of engine torque limit 3, transmission.

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1261 Engine Torque Limit 4, Transmission

Limit applied to the engine output torque during vehicle operation in transmission gear ratios numerically less than or equal to transmission gear ratio 3 (see SPN 1259).

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1262 Engine Torque Limit 5, Switch

Limit applied to the engine output torque based on activation of an ECU switch input.

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1263 Engine Torque Limit 6, Axle Input

Limit applied to the engine output torque based on the maximum allowable axle input torque. Axle input torque is calculated as the current engine torque output multiplied by the transmission gear ratio.

Data Length:	2 bytes	
Resolution:	2 Nm/bit, 0 offset	
Data Range:	0 to 128,510 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65168	

SPN 1264 Engine Extended Crankcase Blow-by Pressure - duplicate (see SPN 22)

Differential crankcase blow-by pressure as measured through a tube with a venturi.

(1264 not to be used – obsolete)

Data Length:	1 byte	
Resolution:	0.05 kPa/bit, 0 offset	
Data Range:	0 to 12.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 1294 Engine Spark Plug 1

The measured voltage of the spark event on Cylinder #1

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64887	

SPN 1295 Engine Spark Plug 2

The measured voltage of the spark event on Cylinder #2

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64887	

SPN 1296 Engine Spark Plug 3

The measured voltage of the spark event on Cylinder #3

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64887	

SPN 1297 Engine Spark Plug 4

The measured voltage of the spark event on Cylinder #4

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64887	

SPN 1298 Engine Spark Plug 5

The measured voltage of the spark event on Cylinder #5

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64886	

SPN 1299 Engine Spark Plug 6

The measured voltage of the spark event on Cylinder #6

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64886	

SPN 1300 Engine Spark Plug 7

The measured voltage of the spark event on Cylinder #7

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64886	

SPN 1301 Engine Spark Plug 8

The measured voltage of the spark event on Cylinder #8

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64886	

SPN 1302 Engine Spark Plug 9

The measured voltage of the spark event on Cylinder #9

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64885	

SPN 1303 Engine Spark Plug 10

The measured voltage of the spark event on Cylinder #10

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64885	

SPN 1304 Engine Spark Plug 11

The measured voltage of the spark event on Cylinder #11

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64885	

SPN 1305 Engine Spark Plug 12

The measured voltage of the spark event on Cylinder #12

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64885	

SPN 1306 Engine Spark Plug 13

The measured voltage of the spark event on Cylinder #13

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64884	

SPN 1307 Engine Spark Plug 14

The measured voltage of the spark event on Cylinder #14

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64884	

SPN 1308 Engine Spark Plug 15

The measured voltage of the spark event on Cylinder #15

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64884	

SPN 1309 Engine Spark Plug 16

The measured voltage of the spark event on Cylinder #16

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64884	

SPN 1310 Engine Spark Plug 17

The measured voltage of the spark event on Cylinder #17

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64883	

SPN 1311 Engine Spark Plug 18

The measured voltage of the spark event on Cylinder #18

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64883	

SPN 1312 Engine Spark Plug 19

The measured voltage of the spark event on Cylinder #19

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64883	

SPN 1313 Engine Spark Plug 20

The measured voltage of the spark event on Cylinder #20

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64883	

SPN 1314 Engine Spark Plug 21

The measured voltage of the spark event on Cylinder #21

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64882	

SPN 1315 Engine Spark Plug 22

The measured voltage of the spark event on Cylinder #22

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64882	

SPN 1316 Engine Spark Plug 23

The measured voltage of the spark event on Cylinder #23

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64882	

SPN 1317 Engine Spark Plug 24

The measured voltage of the spark event on Cylinder #24

Data Length:	2 bytes	
Resolution:	1 V/bit, 0 offset	
Data Range:	0 to 64,255 Volts	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64882	

SPN 1320 Engine External Shutdown Air Supply Pressure

Pressure of the air used to shut off the fuel supply to the engine.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65167	

SPN 1349 Engine Injector Metering Rail 2 Pressure

The gage pressure of fuel in the metering rail #2 as delivered from the supply pump to the injector metering intake. See Figure SPN16_A for fuel system related parameters. Although the figure does not show rail #2 it does show the relationship of rail pressure to other signals.

Data Length:	2 bytes	
Resolution:	1/256 MPa/bit, 0 offset	
Data Range:	0 to 250.996 Mpa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65243	

SPN 1350 Time Since Last Service

The vehicle operation time since the last service was performed. The type of service information is identified by the service component identification number.

Data Length:	2 bytes	
Resolution:	1 hr/bit, -32,127 hr offset	
Data Range:	-32,127 to 32,128 hr	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65166	

SPN 1351 Air Compressor Status

Indicates whether the air compressor is actively compressing air.

00	Compressor not active
01	Compressor active
10	Error indicator
11	Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65198	

SPN 1352 Engine Cylinder 1 Knock Level

Used to indicate the level of knock for engine cylinder 1. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: 0 to 100%
Type:	Status	
Supporting Information:		
PGN reference:	61463	

SPN 1353 Engine Cylinder 2 Knock Level

Used to indicate the level of knock for engine cylinder 2. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61463	

SPN 1354 Engine Cylinder 3 Knock Level

Used to indicate the level of knock for engine cylinder 3. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61463	

SPN 1355 Engine Cylinder 4 Knock Level

Used to indicate the level of knock for engine cylinder 4. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61463	

SPN 1356 Engine Cylinder 5 Knock Level

Used to indicate the level of knock for engine cylinder 5. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61463	

SPN 1357 Engine Cylinder 6 Knock Level

Used to indicate the level of knock for engine cylinder 6. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61463	

SPN 1358 Engine Cylinder 7 Knock Level

Used to indicate the level of knock for engine cylinder 7. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61463	

SPN 1359 Engine Cylinder 8 Knock Level

Used to indicate the level of knock for engine cylinder 8. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61463	

SPN 1360 Engine Cylinder 9 Knock Level

Used to indicate the level of knock for engine cylinder 9. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61464	

SPN 1361 Engine Cylinder 10 Knock Level

Used to indicate the level of knock for engine cylinder 10. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61464	

SPN 1362 Engine Cylinder 11 Knock Level

Used to indicate the level of knock for engine cylinder 11. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61464	

SPN 1363 Engine Cylinder 12 Knock Level

Used to indicate the level of knock for engine cylinder 12. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61464	

SPN 1364 Engine Cylinder 13 Knock Level

Used to indicate the level of knock for engine cylinder 13. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61464	

SPN 1365 Engine Cylinder 14 Knock Level

Used to indicate the level of knock for engine cylinder 14. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61464	

SPN 1366 Engine Cylinder 15 Knock Level

Used to indicate the level of knock for engine cylinder 15. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61464	

SPN 1367 Engine Cylinder 16 Knock Level

Used to indicate the level of knock for engine cylinder 16. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61464	

SPN 1368 Engine Cylinder 17 Knock Level

Used to indicate the level of knock for engine cylinder 17. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61465	

SPN 1369 Engine Cylinder 18 Knock Level

Used to indicate the level of knock for engine cylinder 18. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61465	

SPN 1370 Engine Cylinder 19 Knock Level

Used to indicate the level of knock for engine cylinder 19. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61465	

SPN 1371 Engine Cylinder 20 Knock Level

Used to indicate the level of knock for engine cylinder 20. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61465	

SPN 1372 Engine Cylinder 21 Knock Level

Used to indicate the level of knock for engine cylinder 21. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61465	

SPN 1373 Engine Cylinder 22 Knock Level

Used to indicate the level of knock for engine cylinder 22. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61465	

SPN 1374 Engine Cylinder 23 Knock Level

Used to indicate the level of knock for engine cylinder 23. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61465	

SPN 1375 Engine Cylinder 24 Knock Level

Used to indicate the level of knock for engine cylinder 24. The level of knock is reported using a relative scale where 0% is least level of knock, and increasing levels indicate more knock until 100% indicates the most severe level of knock allowed or measurable for the engine.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61465	

SPN 1377 Engine Synchronization Switch

This is the On/Off operation of the Multiple Unit Synchronization functionality. When it is enabled (i.e. On) the master engine will synchronize one or more slave engines to operate at the same speed. This switch position indicates whether this feature is disabled (off) or enabled (on).

00 Functionality is disabled (off)
 01 Functionality is enabled (on)
 10 Error
 11 Not available or Unused

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64971	

SPN 1379 Service Component Identification

Identification of component needing service. See Table SPN911_A.

Data Length:	1 byte	
Resolution:	1 ID/bit, 0 offset	
Data Range:	0 to 250 ID	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65166	

SPN 1380 Engine Oil Level Remote Reservoir

Ratio of current volume of engine oil in a remote reservoir to the maximum required volume. If a single switch (on/off) is used, 20% and 100% respectively will be used where 100% means no oil needs to be added and 20% means oil needs to be added. If two switches are used, 20%, 50%, and 100% will be used where 20% indicates the oil is critically low, 50% indicates the oil level is low, and 100% means no oil needs to be added. For continuous sensors, the actual measured percent will be used.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65130	

SPN 1381 Engine Fuel Supply Pump Intake Pressure

Absolute pressure of fuel at the fuel supply pump intake. See Figures SPN16_A & SPN16_B

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65130	

SPN 1382 Engine Fuel Filter (suction side) Differential Pressure

Differential pressure measured across the fuel filter located between the fuel tank and the supply pump. See Figures SPN16_A and SPN16_B.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65130	

SPN 1385 Auxiliary Temperature #1 (duplicate see also SPN 441)

Temperature measured by auxiliary temperature sensor #1 or #2. Not to be used in place of existing SPNs.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 1386 Auxiliary Temperature #2 (duplicate see also SPN 442)

Temperature measured by auxiliary temperature sensor #1 or #2. Not to be used in place of existing SPNs.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 1387 Auxiliary Pressure #1

Pressure measured by auxiliary pressure sensor #1. Not to be used in place of existing SPNs.

Data Length:	1 byte	
Resolution:	16 kPa/bit, 0 offset	
Data Range:	0 to 4000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65164	

SPN 1388 Auxiliary Pressure #2

Pressure measured by auxiliary pressure sensor #2. Not to be used in place of existing SPNs.

Data Length:	1 byte	
Resolution:	16 kPa/bit, 0 offset	
Data Range:	0 to 4000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65164	

SPN 1389 Engine Fuel Specific Gravity

This parameter conveys the specific gravity of the gaseous fuel being used by the engine. The specific gravity of the fuel can then be used to compute the density of the fuel.

Data Length:	2 bytes	
Resolution:	0.0001/bit, 0 offset	
Data Range:	0 to 6.4255	Operational Range: 0 to 2.0000
Type:	Status	
Supporting Information:		
PGN reference:	65202	

SPN 1390 Engine Fuel Valve 1 Intake Absolute Pressure

The absolute pressure of gas on the intake side of the first system control valve. See SPN 3466 for Engine Fuel Valve 2.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65163	

SPN 1391 Engine Fuel Valve Differential Pressure

The differential pressure between the intake and the outlet of a gaseous fuel valve.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65163	

SPN 1392 Engine Air to Fuel Differential Pressure

The differential pressure between the gaseous fuel and the air intake manifold.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65163	

SPN 1393 Engine Cylinder #1 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65160	

SPN 1394 Engine Cylinder #2 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65160	

SPN 1395 Engine Cylinder #3 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65160	

SPN 1396 Engine Cylinder #4 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65160	

SPN 1397 Engine Cylinder #5 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65160	

SPN 1398 Engine Cylinder #6 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65160	

SPN 1399 Engine Cylinder #7 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65160	

SPN 1400 Engine Cylinder #8 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65160	

SPN 1401 Engine Cylinder #9 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65161

SPN 1402 Engine Cylinder #10 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65161

SPN 1403 Engine Cylinder #11 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65161

SPN 1404 Engine Cylinder #12 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65161

SPN 1405 Engine Cylinder #13 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 65161

SPN 1406 Engine Cylinder #14 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65161	

SPN 1407 Engine Cylinder #15 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65161	

SPN 1408 Engine Cylinder #16 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65161	

SPN 1409 Engine Cylinder #17 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65162	

SPN 1410 Engine Cylinder #18 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65162	

SPN 1411 Engine Cylinder #19 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65162	

SPN 1412 Engine Cylinder #20 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65162	

(R) SPN 1413 Engine Cylinder #1 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65154	

(R) SPN 1414 Engine Cylinder #2 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65154	

(R) SPN 1415 Engine Cylinder #3 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65154	

(R) SPN 1416 Engine Cylinder #4 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65154	

(R) SPN 1417 Engine Cylinder #5 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65155	

(R) SPN 1418 Engine Cylinder #6 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65155	

(R) SPN 1419 Engine Cylinder #7 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65155	

(R) SPN 1420 Engine Cylinder #8 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65155	

(R) SPN 1421 Engine Cylinder #9 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65156	

(R) SPN 1422 Engine Cylinder #10 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65156	

(R) SPN 1423 Engine Cylinder #11 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65156	

(R) SPN 1424 Engine Cylinder #12 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65156	

(R) SPN 1425 Engine Cylinder #13 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65157	

(R) SPN 1426 Engine Cylinder #14 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65157	

(R) SPN 1427 Engine Cylinder #15 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65157	

(R) SPN 1428 Engine Cylinder #16 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65157	

(R) SPN 1429 Engine Cylinder #17 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65158	

(R) SPN 1430 Engine Cylinder #18 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65158	

(R) SPN 1431 Engine Cylinder #19 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65158	

(R) SPN 1432 Engine Cylinder #20 Ignition Timing

The ignition timing (SI engines) or main fuel injection timing (CI engines) of the cylinder.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65158	

SPN 1433 Engine Desired Ignition Timing #1

A programmable timing value specific to the engine's application. Factors affecting this value include both fuel type and the nature of the load being driven.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65159	

SPN 1434 Engine Desired Ignition Timing #2

A programmable timing value specific to the engine's application. Factors affecting this value include both fuel type and the nature of the load being driven.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65159	

SPN 1435 Engine Desired Ignition Timing #3

A programmable timing value specific to the engine's application. Factors affecting this value include both fuel type and the nature of the load being driven.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65159	

SPN 1436 Engine Actual Ignition Timing

The actual ignition timing at the current engine conditions. This parameter may or may not be equal to one of the desired timing parameters (see SPNs 1433-1435), depending on the status of the engine.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65159	

SPN 1437 Road Speed Limit Status

Status (active or not active) of the system used to limit maximum vehicle velocity.

00 - Active
 01 - Not Active
 10 - Error
 11 - Not available

NOTE - While somewhat inconsistent with other J1939 status parameters, the states defining 00 = active and 01 = inactive for Road Speed Limit Status are NOT typographical errors, and should be implemented as stated.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61443	

SPN 1438 ABS/EBS Amber Warning Signal (Powered Vehicle)

This parameter commands the ABS/EBS amber/yellow optical warning signal

00 Off
 01 On
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61441	

SPN 1439 EBS Red Warning Signal

This parameter commands the EBS red optical warning signal

00 Off

01 On

10 Reserved

11 Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61441

SPN 1440 Engine Fuel Flow Rate 1

The rate at which the fuel is flowing through a fuel valve.

Data Length: 2 bytes

Resolution: 0.1 m³/h per bit, 0 offset

Data Range: 0 to 6425.5 m³/h

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65153

SPN 1441 Engine Fuel Flow Rate 2

The rate at which the fuel is flowing through a fuel valve.

Data Length: 2 bytes

Resolution: 0.1 m³/h per bit, 0 offset

Data Range: 0 to 6425.5 m³/h

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65153

SPN 1442 Engine Fuel Valve 1 Position

The position of a gaseous fuel valve that is metering the fuel flow to the engine. 0% indicates no fuel flow through valve and 100% means maximum fuel flow through valve.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65153

SPN 1443 Engine Fuel Valve 2 Position

The position of a gaseous fuel valve that is metering the fuel flow to the engine. 0% indicates no fuel flow through valve and 100% means maximum fuel flow through valve.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65153

SPN 1444 Engine Cylinder #1 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65147	

SPN 1445 Engine Cylinder #2 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65147	

SPN 1446 Engine Cylinder #3 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65147	

SPN 1447 Engine Cylinder #4 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65147	

SPN 1448 Engine Cylinder #5 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65148	

SPN 1449 Engine Cylinder #6 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65148	

SPN 1450 Engine Cylinder #7 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65148	

SPN 1451 Engine Cylinder #8 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65148	

SPN 1452 Engine Cylinder #9 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65149	

SPN 1453 Engine Cylinder #10 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65149	

SPN 1454 Engine Cylinder #11 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65149	

SPN 1455 Engine Cylinder #12 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65149	

SPN 1456 Engine Cylinder #13 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65150	

SPN 1457 Engine Cylinder #14 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65150	

SPN 1458 Engine Cylinder #15 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65150	

SPN 1459 Engine Cylinder #16 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65150	

SPN 1460 Engine Cylinder #17 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65151	

SPN 1461 Engine Cylinder #18 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65151	

SPN 1462 Engine Cylinder #19 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65151	

SPN 1463 Engine Cylinder #20 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65151	

SPN 1464 Engine Desired Combustion Time

The desired combustion time based upon engine load and speed lookup maps.

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65152	

SPN 1465 Engine Average Combustion Time

The average combustion time of all cylinders of an engine.

Data Length:	2 bytes	
Resolution:	0.01 ms/bit, 0 offset	
Data Range:	0 to 642.55 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65152	

SPN 1466 Steer Channel Mode

Indicates the functional mode of steer channel of the tire pressure control system.

0000 Maintain
 0001 Inflate
 0010 Deflate
 0011 Confirm
 0100 Inflate Wait – System will inflate when conditions allow
 0101 Deflate Wait – System will deflate when conditions allow
 0110 Pressure Check
 0111-1101 Reserved
 1110 Error Condition
 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65144	

SPN 1467 Trailer/tag Channel Mode

Indicates the functional mode of trailer/tag channel of the tire pressure control system.

0000 Maintain

0001 Inflate

0010 Deflate

0011 Confirm

0100 Inflate Wait – System will inflate when conditions allow

0101 Deflate Wait – System will deflate when conditions allow

0110 Pressure Check

0111-1101 Reserved

1110 Error Condition

1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65144

SPN 1468 Drive Channel Mode

Indicates the functional mode of trailer/tag channel of the tire pressure control system.

0000 Maintain

0001 Inflate

0010 Deflate

0011 Confirm

0100 Inflate Wait – System will inflate when conditions allow

0101 Deflate Wait – System will deflate when conditions allow

0110 Pressure Check

0111-1101 Reserved

1110 Error Condition

1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65144

SPN 1469 PCU Drive Solenoid Status

Current state of the drive solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off

01 - On

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65144

SPN 1470 PCU Steer Solenoid Status

Current state of the steer solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65144	

SPN 1471 Tire Pressure Supply Switch Status

Current state of an open/closed type switch used to determine if adequate pressure exists for system implementation.

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65144	

SPN 1472 PCU Deflate Solenoid Status

Current state of the deflate solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
01 - On
10 - Error
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65144	

SPN 1473 PCU Control Solenoid Status

Current state of the control solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65144	

SPN 1474 PCU Supply Solenoid Status

Current state of the supply solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65144	

SPN 1475 PCU Trailer, Tag or Push Solenoid Status

Current state of the trailer, tag, or push solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
 01 - On
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65144	

SPN 1476 Engine Oil Specific Resistance

Engine oil specific resistance used to describe the engine oil quality.

Data Length:	1 byte	
Resolution:	0.1 Mohm*m/bit, 0 offset	
Data Range:	0 to 25 Mohm*m	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 1477 Engine Oil Kinematic Viscosity

Engine oil kinematic viscosity used to describe the engine oil quality.

Data Length:	1 byte	
Resolution:	1 mm ² /s per bit, 0 offset	
Data Range:	0 to 250 mm ² /s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 1478 Engine Oil Relative Dielectricity

Engine oil relative dielectricity used to describe the engine oil quality.

Data Length:	1 byte	
Resolution:	0.1/bit, 0 offset	
Data Range:	0 to 25.0	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 1480 Source Address of Controlling Device for Retarder Control

The source address of the SAE J1939 device currently controlling the retarder. It is used to expand the torque mode parameter (see SPN 899) in cases where control is in response to an ECU that is not listed in Table SPN899_A. Its value may be the source address of the ECU transmitting the message (which means that no external SAE J1939 message is providing the active command) or the source address of the SAE J1939 ECU that is currently providing the active command in a TSC1 (see PGN 0) or similar message. Note that if this parameter value is the same as the source address of the device transmitting it, the control may be due to a message on a non-SAE J1939 data link such as SAE J1922 or a proprietary link.

Data Length:	1 byte	
Resolution:	1 source address/bit, 0 offset	
Data Range:	0 to 255	Operational Range: 0 to 253
Type:	Status	
Supporting Information:		
PGN reference:	61440	

SPN 1481 Source Address of Controlling Device for Brake Control

The source address of the SAE J1939 device currently controlling the brake system. Its value may be the source address of the ECU transmitting the message (which means that no external SAE J1939 message is providing the active command) or the source address of the SAE J1939 ECU that is currently providing the active command in a TSC1 (see PGN 0) or similar message. Note that if this parameter value is the same as the source address of the device transmitting it, the control may be due to a message on a non-SAE J1939 data link such as SAE J1922 or a proprietary link.

Data Length:	1 byte	
Resolution:	1 source address/bit, 0 offset	
Data Range:	0 to 255	Operational Range: 0 to 253
Type:	Status	
Supporting Information:		
PGN reference:	61441	

SPN 1482 *Source Address of Controlling Device for Transmission Control*

The source address of the SAE J1939 device currently controlling the transmission. Its value may be the source address of the ECU transmitting the message (which means that no external SAE J1939 message is providing the active command) or the source address of the SAE J1939 ECU that is currently providing the active command in a TSC1 (see PGN 0) or similar message. Note that if this parameter value is the same as the source address of the device transmitting it, the control may be due to a message on a non-SAE J1939 data link such as SAE J1922 or a proprietary link.

Data Length:	1 byte	
Resolution:	1 source address/bit, 0 offset	
Data Range:	0 to 255	Operational Range: 0 to 253
Type:	Status	
Supporting Information:		
PGN reference:	61442	

SPN 1483 *Source Address of Controlling Device for Engine Control*

The source address of the SAE J1939 device currently controlling the engine. It is used to expand the torque mode parameter (see SPN 899) in cases where control is in response to an ECU that is not listed in Table SPN899_A. Its value may be the source address of the ECU transmitting the message (which means that no external SAE J1939 message is providing the active command) or the source address of the SAE J1939 ECU that is currently providing the active command in a TSC1 (see PGN 0) or similar message. Note that if this parameter value is the same as the source address of the device transmitting it, the control may be due to a message on a non-J1939 data link such as SAE J1922 or a proprietary link.

Data Length:	1 byte	
Resolution:	1 source address/bit, 0 offset	
Data Range:	0 to 255	Operational Range: 0 to 253
Type:	Status	
Supporting Information:		
PGN reference:	61444	

SPN 1487 *Illumination Brightness Percent*

Commanded backlight brightness level for all cab displays.

Note: If a separate device is used to independently control the switch backlight brightness level, see SPN 5532.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53248	

SPN 1503 *Armrest 1 Switch 1*

Status of the first switch located in armrest 1.

00: Off

01: On

10: Reserved

11: Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64745

SPN 1550 *Estimated Percent Fan 2 Speed*

Estimated fan speed as a ratio of the fan drive (current speed) to the fully engaged fan drive (maximum fan speed). A two state fan (off/on) will use 0% and 100% respectively. A three state fan (off/intermediate/on) will use 0%, 50% and 100% respectively. A variable speed fan will use 0% to 100%. Multiple fan systems will use 0 to 100% to indicate the percent cooling capacity being provided.

Note that the intermediate fan speed of a three state fan will vary with different fan drives, therefore 50% is being used to indicate that the intermediate speed is required from the fan drive.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64817

SPN 1557**Fan 2 Drive State**

This parameter is used to indicate the current state or mode of operation by the second fan drive.

0000 Fan off
 0001 Engine system—General
 0010 Excessive engine air temperature
 0011 Excessive engine oil temperature
 0100 Excessive engine coolant temperature
 0101 Excessive transmission oil temperature
 0110 Excessive hydraulic oil temperature
 0111 Default Operation
 1000 Reverse Operation
 1001 Manual control
 1010 Transmission retarder
 1011 A/C system
 1100 Timer
 1101 Engine brake
 1110 Other
 1111 Not available

Fan off 0000b —Used to indicate that the fan clutch is disengaged and the fan is inactive

Engine system—General 0001b —Used to indicate that the fan is active due to an engine system not otherwise defined.

Excessive engine air temperature 0010b —Used to indicate that the fan is active due to high air temperature.

Excessive engine oil temperature 0011b —Used to indicate that the fan is active due to high oil temperature.

Excessive engine coolant temperature 0100b —Used to indicate that the fan is active due to high coolant temperature.

Reverse Operation 1000b — Used to indicate that the fan is in reverse direction of operation compared to the normal direction of operation

Manual control 1001b —Used to indicate that the fan is active as requested by the operator.

Transmission retarder 1010b —Used to indicate that the fan is active as required by the transmission retarder.

A/C system 1011b —Used to indicate that the fan is active as required by the air conditioning system.

Timer 1100b —Used to indicate that the fan is active as required by a timing function.

Engine brake 1101b —Used to indicate that the fan is active as required to assist engine braking.

Excessive transmission oil temperature - 0101b - Used to indicate fan is active due to excessive transmission oil temperature.

Excessive hydraulic oil temperature - 0110b - Used to indicate fan is active due to excessive hydraulic oil temperature.

Default Operation - 0111b - Used to indicate fan is active due to a error condition resulting in default operation

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Type: Status

Supporting Information:

PGN reference: 64817

Operational Range: same as data range

SPN 1573 LED Display Data #1

Informs display devices how to display the current vertical position.

Values which are less than 128 decimal are bit-mapped values and any combination of these values is considered a valid value. For example communicating the "High Fine LED on" value to the display would result in the High Fine LED being turned on. Communicating a value with the "High Fine LED on" bit set to "1" and the "On-Grade LED on" bit set to "1" should result in the display turning on the High Fine LED AND the On-Grade LED.

Values 128 decimal and above are discrete states. Any bit-mapped combination of these states are invalid unless the results correspond to one of the states defined. For example, the result of adding the "Low Coarse" and "Low Medium" states results in the "Low Medium" state, which is valid. However, adding the "Low Medium" and the "Low Fine" states results in an value which does not have a defined state and is invalid.

00000010 High Coarse LED on
 00000100 High Fine LED on
 00001000 On-grade LED on
 00010000 Low Fine LED on
 00100000 Low Coarse LED on

10000000 Low Coarse
 10000001 Low Medium/Coarse
 10000010 Low Medium
 10000011 Low Medium/Fine
 10000100 Low Fine
 10010000 On Grade
 10010001 High Fine
 10010010 High Medium/Fine
 10010011 High Medium
 10010100 High Medium/Coarse
 10010101 High Coarse
 10011111 No data (i.e. no laser strikes)
 11111110 Error
 11111111 Not Available

Undefined values between 10100000 binary and 11111101 binary are reserved for future use.

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65142	

SPN 1574 Laser Strike Vertical Deviation

The calculated distance from the laser strike position to the current land leveling system reference point.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: -3200 to +3200 mm, negative values are below grade, positive values are above grade, zero is on grade, 0xFE03 indicates that the sensor can not sense the laser
Type:	Measured	
Supporting Information:		
PGN reference:	65141	

SPN 1575 *Modify Leveling System Set Point*

Used to control and coordinate the set point for the leveling system.

Operating Range: -3200 to +3200 mm, negative values are below current position, positive values are above current position, zero is no change.

Parameter specific parameter:

0xFE01 indicates Stop modifying the set point

0xFE03 indicates Raise the current set point by 5 mm

0xFE11 indicates Lower the current set point by 5 mm

0xFE13 indicates Search for laser or target

0xFE15 indicates go to the Park position

0xFE17 indicates go to the Bench position

Data Length: 2 bytes

Resolution: 0.1 mm/bit, -3,200 mm offset

Data Range: -3,200 to 3,225.5 mm

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65140

SPN 1576 *Mast Position*

Used to monitor the position of the sensor attached to the land leveling mast.

Data Length: 2 bytes

Resolution: 0.1 mm/bit, -3,200 mm offset

Data Range: -3,200 to 3,225.5 mm

Operational Range: -3200 to +3200 mm, negative values are below current position, positive values are above current position, zero is no change.

Type: Measured

Supporting Information:

PGN reference: 65139

SPN 1577 *Blade Duration and Direction*

Used to indicate the duration and direction that the land leveling system blade moves.

Data Length: 2 bytes

Resolution: 0.1 sec/bit, -3,276.8 sec offset

Data Range: -3276.8 to 3148.7 sec

Operational Range: -3276.8 to 3276.8 sec, negative values indicate move the blade up, positive values indicate move the blade down, zero indicates no change

Type: Status

Supporting Information:

PGN reference: 65138

SPN 1578 Blade Control Mode

Allows the user to select the type of blade control for the land leveling system.

00000000 Manual mode
 00000001 Automatic mode
 00000010 Inactive automatic mode
 All other values Reserved

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65138	

SPN 1579 Laser Tracer Target Deviation

The calculated distance for the laser target to the current laser tracer reference point.

Parameter specific parameter: 0xFE03 indicates that the sensor can not sense the laser

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: -3200 to +3200 mm, negative values are below setpoint, positive values are above setpoint, zero is on grade.
Type:	Measured	
Supporting Information:		
PGN reference:	65137	

SPN 1580 Laser Tracer Vertical Distance

The elevation of the laser tracer sensor in a laser leveling system.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, 0 offset	
Data Range:	0 to 6,425.5 mm (0 to 6.4255 m)	Operational Range: 0 to 6400 mm
Type:	Measured	
Supporting Information:		
PGN reference:	65137	

SPN 1581 Laser Tracer Horizontal Deviation

The calculated percent deviation between the target distance and the center of the laser tracer.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: 0 to 200%, 0 to 99% indicates target is left of center, 101 to 200% indicates target is right of center, 100% indicates target is centered, 0xFF indicates previous pass mode and thus no horizontal deviation
Type:	Measured	
Supporting Information:		
PGN reference:	65137	

SPN 1582 LED Display Data #2

Informs display devices how to display the current position of the laser tracer.

Values which are less than 128 decimal are bit-mapped values and any combination of these values is considered a valid value. For example communicating the "Up LED on" value to the display would result in the Up LED being turned on. Communicating a value with the "Up LED on" bit set to "1" and the "On-Grade 'A' LED on" bit set to "1" should result in the display turning on the Up LED AND the On-Grade "A" LED.

Values 128 decimal and above are discrete states. Any bit-mapped combination of these states are invalid unless the results correspond to one of the states defined. For example, the result of adding the "Low Coarse" and "Low Medium" states results in the "Low Medium" state, which is valid. However, adding the "Low Medium" and the "Low Fine" states results in an value which does not have a defined state and is invalid.

00000001 On-grade "A" LED on
 00000010 On-grade "B" LED on
 00000100 On-grade "C" LED on
 00001000 Up LED on
 00010000 Down LED on
 00100000 Left LED on
 01000000 Right LED on

00000001 On-grade "A" LED on
 00000010 On-grade "B" LED on
 00000100 On-grade "C" LED on
 00001000 Up LED on
 00010000 Down LED on
 00100000 Left LED on
 01000000 Right LED on

10000000 Low Coarse
 10000001 Low Medium/Coarse
 10000010 Low Medium
 10000011 Low Medium/Fine
 10000100 Low Fine
 10010000 On Grade
 10010001 High Fine
 10010010 High Medium/Fine
 10010011 High Medium
 10010100 High Medium/Coarse
 10010101 High Coarse
 10011111 No data (i.e. no laser strikes)
 11111110 Error
 11111111 Not Available

Undefined values between 10100000 binary and 11111101 binary are reserved for future use.

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65137	

SPN 1583 *Laser Tracer Information*

Provides the status of the laser tracer to the operator.

00000001 Laser power is on

00000010 Laser is ready

00000100 Valid target (1 = yes)

00001000 Previous pass (1 = yes)

00010000 Stringline (1 = yes)

00100000 Curb (1 = yes)

All other values Reserved

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255

Type: Status

Supporting Information:

PGN reference: 65137

Operational Range: same as data range

SPN 1584 *Service Component Identification*

Identification of component needing service. See Table SPN911_A.

Data Length: 1 byte

Resolution: 1 ID/bit, 0 offset

Data Range: 0 to 250 ID

Type: Measured

Supporting Information:

PGN reference: 56832

Operational Range: same as data range

SPN 1585 *Powered Vehicle Weight*

Total mass imposed by the tires of the powered vehicle on the road surface. Does not include the trailer.

Data Length: 2 bytes

Resolution: 10 kg/bit, 0 offset

Data Range: 0 to 642,550 kg

Type: Measured

Supporting Information:

PGN reference: 65136

Operational Range: same as data range

SPN 1586 *Speed of forward vehicle*

Absolute velocity of the preceding vehicle situated within 250 m in the same lane and moving in the same direction.

Data Length: 1 byte

Resolution: 1 km/h per bit, 0 offset

Data Range: 0 to 250 km/h

Type: Measured

Supporting Information:

PGN reference: 65135

Operational Range: 0xFF = no vehicle detected

SPN 1587 *Distance to forward vehicle*

Distance to the preceding vehicle situated within 250 m in the same lane and moving in the same direction.

Data Length:	1 byte	
Resolution:	1 m/bit, 0 offset	
Data Range:	0 to 250 m	Operational Range: 0xFF = no vehicle detected
Type:	Measured	
Supporting Information:		
PGN reference:	65135	

SPN 1588 *Adaptive Cruise Control Set Speed*

Value of the desired (chosen) velocity of the adaptive cruise control system.

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: 0 to 120 km/h
Type:	Status	
Supporting Information:		
PGN reference:	65135	

SPN 1589 *Adaptive cruise control set distance mode*

Selected distance mode for adaptive cruise control.

000 ACC Distance mode #1 (largest distance)
 001 ACC Distance mode #2
 010 ACC Distance mode #3
 011 ACC Distance mode #4
 100 ACC Distance mode #5 (shortest distance)
 101 Conventional cruise control mode
 110 Error condition
 111 Not available/not valid

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65135	

SPN 1590 Adaptive Cruise Control Mode

This parameter is used to indicate the current state, or mode, of operation by the Adaptive Cruise Control (ACC) device. The states characterize independent system states (e.g., it is not possible to express distance control active and overtake mode simultaneously). ACC must not switch itself off while active because the driver expects it to work. So if an error occurs, the ACC must signal that to the driver so that the driver knows that he has to switch off the ACC.

000 Off (Standby, enabled, ready for activation)

001 Speed control active

010 Distance control active

011 Overtake mode

100 Hold mode

101 Finish mode

110 Disabled or error condition

111 Not available/not valid

000b - Off—Used to indicate the ACC is enabled in calibration or configuration and there are no faults that would prevent the system from operating.

001b - Speed Control Active—Used to indicate that ACC is on but not currently sending control messages. In other words, there is no target ahead and regular vehicle cruise control is controlling the vehicle speed to the driver's set speed.

010b - Distance Control Active—Used to indicate that ACC is on and actively sending control messages to maintain the appropriate following interval.

011b - Overtake Mode—Used to indicate that ACC is on but temporarily disabled because the driver is manually overriding cruise control by using either the accelerator pedal or the cruise control "accel" switch.

100b - Hold Mode—Used to indicate that the ACC has lost the previous target vehicle and is in HOLD mode. In this mode, the ACC shall limit the speed to the speed held when the target was lost. For example, if the driver activates the typical cruise buttons (Resume/Inc/Dec) the HOLD mode shall be exited and normal cruise functionality resumed. If a new target is detected, the Distance Control Active mode (010b) is again entered, unless existing conditions prohibit this.

101b - Finish Mode—Used to indicate that ACC is on with no target ahead, and ACC is currently sending control messages to return to the driver's set speed. This occurs when the target the ACC system was tracking moves out of the way so ACC returns the vehicle to the driver's set speed.

110b - Disabled or Error Condition—Used to indicate that ACC is in an error state and can not operate.

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65135

SPN 1591 Road curvature

Estimated value of the current road curvature for use by the adaptive cruise control system. Positive values are used for left curves. Curvature is the inverse of the radius and is zero for straight roads.

Data Length: 2 bytes

Resolution: 1/128 1/km per bit, -250 1/km offset

Data Range: -250 to 251.992 1/km

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65135

SPN 1592 *Front Axle, Left Wheel Speed*

High resolution measurement of the speed of the left wheel on the front axle.

Data Length:	2 bytes	
Resolution:	1/256 km/h per bit, 0 offset	
Data Range:	0 to 250.996 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65134	

SPN 1593 *Front axle, right wheel speed*

High resolution measurement of the speed of the right wheel on the front axle.

Data Length:	2 bytes	
Resolution:	1/256 km/h per bit, 0 offset	
Data Range:	0 to 250.996 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65134	

SPN 1594 *Rear axle, left wheel speed*

High resolution measurement of the speed of the left wheel on the rear axle.

Data Length:	2 bytes	
Resolution:	1/256 km/h per bit, 0 offset	
Data Range:	0 to 250.996 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65134	

SPN 1595 *Rear axle, right wheel speed*

High resolution measurement of the speed of the right wheel on the rear axle.

Data Length:	2 bytes	
Resolution:	1/256 km/h per bit, 0 offset	
Data Range:	0 to 250.996 km/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65134	

SPN 1598 *Fan 2 Speed*

The speed of the second fan associated with engine coolant system.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64817	

SPN 1600 High Resolution Engine Fuel Rate

Amount of fuel consumed by engine per unit of time.

NOTE - See SPN 183 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.001 L/h per bit, 0 offset	
Data Range:	0 to 4,211,081.215 L/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64737	

SPN 1601 Local minute offset

The minute component of the offset between the UTC time and date and a local time zone time and date. This is the number of minutes to add to UTC (Universal Time Coordinate) time and date to convert to the time and date in the local time zone. The Local Offset is a positive value for time zones East of the Prime Meridian to the International Date Line. The Local Offset is a negative value for time zones West of the Prime Meridian to the International Date Line.

The Local Minute Offset is only applicable when the Time and Date parameters are reported as UTC time and date. Refer to SPN 1602 for details.

Data Length:	1 byte	
Resolution:	1 min/bit, -125 min offset	
Data Range:	-125 to 125 mins	Operational Range: -59 to +59 min
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	65254	

SPN 1602 Local hour offset

The hour component of the offset between the UTC (Universal Time Coordinate) time and date and a local time zone time and date. This is the number of hours to add to UTC, a.k.a. GMT, time and date to convert to the time and date in the local time zone. This parameter indicates the time reference of the data reported in the Time and Date SPNs 959, 960, 961, 962, 963, and 964. The Local Offset is a positive value for time zones East of the Prime Meridian to the International Date Line. The Local Offset is a negative value for time zones West of the Prime Meridian to the International Date Line. The Local Hour Offset is only applicable when the Time and Date parameters are reported as UTC time and date.

Recommended Settings:

Applications should not use the \$FF 'Not Available' if using the Time and Date parameters due to some ambiguity of the time standard for the reported time and date values. The recommended settings for the Local Hour Offset settings are:

If reporting the Time and Date as Local time, then Local Hour Offset must be reported as \$FA.

If reporting the Time and Date as UTC time and Local Hour Offset is not supported or not known, then Local Hour Offset must be reported as \$F9.

If reporting the Time and Date as UTC time and Local Hour Offset is known, then Local Hour Offset must be reported as a value between \$66 and \$94.

Data Length:	1 byte	
Resolution:	1 hr/bit, -125 hr offset	
Data Range:	-125 to 125 hr	Operational Range: -23 to +23 h
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	65254	

SPN 1603 Adjust seconds

The seconds component for setting the current time of day. This should be reported as the seconds component of the current time according to the time of day standard indicated with the Local Hour Offset parameter (SPN 1602). The time of day should be reported as the current time at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be

reported as the current time at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the time of day (SPNs 959, 960, and 961) is the current UTC time or a local time zone time. Refer to SPN 1602 for details.

Data Length:	1 byte	
Resolution:	0.25 s/bit, 0 offset	
Data Range:	0 to 62.5 s	Operational Range: 0 to 59.75 s
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	54528	

SPN 1604 ***Adjust minutes***

The minutes component for setting the current time of day. This should be reported as the minutes component of the current time according to the time of day standard indicated with the Local Hour Offset parameter (SPN 1602). The time of day should be reported as the current time at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the current time at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the time of day (SPNs 959, 960, and 961) is the current UTC time or a local time zone time. Refer to SPN 1602 for details.

Data Length:	1 byte	
Resolution:	1 min/bit, 0 offset	
Data Range:	0 to 250 mins	Operational Range: 0 to 59 min
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	54528	

SPN 1605 ***Adjust hours***

The hours component for setting the current time of day. This should be reported as the hours component of the current time according to the time of day standard indicated with the Local Hour Offset parameter (SPN 1602). The time of day should be reported as the current time at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the current time at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the time of day (SPNs 959, 960, and 961) is the current UTC time or a local time zone time. Refer to SPN 1602 for details.

Data Length:	1 byte	
Resolution:	1 hr/bit, 0 offset	
Data Range:	0 to 250 hr	Operational Range: 0 to 23 h
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	54528	

SPN 1606 ***Adjust month***

The month component for setting the current calendar date. This should be reported as the month component of the current date according to the calendar date standard indicated with the Local Hour Offset parameter (SPN 1602). The calendar date should be reported as the current date at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the current date at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the calendar date (SPNs 962, 963, and 964) is the current UTC date or a local time zone date. Refer to SPN 1602 for details.

NOTE - A value of 0 for the month is null. The value 1 identifies January; 2 identifies February; etc.

Data Length:	1 byte	
Resolution:	1 month/bit, 0 offset	
Data Range:	0 to 250 months	Operational Range: 1 to 12 month
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	54528	

SPN 1607 *Adjust day*

The day component for setting the current calendar date. This should be reported as the day component of the current date according to the calendar date standard indicated with the Local Hour Offset parameter (SPN 1602). The calendar date should be reported as the current date at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the current date at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the calendar date (SPNs 962, 963, and 964) is the current UTC date or a local time zone date. Refer to SPN 1602 for details.

NOTE - A value of 0 for the date is null. The values 1, 2, 3, and 4 are used to identify the first day of the month; 5, 6, 7, and 8 identify the second day of the month; etc.

Data Length:	1 byte	
Resolution:	0.25 days/bit, 0 offset	
Data Range:	0 to 62.5 days	Operational Range: 0.25 to 31.75 day
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	54528	

SPN 1608 *Adjust year*

The year component for setting the current calendar date. This should be reported as the year component of the current date according to the calendar date standard indicated with the Local Hour Offset parameter (SPN 1602). The calendar date should be reported as the current date at UTC (Universal Time Coordinate), a.k.a. GMT; however, it may be reported as the current date at a local time zone. The Local Hour Offset parameter (SPN 1602) is used to indicate if the calendar date (SPNs 962, 963, and 964) is the current UTC date or a local time zone date. Refer to SPN 1602 for details.

NOTE - A value of 0 for the year identifies the year 1985; a value of 1 identifies 1986; etc.

Data Length:	1 byte	
Resolution:	1 year/bit, 1985 years offset	
Data Range:	1985 to 2235 years	Operational Range: 1985 to 2235 year
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	54528	

SPN 1609 *Adjust local minute offset*

The minute component for setting the offset between the UTC (Universal Time Coordinate) time and date and a the local time zone time and date. This is the number of minutes to add to UTC, a.k.a. GMT, time and date to convert to the time and date in the Local Time Zone. The Local Offset is a positive value for time zones East of the Prime Meridian to the International Date Line. The Local Offset is a negative value for time zones West of the Prime Meridian to the International Date Line.

The Local Minute Offset is only applicable when the Time and Date parameters are reported as UTC time and date. Refer to SPN 1602 for details.

Data Length:	1 byte	
Resolution:	1 min/bit, -125 min offset	
Data Range:	-125 to 125 mins	Operational Range: -59 to +59 min
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	54528	

SPN 1610 *Adjust local hour offset*

The hour component for setting the offset between the UTC (Universal Time Coordinate) time and date and a the local time zone time and date. This is the number of minutes to add to UTC, a.k.a. GMT, time and date to convert to the time and date in the Local Time Zone. The Local Offset is a positive value for time zones East of the Prime Meridian to the International Date Line. The Local Offset is a negative value for time zones West of the Prime Meridian to the International Date Line.

The Local Hour Offset is only applicable when the Time and Date parameters are reported as UTC time and date. Refer to SPN 1602 for details.

Data Length:	1 byte	
Resolution:	1 hr/bit, -125 hr offset	
Data Range:	-125 to 125 hr	Operational Range: -24 to +23 h
Type:	Measured	
Supporting Information:	See Appendix D - PGN 65254	
PGN reference:	54528	

SPN 1611 *Vehicle motion*

Indicates whether motion of the vehicle is detected or not.

00 Vehicle motion not detected
 01 Vehicle motion detected
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65132	

SPN 1612 *Driver 1 working state*

State of work of the driver.

000 Rest - sleeping
 001 Driver available – short break
 010 Work – loading, unloading, working in an office
 011 Drive – behind wheel
 100-101 Reserved
 110 Error
 111 Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65132	

SPN 1613 Driver 2 working state

State of work of the driver.

000 Rest - sleeping
 001 Driver available – short break
 010 Work – loading, unloading, working in an office
 011 Drive – behind wheel
 100-101 Reserved
 110 Error
 111 Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65132	

SPN 1614 Vehicle Overspeed

Indicates whether the vehicle is exceeding the legal speed limit set in the tachograph.

00 No overspeed
 01 Overspeed
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65132	

SPN 1615 Driver card, driver 1

Indicates the presence of a driver card

00 - Driver card not present
 01 - Driver card present
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65132	

SPN 1616 Driver card, driver 2

Indicates the presence of a driver card

00 - Driver card not present

01 - Driver card present

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65132

SPN 1617 Driver 1 Time Related States

Indicates if the driver approaches or exceeds working time limits (or other limits).

0000 Normal/No limits reached

0001 Limit #1 – 15 min before 4 ½ h

0010 Limit #2 – 4 ½ h reached

0011 Limit #3 – 15 min before 9 h

0100 Limit #4 – 9 h reached

0101 Limit #5 – 15 min before 16 h (not having 8h rest during the last 24h)

0110 Limit #6 – 16 h reached

0111-1100 Reserved

1101 Other

1110 Error

1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65132

SPN 1618 Driver 2 Time Related States

Indicates if the driver approaches or exceeds working time limits (or other limits).

0000 Normal/No limits reached

0001 Limit #1 – 15 min before 4 ½ h

0010 Limit #2 – 4 ½ h reached

0011 Limit #3 – 15 min before 9 h

0100 Limit #4 – 9 h reached

0101 Limit #5 – 15 min before 16 h (not having 8h rest during the last 24h)

0110 Limit #6 – 16 h reached

0111-1100 Reserved

1101 Other

1110 Error

1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65132

SPN 1619 ***Direction indicator***

Indicates the direction of the vehicle.

00 - Forward
01 - Reverse
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65132

Operational Range: same as data range

SPN 1620 ***Tachograph performance***

Indicates the tachograph performance; including electronic or mechanical analysis, instrument analysis, speed sensor analysis, mass storage analysis, and printer analysis.

00 - Normal performance
01 - Performance analysis
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65132

Operational Range: same as data range

SPN 1621 ***Handling information***

Indicates that handling information is present. Information could include "no printer paper", "no driver card", etc.

00 - No handling information
01 - Handling information
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65132

Operational Range: same as data range

SPN 1622 System event

Indicates that a tachograph event has occurred. This may include power supply interruption, interruption of the speed sensor, incorrect data on the driver card, driving without a driver card, illegal removal of a driver card, insertion of a driver card during driving, and time adjustment.

00 - No tachograph event

01 - Tachograph event

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65132

SPN 1623 Tachograph output shaft speed

Calculated speed of the transmission output shaft.

Data Length: 2 bytes

Resolution: 0.125 rpm/bit, 0 offset

Data Range: 0 to 8,031.875 rpm

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65132

SPN 1624 Tachograph vehicle speed

Speed of the vehicle registered by the tachograph.

Data Length: 2 bytes

Resolution: 1/256 km/h per bit, 0 offset

Data Range: 0 to 250.996 km/h

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65132

SPN 1625 Driver 1 identification

Used to obtain the driver identity.

Data Length: Variable - up to 1728 bytes followed by an "" delimiter

Resolution: ASCII, 0 offset

Data Range: 0 to 255 per byte

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65131

SPN 1626 Driver 2 identification

Used to obtain the driver identity.

Data Length: Variable - up to 1728 bytes followed by an "" delimiter

Resolution: ASCII, 0 offset

Data Range: 0 to 255 per byte

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65131

SPN 1632 Engine Torque Limit Feature

Torque limit rating described in the current record.

000 Reserved

001 Highest torque rating

010 First torque rating

011 Previous torque rating (rating prior to the current rating)

100 Current torque rating

101-110 Reserved

111 Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65168

SPN 1633 Cruise Control Pause Switch

Switch signal which indicates the position of the Cruise Control Pause Switch used on Remote Cruise Control applications. The Cruise Control Pause Switch signal temporarily disables the Cruise Control function.

00 - Off

01 - On

10 - Error Indicator

11 -Take No Action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65265

SPN 1636 Engine Intake Manifold 1 Air Temperature (High Resolution)

Temperature of pre-combustion air found in intake manifold of engine air supply system. The higher resolution is required for control purposes.

Data Length: 2 bytes

Resolution: 0.03125 deg C/bit, -273 deg C offset

Data Range: -273 to 1734.96875 deg C

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65129

SPN 1637 Engine Coolant Temperature (High Resolution)

Temperature of liquid found in engine cooling system. The higher resolution is required for control purposes.

Data Length: 2 bytes

Resolution: 0.03125 deg C/bit, -273 deg C offset

Data Range: -273 to 1734.96875 deg C

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65129

SPN 1638 Hydraulic Temperature

Temperature of hydraulic fluid.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65128	

SPN 1639 Fan Speed

The speed of the fan associated with engine coolant system.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65213	

SPN 1653 Vehicle Limiting Speed Governor Enable Switch

Switch signal which enables the Vehicle Limiting Speed Governor (VLSG) such that the vehicle speed may be either increased or decreased when the engine is off idle.

00 - Switch disabled
 01 - Switched enabled
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	57344	

SPN 1654 Vehicle Limiting Speed Governor Increment Switch

Switch signal which increases the Vehicle Limiting Speed Governor (VLSG).

00 - Switch in the off state
 01 - Switch in the on state - increase
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	57344	

SPN 1655 *Vehicle Limiting Speed Governor Decrement Switch*

Switch signal which decreases the Vehicle Limiting Speed Governor (VLSG).

- 00 - Switch in the off state
- 01 - Switch in the on state - decrease
- 10 - Error
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	57344	

SPN 1656 *Engine Automatic Start Enable Switch*

Switch signal which enables the idle management system to be enabled. When this system is enabled with the engine in an idle mode and safe operating conditions existing, then the engine may be started or stopped automatically.

- 00 - Switch in the off state
- 01 - Switch in the on state
- 10 - Error
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	57344	

SPN 1665 *Engine Turbocharger Oil Level Switch*

Switch signal which indicates the presence of oil at the turbocharger

- 00 = No oil present at turbocharger
- 01 = Oil present at turbocharger
- 10 = Error
- 11 = Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65245	

SPN 1666 Automatic Gear Shifting Enable Switch

Indicates that automated gear shifting is enabled via a switch

- 00 = Automated Gear Shifting is disabled
- 01 = Automated Gear Shifting is enabled
- 10 = Error
- 11 = Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	57344	

SPN 1667 Retarder Requesting Brake Light

Indicates that whether the retarder is requesting that the brake lights are illuminated.

- 00 - Retarder is not requesting that the brake lights are illuminated
- 01 - Retarder is requesting that the brake lights are illuminated
- 10 - Reserved
- 11 - Not available/Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61440	

(R) SPN 1675 Engine Starter Mode

There are several phases in a starting action and different reasons why a start cannot take place.

- 0000 start not requested
- 0001 starter active, gear not engaged
- 0010 starter active, gear engaged
- 0011 start finished; starter not active after having been actively engaged (after 50ms mode goes to 0000)
- 0100 starter inhibited due to engine already running
- 0101 starter inhibited due to engine not ready for start (preheating)
- 0110 starter inhibited due to driveline engaged or other transmission inhibit
- 0111 starter inhibited due to active immobilizer
- 1000 starter inhibited due to starter over-temp
- 1001 starter inhibited due to intake air shutoff valve being active
- 1010 starter inhibited due to active SCR inducement
- 1011 Reserved
- 1100 starter inhibited - reason unknown
- 1101 error (legacy implementation only, use 1110)
- 1110 error
- 1111 not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61444	

SPN 1676 Auxiliary Heater Water Pump Status

Parameter indicating whether the auxiliary heater water pump is running

00 Water Pump is not running

01 Water Pump is running

10 Reserved

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65133

SPN 1677 Auxiliary Heater Mode

State of the auxiliary heater

0000 Heater not active

0001 Off due to ADR per European Regulations for Transport of hazardous materials

0010 Economy mode

0011 Normal mode

0100-1101 Not defined

1110 Error

1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65133

SPN 1678 Cab Ventilation

Indicates whether the cab is being ventilated or not.

00 Cab not ventilated

01 Cab is ventilated

10 Reserved

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65133

SPN 1679 Engine Heating Zone

Parameter indicating whether the engine zone is being heated.

00 Engine heating zone off
 01 Engine heating zone on
 10 Reserved
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65133

Operational Range: same as data range

SPN 1680 Cab Heating Zone

Parameter indicating whether the cab zone is being heated.

00 Cab heating zone off
 01 Cab heating zone on
 10 Reserved
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65133

Operational Range: same as data range

SPN 1681 Battery Main Switch Hold State

Parameter indicating whether the battery main switch is held due to an external request or not. The state battery main switch held indicates that the battery main switch is about to switch off.

00 Battery main switch not held
 01 Battery main switch held
 10 Reserved
 11 Don't care/take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65126

Operational Range: same as data range

SPN 1682 *Battery Main Switch Hold Request*

Request to hold the battery main switch.

00 Release Battery Main Switch

01 Hold Battery Main Switch

10 undefined

11 Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 57344

SPN 1683 *Auxiliary Heater Mode Request*

Request to activate the auxiliary heater.

0000 De-activate auxiliary heater

0001 Off due to ADR per European Regulations for Transport of hazardous materials

0010 Economy mode

0011 Normal mode

0100-1101 Not defined

1110 Reserved

1111 Don't care/take no action

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 57344

SPN 1684 *Auxiliary Heater Coolant Pump Request*

Indicates whether to activate the auxiliary heater coolant water pump.

00 Deactivate water pump

01 Activate water pump

10 Reserved

11 Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 57344

SPN 1685 Request Engine Zone Heating

Request to activate engine zone heating.

00 Do not heat engine zone

01 Heat engine zone

10 Reserved

11 Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 57344

SPN 1686 Request Cab Zone Heating

Request to activate cab zone heating.

00 Do not cab engine zone

01 Heat cab zone

10 Reserved

11 Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 57344

SPN 1687 Auxiliary Heater Output Coolant Temperature

Temperature of the auxiliary heater output coolant (I.e. water in a water heater system.)

Data Length: 1 byte

Resolution: 1 deg C/bit, -40 deg C offset

Data Range: -40 to 210 deg C

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65133

SPN 1688 Auxiliary Heater Input Air Temperature

Temperature of the input air in an auxiliary heater system.

Data Length: 1 byte

Resolution: 1 deg C/bit, -40 deg C offset

Data Range: -40 to 210 deg C

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65133

SPN 1689 Auxiliary Heater Output Power Percent

Current auxiliary heater output power, relative to the auxiliary heater maximum output power.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65133	

SPN 1690 Auxiliary Heater Maximum Output Power

The maximum output power of the auxiliary heater.

Data Length:	2 bytes	
Resolution:	2 W/bit, 0 offset	
Data Range:	0 to 128,510 W	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65127	

SPN 1691 Cab Interior Temperature Command

Parameter used to command a certain cab interior temperature.

Note: See also SPN 170. SPN 1662 is an additional diagnostic SPN associated with cab temperature.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	57344	

SPN 1692 Engine Desired Absolute Intake Manifold Pressure (Turbo Boost Limit)

The desired absolute intake manifold pressure of the engine.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65194	

SPN 1693 Engine Turbocharger Wastegate Valve Position

The position of the turbocharger wastegate valve (not the electronic wastegate control valve).

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65194	

SPN 1694 Engine Gas Mass Flow Sensor Fueling Correction

The amount of fuel the Gas Mass Flow Sensor is sensing should be added or subtracted compared to the maximum amount of fuel the control system allows the sensor to add or subtract.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65194	

SPN 1695 Engine Exhaust Gas Oxygen Sensor Fueling Correction

The amount of fueling change required by the system based on the measured Exhaust Oxygen value compared to the maximum fueling change permitted by the system, expressed as percentages.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65193	

SPN 1696 Engine Exhaust Gas Oxygen Sensor Closed Loop Operation

Indicates whether the engine is using the Exhaust Gas Oxygen sensor to control the air/fuel ratio.

00 Engine not using the Exhaust Gas Oxygen sensor (open loop)
 01 Engine using the Exhaust Gas Oxygen sensor for a closed loop operation
 10 Reserved
 11 Don't Care/take no action

See also SPN 4240 for an implementation with more states.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65193	

SPN 1697 CTI Wheel End Electrical Fault

Indicates the status of electrical fault on CTI wheel interface.

00 Ok (No Fault)
 01 Not Defined
 10 Error
 11 Not Supported

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65268	

SPN 1698 CTI Tire Status

Indicates the status of the tire.

00 Ok (no fault)

01 Tire leak detected

10 Error

11 Not Supported

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65268

SPN 1699 CTI Wheel Sensor Status

Indicates whether the wheel is being monitored by the CTI controller.

00 Off / isolated from CTI Pressure Controller

01 On (tire is polled)

10 Not Defined

11 Not Supported

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65268

SPN 1700 Lane Departure Imminent, Left Side

Indicates departure imminent on left side of lane.

00 Not imminent

01 Imminent

10 Reserved

11 Not used

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61447

SPN 1701 Lane Departure Imminent, Right Side

Indicates departure imminent on right side of lane.

00 Not imminent
01 Imminent
10 Reserved
11 Not Used

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61447

Operational Range: same as data range

SPN 1702 Lane Departure Indication Enable Status

Indicates whether lane departure indication is active.

00 Lane Departure indication disabled
01 Lane Departure Indication enabled
10 Reserved
11 Not Used

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65115

Operational Range: same as data range

SPN 1707 Hydraulic Fan 2 Motor Pressure

The hydraulic pressure used to drive the second fan system, sensed before the hydraulic fan motor.

Data Length: 2 bytes
Resolution: 0.5 kPa/bit, 0 offset
Data Range: 0 to 32,127.5 kPa
Type: Measured
Supporting Information:
PGN reference: 64817

Operational Range: same as data range

SPN 1708 Fan 2 Drive Bypass Command Status

Status of the Fan Drive Bypass Command for the second fan as being commanded by the ECU. The fan drive bypass diverts pump pressure away from the hydraulic motor to maintain the fan drive pressure. 0% is defined as no bypass (i.e. diverting no fan drive pressure) and 100% is defined as full bypass (i.e. diverting the maximum fan drive pressure) from the fan motor.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 %
Type: Status
Supporting Information:
PGN reference: 64817

Operational Range: same as data range

SPN 1710 Lane Tracking Status Left Side

Indicates whether the left side is tracking lane.

00 Not Tracking Left side

01 Tracking Left side

10 Reserved

11 Don't care/Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65115

SPN 1711 Lane Tracking Status Right Side

Indicates whether right side is tracking lane.

00 Not Tracking Right side

01 Tracking Right side

10 Reserved

11 Don't Care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65115

SPN 1712 Engine Extended Range Requested Speed Control Range Upper Limit (Engine configuration)

The maximum engine speed regardless of load that the engine will allow when operating in a speed control/limit mode, excluding any maximum momentary engine override speed, if supported.

When the limit is higher than 2500 RPM the 'Requested Speed Control Range Upper Limit (Engine Configuration)' parameter (see SPN 536) will be transmitted with a value of 2500 RPM.

Data Length: 2 bytes

Resolution: 0.125 rpm/bit, 0 offset

Data Range: 0 to 8,031.875 rpm

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65251

SPN 1713 Hydraulic Oil Filter Restriction Switch

This switch indicates whether hydraulic oil filter is clogged. This is not the transmission oil filter restriction switch, which is SPN 3359.

00 No restriction

01 Restriction exists on oil filter

10 Error

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65128

SPN 1714 Operator Seat Direction Switch

Senses whether the operator seat is in the forward driving position

00 Operator seat not facing forward

01 Operator seat is facing forward

10 Error

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 57344

SPN 1715 Drivers Demand Retarder - Percent Torque

The Drivers demand retarder – percent torque is the maximum torque selected by the driver when one or more modes are selected by the driver, such as hand lever, switch, constant torque, constant velocity, etc.

Data Length: 1 byte

Resolution: 1 %/bit, -125 % offset

Data Range: -125 to 125 %

Operational Range: -125% to 0%

Type: Status

Supporting Information:

PGN reference: 61440

SPN 1716 Retarder Selection, non-engine

The “Retarder Selection, non-engine” is the position of the driver’s selector for retarders that are not part of the engine system, expressed as percent and determined by the ratio of current position to the maximum possible position. The physical device may be a lever, rotary dial, combination of switches, or other device that the driver can use to select the type or amount of retardation needed.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61440

SPN 1717 *Actual Maximum Available Retarder - Percent Torque*

This is the maximum amount of torque that the retarder can immediately deliver. It is the same as the maximum torque shown in the Retarder's Configuration message, but allows for a much faster rate of change than could be communicated by reissuing the configuration message.

Application Note: The purpose for this parameter is to allow a "Master" retarder controller to more accurately allocate the vehicle's retarder requirements among multiple retarders. Its value should be the same as the value in the Configuration message at the time that message is assembled for broadcast, but may vary between those broadcasts.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125 % to 0
Type:	Measured	
Supporting Information:		
PGN reference:	61440	

SPN 1718 *Damper Stiffness Request Front Axle*

Demand value for the shock absorber control at the front axle.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 1719 *Damper Stiffness Request Rear Axle*

Demand value for the shock absorber control at the rear axle.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 1720 *Damper Stiffness Request Lift / Tag Axle*

Demand value for the shock absorber control at the lift or tag axle

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 1721 *Relative Level Front Axle Left*

Information of the height at the left side of the front axle referred to normal level 1. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65113	

SPN 1722 *Relative Level Front Axle Right*

Information of the height at the right side of the front axle referred to normal level 1. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65113	

SPN 1723 *Relative Level Rear Axle Right*

Information of the height at the left side of the rear axle referred to normal level 1. For explanations of normal level 1 see parameter SPN 1734 - Nominal Level Front Axle.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65113	

SPN 1724 *Relative Level Rear Axle Left*

Information of the height at the left side of the rear axle referred to normal level 1. For explanations of normal level 1 see parameter SPN 1734 - Nominal Level Front Axle.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65113	

SPN 1725 *Bellow Pressure Front Axle Left*

Information of the pressure of the air suspension bellow at the left side of the front axle

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65112	

SPN 1726 *Bellow Pressure Front Axle Right*

Information of the pressure of the air suspension bellow at the right side of the front axle

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65112	

SPN 1727 Bellow Pressure Rear Axle Left

Information of the pressure of the air suspension bellow at the left side of the rear axle

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65112	

SPN 1728 Bellow Pressure Rear Axle Right

Information of the pressure of the air suspension bellow at the right side of the rear axle

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65112	

SPN 1729 Damper Stiffness Front Axle

Damper stiffness information of the shock absorber control at the front axle

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65111	

SPN 1730 Damper Stiffness Rear Axle

Damper stiffness information of the shock absorber control at the rear axle

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65111	

SPN 1731 Damper Stiffness Lift / Tag Axle

Damper stiffness information of the shock absorber control at the lift of tag axle

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65111	

SPN 1732 Level Preset Front Axle Left

Set value for nominal level 'preset level' at the left side of the front axle. This value is referred to 'Normal level 1'. For explanations of normal level 1 see parameter SPN 1734 - Nominal Level Front Axle.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53504	

(R) SPN 1733 Nominal Level Rear Axle

Signal which indicates the nominal (desired) height of the rear axle to be controlled by the suspension system.

For further explanations see SPN 1734 - Nominal Level Front Axle.

0000 Level not specified,(i.e. the nominal level is none of the specified levels, no error condition)
 0001 "Normal Level 1,(i.e. the level prescribed for normal driving, given by design)
 0010 "Normal Level 2,(i.e. a level permitted for driving, for example to lower the vehicle in case of high speed)
 0011 "Normal Level 3,(i.e. a level permitted for driving, for example to lift the vehicle in case of offroad)
 0100 "Preset Level,(i.e. a level to be defined externally via CAN)
 0101 "Customer Level,(i.e. a level to be defined by customer via parameter setting)
 0110 "Upper Level,(i.e. the highest level to be controlled)
 0111 "Lower Level,(i.e. the lowest level to be controlled)
 1000 Level change stopped
 1001 Raising
 1010 Lowering
 1011-1101 Reserved
 1110 Error
 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65114	

(R) SPN 1734 Nominal Level Front Axle

Signal which indicates the nominal (desired) height of the front axle to be controlled by the suspension system.

These heights are discrete levels. They are the upper level, lower level, normal level 1, normal level 2, normal level 3, customer level, and preset level. Refer to Figure SPN1734_A.

- Upper Level is the highest mechanically available height of the vehicle.
- Lower Level is the lowest mechanically available height of the vehicle.

Normal Levels 1, 2 and 3 are heights normally used during driving.

- Normal Level 1 is most often used and is given by design.
- Normal Level 2 may be chosen, for example, to be lower than Normal Level 1 for the purpose of reducing fuel consumption while driving on highways.
- Normal Level 3 may be chosen above Normal Level 1 for driving off road.

The preset level has to be set by means of ASC 6 (PGN: 53504).

States 'Raising' and 'Lowering' are only active when corresponding states are requested in SPN 1751. This provides the possibility to adjust vehicle to a level other than the predefined levels.

0000 Level not specified,(i.e. the nominal level is none of the specified levels, no error condition)
 0001 "Normal Level 1,(i.e. the level prescribed for normal driving, given by design)
 0010 "Normal Level 2,(i.e. a level permitted for driving, for example to lower the vehicle in case of high speed)
 0011 "Normal Level 3,(i.e. a level permitted for driving, for example to lift the vehicle in case of offroad)
 0100 "Preset Level,(i.e. a level to be defined externally via CAN)
 0101 "Customer Level,(i.e. a level to be defined by customer via parameter setting)
 0110 "Upper Level,(i.e. the highest level to be controlled)
 0111 "Lower Level,(i.e. the lowest level to be controlled)
 1000 Level change stopped
 1001 Raising
 1010 Lowering
 1011-1101 Reserved
 1110 Error
 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1734	
PGN reference:	65114	

SPN 1735 Level Preset Rear Axle Right

Set value for nominal level 'preset level' at the right side of the rear axle. This value is referred to 'Normal level 1'. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53504	

SPN 1736 ***Above Nominal Level Rear Axle***

Signal which indicates whether the actual height of the rear axle is above the nominal (desired) level of the rear axle. For explanations of nominal level see parameter SPN 1734 - Nominal Level Front Axle.

00 Not above
01 Above
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65114

Operational Range: same as data range

SPN 1737 ***Above Nominal Level Front Axle***

Signal which indicates whether the actual height of the front axle is above the nominal (desired) level of the front axle. For explanations of nominal level see SPN 1734 - Nominal Level Front Axle.

00 Not above
01 Above
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65114

Operational Range: same as data range

SPN 1738 ***Below Nominal Level Front Axle***

Signal which indicates whether the actual height of the front axle is below the nominal (desired) level for the front axle. For explanations of nominal level see parameter SPN 1734 - Nominal Level Front Axle.

00 Not below
01 Below
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65114

Operational Range: same as data range

SPN 1739 *Lifting Control Mode Front Axle*

Signal which indicates the actual lifting level change at the front axle

00 Lifting not active
 01 Lifting active
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65114	

SPN 1740 *Lowering Control Mode Front Axle*

Signal which indicates the actual lowering level change at the front axle

00 Lowering not active
 01 Lowering active
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65114	

(R) SPN 1741 *Level Control Mode*

Signal which indicates the actual control mode of the air suspension system

0000 Normal operation; i.e. the system performs a "pure" control of the vehicle height
 0001 Traction help (load transfer); i.e. the driven axle is loaded to a maximum value given by legislation or design
 0010 Load fixing; i.e. the driven axlen is loaded to a value defined by the driver
 0011 Pressure ratio 1; i.e. the ratio between the pressures at the driven axle and at the third axle is controlled, so that the ratio equals a fixed value 1
 0100 Pressure ratio 2; i.e. the ratio between the pressures at the driven axle and at the third axle is controlled, so that the ratio equals a fixed value 2
 0101 Optimum traction 1; i.e. the pressure at the driven axle is controlled at a fixed value 1
 0110 Optimum traction 2; i.e. the pressure at the driven axle is controlled at a fixed value 2
 0111 Traction help - load reduce; (i.e. the driven axle load is reduced to normal load condition)
 1000 Exhausting bellow function; i.e. the bellows are exhausted totally
 1001 Air suspension control prohibited (i.e. hold current pressures in all suspension devices.)
 1010 Automatic air suspension control prohibited
 1011 Force to bumper level request is in effect
 1100-1101 Not defined
 1110 Error
 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65114	

SPN 1742 *Kneeling Information*

Signal which indicates the actual level change in case of kneeling function

0000 Not active,(i.e. the kneeling function is not active)

0001 Lowering active,(i.e. the vehicle is lowered due to a kneeling request)

0010 Kneeling level reached,(i.e. the vehicle is at the fixed kneeling level)

0011 Lifting active,(i.e. the vehicle is lifted due to a recover request)

0100 Kneeling aborted,(i.e. in case of manual actuation the request was dropped before the kneeling level was reached)

0101-1101 Not defined

1110 Error

1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65114

SPN 1743 *Lift Axle 1 Position*

Signal which indicates the position / load condition of lift axle / tag axle #1. Numbering of lift/tag axles starts at front axle.

00 Lift axle position down / tag axle laden

01 Lift axle position up / tag axle unladen

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65114

SPN 1744 *Door Release*

Signal which indicates that the doors may be opened. [Please note: doors instead of door!]

In case a kneeling request is active the ASC indicates during lowering the vehicle "doors shall not be opened" as a security information until the kneeling level is reached. Then "doors may be opened" is sent.

00 Doors may not be opened

01 Doors may be opened

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65114

SPN 1745 *Vehicle Motion Inhibit*

Signal which indicates whether vehicle motion is inhibited.

00 Vehicle may be moved
 01 Vehicle motion is inhibited
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65114

Operational Range: same as data range

SPN 1746 *Security Device*

The signal which indicates the status of the security device. An example of a security device is a curbstone feeler installed beneath the doors of a bus. If the security device becomes active during kneeling the kneeling process (lowering) is stopped and the vehicle lifts back to the starting level.

00 Not active
 01 Active
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65114

Operational Range: same as data range

SPN 1747 *Kneeling Control Mode Request*

Command signal to select the kneeling functionality

00 Automatically actuated
 01 Manually actuated
 10 Reserved
 11 Don't care/take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 53760

Operational Range: same as data range

SPN 1748 *Kneeling Request Right Side*

Command signal to activate the kneeling functionality on the right side of the vehicle

00 No kneeling request
 01 Kneeling request
 10 Reserved
 11 Don't care/take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 53760

Operational Range: same as data range

SPN 1749 *Kneeling Request Left Side*

Command signal to activate the kneeling functionality on the left side of the vehicle

00 No kneeling request
 01 Kneeling request
 10 Reserved
 11 Don't care/take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 53760

Operational Range: same as data range

SPN 1750 *Nominal Level Request Rear Axle*

Command signal to activate a level of the rear axle programmed and/or memorized in the ECU. For explanations of nominal level see SPN 1734 - Nominal Level Front Axle.

0000 No level request
 0001 Normal Level 1,(i.e. the level prescribed for normal driving, given by design)
 0010 Normal Level 2,(i.e. a level permitted for driving, for example to lower the vehicle in case of high speed)
 0011 Normal Level 3,(i.e. a level permitted for driving, for example to lift the vehicle in case of offroad)
 0100 Preset Level,(i.e. a level to be defined externally via CAN)
 0101 Customer Level,(i.e. a level to be defined by customer via parameter setting)
 0110 Upper Level,(i.e. the highest level to be controlled)
 0111 Lower Level,(i.e. the lowest level to be controlled)
 1000 Stop level change,(i.e. the level change in process shall be stopped immediately)
 1001 Raise Request (Continuously raising front axle, as long as active).
 1010 Lower Request (Continuously lowering front axle, as long as active).
 1011-1101 Not defined
 1110 Reserved
 1111 Don't care/take no action

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 53760

Operational Range: same as data range

SPN 1751 Nominal Level Request Front Axle

Command signal to activate a level of the front axle programmed and/or memorized in the ECU For explanations of nominal level see SPN 1734 - Nominal Level Front Axle.

0000 No level request

0001 Normal Level 1,(i.e. the level prescribed for normal driving, given by design)

0010 Normal Level 2,(i.e. a level permitted for driving, for example to lower the vehicle in case of high speed)

0011 Normal Level 3,(i.e. a level permitted for driving, for example to lift the vehicle in case of offroad)

0100 Preset Level,(i.e. a level to be defined externally via CAN)

0101 Customer Level,(i.e. a level to be defined by customer via parameter setting)

0110 Upper Level,(i.e. the highest level to be controlled)

0111 Lower Level,(i.e. the lowest level to be controlled)

1000 Stop level change,(i.e. the level change in process shall be stopped immediately)

1001 Raise Request (Continuously raising front axle, as long as active).

1010 Lower Request (Continuously lowering front axle, as long as active).

1011-1101 Not defined

1110 Reserved

1111 Don't care/take no action

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 53760

SPN 1752 Lift Axle 1 Position Command

Signal to command the position/load condition of lift/tag axle #1. Numbering of lift/tag axles starts at front axle.

00 Lift axle position down / tag axle laden

01 Lift axle position up / tag axle unladen

10 Reserved

11 Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 53760

(R) SPN 1753 Level Control Mode Request

Command signal to activate a level control mode

0000 Normal operation; i.e. the system performs a "pure" control of the vehicle height
 0001 Traction help (load transfer); i.e. the driven axle is loaded to a maximum value given by legislation or design
 0010 Load fixing; i.e. the driven axle is loaded to a value defined by the driver
 0011 Pressure ratio 1; i.e. the ratio between the pressures at the driven axle and at the third axle is controlled, so that the ratio equals a fixed value 1
 0100 Pressure ratio 2; i.e. the ratio between the pressures at the driven axle and at the third axle is controlled, so that the ratio equals a fixed value 2
 0101 Optimum traction 1; i.e. the pressure at the driven axle is controlled at a fixed value 1
 0110 Optimum traction 2; i.e. the pressure at the driven axle is controlled at a fixed value 2
 0111 Traction help - load reduce; (i.e. reduce axle load of driven axle to normal load condition)
 1000 Exhaust bellows
 1001 Force to bumper level
 1010 -1101 Not defined
 1110 Reserved
 1111 Don't care/take no action

Mode 1001 would be used to override other level change requests and force an immediate return to bumper level, e.g. in a situation where the vehicle is in danger of tilting.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 1754 Below Nominal Level Rear Axle

Signal which indicates whether the actual height of the rear axle is below the nominal (desired) level for the rear axle. For explanations of nominal level see SPN 1734 - Nominal Level Front Axle.

00 Not below
 01 Below
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65114	

SPN 1755 Lowering Control Mode Rear Axle

Signal which indicates the actual lowering level change at the rear axle

00 Lowering not active
 01 Lowering active
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65114	

SPN 1756 Lifting Control Mode Rear Axle

Signal which indicates the actual lifting level change at the rear axle

00 Lifting not active
 01 Lifting active
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65114	

SPN 1757 Level Preset Front Axle Right

Set value for nominal level 'preset level' at the right side of the front axle. This value is referred to 'Normal level 1'. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53504	

SPN 1758 Level Preset Rear Axle Left

Set value for nominal level 'preset level' at the left side of the rear axle. This value is referred to 'Normal level 1'. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53504	

SPN 1759 Blade Height Set Point - High Resolution

High resolution for the laser guided blade set point. The high resolution required for more accurate control and 'accurate' unit conversions.

Negative values are below grade, positive values are above grade, zero is on grade.

Data Length:	4 bytes	
Resolution:	100 mm/bit, -209.7152 m offset	
Data Range:	-209.7152 to 211.3929215 m	Operational Range: -209.7152m to 209.7152m
Type:	Measured	
Supporting Information:		
PGN reference:	65140	

SPN 1760 Gross Combination Vehicle Weight

The total weight of the truck and all attached trailers.

Data Length:	2 bytes	
Resolution:	10 kg/bit, 0 offset	
Data Range:	0 to 642,550 kg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65136	

SPN 1761 Aftertreatment 1 Diesel Exhaust Fluid Tank Level

Ratio of volume of diesel exhaust fluid to the total volume of diesel exhaust fluid storage container.

0 % = Empty

100% = Full

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	65110	

SPN 1762 Hydraulic Pressure

Hydraulic pressure measured at the output of the hydraulic pump.

Data Length:	2 bytes	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 128,510 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61448	

SPN 1763 Engine Hydraulic Pressure Governor Mode Indicator

Mode for governor operation is hydraulic pressure control.

00 Disabled
 01 Enabled
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61448	

SPN 1764 Engine Hydraulic Pressure Governor Switch

Switch that sets the mode of hydraulic governor

00 Pressure Mode Inactive
 01 Pressure Mode Active
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61448	

SPN 1765 Engine Requested Fuel Valve 1 Position

The requested position of a gaseous fuel valve 1 that is metering the fuel flow to the engine.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65153	

SPN 1766 Engine Requested Fuel Valve 2 Position

The requested position of a gaseous fuel valve 2 that is metering the fuel flow to the engine, as requested by the Engine Control Unit.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65153	

SPN 1767 *Specific Heat Ratio*

The specific heat ratio of the fuel.

Data Length:	2 bytes	
Resolution:	0.001/bit, 0 offset	
Data Range:	0 to 64.255	Operational Range: 0 to 2.0000
Type:	Status	
Supporting Information:		
PGN reference:	65109	

SPN 1768 *Engine Low Limit Threshold for Maximum RPM from Engine*

Minimum allowable value for maximum continuous RPM from engine

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65108	

SPN 1769 *Engine High Limit Threshold for Minimum Continuous Engine RPM*

Maximum allowable value for minimum continuous RPM from engine

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65108	

SPN 1770 *Engine Low Limit Threshold for Maximum Torque from Engine*

Minimum allowable value for maximum continuous torque from engine

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65108	

SPN 1771 *Engine High Limit Threshold for Minimum Continuous Torque from Engine*

Maximum allowable value for minimum continuous torque from engine

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65108	

SPN 1772 Engine Maximum Continuous RPM

Applied limit for maximum continuous engine RPM

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65108	

SPN 1773 Engine Minimum Continuous RPM

Applied limit for minimum continuous engine RPM

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65108	

SPN 1774 Engine Maximum Continuous Torque

Applied limit for maximum continuous engine torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65108	

SPN 1775 Engine Minimum Continuous Torque

Applied limit for minimum continuous engine torque

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65108	

SPN 1776 Low Limit Threshold for Maximum RPM from Retarder

Minimum allowable value for maximum continuous retarder speed

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65107	

SPN 1777 *High Limit Threshold for Minimum Continuous RPM from Retarder*

Maximum allowable value for minimum continuous retarder speed

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65107	

SPN 1778 *Low Limit Threshold for Maximum Torque from Retarder*

Minimum allowable value for maximum continuous retarder torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65107	

SPN 1779 *High Limit Threshold for Minimum Continuous Torque from Retarder*

Maximum allowable value for minimum continuous retarder torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65107	

SPN 1780 *Maximum Continuous Retarder Speed*

Applied limit for maximum continuous retarder RPM

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65107	

SPN 1781 *Minimum Continuous Retarder Speed*

Applied limit for minimum continuous retarder RPM

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65107	

SPN 1782 *Maximum Continuous Retarder Torque*

Applied limit for maximum continuous retarder torque.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65107	

SPN 1783 *Minimum Continuous Retarder Torque*

Applied limit for minimum continuous retarder torque

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65107	

SPN 1784 *Engine Speed Limit Request - Minimum Continuous*

Requested minimum continuous engine speed

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	52992	

SPN 1785 *Engine Speed Limit Request - Maximum Continuous*

Requested maximum continuous engine speed

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	52992	

SPN 1786 *Engine Torque Limit Request - Minimum Continuous*

Requested minimum continuous engine torque (operating range: 0 to 125%)

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Status	
Supporting Information:		
PGN reference:	52992	

SPN 1787 Engine Torque Limit Request - Maximum Continuous

Requested maximum continuous engine torque (operating range: 0 to 125%)

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Status	
Supporting Information:		
PGN reference:	52992	

SPN 1788 Minimum Continuous Retarder Speed Limit Request

Requested minimum continuous retarder speed

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	52992	

SPN 1789 Maximum Continuous Retarder Speed Limit Request

Requested maximum continuous retarder speed

Data Length:	1 byte	
Resolution:	32 rpm/bit, 0 offset	
Data Range:	0 to 8,000 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	52992	

SPN 1790 Minimum Continuous Retarder Torque Limit Request

Requested minimum continuous retarder torque (operating range: -125 to 0%)

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125 to 0%
Type:	Status	
Supporting Information:		
PGN reference:	52992	

SPN 1791 Maximum Continuous Retarder Torque Limit Request

Requested maximum continuous retarder torque (operating range: -125 to 0%)

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125 to 0%
Type:	Status	
Supporting Information:		
PGN reference:	52992	

SPN 1792 *Tractor-Mounted Trailer ABS Warning Signal*

This parameter commands the tractor-mounted trailer ABS optical warning signal.

00 Off
01 On
10 Reserved
11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61441	

SPN 1793 *ATC/ASR Information Signal*

This parameter commands the ATC/ASR driver information signal, for example a dash lamp.

00 Off
01 On
10 Reserved
11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61441	

SPN 1794 *Engine Moment of Inertia*

Moment of inertia for the engine, including items driven full-time by the engine such as fuel, oil and cooling pumps. The inertia from the following items are not included: flywheel, alternator, compressor, fan, and other engine-driven accessories.

Data Length:	2 bytes	
Resolution:	0.004 kg-m ² /bit, 0 offset	
Data Range:	0 to 257.02 kg-m ²	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65251	

SPN 1795 *Alternator Current (High Range/Resolution)*

This parameter indicates the amount of electrical current output from the alternator of the main vehicle. Alternator Current (SPN 115) has a lower range and resolution.

Data Length:	2 bytes	
Resolution:	0.05 A/bit, -1600 A offset	
Data Range:	-1600 to 1612.75 A	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65106	

SPN 1796 ACC Distance Alert Signal

Signal to indicate to the operator that the ACC system is not able to maintain the distance to the target. Example: Target stopping rapidly. This signal may be used to activate warning sounds or indicators.

00 ACC DAS Not Active

01 ACC DAS Active

10 Reserved

11 Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 65135

Operational Range: same as data range

SPN 1797 ACC System Shutoff Warning

Signal to warn the driver of system deactivation due to non-driver actions. Example: Attempting to control vehicle speed below or above limits of ACC. This signal may be used to activate warning sounds or indicators.

00 ACC SSOW Not Active

01 ACC SSOW Active

10 Reserved

11 Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 65135

Operational Range: same as data range

SPN 1798 ACC Target Detected

Signal to indicate to the driver that the ACC system has detected a target.

00 No targets detected

01 Target detected

10 Reserved

11 Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 65135

Operational Range: same as data range

SPN 1799 Requested ACC Distance Mode

The Requested Distance Control Mode to the ACC system from the operators interface.

The ACC Set Distance Mode (SPN 1589) indicates the selected Distance Control Mode for the ACC system. This parameter is the driver requested setting for this.

000 Requested ACC Distance Mode #1 (largest distance)
 001 Requested ACC Distance Mode #2
 010 Requested ACC Distance Mode #3
 011 Requested ACC Distance Mode #4
 100 Requested ACC Distance Mode #5 (shortest distance)
 101 not defined
 110 error condition
 111 not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65105	

SPN 1800 Battery 1 Temperature

Temperature of the battery 1. The relation to physical location is determined by the equipment manufacturer.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65104	

SPN 1801 Battery 2 Temperature

Temperature of the battery 2. The relation to physical location is determined by the equipment manufacturer.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65104	

SPN 1802 Engine Intake Manifold 5 Temperature

Temperature of pre-combustion air found in intake manifold number 5 of engine air supply system.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65189	

SPN 1803 Engine Intake Manifold 6 Temperature

Temperature of pre-combustion air found in intake manifold number 6 of engine air supply system.

Data Length: 1 byte
 Resolution: 1 deg C/bit, -40 deg C offset
 Data Range: -40 to 210 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65189

SPN 1804 Engine Start Enable Device 2

Devices that assist an engine in starting, e.g. intake heaters, ether, or an alternate/secondary starting aid. May be of the same type or different than Start Enable Device 1 (SPN 626). Parameter indicating whether the start enable device 2 is ON or OFF.

00 - start enable OFF
 01 - start enable ON
 10 - reserved
 11 - not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64966

SPN 1805 LED Display Mode Control

This parameter informs the system what the selected Display mode will be.

0000 - Center On-Grade Display Mode 1 (5 CHANNEL)
 0001 - Offset On-Grade Display Mode
 0010 - Center On-Grade Display Mode 2 (7 CHANNEL)
 0011 - 1110 Reserved
 1111 - Not Available or Not Applicable

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 65142

SPN 1806 LED Display Deadband Control

This parameter informs the system what the selected Display deadband will be.

0000 +/- 4.5 mm (0.015 feet, 0.18 inches)
 0001 +/- 12 mm (0.040 feet, 0.45 inches)
 0010 +/- 24 mm (0.080 feet, 0.96 inches)
 0011 +/- 5 mm (0.017 feet, 0.2 inches)
 0100 +/- 1 mm (0.003 feet, 0.04 inches)
 0101 - 1110 Reserved
 1111 Not Available or Not applicable

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 65142

Operational Range: same as data range

SPN 1807 Steering Wheel Angle

The main operator's steering wheel angle (on the steering column, not the actual wheel angle). The vehicle being steered to the left (counterclockwise) results in a positive steering wheel angle. This is the yaw angle of the steering wheel with the z-axis along the centerline of the steering column. This parameter is defined according to a Z-Up axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Up Axis System has positive X directed forward, positive Y to the left, and positive Z directed up.

Data Length: 2 bytes
 Resolution: 1/1024 rad per bit, -31.374 rad offset
 Data Range: -31.374 to +31.374 rad
 Type: Measured
 Supporting Information:
 PGN reference: 61449

Operational Range: same as data range

SPN 1808 Yaw Rate

Indicates the rate of rotation about the vertical axis (i.e. the z-axis). A positive yaw rate signal results when the vehicle turns counter-clockwise. This parameter is defined according to a Z-Up axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Up Axis System has positive X directed forward, positive Y to the left, and positive Z directed up. See SPN 4985 for an alternate range and resolution using a Z-Down Axis System.

Data Length: 2 bytes
 Resolution: 1/8192 rad/s per bit, -3.92 rad/s offset
 Data Range: -3.92 to +3.92 rad/s
 Type: Measured
 Supporting Information:
 PGN reference: 61449

Operational Range: same as data range

SPN 1809 *Lateral Acceleration*

Indicates a lateral acceleration of the vehicle (the component of vehicle acceleration vector along the Y-axis). A positive lateral acceleration signal results when the vehicle is accelerated to the left. This parameter is defined according to a Z-Up axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Up Axis System has positive X directed forward, positive Y to the left, and positive Z directed up. See SPN 5347 for an alternate range and resolution.

Data Length: 2 bytes
 Resolution: 1/2048 m/s² per bit, -15.687 m/s² offset
 Data Range: -15.687 to +15.687 m/s² Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 61449

SPN 1810 *Longitudinal Acceleration*

Indicates the longitudinal acceleration of the vehicle. A positive longitudinal acceleration signal results when the vehicle speed increases, regardless of driving the vehicle forward or backward. This parameter is applicable to vehicle speed measurement systems, such as passive wheel speed sensors, that are not capable of determining the direction of the vehicle motion. See SPN 5348 for an alternate longitudinal acceleration.

Data Length: 1 byte
 Resolution: 0.1 m/s² per bit, -12.5 m/s² offset
 Data Range: -12.5 to +12.5 m/s² Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 61449

SPN 1811 *Steering Wheel Turn Counter*

Indicates number of steering wheel turns, absolute position or relative position at ignition on. Positive values indicate left turns.

Data Length: 6 bits
 Resolution: 1 turn/bit, -32 turns offset
 Data Range: -32 to 29 turns Operational Range: -10 to +10 Turns
 Type: Measured
 Supporting Information:
 PGN reference: 61449

SPN 1812 *Steering Wheel Angle Sensor Type*

Indicates whether the steering wheel angle sensor is capable of absolute measuring of the number of steering wheel turns or not (relative measuring to position at ignition on).

00 Relative measuring principle
 01 Absolute measuring principle
 10 Reserved
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 61449

SPN 1813 VDC Information Signal

This parameter commands the VDC information signal, for example a dash lamp.

00 Off

01 On

10 Reserved

11 Don't care/Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65103

SPN 1814 VDC Fully Operational

Signal that indicates whether VDC is fully operational or whether its functionality is reduced by a permanent or temporary (e.g. low voltage) defect, by intended action (e.g. disabled by a switch or during special diagnostic procedures), not configured or not yet fully initialized (e.g. missing initialization or configuration message). VDC contains ROP and YC.

00 Not fully operational

01 Fully operational

10 Reserved

11 Don't care/Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65103

SPN 1815 VDC brake light request

Indicates whether VDC requests to turn the vehicle brake lights on

00 Turn brake light not on

01 Turn brake light on

10 Reserved

11 Don't care/Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65103

SPN 1816 ROP Engine Control active

State Signal which indicates that the Roll Over Prevention (ROP) has commanded engine control to be active. Within the physical limits, ROP attempts to prevent rolling over of the vehicle. Active means that ROP actually tries to control the engine. This state signal is independent of other control commands to the engine which may have higher priority.

00 ROP engine control passive but installed

01 ROP engine control active

10 Reserved

11 Don't care/Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 65103

Operational Range: same as data range

SPN 1817 YC Engine Control active

State Signal which indicates that the Yaw Control (YC) has commanded engine control to be active. Within the physical limits, YC attempts to prevent yawing of the vehicle. Active means that YC actually tries to control the engine. This state signal is independent of other control commands to the engine which may have higher priority.

00 YC engine control passive but installed

01 YC engine control active

10 Reserved

11 Don't care/Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 65103

Operational Range: same as data range

SPN 1818 ROP Brake Control active

State signal which indicates that Roll over Prevention (ROP) has activated brake control. Active means that ROP actually controls wheel brake pressure at one or more wheels of the vehicle or vehicle combination. Within the physical limits, ROP attempts to prevent rolling over of the vehicle.

00 ROP brake control passive but installed

01 ROP brake control active

10 Reserved

11 Don't care/Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 65103

Operational Range: same as data range

SPN 1819 YC Brake Control active

State signal which indicates that Yaw Control (YC) has activated brake control. Active means that YC actually controls wheel brake pressure at one or more wheels of the vehicle or vehicle combination. Within the physical limits, YC attempts to prevent yawing of the vehicle.

00 YC brake control passive but installed

01 YC brake control active

10 Reserved

11 Don't care/Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65103

SPN 1820 Ramp / Wheel Chair Lift Position

Signal which indicates the actual position of the ramp / wheel chair lift.

00 Inside bus

01 Outside bus

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65102

SPN 1821 Position of doors

Signal which indicates the actual position of the doors.

0000 At least 1 door is open

0001 Closing last door

0010 All doors closed

0011-1101 Not defined

1110 Error

1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65102

SPN 1822 *Lift Axle 2 Position*

Signal which indicates the position / load condition of lift axle / tag axle #2. Numbering of lift/tag axles starts at front axle.

00 Lift axle position down / tag axle laden
01 Lift axle position up / tag axle unladen
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65114

Operational Range: same as data range

SPN 1823 *Rear Axle in Bumper Range*

Signal which indicates that the vehicle height at the rear axle (SPNs 1723 and 1724) is within the bumper range.

00 Actual level out of bumper range
01 Actual level within bumper range
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65114

Operational Range: same as data range

SPN 1824 *Front Axle in Bumper Range*

Signal which indicates that the vehicle height at the front axle (SPNs 1721 and 1722) is within the bumper range.

00 Actual level out of bumper range
01 Actual level within bumper range
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65114

Operational Range: same as data range

SPN 1825 Suspension Remote control 2

Signal which indicates that the suspension system is controlled by remote control #2. Remote control is an external unit to operate the suspension system.

00 Not active
01 Active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65114

Operational Range: same as data range

SPN 1826 Suspension Remote Control 1

Signal which indicates that the suspension system is controlled by remote control #1. Remote control is an external unit to operate the suspension system.

00 Not active
01 Active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65114

Operational Range: same as data range

SPN 1827 Suspension Control Refusal Information

Signal which indicates that the air suspension control cannot perform a request due to the operating conditions. It also provides a reason for the refusal.

0000 Actual request not refused
0001 Axle load limit reached (load transfer)
0010 Would exceed axle load limit (tag axle)
0011 Bogie differential not locked
0100 Above speed limit
0101 Below speed limit
0110 General reject; I.e. no specified reason applies
0111 Requested level not available
1000 - 1101 Not defined
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15
Type: Status
Supporting Information:
PGN reference: 65114

Operational Range: same as data range

SPN 1828 *Lift Axle 2 Position Command*

Signal to command the position / load condition of lift / tag axle #2. Numbering of lift/tag axles starts at front axle.

00 Lift axle position down / tag axle laden
01 Lift axle position up / tag axle unladen
10 Reserved
11 Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 1829 *Kneeling Command - Rear Axle*

Command signal to activate the kneeling functionality at the rear axle of the vehicle.

00 Deactivate kneeling
01 Activate kneeling
10 Reserved
11 Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 1830 *Kneeling Command - Front Axle*

Command signal to activate the kneeling functionality at the front axle of the vehicle

00 Deactivate kneeling
01 Activate kneeling
10 Reserved
11 Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 1831 *Electronic Shock Absorber Control Mode - Lift/Tag Axle*

Signal which indicates the current mode of operation of the electronic shock absorber control at the lift/tag axle.

00 Normal operation dampers passive
 01 Normal operation dampers active
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65111

Operational Range: same as data range

SPN 1832 *Electronic Shock Absorber Control Mode - Rear Axle*

Signal which indicates the current mode of operation of the electronic shock absorber control at the rear axle.

00 Normal operation dampers passive
 01 Normal operation dampers active
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65111

Operational Range: same as data range

SPN 1833 *Electronic Shock Absorber Control Mode - Front Axle*

Signal which indicates the current mode of operation of the electronic shock absorber control at the front axle.

00 Normal operation dampers passive
 01 Normal operation dampers active
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65111

Operational Range: same as data range

SPN 1834 *Engine Total Average Fuel Rate*

Average fuel rate, equal to total fuel used divided by total engine hours, over the life of the engine

Data Length: 2 bytes
 Resolution: 0.05 L/h per bit, 0 offset
 Data Range: 0 to 3,212.75 L/h
 Type: Measured
 Supporting Information:
 PGN reference: 65101

Operational Range: same as data range

SPN 1835 Engine Total Average Fuel Economy

Average fuel economy, equal to total vehicle distance divided by total fuel used, over the life of the engine

Data Length:	2 bytes	
Resolution:	1/512 km/L per bit, 0 offset	
Data Range:	0 to 125.498046875 km/L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65101	

SPN 1836 Trailer ABS Status

State signal which indicates that ABS in the trailer is actively controlling the brakes. A message is sent to the tractor from the trailer (i.e. by PLC). The receiving device in the tractor transfers this information to the J1939 network. At the beginning of power on the message is sent by the trailer to indicate if this status information is supported. Timeout of the trailer ABS active can be done by monitoring of the Trailer warning light information.

00 Trailer ABS Status Information Available But Not Active

01 Trailer ABS Active

10 Reserved

11 Trailer ABS Status Information Not Available or Parameter Not Supported

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61441	

SPN 1837 Convoy Driving Lamp Select

Black Out Convoy Driving Lamp Selection

00 Off

01 On

10 Reserved

11 Not Supported

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65100	

SPN 1838 Convoy Lamp Select

Black Out Convoy Lamp Selection

00 Off

01 On

10 Reserved

11 Not Supported

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65100	

SPN 1839 Front Black Out Marker Lamp Select

Front Black Out Marker Lamp Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65100

Operational Range: same as data range

SPN 1840 Rear Black Out Marker Select

Rear Black Out Marker Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65100

Operational Range: same as data range

SPN 1841 Black Out Brake/Stop Lamp Select

Black Out Brake/Stop Lamp Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65100

Operational Range: same as data range

SPN 1842 *Black Out Work Lamp Select*

Black Out Work Lamp Selection

00 Off
 01 On
 10 Reserved
 11 Not Supported

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65100

Operational Range: same as data range

SPN 1843 *Night Vision Illuminator Select*

Night Vision Illuminator Selection

00 Off
 01 On
 10 Reserved
 11 Not Supported

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65100

Operational Range: same as data range

SPN 1844 *Operators Black Out Intensity Selection*

Operators Selection of lamp intensity in black out mode. This parameter provides the operators selected illumination intensity as a percentage of available full scale. This parameter would be typically used as a dash or instrument cluster intensity adjustment.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 %
 Type: Status
 Supporting Information:
 PGN reference: 65100

Operational Range: same as data range

SPN 1845 *Transmission Torque Limit*

Parameter provided to the engine from the transmission as a torque limit to be invoked by the engine in the event that J1939 communication with the transmission is lost.

The intention is to protect transmissions that use a continuous torque limit during torque converter mode or operation in specific lower gears, where stall or drivetrain torque may reach levels higher than the gearbox capacity. If communication is lost during torque limited operation, unrestricted engine torque output could harm the transmission.

It is recommended that engines use reception of the ETC#1 message as a transmission "heartbeat". In the event that the ETC#1 message is not received in a time period of 5 times its' broadcast rate ($5 \times 10 \text{ ms} = 50 \text{ ms}$), the engine should invoke a torque limit holding the engine to less than or equal to the value of the Transmission Torque Limit parameter. The engine may release the limit when transmission-to-engine communication is re-established.

A value of 0xFF00 to 0xFFFF indicates that no transmission torque limit is desired.

It is expected that the engine will record this torque value in non-volatile memory and will include this in the engine configuration PGN as parameter Engine Default Torque Limit (SPN 1846)

If the engine observes change in this parameter value on power-up, the engine should record the new value.

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65099	

SPN 1846 *Engine Default Torque Limit*

Companion parameter to Transmission Torque Limit (SPN 1845). This "echo" parameter provides confirmation to the transmission that the engine has received and will invoke the requested Transmission Torque Limit in the event that J1939 communication is lost between the two devices.

If the engine supports this protection logic, the Engine Default Torque Limit parameter should be set equal to the Transmission Torque Limit parameter as received in the Transmission Configuration 2 message (PGN 65099). Otherwise, an Engine Default Torque Limit value of FF00 to FFFF indicates that no engine default torque limit has been received or set.

The intention is to protect transmissions that use a continuous torque limit during torque converter mode or operation in specific lower gears, where stall or drivetrain torque may reach levels higher than the gearbox capacity. If communication is lost during torque limited operation, unrestricted engine torque output could harm the transmission.

It is recommended that engines use reception of the ETC#1 message as a transmission "heartbeat". In the event that the ETC#1 message is not received in a time period of 5 times its' broadcast rate ($5 \times 10 \text{ ms} = 50 \text{ ms}$), the engine should invoke a torque limit holding the engine to less than or equal to the value of the Transmission Torque Limit parameter. The engine may release the limit when engine-to-transmission communication is re-established.

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65251	

SPN 1849 *Transmission Requested Range Display Flash State*

State signal indicating a transmission request for the display of the Transmission Requested Range parameter (SPN 162) to flash or not to flash. The 'Transmission Requested Range Display Flash State' indicator can be utilized by (but not

limited to) the shift console, instrument cluster, or cab display. Definition of the cause of this state is at the discretion of the transmission manufacturer. The flash period shall be 700 ms @ 50% duty cycle.

Transmission manufacturers may want to flash the Transmission Requested Range display depending on certain events. It could be because a gear could not be attained, or because fluid is low, etc. Indicator should be on for 350 ms and off for 350 ms.

Transmissions supporting both this parameter and the Transmission Requested Range Display Blank State should treat the active states of these parameters as mutually exclusive; both parameters should not indicate "active" at the same time.

00 Inactive; Transmission Requested Range display should not be flashing

01 Active; Transmission Requested Range display should be flashing

10 Reserved

11 Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65098

SPN 1850

Transmission Requested Range Display Blank State

State signal indicating a transmission request for the display of the Transmission Requested Range parameter (SPN162) to be blanked or not blanked. The 'Transmission Requested Range Display Blank State' indicator can be utilized by (but not limited to) the shift console, instrument cluster, or cab display. Definition of the cause of this state is at the discretion of the transmission manufacturer

Transmission manufacturers may want to blank the Transmission Requested Range display depending on certain events. Typically it is an indication of a shift selector problem.

Transmissions supporting both this parameter and the Transmission Requested Range Display Flash State should treat the active states of these parameters as mutually exclusive; both parameters should not indicate "active" at the same time.

00 Inactive; Transmission Requested Range display should not be blanked

01 Active; Transmission Requested Range display should be blanked

10 Reserved

11 Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65098

SPN 1851 *Transmission Shift Inhibit Indicator*

State signal indicating a transmission request for the Shift Inhibit Indicator to be active or inactive. The shift inhibit indicator can be of lamp or text form, located on (but not limited to) the shift console, instrument cluster, or cab display. Definition of the cause of the 'range inhibit' state is at the discretion of the transmission manufacturer.

Transmission manufacturers may want to indicate that they currently cannot make a requested shift. This could be due to inappropriate vehicle speed or other restrictions.

Distinctions in meaning between the continuous and flashing are left to the transmission manufacturer.

00 Inactive; shift is not inhibited
 01 Active (on continuously); shift is inhibited
 10 Active (flashing)
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65098	

SPN 1852 *Transmission Mode 1*

Indicates whether transmission mode 1 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 2536.

00 Disable
 01 Enable
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 1853 *Transmission Mode 2*

Indicates whether transmission mode 2 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 2537.

00 Disable
 01 Enable
 10 Reserved
 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	256	

SPN 1854 Transmission Mode 3

Indicates whether transmission mode 3 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 2538.

00 Disable
01 Enable
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 256

Operational Range: same as data range

SPN 1855 Transmission Mode 4

Indicates whether transmission mode 4 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 2539.

00 Disable
01 Enable
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 256

Operational Range: same as data range

SPN 1856 Seat Belt Switch

State of switch used to determine if Seat Belt is buckled

00 NOT Buckled
01 OK - Seat Belt is buckled
10 Error - Switch state cannot be determined
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 57344

Operational Range: same as data range

SPN 1857 Winch Oil Pressure Switch

State of switch used to determine if Winch Oil Pressure is above desired minimum

00 NOT OK- Oil pressure is too low
 01 OK - Oil pressure is above minimum
 10 Error - Switch state cannot be determined
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65128	

SPN 2347 High Beam Head Light Command

Command to activate or de-activate the tractor high beam head light lamps.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2348 High Beam Head Light Data

This parameter provides measured data from the tractor high beam head light lamps.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2349 *Low Beam Head Light Command*

Command to activate or de-activate the tractor low beam head light lamps.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2350 *Low Beam Head Light Data*

This parameter provides measured data from the tractor low beam head light lamps.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2351 *Alternate Beam Head Light Command*

Command to activate or de-activate the tractor alternate head lights (only low beam is available on alternate head lights).
 The alternate position lights are intended for use with loader and snow plows that tend to block the primary head lights.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2352 *Alternate Beam Head Light Data*

This parameter provides measured data from the tractor alternate beam head light lamps.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2353 *Tractor Front Low Mounted Work Lights Command*

Command to activate or de-activate the tractor front low mounted work lights.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2354 *Tractor Front Low Mounted Work Lights*

This parameter provides measured data from the tractor front low mounted work lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2355 *Tractor Front High Mounted Work Lights Command*

Command to activate or de-activate the tractor front high mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2356 *Tractor Front High Mounted Work Lights*

This parameter provides measured data from the tractor front high mounted work lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2357 *Tractor Underside Mounted Work Lights Command*

Command to activate or de-activate the tractor underside mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2358 *Tractor Underside Mounted Work Lights*

This parameter provides measured data from the tractor underside mounted work lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2359 *Tractor Rear Low Mounted Work Lights Command*

Command to activate or de-activate the tractor rear low mounted work lights.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2360 *Tractor Rear Low Mounted Work Lights*

This parameter provides measured data from the tractor rear low mounted work lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2361 *Tractor Rear High Mounted Work Lights Command*

Command to activate or de-activate the tractor rear high mounted work lights.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2362 *Tractor Rear High Mounted Work Lights*

This parameter provides measured data from the tractor rear high mounted work lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2363 *Tractor Side Low Mounted Work Lights Command*

Command to activate or de-activate the tractor side low mounted work lights.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2364 *Tractor Side Low Mounted Work Lights*

This parameter provides measured data from the tractor side low mounted work lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2365 *Tractor Side High Mounted Work Lights Command*

Command to activate or de-activate the tractor side high mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2366 *Tractor Side High Mounted Work Lights*

This parameter provides measured data from the tractor side high mounted work lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2367 *Left Turn Signal Lights Command*

Command to activate or de-activate left turn signal lights on the tractor and all connected implements

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2368 *Left Turn Signal Lights*

This parameter provides measured data from the tractor and attached implement left turn signal lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2369 *Right Turn Signal Lights Command*

Command to activate or de-activate right turn signal lights on the tractor and all connected implements

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2370 *Right Turn Signal Lights*

This parameter provides measured data from the tractor and attached implement right turn signal lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2371 *Left Stop Light Command*

Command to activate or de-activate the tractor and implement left stop lights

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2372 *Left Stop Light*

This parameter provides measured data from the tractor and attached implement left stop lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2373 *Right Stop Light Command*

Command to activate or de-activate the tractor and implement right stop light

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2374 *Right Stop Light*

This parameter provides measured data from the tractor and attached implement right stop lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2375 *Center Stop Light Command*

Command to activate or de-activate the tractor and implement center stop light

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2376 Center Stop Light

This parameter provides measured data from the tractor and attached implement center stop lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2377 Tractor Marker Light Command

Command to activate or de-activate tractor and implement front position lights, rear red tail lights, side amber running lights, license plate lights and instrument and switch back lights.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2378 Tractor Marker Light

This parameter provides measured data from the tractor and attached implement marker lights, including front position lights, rear tail lights, side running lights, license plate lights and instruments and switch back lights.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2379 *Implement Marker Light Command*

Command to activate or de-activate implement front position lights, rear red tail lights, side amber running lights, license plate lights and instrument and switch back lights.

00 De-activate

01 Activate

10 Reserved

11 Don't Care

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65089

SPN 2380 *Implement Marker Light*

This parameter provides measured data from an attached implement marker lights, including front position lights, rear tail lights, side running lights, license plate lights and instruments and switch back lights.

00 De-activated

01 Activated

10 Fault Detected

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65088

SPN 2381 *Tractor Clearance Light Command*

Command to activate or de-activate the tractor high mounted clearance and center ID lights

00 De-activate

01 Activate

10 Reserved

11 Don't Care

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65089

SPN 2382 *Tractor Clearance Light*

This parameter provides measured data from the tractor high mounted clearance and center ID lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2383 *Implement Clearance Light Command*

Command to activate or de-activate the implement high mounted clearance and lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2384 *Implement Clearance Light*

This parameter provides measured data from an attached implement high mounted clearance lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2385 *Rotating Beacon Light Command*

Command to activate or de-activate slow moving vehicle indicator lights on tractor and/or implements. Activation of the slow moving vehicle lights implies that the controller should manipulate the lighting as appropriate to provide the slow moving vehicle lighting function.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65089

Operational Range: same as data range

SPN 2386 *Rotating Beacon Light*

This parameter provides measured data from the beacon light on tractor or attached implements.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65088

Operational Range: same as data range

SPN 2387 *Tractor Front Fog Lights Command*

Command to activate or de-activate tractor front fog lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65089

Operational Range: same as data range

SPN 2388 *Tractor Front Fog Lights*

This parameter provides measured data from the tractor front fog lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65088

Operational Range: same as data range

SPN 2389 *Rear Fog Light Command*

Command to activate or de-activate tractor or implement rear fog lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65089

Operational Range: same as data range

SPN 2390 *Rear Fog Lights*

This parameter provides measured data from the tractor and/or implement rear fog lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65088

Operational Range: same as data range

SPN 2391 *Back Up Light and Alarm Horn Command*

Command to activate or de-activate the back up lights and/ or associated alarm if required

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65089

Operational Range: same as data range

SPN 2392 *Back Up Light and Alarm Horn*

This parameter provides measured data from the back up lights and/ or associated alarm.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 65088

Operational Range: same as data range

SPN 2393 *Lighting Data Request Command*

Command to provide a response of the light state

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65089

Operational Range: same as data range

SPN 2394 *Implement Rear Work Light*

This parameter provides measured data from the implement rear work lamps.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2395 *Implement OEM Option 1 Light Command*

Command to activate or de-activate an implement OEM option 1 light. This is provided to meet special needs on implements, such as tank inspection or filling lights.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2396 *Implement OEM Option 1 Light*

This parameter provides measured data from the implement OEM option 1 light.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2397 *Implement OEM Option 2 Light Command*

Command to activate or de-activate an implement OEM option 2 light. This is provided to meet special needs on implements, such as tank inspection or filling lights.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2398 *Implement OEM Option 2 Light*

This parameter provides measured data from the implement OEM option 2 light.

00 De-activated
 01 Activated
 10 Fault Detected
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2399 *Implement Left Facing Work Light Command*

Command to activate or de-activate the left facing work lights toward the left end of the implement.

00 De-activate
 01 Activate
 10 Reserved
 11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2400 *Implement Left Facing Work Light*

This parameter provides measured data from the left facing work lights toward the left end of the implement.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65088

Operational Range: same as data range

SPN 2401 *Implement Right Forward Work Light Command*

Command to activate or de-activate the forward facing work lights toward the right end of the implement.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65089

Operational Range: same as data range

SPN 2402 *Implement Right Forward Work Light*

This parameter provides measured data from the forward facing work lights toward the right end of the implement.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65088

Operational Range: same as data range

SPN 2403 *Running Light Command*

Command to activate or de-activate the tractor or powered vehicle running lights. Usually only used for on road vehicles.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65089

Operational Range: same as data range

SPN 2404 *Running Light*

This parameter provides measured data from the vehicle's running lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 65088

Operational Range: same as data range

SPN 2405 *Implement Rear Work Light Command*

Command to activate or de-activate implement rear work lights. (This is also the same as Reversing Lights for truck applications.)

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65089

Operational Range: same as data range

SPN 2406 *Implement Right Facing Work Light Command*

Command to activate or de-activate work lights mounted on an implement to illuminate beyond right end of the implement.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2407 *Implement Right Facing Work Light*

This parameter provides measured data from the work lights mounted on an implement to illuminate beyond right end of the implement.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2432 *Engine Demand – Percent Torque*

The requested torque output of the engine by all dynamic internal inputs, including smoke control, noise control and low and high speed governing.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: -125% to +125%
Type:	Measured	
Supporting Information:	See Appendix D - SPN 2432	
PGN reference:	61444	

SPN 2433 *Engine Exhaust Gas Temperature - Right Manifold*

Temperature of combustion byproducts within the right engine exhaust manifold. Single manifold engines should use exhaust temperature (SPN 173).

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65031	

SPN 2434 Engine Exhaust Gas Temperature - Left Manifold

Temperature of combustion byproducts within the left engine exhaust manifold. Single manifold engines should use exhaust temperature (SPN 173).

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65031

SPN 2435 Sea Water Pump Outlet Pressure

Gauge pressure of liquid found at outlet of sea water pump in sea water cooling system.

Data Length: 1 byte
 Resolution: 2 kPa/bit, 0 offset
 Data Range: 0 to 500 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65172

SPN 2536 Transmission Mode 1 Indicator

This state signal is the transmission's indication that it is operating under transmission mode 1 (SPN 1852) as commanded via the TC1 message (PGN 256). The definition of the transmission mode is left to the discretion of the transmission manufacturer.

00 Transmission Mode 1 not active
 01 Transmission Mode 1 Active
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 65098

SPN 2537 Transmission Mode 2 Indicator

This state signal is the transmission's indication that it is operating under transmission mode 2 (SPN 1853) as commanded via the TC1 message (PGN 256). The definition of the transmission mode is left to the discretion of the transmission manufacturer.

00 Transmission Mode 2 not active
 01 Transmission Mode 2 Active
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 65098

SPN 2538 *Transmission Mode 3 Indicator*

This state signal is the transmission's indication that it is operating under transmission mode 3 (SPN 1854) as commanded via the TC1 message (PGN 256). The definition of the transmission mode is left to the discretion of the transmission manufacturer.

00 Transmission Mode 3 not active

01 Transmission Mode 3 Active

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65098

SPN 2539 *Transmission Mode 4 Indicator*

This state signal is the transmission's indication that it is operating under transmission mode 4 (SPN 1855) as commanded via the TC1 message (PGN 256). The definition of the transmission mode is left to the discretion of the transmission manufacturer.

00 Transmission Mode 4 not active

01 Transmission Mode 4 Active

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65098

SPN 2576 *Laser Receiver Type*

Identifies which type of Laser Receiver transmitted the message.

0 = Reserved

1 = Linear Laser Receiver

2 = 1 Meter Survey Receiver

3 = 2 Meter Survey Receiver

4 = 2.5 Meter Survey Receiver

5-250 = Reserved

Data Length: 1 byte

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 250

Operational Range: 1-4

Type: Status

Supporting Information:

PGN reference: 65141

SPN 2577 *Display Deadbands*

Sets Display Deadbands mode.

0000 - Narrow = +/- 4.5mm
 0001 - Standard = +/- 12mm
 0010 - Wide = +/- 24mm
 0011 - 1110 Reserved
 1111 Not Available

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 65142

Operational Range: same as data range

SPN 2578 *LED Pattern Control*

Sets LED Pattern control mode on laser leveling systems.

0000 - 5 Channel
 0001 - Offset
 0010 - 7 Channel
 0011 - 1110 Reserved
 1111 Not Available

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 65142

Operational Range: same as data range

SPN 2579 *Net Battery Current (High Range/Resolution)*

Net flow of electrical current into/out-of the battery or batteries. This parameter is the high range and resolution of SPN 114 - Net Battery Current.

Data Length: 2 bytes
 Resolution: 0.05 A/bit, -1600 A offset
 Data Range: -1600 to 1612.75 A
 Type: Measured
 Supporting Information:
 PGN reference: 65106

Operational Range: same as data range

SPN 2580 *Hydraulic Brake Pressure Circuit 1*

Gage hydraulic pressure in circuit 1 of the hydraulic brake system

Data Length: 1 byte
 Resolution: 100 kPa/bit, 0 offset
 Data Range: 0 to 25 MPa
 Type: Measured
 Supporting Information:
 PGN reference: 64998

Operational Range: same as data range

SPN 2581 Hydraulic Brake Pressure Circuit 2

Gage hydraulic pressure in circuit 2 of the hydraulic brake system

Data Length:	1 byte	
Resolution:	100 kPa/bit, 0 offset	
Data Range:	0 to 25 MPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64998	

SPN 2582 Hydraulic Brake Pressure Supply State Circuit 1

Signal which indicates whether the hydraulic brake pressure supply of circuit 1 is reliable; that is, able to support continued braking.

00 Supply is not reliable
 01 Supply is reliable
 10 Error indicator
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64998	

SPN 2583 Hydraulic Brake Pressure Supply State Circuit 2

Signal which indicates whether the hydraulic brake pressure supply of circuit 2 is reliable; that is, able to support continued braking.

00 Supply is not reliable
 01 Supply is reliable
 10 Error indicator
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64998	

SPN 2584 Hydraulic Brake Pressure Warning State Circuit 1

Signal which indicates whether the hydraulic brake pressure of circuit 1 is below the warning level

00 Pressure level sufficient
 01 Pressure level below warning level
 10 Error indicator
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64998	

SPN 2585 Hydraulic Brake Pressure Warning State Circuit 2

Signal which indicates whether the hydraulic brake pressure of circuit 2 is below the warning level

00 Pressure level sufficient

01 Pressure level below warning level

10 Error indicator

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64998

SPN 2586 Tire Air Leakage Rate

The pressure loss rate of a tire.

Data Length: 2 bytes

Resolution: 0.1 Pa/s per bit, 0 offset

Data Range: 0 Pa/s to 6425.5 Pa/s

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65268

SPN 2587 Tire Pressure Threshold Detection

Signal indicating the pressure level of the tire. The levels defined represent different pressure conditions of the tire:

000 Extreme over pressure - The tire pressure is at a level where the safety of the vehicle may be jeopardised.

001 Over pressure - The tire pressure is higher than the pressure defined by the vehicle or tire manufacturer.

010 No warning pressure - The tire pressure is within the thresholds defined by the vehicle or tire manufacturer.

011 Under pressure - The tire pressure is lower than the pressure defined by the vehicle or tire manufacturer.

100 Extreme under pressure - The tire pressure is at a level where the safety of the vehicle may be jeopardised.

101 Not defined

110 Error indicator

111 Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65268

SPN 2588 *Maximum Vehicle Speed Limit 1*

The lowest Maximum Vehicle Speed Limit. This value is the similar to SPN 74. However, SPN 74 was not specifically defined to convey the applied vehicle speed limit or what was possible to be applied. This new SPN is the lowest vehicle speed limit that is possible. Additionally, the lowest vehicle speed limit shall be applied when the J1939 network is no longer providing input regarding the Selected Maximum Vehicle Speed Limit. Exceptions to this exist when the device performing the maximum vehicle speed limiting function has methods of selecting the thresholds separately from the Selected Maximum Vehicle Speed Limit parameter.

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64997	

SPN 2589 *Maximum Vehicle Speed Limit 2*

The highest of the two lowest vehicle speed limits

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64997	

SPN 2590 *Maximum Vehicle Speed Limit 3*

The highest of the three lowest vehicle speed limits

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64997	

SPN 2591 *Maximum Vehicle Speed Limit 4*

The highest of the four lowest vehicle speed limits

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64997	

SPN 2592 *Maximum Vehicle Speed Limit 5*

The highest of the five lowest vehicle speed limits

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64997	

SPN 2593 *Maximum Vehicle Speed Limit 6*

The highest of the six lowest vehicle speed limits

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64997	

SPN 2594 *Maximum Vehicle Speed Limit 7*

The highest of the seven lowest vehicle speed limits

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64997	

SPN 2595 *Applied Vehicle Speed Limit*

The vehicle speed limit in effect.

251 (0xFB) is used to indicate that a maximum vehicle speed limit is not selected.

Data Length:	1 byte	
Resolution:	1 km/h per bit, 0 offset	
Data Range:	0 to 250 km/h	Operational Range: 0 to 250 km/h. 251 (0xFB) is used to indicate that a maximum vehicle speed limit is not selected.
Type:	Status	
Supporting Information:		
PGN reference:	64997	

SPN 2596 *Selected Maximum Vehicle Speed Limit*

User selected maximum vehicle speed. If one is selected, then this SPN must equal one of the maximum vehicle speeds #1-#7 from PGN 64997 - Maximum Vehicle Speed Limit Status. If different maximum vehicle speed requests are present from different devices, the lowest requested value should be used.

0 is used to indicate that a maximum vehicle speed is not selected. 1 through 7 are valid selectable speed limits. 8 through 250 are not allowed.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: 0 is used to indicate that a maximum vehicle speed is not selected. 1 through 7 are valid selectable speed limits. 8 through 250 are not allowed.
Type:	Status	
Supporting Information:		
PGN reference:	57344	

SPN 2597 *Implement Left Forward Work Light Command*

Command to activate or de-activate work lights mounted on an implement to illuminate beyond left end of the implement.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65089	

SPN 2598 *Implement Left Forward Work Light*

This parameter provides measured data from the work lights mounted on an implement to illuminate the forward left end of the implement.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65088	

SPN 2599 *Fire Apparatus Pump Engagement*

The measured status of the pump used to provide water in fire fighting apparatus for distribution of water through water cannons or fire hoses.

00 Pump not engaged
01 Pump engaged
10 Error
11 Not available or not installed

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61448	

SPN 2600 *Payload Percentage*

The current payload of the equipment, reported as a percentage of the equipment's rated payload limit.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64996	

SPN 2601 *Travel Velocity Control Position*

The position of the travel velocity control component reported as a percentage of the control's full displacement in each direction respectively. Positive position values indicate forward travel direction; negative position values indicate reverse, or backward, travel direction; and zero (0) percent position indicates the control device is in the neutral position. Higher percent for a particular travel direction indicates a higher desired travel speed in that direction.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64995	

SPN 2602 *Hydraulic Oil Level*

This parameter indicates the level of the hydraulic fluid in tank as a ratio of current volume to total tank volume. This parameter is intended for reporting the hydraulic fluid level in the system tank or reservoir. This hydraulic fluid is for the entire hydraulics system of a piece of equipment.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65128	

SPN 2603 *Pneumatic Supply Pressure Request*

Command signal to influence the pneumatic pressure in the main reservoir. This parameter is the setpoint for the parameter SPN 46.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64994	

SPN 2604 *Parking and/or Trailer Air Pressure Request*

Command signal to influence the pneumatic pressure in the circuit or reservoir for the parking brake and/or the trailer supply. This parameter is the setpoint for the parameter SPN 1086.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64994	

SPN 2605 Service Brake Air Pressure Request, Circuit #1

Command signal to influence the pneumatic pressure in the service brake circuit or reservoir #1. This parameter is the setpoint for the parameter SPN 1087.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64994	

SPN 2606 Service Brake Air Pressure Request, Circuit #2

Command signal to influence the pneumatic pressure in the service brake circuit or reservoir #2. This parameter is the setpoint for the parameter SPN 1088.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64994	

SPN 2607 Auxiliary Equipment Supply Pressure Request

Command signal to influence the pneumatic pressure in the auxiliary circuit. This parameter is the setpoint for the parameter SPN 1089.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64994	

SPN 2608 Air Suspension Supply Pressure Request

Command signal to influence the pneumatic pressure in the circuit for the electronically controlled air suspension system. This parameter is the setpoint for the parameter SPN 1090.

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64994	

SPN 2609 Cab A/C Refrigerant Compressor Outlet Pressure

This is the gage pressure at the compressor outlet in the cab air conditioning system.

Data Length:	1 byte	
Resolution:	16 kPa/bit, 0 offset	
Data Range:	0 to 4000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64993	

SPN 2610 Solar Intensity Percent

This is the solar radiation (power density) falling on the vehicle in percent of the maximum sensor value (SPN 2611). Currently this is in the infra-red spectrum.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64992	

SPN 2611 Solar Sensor Maximum

This is the maximum value which can be reported by the sensor for the solar intensity. (This is a configuration parameter)

Data Length:	1 byte	
Resolution:	0.4 mW/cm ² per bit, 0 offset	
Data Range:	0 to 100 mW/cm ²	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64992	

SPN 2612 Front Wheel Drive Actuator Status

Feedback on the front wheel drive actuator.

00 Front Wheel Drive Actuator not engaged
 01 Front Wheel Drive Actuator engaged
 10 Error
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64991	

SPN 2613 Drive Axle Lube Pressure

The drive axle lubricant pressure with location determined by Drive Axle Location (SPN 930).

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65273	

SPN 2614 Steering Axle Lube Pressure

The steering axle lubricant pressure.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65273	

SPN 2615 Engine Throttle Synchronization Mode Status

The status of the Throttle Synchronization Mode. Throttle Synchronization Mode is used to indicate which throttle, if any, is currently being used for the synchronized throttle.

0000 Not Synchronized
 0001 Synchronized Center
 0010 Synchronized Port
 0011 Synchronized Starboard
 0100 Synchronized Master
 0101-1110 Reserved
 1111 Take no action

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 64988

Operational Range: same as data range

SPN 2616 Trolling Mode Status

The status of the Trolling Mode. Trolling mode limits the top speed. Full range travel of the throttle level spans from low idle engine speed to maximum trolling speed.

00 Trolling mode is OFF.
 01 Trolling mode is ACTIVE.
 10 Reserved
 11 Take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64988

Operational Range: same as data range

SPN 2617 Slow Vessel Mode Status

The status of the Slow Vessel Mode. Slow Vessel Mode puts the engine in a lower-than-normal low idle speed during docking or other slow vessel operations.

00 Slow vessel mode is OFF.
 01 Slow vessel mode is ACTIVE.
 10 Reserved
 11 Take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64988

Operational Range: same as data range

(R) SPN 2623 Accelerator Pedal #1 Channel 2

Sensor output 2 for the accelerator pedal #1 position when using a redundant-style sensor. The ratio of actual accelerator pedal position to maximum pedal position. This is for the first occurrence of the accelerator pedal. Although it is used as an input to determine powertrain demand, it also provides anticipatory information to transmission and ASR algorithms about driver actions. This is the second sensor output when a multiple output (redundant) sensor is used for Accelerator Pedal #1 position. Sensor outputs 1 & 3 (for accelerator pedal #1 position) are SPNs 91 & 2624.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64963	

(R) SPN 2624 Accelerator Pedal #1 Channel 3

Sensor output 3 for the accelerator pedal #1 position when using a redundant-style sensor. The ratio of actual accelerator pedal position to maximum pedal position. This is for the first occurrence of the accelerator pedal. Although it is used as an input to determine powertrain demand, it also provides anticipatory information to transmission and ASR algorithms about driver actions. This is the third sensor output when a multiple output (redundant) sensor is used for Accelerator Pedal #1 position. Sensor outputs 1 & 2 (for accelerator pedal #1 position) are SPNs 91 & 2623.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64963	

(R) SPN 2625 Accelerator Pedal #2 Channel 2

Sensor output 2 for the accelerator pedal #2 position when using a redundant-style sensor. The ratio of actual accelerator pedal position to maximum pedal position. This is for the second occurrence of the accelerator pedal. Although it is used as an input to determine powertrain demand, it also provides anticipatory information to transmission and ASR algorithms about driver actions. This is the second sensor output when a multiple output (redundant) sensor is used for Accelerator Pedal # 2 position. Sensor outputs 1 & 3 (for accelerator pedal #2 position) are SPNs 29 & 2626.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64963	

(R) SPN 2626 Accelerator Pedal #2 Channel 3

Sensor output 3 for the accelerator pedal #2 position when using a redundant-style sensor. The ratio of actual accelerator pedal position to maximum pedal position. This is for the second occurrence of the accelerator pedal. Although it is used as an input to determine powertrain demand, it also provides anticipatory information to transmission and ASR algorithms about driver actions. This is the third sensor output when a multiple output (redundant) sensor is used for Accelerator Pedal # 2 position. Sensor outputs 1 & 2 (for accelerator pedal #2 position) are SPNs 29 & 2625.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64963	

SPN 2629 Engine Turbocharger 1 Compressor Outlet Temperature

Temperature of the air exiting the turbocharger 1 compressor outlet

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64979

SPN 2630 Engine Charge Air Cooler 1 Outlet Temperature

Temperature of combustion air after it exits from the Charge Air Cooler 1 but before any mixing of recirculated exhaust gas.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65129

SPN 2631 Engine Charge Air Cooler Outlet Pressure

Measures pressure of air at outlet from charge air cooler

Data Length: 1 byte
 Resolution: 2 kPa/bit, 0 offset
 Data Range: 0 to 500 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64938

SPN 2659 Engine Exhaust Gas Recirculation 1 (EGR1) Mass Flow Rate

Flow rate of gas through the EGR system. Flow rate of the exhaust gas being recirculated into the combustion air.

Data Length: 2 bytes
 Resolution: 0.05 kg/h per bit, 0 offset
 Data Range: 0 to 3212.75 kg/h Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - SPN 27
 PGN reference: 61450

SPN 2660 Joystick 1 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
 Resolution: 0.1 %/bit, 0 offset
 Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
 Type: Measured
 Supporting Information:
 PGN reference: 64982

SPN 2661 Joystick 1 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: 0.0 to 100.0%
Type:	Measured	
Supporting Information:		
PGN reference:	64982	

SPN 2662 Joystick 1 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: 0.0 to 100.0%
Type:	Measured	
Supporting Information:		
PGN reference:	64983	

SPN 2663 Joystick 1 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: 0.0 to 100.0%
Type:	Measured	
Supporting Information:		
PGN reference:	64983	

SPN 2664 Joystick 1 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: 0.0 to 100.0%
Type:	Measured	
Supporting Information:		
PGN reference:	64983	

SPN 2665 *Joystick 1 X-Axis Lever Right Positive Position Status*

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2666 *Joystick 1 Y-Axis Lever Forward Positive Position Status*

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2667 *Joystick 1 Grip X-Axis Lever Right Positive Position Status*

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64983

Operational Range: same as data range

SPN 2668 Joystick 1 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64983

Operational Range: same as data range

SPN 2669 Joystick 1 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64983

Operational Range: same as data range

SPN 2670 Joystick 1 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
 01 On negative side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2671 Joystick 1 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64982

SPN 2672 Joystick 1 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64983

SPN 2673 Joystick 1 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64983

SPN 2674 Joystick 1 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64983

SPN 2675 Joystick 1 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64982

SPN 2676 Joystick 1 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64982

SPN 2677 Joystick 1 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64983

SPN 2678 Joystick 1 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64983

SPN 2679 Joystick 1 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64983

SPN 2680 Joystick 1 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64982

SPN 2681 Joystick 1 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64982

SPN 2682 Joystick 1 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64983

SPN 2683 Joystick 1 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64983

SPN 2684 Joystick 1 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64983

SPN 2685 Joystick 1 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64982

SPN 2686 Joystick 1 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2687 Joystick 1 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2688 Joystick 1 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2689 Joystick 1 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2690 Joystick 1 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2691 Joystick 1 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2692 Joystick 1 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2693 Joystick 1 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2694 Joystick 1 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2695 Joystick 1 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2696 Joystick 1 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64982

Operational Range: same as data range

SPN 2697 Joystick 2 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
 Resolution: 0.1 %/bit, 0 offset
 Data Range: 0 to 102 %
 Type: Measured
 Supporting Information:
 PGN reference: 64984

Operational Range: 0.0 to 100.0%

SPN 2698 Joystick 2 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
 Resolution: 0.1 %/bit, 0 offset
 Data Range: 0 to 102 %
 Type: Measured
 Supporting Information:
 PGN reference: 64984

Operational Range: 0.0 to 100.0%

SPN 2699 Joystick 2 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: 0.0 to 100.0%
Type:	Measured	
Supporting Information:		
PGN reference:	64985	

SPN 2700 Joystick 2 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: 0.0 to 100.0%
Type:	Measured	
Supporting Information:		
PGN reference:	64985	

SPN 2701 Joystick 2 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: 0.0 to 100.0%
Type:	Measured	
Supporting Information:		
PGN reference:	64985	

SPN 2702 Joystick 2 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64984	

SPN 2703 Joystick 2 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64984

Operational Range: same as data range

SPN 2704 Joystick 2 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64985

Operational Range: same as data range

SPN 2705 Joystick 2 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64985

Operational Range: same as data range

SPN 2706 Joystick 2 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2707 Joystick 2 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2708 Joystick 2 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2709 Joystick 2 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2710 Joystick 2 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2711 Joystick 2 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2712 Joystick 2 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2713 Joystick 2 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2714 Joystick 2 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2715 Joystick 2 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2716 Joystick 2 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2717 Joystick 2 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2718 Joystick 2 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2719 Joystick 2 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2720 Joystick 2 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2721 Joystick 2 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64985

SPN 2722 Joystick 2 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2723 Joystick 2 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2724 Joystick 2 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64984

Operational Range: same as data range

SPN 2725 Joystick 2 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64984

Operational Range: same as data range

SPN 2726 Joystick 2 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64984

Operational Range: same as data range

SPN 2727 Joystick 2 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64984

Operational Range: same as data range

SPN 2728 Joystick 2 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64984

Operational Range: same as data range

SPN 2729 Joystick 2 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64984

Operational Range: same as data range

SPN 2730 Joystick 2 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2731 Joystick 2 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2732 Joystick 2 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2733 Joystick 2 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64984

SPN 2734 Joystick 3 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: 0.0 to 100.0%

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2735 Joystick 3 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: 0.0 to 100.0%

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2736 Joystick 3 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: 0.0 to 100.0%

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2737 Joystick 3 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: 0.0 to 100.0%
Type:	Measured	
Supporting Information:		
PGN reference:	64987	

SPN 2738 Joystick 3 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: 0.0 to 100.0%
Type:	Measured	
Supporting Information:		
PGN reference:	64987	

SPN 2739 Joystick 3 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64986	

SPN 2740 Joystick 3 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64986	

SPN 2741 Joystick 3 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64987

Operational Range: same as data range

SPN 2742 Joystick 3 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64987

Operational Range: same as data range

SPN 2743 Joystick 3 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64987

Operational Range: same as data range

SPN 2744 Joystick 3 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2745 Joystick 3 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2746 Joystick 3 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2747 Joystick 3 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2748 Joystick 3 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2749 Joystick 3 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2750 Joystick 3 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2751 Joystick 3 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2752 Joystick 3 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2753 *Joystick 3 Theta-Axis Neutral Position Status*

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2754 *Joystick 3 X-Axis Detent Position Status*

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2755 *Joystick 3 Y-Axis Detent Position Status*

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2756 Joystick 3 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2757 Joystick 3 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2758 Joystick 3 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64987

SPN 2759 Joystick 3 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64986

Operational Range: same as data range

SPN 2760 Joystick 3 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64986

Operational Range: same as data range

SPN 2761 Joystick 3 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64986

Operational Range: same as data range

SPN 2762 Joystick 3 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64986

Operational Range: same as data range

SPN 2763 Joystick 3 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64986

Operational Range: same as data range

SPN 2764 Joystick 3 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64986

Operational Range: same as data range

SPN 2765 Joystick 3 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2766 Joystick 3 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2767 Joystick 3 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64986

SPN 2768 Joystick 3 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64986	

SPN 2769 Joystick 3 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64986	

SPN 2770 Joystick 3 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64986	

SPN 2789 Engine Turbocharger 1 Calculated Turbine Intake Temperature

Calculated value of turbine intake temperature based on engine operating conditions, such as intake manifold temperature, charge fuel ratio, injection timing, and engine speed. Use SPN 1180 for actual measured intake temperature.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64981	

SPN 2790 Engine Turbocharger 1 Calculated Turbine Outlet Temperature

Calculated value of turbocharger compressor outlet air temperature. Temperature of air exiting the turbocharger compressor and before entering charge air cooler. The estimate is based on turbo speed and measured turbocharger compressor intake temperature. Use SPN 1184 for actual measured outlet temperature.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64981

SPN 2791 Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control

Desired percentage of maximum Exhaust Gas Recirculation (EGR) valve opening. 0% means valve is closed. 100% means maximum valve opening (full gas flow).

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: 0 to 100%
 Type: Status
 Supporting Information: See Appendix D - SPN 27
 PGN reference: 64981

SPN 2792 Engine Variable Geometry Turbocharger (VGT) Air Control Shutoff Valve

Isolates vehicle brake air from the Variable Geometry Turbocharger (VGT) system when engine is not running. This valve prevents vehicle air from bleeding off through the VGT Control Valve when engine is not in use. Primary vehicle air system from air tanks feed the VGT Air Control Shutoff Valve, which in turn provides air to the VGT Control Valve when the key switch is 'ON'. The VGT Control Valve delivers air to the VGT actuator to adjust turbocharger geometry.

00 VGT Air Control Shutoff Valve is Off
 01 VGT Air Control Shutoff Valve is On
 10 Reserved
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64981

SPN 2793 Laser Strike Data Latency

Time from laser strike to CAN message transmission. This parameter will be reported by survey receiver type devices only. Byte 3 (SPN 2576) of PGN 65141 identifies the type of Laser Receiver.

Data Length: 2 bytes
 Resolution: 51.2 us/bit, 0 offset
 Data Range: 0 to 3.289856 s Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65141

SPN 2794 *Absolute Laser Strike Position*

Laser Strike location on the survey type laser receiver.

Data Length: 2 bytes
 Resolution: 0.1 mm/bit, 0 offset
 Data Range: 0 to 6,425.5 mm (0 to 6.4255 m) Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65141

SPN 2795 *Engine Variable Geometry Turbocharger (VGT) 1 Actuator Position*

Sensor that measures the position of the variable geometry turbocharger actuator. A position of 0% indicates the actuator is in the position creating the smallest geometry turbocharger. A position of 100% represents the largest geometry turbocharger.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64981

SPN 2796 *Transfer Case Selector Switch*

Operator switch to select the condition of the transfer case. States 000 and 001 should be used if the transfer case only functions to switch between 2-wheel and 4-wheel drive. If the transfer case includes a High / Low Range function, states 011 and 100 should be supported as well. For reporting the status of the transfer case, see SPN 3645.

000: 2 wheel high (Normal or 'On Highway' Range)
 001: 4 wheel high (Normal or 'On Highway' Range)
 010: Neutral
 011: 2 wheel low (or 'Off Highway' Range)
 100: 4 wheel low (or 'Off Highway' Range)
 101: Reserved for SAE assignment
 110: Error indicator
 111: Not available

Data Length: 3 bits
 Resolution: 8 states/3 bit, 0 offset
 Data Range: 0 to 7 Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64980

SPN 2799 *Engine Turbocharger 2 Compressor Outlet Temperature*

Temperature of the air exiting the turbocharger 2 compressor outlet

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64979

SPN 2800 Engine Turbocharger 3 Compressor Outlet Temperature

Temperature of the air exiting the turbocharger 3 compressor outlet

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64979

SPN 2801 Engine Turbocharger 4 Compressor Outlet Temperature

Temperature of the air exiting the turbocharger 4 compressor outlet

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64979

SPN 2802 Data Memory Usage

The used storage capacity of the data buffer memory internal to an ECU, such as a data logger.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64978

SPN 2803 Keep-Alive Battery Consumption

The capacity consumed from the direct battery connection since the key was last turned off. This value is maintained and does not accumulate while the key switch is on. The value is reset to 0 when the key switch is turned to the off position.

Data Length: 2 bytes
 Resolution: 1 mAhr/bit, 0 offset
 Data Range: 0 to 64255mAhr (64.255Ahr) Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64978

SPN 2804 FMS-standard Diagnostics Supported

Status signal which indicates if the FMS Vehicle Interface (FMS Gateway) supports the handling of diagnostic messages from the vehicle network onto the FMS network.

The FMS gateway does NOT support the re-broadcast of diagnostics messages present on the vehicle network.

If this 'FMS-standard Diagnostics Supported' feature is supported by the FMS Gateway, the FMS Gateway will support the requests for diagnostics information (from the FMS device) onto the vehicle network and pass the responses onto the FMS network.

Note: This feature of the FMS Gateway is independent of the 'FMS-standard Requests Supported'. The FMS Gateway may support diagnostics without supporting the 'FMS-standard Requests Supported' function, or visa-versa.

00 Diagnostics Is Not Supported

01 Diagnostics Is Supported

10 Reserved

11 Don't care

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64977

SPN 2805 FMS-standard Requests Supported

Status signal which indicates if the FMS Vehicle Interface (FMS Gateway) will respond to requests from the FMS device for the PGNs listed in the FMS Interface Specification.

This mode is to support FMS gateway devices that only operate in a 'Request' mode.

The FMS PGNs may also be broadcast periodically in this mode.

The FMS Gateway will NOT support the requests for information not included in the FMS Interface Specification onto the vehicle network."

00 On request mode is not supported

01 On request mode is supported

10 Reserved

11 Don't care

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64977

SPN 2806 FMS-standard SW-version supported.

Information that identifies which issue level of the FMS-standard document the software included in the FMS gateway supports. Four bytes, representing xx.yy type revision level identification.

Information to be ASCII equivalent of the numeric revision level of the FMS document, 00.01 to 99.99. The first released version will be 01.00.

Note:

Byte 2 and byte 3 represents the SW version supported for trucks. Version number in the format ab.cd where Byte 2 represents "a" ASCII and Byte 3 represents "b" ASCII.

Byte 4 and byte 5 represents the SW version supported for bus and coaches; version number in the format ab.cd where Byte 4 represents "c" ASCII and Byte 5 represents "d" ASCII.

Data Length:	4 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64977	

SPN 2807 Engine Fuel Shutoff 2 Control

Control setting for fuel shutoff 2. First instance is SPN 632. For a dual fuel shutoff system, this SPN is representative of the downstream fuel shutoff commanded position. When fuel (gas) is desired at the engine, the fuel shutoff is opened. Otherwise, it is closed.

00 = Open (fuel supplied to engine)
 01 = Closed (no fuel supplied to engine)
 10 = Reserved
 11 = Don't care / take no action

In addition to communicating desired action of fuel shutoff 2 and its driver status, this new SPN can be used to communicate whether fuel shutoff 2 feedback position (if available) matches the commanded position, through the use of FMIs.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64914	

SPN 2809 Engine Air Filter 2 Differential Pressure

Change in engine air system pressure, measured across the second air filter, due to the filter and any accumulation of solid foreign matter on or in the filter.

This is for monitoring the air filter on the intake to the second turbocharger. Filter numbering follows the guidelines noted in section Naming Convention For Engine Parameters.

Data Length:	1 byte	
Resolution:	0.05 kPa/bit, 0 offset	
Data Range:	0 to 12.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64976	

SPN 2810 Engine Air Filter 3 Differential Pressure

Change in engine air system pressure, measured across the third air filter, due to the filter and any accumulation of solid foreign matter on or in the filter.

This is for monitoring the air filter on the intake to the third turbocharger. Filter numbering follows the guidelines noted in section Naming Convention For Engine Parameters.

Data Length:	1 byte	
Resolution:	0.05 kPa/bit, 0 offset	
Data Range:	0 to 12.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64976	

SPN 2811 Engine Air Filter 4 Differential Pressure

Change in engine air system pressure, measured across the fourth air filter, due to the filter and any accumulation of solid foreign matter on or in the filter.

This is for monitoring the air filter on the intake to the fourth turbocharger. Filter numbering follows the guidelines noted in section Naming Convention For Engine Parameters.

Data Length:	1 byte	
Resolution:	0.05 kPa/bit, 0 offset	
Data Range:	0 to 12.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64976	

SPN 2812 Engine Overspeed Test

The engine overspeed test signal as measured by the reporting ECM. Engine Overspeed Test is a mechanism to simulate engine overspeed situations, while operating the engine within the engine's safe operating range.

State signal which indicates when the overspeed test input to the ECM is being driven.

00 Engine Overspeed Test Not Active
 01 Engine Overspeed Test Active
 10 Reserved
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65252	

SPN 2813 Engine Air Shutoff Command Status

State signal which indicates when the Air Shutoff driver output is being driven. Disabled means controller wants air flowing to the engine. Status of the airflow shutoff as being commanded by the ECU.

00 Air Shutoff Disabled, not attempting to shutoff engine air supply

01 Air Shutoff Enabled, attempting to shutoff engine air supply

10 Reserved

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65252

SPN 2814 Engine Alarm Output Command Status

State signal which indicates when the Alarm driver output is being driven. Not active means the Controller has no alarm level conditions.

00 Engine Alarm Output Command Not Active

01 Engine Alarm Output Command Active

10 Reserved

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65252

SPN 2815 Engine Alarm Acknowledge

The Engine Alarm Acknowledge Input signal as measured by the reporting ECM. The Engine Alarm Acknowledge is a mechanism for external acknowledgement of the SPN 2814, Engine Alarm Output Command.

00 Engine Alarm Acknowledge Not Active

01 Engine Alarm Acknowledge Active

10 Error

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65252

SPN 2863 Front Operator Wiper Switch

State of operation selected by operator switch for the Wiper in front of the operator position. This parameter, 'Front Operator Wiper Switch' should be used for the control information if either of the other wiper switch parameters is 'Not Available' and the associated wiper still needs to be controlled.

0000 Off
 0001 Low
 0010 Medium
 0011 High
 0100 Delayed 1 (used for the first delay choice when the wiper switch position controls the delay)
 0101 Delayed 2 (used for the second delay choice when the wiper switch position controls the delay)
 0110 Mist (position where external sensor controls wiper rate)
 0111 - 1110 Reserved
 1111 Not available (do not change)

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64973	

SPN 2864 Front Non-operator Wiper Switch

State of operation selected by operator switch for the front wiper not in front of the operator position. The parameter, 'Front Operator Washer Switch' should be used for the control information if this parameter is 'Not Available' and the associated washer still needs to be controlled.

0000 Off
 0001 Low
 0010 Medium
 0011 High
 0100 Delayed 1 (used for the first delay choice when the wiper switch position controls the delay)
 0101 Delayed 2 (used for the second delay choice when the wiper switch position controls the delay)
 0110 Mist (position where external sensor controls wiper rate)
 0111 - 1110 Reserved
 1111 Not available (do not change)

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64973	

SPN 2865 *Rear Wiper Switch*

State of operation selected by operator switch for the rear wiper. The parameter, 'Front Operator Washer Switch' should be used for the control information if this parameter is 'Not Available' and the associated washer still needs to be controlled.

0000 Off
 0001 Low
 0010 Medium
 0011 High
 0100 Delayed 1 (used for the first delay choice when the wiper switch position controls the delay)
 0101 Delayed 2 (used for the second delay choice when the wiper switch position controls the delay)
 0110 Mist (position where external sensor controls wiper rate)
 0111 - 1110 Reserved
 1111 Not available (do not change)

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64973	

SPN 2866 *Front Operator Washer Switch*

State of operation selected by operator switch for the washer in front of the operator position. This parameter, 'Front Operator Washer Switch' should be used for the control information if either of the other washer switch parameters is 'Not Available' and the associated washer still needs to be controlled.

000 Off
 001 Low
 010 Medium
 011 High
 100 - 110 Reserved
 111 Not available (do not change)

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64973	

SPN 2867 Front Non-operator Washer Switch

State of operation selected by operator switch for the front washer not in front of the operator position. The parameter, 'Front Operator Washer Switch' should be used for the control information if this parameter is 'Not Available' and the associated washer still needs to be controlled.

000 Off
 001 Low
 010 Medium
 011 High
 100 - 110 Reserved
 111 Not available (do not change)

Data Length: 3 bits
 Resolution: 8 states/3 bit, 0 offset
 Data Range: 0 to 7
 Type: Measured
 Supporting Information:
 PGN reference: 64973

Operational Range: same as data range

SPN 2868 Rear Washer Function

State of operation selected by operator switch for the rear washer. The parameter, 'Front Operator Washer Switch' should be used for the control information if this parameter is 'Not Available' and the associated washer still needs to be controlled.

000 Off
 001 Low
 010 Medium
 011 High
 100 - 110 Reserved
 111 Not available (do not change)

Data Length: 3 bits
 Resolution: 8 states/3 bit, 0 offset
 Data Range: 0 to 7
 Type: Measured
 Supporting Information:
 PGN reference: 64973

Operational Range: same as data range

SPN 2869 Front Operator Wiper Delay Control

Time between cycles of the front operator side wiper (i.e. from end of cycle 'n' to start of cycle 'n+1') as selected by the operator control (switch, etc.) in percentage of position with maximum position corresponding to maximum delay selectable. This parameter, 'Front Operator Wiper Delay Control' should be used for the delay information if either of the other delay parameters is 'Not Available' and the function needs to be provided.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 %
 Type: Measured
 Supporting Information:
 PGN reference: 64973

Operational Range: same as data range

SPN 2870 Front Non-operator Wiper Delay Control

Time between cycles of the front non-operator side wiper (i.e. from end of cycle 'n' to start of cycle 'n+1') as selected by the operator control (switch, etc.) in percentage of position with maximum position corresponding to maximum delay selectable. The parameter, 'Front Operator Wiper Delay Control' should be used for the delay information if this parameter is 'Not Available' and the function needs to be provided.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64973	

SPN 2871 Rear Wiper Delay Control

Time between cycles of the rear wiper (i.e. from end of cycle 'n' to start of cycle 'n+1') as selected by the operator control (switch, etc.) in percentage of position with maximum position corresponding to maximum delay selectable. The parameter, 'Front Operator Wiper Delay Control' should be used for the delay information if this parameter is 'Not Available' and the function needs to be provided.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64973	

SPN 2872 Main Light Switch

A 4 bit parameter to indicate the selected position of the operator's main light switch.

0000 Off - The position by which the operator selects that none of the lamps are to be on.

0001 Park On - The position by which the operator selects that the park lamps are to be on.

0010 Headlight On - The position by which the operator selects that the headlamps are to be on.

0011 Headlight and Park On - The position by which the operator selects that Both the Headlamps and the Park lamps are to be on.

0100 - 0111 Reserved

1000 Delayed Off - The position by which the operator selects that a certain set of lamps are to come On and then are to be turned Off following a delay time (Operators Desired - Delayed Lamp Off Time).

1001 - 1101 Reserved

1110 Error

1111 Not available (do not change)

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64972	

SPN 2873 Work Light Switch

A 4 bit parameter to indicate the selected position of the operator's work light switch. In Ag applications the work lights are often referred to as field lights. In on-highway applications the work lights are often referred to as clearance lights and may or may not be operated by a switch separate from the main light switch.

0000 Off - The position by which the operator selects that none of the work lamps are to be on.

0001 Work Light Combination #1 On - The position by which the operator selects that the lamps in the combination defined as Work Light Combination #1 are to be on.

0010 Work Light Combination #2 On - The position by which the operator selects that the lamps in the combination defined as Work Light Combination #2 are to be on.

0011 Work Light Combination #3 On - The position by which the operator selects that the lamps in the combination defined as Work Light Combination #3 are to be on.

0100 Work Light Combination #4 On - The position by which the operator selects that the lamps in the combination defined as Work Light Combination #4 are to be on.

0101-1101 Reserved

1110 Error

1111 Not available (do not change)

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64972

SPN 2874 High-Low Beam Switch

A 2 bit parameter to indicate the selected position of the operator's high/low beam select switch.

00 Low Beam Selected

01 High Beam Selected

10 Error

11 Not available (do not change)

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64972

SPN 2875 Hazard Light Switch

A 2 bit parameter to indicate the selected position of the operator's hazard light switch.

00 Hazard Lamps to be Off

01 Hazard Lamps to be Flashing

10 Error

11 Not available (do not change)

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64972

SPN 2876 Turn Signal Switch

A 4 bit parameter to indicate the selected position of the operator's turn signal switch.

0000 No Turn being signaled
 0001 Left Turn to be Flashing
 0010 Right turn to be Flashing
 0011 - 1101 Reserved
 1110 Error (to include both left and right selected simultaneously)
 1111 Not available (do not change)

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Measured
 Supporting Information:
 PGN reference: 64972

Operational Range: same as data range

SPN 2877 Operators Desired - Delayed Lamp Off Time

A 16 bit parameter to be associated with Delayed Off position (1000 binary) of the Main Light Switch. This parameter indicates the time the operator wishes to have elapse following the Main Light switch being placed in Delayed Off position before the defined lights turn back off. The Operator's definition as to which lamps are to turn On (and then Off of course) when the Main Light Switch is in the Delayed Off position. The specific lamps are not identified within this message, but are to be stored by whatever device (ecu) is planning to send the lamp command message for said lamps. Said device must also provide the means for the operator to enter and/or adjust said definition.

Data Length: 2 bytes
 Resolution: 1 s/bit, 0 offset
 Data Range: 0 to 64,255 s
 Type: Measured
 Supporting Information:
 PGN reference: 64972

Operational Range: same as data range

SPN 2878 Operators Desired Back-light

A 8 bit parameter to indicate the level of back lighting the operator has selected for displays. This is to be differentiated from the Illumination Brightness Percent (SPN:1487 PGN:53248 Cab Illumination Message) which is sent to the displays to tell them what level to be at. This is the operator desired level (as sensed by operator controls) for those system where the operator controls are monitored by an ecu separate from the ecu sending the command to the displays. Note each display (if appropriate) will need to have its own balance function to compensate its nominal brightness to the same level of that of all other displays. This is especially important for systems with back-lights which may change noticeable with aging. In other words it will be necessary within a vehicle to scale all of the displays down to the same level as the dimmest display (since, obviously you can not make the dimmest brighter).

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 %
 Type: Measured
 Supporting Information:
 PGN reference: 64972

Operational Range: same as data range

SPN 2879 Engine Alternate Droop Accelerator 2 Select

Same description as Engine Alternate Droop Accelerator 1 Select (SPN 2881) except that the selections may apply to Accelerator 2.

0000 – Normal Droop Setting is selected

0001 thru 1101 – One of Alternate Droop Setting 1 through 13 (in sequential order) is selected

1110 – Error condition

1111 – Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64971

SPN 2880 Engine Operator Primary Intermediate Speed Select

Allows the operator to select one of 13 preprogrammed Intermediate Speed Control settings. If no speed setting is requested, the engine operates normally. The Intermediate Speed Control is widely used in the Industrial application to control the engine to an intermediate speed setting which can either replace the accelerator position control altogether, or limit the accelerator position control to a selectable speed point minimum or maximum.

0000 – indicates that the ISC functionality is not requested, engine operates normally

0001 thru 1101 – indicates that the ISC Setting 1 thru 13 (in sequential order) is selected

1110 – error condition

1111 – not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64970

SPN 2881 Engine Alternate Droop Accelerator 1 Select

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to Accelerator 1.

0000 – Normal Droop Setting is selected

0001 thru 1101 – One of Alternate Droop Setting 1 through 13 (in sequential order) is selected

1110 – Error condition

1111 – Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64971

SPN 2882 Engine Alternate Rating Select

In some off-highway applications it may be desirable to have multiple engine ratings available for selection by the operator. There is the default engine rating, which provides the maximum available power across the range of operation.

There are additional engine ratings which the user can select that allow for alternate fueling across the operational range. Engine rating selection number 1 is the maximum rating. Selection number 2 is the next highest, selection 3 next highest, etc. The selection impacts the operating points in the Engine Configuration.

0 – indicates that Maximum Power Fueling is selected
 1 – indicates that the Alternate Power Fueling 1 is selected
 2 – indicates that the Alternate Power Fueling 2 is selected
 3 – indicates that the Alternate Power Fueling 3 is selected
 4 thru 253 - indicates that the Alternate Power Fueling 4 thru 253 (in sequential order) is selected.
 254 – Error condition.
 255 – Not available

Data Length:	1 byte	
Resolution:	1 selection/bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64971	

SPN 2883 Engine Alternate Low Idle Switch

Operator switch which selects between two low idle speeds, default and alternate.

The normal programmed low idle is the default low idle, and when the Alternate Low Idle switch is activated, a alternate preprogrammed low idle speed is selected. The accelerator position control operates as normal but is now bounded to a different low idle speed. This selection impacts Point 1 on the Engine Configuration.

00 Default low idle point is selected
 01 Alternate low idle point is selected
 10 Error
 11 Not available or Unused

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64971	

SPN 2884 Engine Auxiliary Governor Switch

This is the On/Off operation of the Auxiliary Governor feature switch. This feature is used to allow engine speed to be controlled by an auxiliary input such as pressure or tailshaft speed. This switch position indicates whether this feature is requested or not.

00 – Auxiliary Governor is disabled
 01 – Auxiliary Governor is enabled
 10 – Error condition
 11 – Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64971	

SPN 2885 *Engine Alternate Droop Auxiliary Input Select*

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to the Alternate Droop Auxiliary Input.

0000 – Normal Droop Setting is selected

0001 thru 1101 – One of Alternate Droop Setting 1 through 13 (in sequential order) is selected

1110 – Error condition

1111 – Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64971

SPN 2886 *Engine Alternate Droop Remote Accelerator Select*

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to the Remote Accelerator.

0000 – Normal Droop Setting is selected

0001 thru 1101 – One of Alternate Droop Setting 1 through 13 (in sequential order) is selected

1110 – Error condition

1111 – Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64971

SPN 2887 *Total Count of Configuration Changes Made*

Total number of times changes have been made to any of the configurable parameters.

Data Length: 2 bytes

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 64,255

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64969

SPN 2888 Engine Alternate Rating Select State

In some off-highway applications it may be desirable to have multiple engine ratings available for selection by the operator. There is the default engine rating, which provides the maximum available power across the range of operation. There are additional engine ratings which the engine controller may use that allow for alternate fueling across the operational range. Engine rating number 1 is the maximum rating. Rating number 2 is the next highest, rating 3 next highest, etc.

00 – Control state is Maximum Power Fueling
 01 – Control state is Alternate Power Fueling 1
 02 – Control state is Alternate Power Fueling 2
 03 – Control state is Alternate Power Fueling 3
 04 thru 253 - Control state is Alternate Power Fueling 4 thru 253 (in sequential order)
 254 – SAE reserved
 255 – Not available

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64967	

SPN 2889 Engine Alternate Droop Accelerator 1 Select State

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections may apply to Accelerator 1. This parameter indicates which state has been selected by the controlling ECM.

0000 – Control state is Normal Droop Setting
 0001 thru 1101 – Control state is one of Alternate Droop Setting 1 through 13 (in sequential order)
 1110 – SAE reserved
 1111 – Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64967	

SPN 2890 Engine Multi-Unit Sync State

This feature is widely used in Industry to operate multiple engines from a single command source. A master engine will “synchronize” one or more slave engines to operate at the same speed. This feature is requested by an operator switch, this parameter indicates the state of the feature as determined by the controlling ECM.

00 Control State is Functionality disabled (off)
 01 Control State is Functionality enabled (on)
 10 SAE reserved
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64967	

SPN 2891 Engine Alternate Low Idle Select State

In many applications, it is desirable that an alternate low idle speed setting be made available via switch input. The normal programmed low idle is the default low idle, and when the Alternate Low Idle feature is activated, an alternate preprogrammed low idle speed is selected. The accelerator position control operates as normal but is now bounded to a different low idle speed. This selection impacts Point 1 on the Engine Configuration.

00 – Normal idle state
 01 – Alternate idle state
 10 – SAE reserved
 11 – not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64967	

SPN 2892 Engine Operator Primary Intermediate Speed Select State

13 preprogrammed intermediate speed control settings are available for the controlling ECM to select. If no speed setting is requested, the engine operates normally. The Intermediate Speed Control is widely used in the Industrial application to control the engine to an intermediate speed setting which can either replace the accelerator position control altogether, or limit the accelerator position control to a selectable speed point minimum or maximum. This parameter indicates which state has been selected by the controlling ECM.

0000 – Control state is ISC functionality is not requested, engine operates normally
 0001 thru 1101 – Control state is ISC Setting 1 thru 13 (in sequential order)
 1110 – SAE reserved
 1111 – not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64968	

SPN 2893 Engine Alternate Droop Accelerator 2 Select State

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to Accelerator 2.

0000 – Control's state is Normal Droop Setting
 0001 thru 1101 – Control's state is One of Alternate Droop Setting 1 through 13 (in sequential order)
 1110 – SAE reserved
 1111 – Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64967	

SPN 2894 Engine Alternate Droop Remote Accelerator Select State

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to Remote Accelerator.

0000 – Control state is Normal Droop Setting

0001 thru 1101 – Control state is One of Alternate Droop Setting 1 through 13 (in sequential order)

1110 – SAE reserved

1111 – Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64967

SPN 2895 Engine Alternate Droop Auxiliary Input Select State

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to Auxiliary Input.

0000 – Control state is Normal Droop Setting

0001 thru 1101 – Control state is One of Alternate Droop Setting 1 through 13 (in sequential order)

1110 – SAE reserved

1111 – Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64967

SPN 2896 Engine Auxiliary Governor State

This is the Engine Auxiliary Governor feature. This feature is used to allow engine speed to be controlled by an auxiliary input such as pressure or tailshaft speed. This feature is requested by an operator switch, this parameter indicates the state of the feature as determined by the controlling ECM.

00 – Control State is Auxiliary Governor disabled

01 – Control State is Auxiliary Governor enabled

10 – SAE reserved

11 – Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64967

SPN 2897 *Operator Engine PTO Governor Memory Select Switch*

Measured state of the operator's engine PTO governor memory select switch. This switch selects which of the two available memory locations is to be used to store the dynamically assigned value. This speed will be set using the PTO governor set switch and modified using the PTO governor accelerate and coast/decelerate switches.

00 PTO set speed memory 1 selected

01 PTO set speed memory 2 selected

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65264

SPN 2898 *Engine Start Enable Device 2 Configuration*

The start enable device installed for start enable device 2.

0000 - no start enable device 2 installed

0001 - glow plugs installed

0010 - fuelled start installed

0011 - ether injection installed

0100 - electric intake air heater installed

0101 - 1110 - reserved

1111 - not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64966

SPN 2899 *Engine Start Enable Device 1 Configuration*

The start enable device installed for start enable device 1.

0000 - no start enable device 1 installed

0001 - glow plugs installed

0010 - fuelled start installed

0011 - ether injection installed

0100 - electric intake air heater installed

0101 - 1110 - reserved

1111 - not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64966

SPN 2900 Transmission Engine Crank Enable

State signal from the transmission indicating if the transmission's status is such that engine cranking is allowed (i.e. at a minimum, transmission is in neutral and the driveline is disengaged). As sender of this information, the transmission is responsible for correct indication immediately upon first broadcast of this parameter.

As with hard-wired neutral start implementations, those utilizing this parameter should consider the impact of the transmission or other controllers 'resetting' due to voltage drops during the engine start sequence.

The vehicle system design should also consider the impact of timing latency in the engine starting sequence. For example, the turn of an ignition key from 'off' to 'start' may happen more quickly than the transmission controller can boot up, determine its' current state of being, and begin broadcasting information over the J1939 datalink.

00 - Cranking disabled; engine cranking is prohibited by the transmission

01 - Cranking enabled; engine cranking is allowed by the transmission

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65098

SPN 2901 ECU Part Number

The part number of the physical ECU.

Data Length: Variable - up to 200 bytes followed by an "" delimiter

Resolution: ASCII, 0 offset

Data Range: 0 to 255 per byte

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64965

SPN 2902 ECU Serial Number

The serial number of the physical ECU.

Data Length: Variable - up to 200 bytes followed by an "" delimiter

Resolution: ASCII, 0 offset

Data Range: 0 to 255 per byte

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64965

SPN 2903 ECU Location

The location of the ECU within a network.

Data Length: Variable - up to 200 bytes followed by an "" delimiter

Resolution: ASCII, 0 offset

Data Range: 0 to 255 per byte

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64965

SPN 2904 ECU Type

The type of ECU. One example of a use of the ECU type could be for classifying ECU capabilities, such as I/O.

Data Length:	Variable - up to 200 bytes followed by an "" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64965	

SPN 2911 Halt brake switch

Switch signal which indicates the position of the halt brake switch.

00 Halt brake switch passive
 01 Halt brake switch active
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61441	

SPN 2912 Hill holder mode

Signal which indicates the current mode of the hill holder function.

000 Inactive
 001 Active
 010 Active, but will change to inactive in a short time. (This mode may be used to warn the driver)
 011 - 101 Reserved
 110 Hill holder not functional
 111 Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64964	

SPN 2913 *Halt brake mode*

Signal which indicates the current mode of the halt brake function.

000	Inactive
001	Active
010	Active, but not functioning properly. (This mode may be used to warn the driver)
011 - 101	Not defined
110	Halt brake not functional
111	Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64964	

SPN 2914 *XBR EBI Mode*

The XBR EBI (Endurance Brake Integration) Mode is used as an input for the brake system to prescribe the use of endurance brakes like retarders or engine brakes.

00 - No Endurance Brake Integration allowed

The demanded acceleration must be realized by the brake system by using only the foundation brakes. During an active XBR request, the brake system must not actively demand brake torque from other braking devices like retarders or engine brakes.

01 - Only Endurance Brakes allowed

The demanded acceleration must be realized by the brake system by demanding brake torque from other brake devices like retarders or engine brakes. The foundation brake itself must not be used (e.g. to reduce brake lining wear).

10 - Endurance Brake Integration allowed

The demanded acceleration may be realized by the brake system by using the foundation brakes and/or by demanding brake torque from other brake devices like retarders or engine brakes.

11 - Not defined

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	1024	

SPN 2915 *XBR Priority*

The XBR Priority is used as an input to the brake system to manage the priority of overlapping external and internal requests.

00 - Highest priority – used for emergency situations, e.g. for future Collision Avoidance System. This mode overrides any brake protection measures of the brake system.

01 - High priority – not defined

10 - Medium priority – used for ACC-Systems. This mode does not override brake protection measures of the brake system.

11 - Low priority – used in "override disabled" XBR Control Mode

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	1024	

SPN 2916 XBR Control Mode

The XBR Control Mode is used as an input to the brake system and defines how the external acceleration demand has to be realized.

- 00 - Override disabled – Disable any existing control commanded by the source of this command.
- 01 - Acceleration control with addition mode - Add the XBR acceleration demand to the driver's acceleration demand.
- 10 - Acceleration control with maximum mode - Execute the XBR acceleration demand if it is higher than the driver's acceleration demand.
- 11 - Not defined

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	1024	

SPN 2917 XBR System State

This parameter indicates which external brake control is allowed.

- 00 - Any external brake demand will be accepted (brake system fully operational)
- 01 - Only external brake demand of highest XBR Priority (00) will be accepted (e.g. because the temperature limit of the brake system is exceeded)
- 10 - No external brake demand will be accepted (e.g. because of fault in brake system)
- 11 - not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64964	

SPN 2918 XBR Active Control Mode

This parameter indicates which XBR Control Mode is executed by the brake system.

- 0000 No brake demand being executed (default mode)
- 0001 Driver's brake demand being executed, no external brake demand
- 0010 Addition mode of XBR acceleration control being executed
- 0011 Maximum mode of XBR acceleration control being executed
- 0100 - 1110 Reserved for SAE assignment
- 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64964	

SPN 2919 Foundation Brake Use

This parameter indicates if the brake system presently uses the foundation brakes.

- 00 Foundation brakes not in use
- 01 Foundation brakes in use
- 10 Reserved
- 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64964

Operational Range: same as data range

SPN 2920 External Acceleration Demand

Parameter provided to the brake system from external sources. This is the acceleration which the brake system is expected to realize. It is specified as an absolute acceleration in reference to the road. Positive values lead to increasing vehicle speed, negative values lead to decreasing vehicle speed. Note: Normally only the negative data range is used, but e.g. in case of downhill driving also positive values are possible.

Data Length: 2 bytes
 Resolution: 1/2048 m/s² per bit, -15.687 m/s² offset
 Data Range: -15.687 to +15.687 m/s²
 Type: Status
 Supporting Information:
 PGN reference: 1024

Operational Range: -10.0 to +10.0 m/s²

SPN 2921 XBR Acceleration Limit

The brake system may temporarily or generally limit the maximum brake performance available for external systems. A temporary limit may be necessary due to high brake temperature; a general limit may be defined by the vehicle manufacturer, e.g. a value of -2.5 m/s² due to liability reasons. The actual limit is communicated to the external systems that request braking. The limit is only effective in the XBR Priorities 01 to 11. It is specified as an absolute acceleration in reference to the road.

Data Length: 1 byte
 Resolution: 0.1 m/s² per bit, -12.5 m/s² offset
 Data Range: -12.5 to +12.5 m/s²
 Type: Status
 Supporting Information:
 PGN reference: 64964

Operational Range: -10.0 to +10.0 m/s²

SPN 2922 Steerable Lift Axle Lowering Inhibit

A signal which indicates if lowering of lifted axle is allowed or inhibited.

- 00 Lowering allowed
- 01 Lowering inhibited
- 10 Reserved
- 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61451

Operational Range: same as data range

SPN 2923 Status of Steering Axle

A signal which indicates different states of the steering axle

0000	Axle steering not active (adhesion steering)
0001	Axle steering active
0010	Axle centered
0011	Axle centered, because of an error
0100	Axle not active because of an error (adhesion steering)
0101	Axle steering in special mode (diagnosis, calibration mode)
0110-1110	Reserved for SAE Assignment
1111	Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61451

SPN 2924 Steering Type

Indicates the different types of steering systems (ref. ECE Regulation 79 paragraph 2.5)

0000	Main steering system
0001	Auxiliary steering equipment
0010-1110	Reserved for Assignment by SAE
1111	Not Available

0000 Main steering system - The steering equipment of a vehicle which is mainly responsible for determining the direction of travel.

0001 Auxiliary steering equipment - A system in which the wheels on axle(s) of vehicles of categories M and N are steered in addition to the wheels of the main steering equipment in the same or opposite direction to those of the main steering equipment and/or the steering angle of the front and/or the rear wheels may be adjusted relative to vehicle behaviour.

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61451

SPN 2925 *Type of Steering Forces*

Type of Steering Forces (Ref. ECE Regulation 79 paragraph 2.5)

0000	Manual steering equipment
0001	Power assisted steering equipment
0010	Full power steering equipment
0011	Self tracking steering equipment
0100-1110	Reserved for SAE assignment
1111	Not Available

0000 Manual steering equipment - The steering forces result solely from the muscular effort of the driver.

0001 Power assisted steering equipment - The steering forces result from both the muscular effort of the driver and the energy supply or supplies.

0010 Full power steering equipment - The steering forces are provided solely by one or more energy supplies.

0011 Self tracking steering equipment - A system designed to create a change of steering angle on one or more wheels only when acted upon by forces and/or moments applied through the tire to road contact.

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61451

SPN 2926 *Type of Steering Transmission*

Type of Steering Transmission (Ref. ECE Regulation 79 paragraph 2.6)

0000	Purely mechanical steering transmission
0001	Purely hydraulic steering transmission
0010	Purely electric steering transmission
0011	Hybrid steering transmission
0100-1110	Reserved for SAE assignment
1111	Not available

0000 Purely mechanical steering transmission - A steering transmission in which the steering forces are transmitted entirely by mechanical means.

0001 Purely hydraulic steering transmission - A steering transmission in which the steering forces, somewhere in the transmission, are transmitted only by hydraulic means.

0010 Purely electric steering transmission - A steering transmission in which the steering forces, somewhere in the transmission, are transmitted only through electric means.

0011 Hybrid steering transmission - A steering transmission in which part of the steering forces is transmitted through one and the other part through another of the above mentioned means. However, in the case where any mechanical part of the transmission is designed only to give position feedback and is too weak to transmit the total sum of the steering forces, this system shall be considered to be purely hydraulic or purely electric steering transmission.

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61451

SPN 2927 *Actual Inner wheel steering angle*

Signal which indicates the actual inner wheel steering angle. The steering angle is the angle of wheel turn relative to the vehicle x-axis (yaw angle of inner wheel). See Figure SPN2927_A for explanation of positive and negative angles. This parameter is defined according to a Z-Down axis system and the sign of the value is in accordance to the right-hand rule,

as specified in SAE J670. As specified in SAE J670, a Z-Down Axis System has positive X directed forward, positive Y to the right, and positive Z directed down.

Data Length:	2 bytes	
Resolution:	1/256 deg/bit, -125 deg offset	
Data Range:	-125 to 125 deg	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 2927	
PGN reference:	61451	

SPN 2928 *Axle Location*

To identify to which of several similar devices (such as tires or fuel tanks) the information applies.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61451	

SPN 2930 *Hydraulic Brake System Audible Warning Command*

Signal which commands an audible warning by the hydraulic braking system.

00	Audible warning off
01	Audible warning on
10	Reserved
11	Don't care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64998	

SPN 2931 Hydraulic Brake Fluid Level Switch

Signal which indicates whether the hydraulic fluid level in the reservoir(s) is sufficient.

- 00 Fluid level is not sufficient
- 01 Fluid level is sufficient
- 10 Error indicator
- 11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64998

SPN 2945 Active Shift Console Indicator

Signal from transmission control unit indicating which shift console (primary or secondary) it currently considers as the active shift selector input.

- 00 Primary shift console is active
- 01 Secondary shift console is active
- 10 Reserved
- 11 Not available

Note: In some applications such as refuse trucks, the transmission can be operated from two positions in the vehicle. The transmission control unit will accept changes in transmission requested gear (SPN 525) from the operator only from the active shift console. The transmission control unit determines which shift console is active based on a switch input controlled by the operator and transmission system state criteria.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65098

SPN 2948 Engine Intake Valve Actuation System Oil Pressure

The gage pressure of the oil in the hydraulic system that powers the engine intake valve actuation system

Data Length: 2 bytes

Resolution: 1/256 MPa/bit, 0 offset

Data Range: 0 to 250.996 Mpa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64961

SPN 2970 Accelerator Pedal 2 Low Idle Switch

Switch signal which indicates the state of the accelerator pedal 2 low idle switch. The low idle switch is defined in SAE J1843.

- 00 Accelerator pedal 2 not in low idle condition
- 01 Accelerator pedal 2 in low idle condition
- 10 Error
- 11 Not available

Note: Also refer to SPN 558 Accelerator Pedal 1 Low Idle Switch and SPN 2971 Accelerator Pedal 3 Low Idle Switch.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61443	

(R) SPN 2978 Estimated Engine Parasitic Losses - Percent Torque

The calculated torque that indicates the estimated amount of torque loss due to engine parasitics, such as cooling fan, air compressor, air conditioning, etc. It is expressed as a percent of Engine Reference Torque.

If there are multiple devices on a network that provide this parameter, then users of this data shall add each of these values to determine the total torque loss due to engine parasitics. Devices other than the engine that provide this parameter shall use the value of Engine Reference Torque transmitted by the engine during the current key cycle to determine the percent torque loss as seen by the engine.

When the data value of this parameter is equal to FB it means that all parasitic losses calculated by the engine are included in the Engine's Nominal Friction Percent Torque (SPN 514).

Note: Refer to section 5.2.1.

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Status	
Supporting Information:		
PGN reference:	65247	

SPN 2979 Vehicle Acceleration Rate Limit Status

Status (active or not active) of the system used to limit maximum forward vehicle acceleration.

- 00 Limit not active
- 01 Limit active
- 10 Reserved
- 11 Not available

NOTE: The effects of emission control limits, such as engine exhaust smoke control, are specifically excluded; they are not considered to be part of a function to limit vehicle acceleration.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61443	

SPN 2980 Engine Fuel Valve 1 Outlet Absolute Pressure

Absolute Pressure of gas on outlet side of the first or only fuel system control valve. See SPN 3469 for the second fuel control valve.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65163	

SPN 2983 Clutch Life Remaining

Signal which indicates the actual clutch life remaining in percent. One hundred percent means the clutch is brand new and zero percent means the clutch is at the end of its life.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65195	

SPN 2984 Automatic traction help (load transfer)

This signal enables the traction help (load transfer) in case of an active ASR function

00 Disable automatic traction help
 01 Enable automatic traction help
 10 Reserved
 11 Don't care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 2985 Transmission Shift Selector Display Mode Switch

Status of the operator's switch used to 'toggle' through multiple display modes of a shift selector display.

When a shift selector display is capable of displaying more than just range information, this switch is toggled by the operator to move through the different display modes. If the selector has only two display modes, this switch may behave as a typical SPST switch. If the selector has more than two display modes, the switch may be momentary, where each activation indicates that the selector has scrolled through to the next subsequent display mode.

00 Off
 01 On
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	256	

SPN 2986 Engine Intake Valve Actuation System Oil Temperature

The temperature of the oil in the hydraulic system that powers the intake valve actuation system.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65129

(R) SPN 3026 Transmission Oil Level 1 Measurement Status

Measurement status for the first instance of a transmission oil level indicator. Indicates if conditions are acceptable to obtain a valid transmission oil level measurement as conveyed in SPN 124 Transmission Oil Level or SPN 3027 Transmission Oil Level 1 High / Low. If conditions are not acceptable, this parameter conveys to the operator what prevents conditions from being acceptable. Only one condition can be conveyed in this parameter at any given point in time. If multiple conditions exist, it is not important which condition is actually broadcast, as the driver must 'correct' each and every condition as it is presented before a valid oil level reading can be made. If multiple conditions exist that prevent a valid reading, the sender should broadcast one of those conditions until it is corrected; then the next condition can be conveyed to the operator, and so on.

0000 Conditions valid for transmission oil level measurement
 0001 Conditions not valid – Settling timer still counting down
 0010 Conditions not valid – Transmission in gear
 0011 Conditions not valid – Transmission fluid temperature too low
 0100 Conditions not valid – Transmission fluid temperature too high
 0101 Conditions not valid – Vehicle moving; output shaft speed too high
 0110 Conditions not valid – Vehicle not level
 0111 Conditions not valid – Engine speed too low
 1000 Conditions not valid – Engine speed too high
 1001 Conditions not valid – No request for reading
 1010 Not defined
 1011 Not defined
 1100 Not defined
 1101 Conditions not valid - Other
 1110 Error
 1111 Not available

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 65272

(R) SPN 3027 Transmission Oil Level 1 High / Low

First instance of a transmission oil level indicator. Conveys the amount of current volume of transmission sump oil compared to recommended volume. Positive values indicate overfill. Zero means the transmission fluid is filled to the recommended level.

Parameter Specific Indicator:

A value of 0xFB indicates conditions are not acceptable for a valid fluid level measurement.

Data Length: 1 bytes
 Resolution: 0.5 L/bit, -62.5 L offset
 Data Range: -62.5 to 62.5 L Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 65272

(R) SPN 3028 *Transmission Oil Level 1 Countdown Timer*

Countdown timer for the first instance of a transmission oil level indicator. Once all vehicle conditions (such as vehicle stopped, etc) are met, some transmissions may require a 'settling time' to allow the fluid level to normalize. This parameter indicates how much of the required settling time remains. When time reaches 0, a valid oil level measurement value will be broadcast in SPN 3027 Transmission Oil Level 1 High / Low.

0000 less than 1 minute

0001 One minute

0010 Two minutes

0011 Three minutes

0100 Four minutes

0101 Five minutes

0110 Six minutes

0111 Seven minutes

1000 Eight minutes

1001 Nine minutes

1010 Ten minutes

1011 Eleven minutes

1100 Twelve minutes

1101 Thirteen minutes

1110 Error

1111 Not Available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: 0 to 13 minutes

Type: Measured

Supporting Information:

PGN reference: 65272

SPN 3030 *Transmission Torque Converter Ratio*

Ratio of the transmissions torque converter output torque to torque converter input torque at current speed.

The ratio of 1.000 (03 E8 hex) indicates torque converter lockup.

If the ratio is less than 1 and the ratio can not be properly determined it shall be set to a value of FB00 hex.

Ratios above 1 indicate torque converter multiplication.

Data Length: 2 bytes

Resolution: 0.001/bit, 0 offset

Data Range: 0 to 64.255

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61452

SPN 3031 *Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature*

Temperature of the diesel exhaust fluid in the storage tank.

Data Length: 1 byte

Resolution: 1 deg C/bit, -40 deg C offset

Data Range: -40 to 210 deg C

Operational Range: same as data range

Type: Measured

Supporting Information: See Appendix D - SPN 1761

PGN reference: 65110

SPN 3043 *Type of Passenger Count*

Used to notify transit link devices of the type of passenger counting system used in the vehicle. Some passenger counting systems indicate real-time boarding and exiting data for other devices to accumulate. Other types of passenger

counters report a current on-board total relative to a transit door status, a fare collection status, or other signal which can define the end of the boarding/exiting period and a stable underway totalized passenger count.

0 - absolute passenger count
 1 - boarding passenger
 2 - exiting passenger
 3 - boarding passenger (second passenger stream)
 4 - exiting passenger (second passenger stream)
 5 to 250 - reserved for future assignment
 251 to 253 - reserved
 254 - error indicator
 255 - not available

Data Length: 8 bits
 Resolution: 256 states/8 bit, 0 offset
 Data Range: 0 to 255
 Type: Measured
 Supporting Information:
 PGN reference: 64960

Operational Range: same as data range

SPN 3044 *Silent Alarm Status*

Used to report silent alarm push button status.

00 - Off
 01 - On
 10 - Error condition
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64960

Operational Range: same as data range

SPN 3045 *Vehicle Use Status*

Used to indicate the proper or unauthorized use of the vehicle. The administrative control device or any device issuing the vehicle use status PID should be sensitive to the run switch status (SPN 3046) and any other locally defined criteria for authorized use (i.e., driver log-ons) before the vehicle use status PID is used to generate an unauthorized use alarm.

00 - Normal use
 01 - Unauthorized use
 10 - Error condition
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64960

Operational Range: same as data range

SPN 3046 ***Transit Run Status***

Status of the run switch for the vehicle.

00 - Off

01 - On

10 - Error condition

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64960

SPN 3047 ***Patron Count***

Count of the number of passengers on a transit vehicle. If the type of passenger count (SPN 3043) is 0, the patron count indicates the number of patrons currently on vehicle after the door has closed. If the type of passenger count is 1 to 4, the patron count indicates an incremental count of passengers since the last data transmittal.

Data Length: 1 byte

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 250

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64960

SPN 3070 ***Number of bytes in the Milepost Identification***

Number of bytes in the Milepost Identification. This parameter identifies the length, in bytes, of the data in SPN 590 (Milepost Identification).

Data Length: 1 byte

Resolution: 1 byte/bit, 0 offset

Data Range: 0 to 250 bytes

Operational Range: 0 to 100 bytes

Type: Measured

Supporting Information:

PGN reference: 64959

SPN 3071 ***Number of bytes in the Transit Assigned Route Identity***

Number of bytes in the Transit Assigned Route Identity. This parameter identifies the length, in bytes, of the data in SPN 3074 (Transit Assigned Route Identity).

Data Length: 1 byte

Resolution: 1 byte/bit, 0 offset

Data Range: 0 to 250 bytes

Operational Range: 1 to 100 bytes

Type: Measured

Supporting Information:

PGN reference: 64958

SPN 3072 ***Number of bytes in the Transit Assigned Run Identity***

Number of bytes in the Transit Assigned Run Identity. This parameter identifies the length, in bytes, of the data in SPN 3075 (Transit Assigned Run Identity).

Data Length:	1 byte	
Resolution:	1 byte/bit, 0 offset	
Data Range:	0 to 250 bytes	Operational Range: 1 to 100 bytes
Type:	Measured	
Supporting Information:		
PGN reference:	64958	

SPN 3073 ***Number of bytes in the Transit Assigned Block Identity***

Number of bytes in the Transit Assigned Block Identity. This parameter identifies the length, in bytes, of the data in SPN 3076 (Transit Assigned Block Identity).

Data Length:	1 byte	
Resolution:	1 byte/bit, 0 offset	
Data Range:	0 to 250 bytes	Operational Range: 1 to 100 bytes
Type:	Measured	
Supporting Information:		
PGN reference:	64958	

SPN 3074 ***Transit Assigned Route Identity***

Identifies the transit route assigned to a specific vehicle. The length of the ASCII text for this parameter must be reported using SPN 3071 (Number of bytes in the Transit Assigned Route Identity).

Data Length:	Variable - up to 100 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64958	

SPN 3075 ***Transit Assigned Run Identity***

Identifies the transit run assigned to a specific vehicle. The length of the ASCII text for this parameter must be reported using SPN 3073 (Number of bytes in the Transit Assigned Run Identity).

Data Length:	Variable - up to 100 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64958	

SPN 3076 ***Transit Assigned Block Identity***

Identifies the transit block assigned to a specific vehicle. The length of the ASCII text for this parameter must be reported using SPN 3073 (Number of bytes in the Transit Assigned Block Identity).

Data Length:	Variable - up to 100 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64958	

SPN 3078 Agency

The identity of the agency involved in this transaction

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64958	

SPN 3079 Intersection Preemption Request/Response

Status of the intersection signal preemption

00 - Message is a request directed to the emitter
 01 - Message is a response from the emitter
 10 - Error condition
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64957	

SPN 3080 Transit Route ID Usage

Transit route ID usage

00 - Transit route ID not used for interleaved data
 01 - Transit route ID used for interleaved data (if range code not enabled)
 10 - Error condition
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64957	

SPN 3081 Range Code Enable

Range code enable

00 - Range code not used for interleaved data
 01 - Range code used for interleaved data
 10 - Error condition
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64957	

SPN 3082 Strobe Activation Control Status

Strobe activation control status

- 00 - Deactivate strobe
- 01 - Activate strobe
- 10 - Error condition
- 11 - Not available

Note: Strobe will flash if not overridden by transit door status, strobe is working, and emitter is in the normal mode.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64957	

SPN 3083 Transit Door Enable

Transit door enable

- 00 - Ignore transit door status
- 01 - Transit door status will override strobe activation
- 10 - Error condition
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64957	

SPN 3084 Priority of Response Sent by Emitter

Priority of response sent by emitter

- 0000 - Reserved
- 0001 - Low priority
- 0010 - Probe priority
- 0011 - High priority
- 0100 to 1000 - Reserved
- 1001 - Priority set by hardware to low priority
- 1010 - Priority set by hardware to probe priority
- 1011 - Priority set by hardware to high priority
- 1100 to 1101 - Reserved
- 1110 - Error condition
- 1111 - Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64957	

SPN 3085 *Vehicle ID*

Numerical designation of the vehicle. 65535 is used to represent the vehicle ID is not available.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 65,535	Operational Range: 0 to 65,534
Type:	Measured	
Supporting Information:		
PGN reference:	64957	

SPN 3086 *Transmission Ready for Brake Release*

This parameter indicates that enough torque / motive force is available at the transmission output shaft to release all the brakes without a risk of unintentional movement in the opposite direction.

00 - Transmission Not Ready for Brake Release
 01 - Transmission Ready for Brake Release
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65098	

SPN 3087 *Auxiliary Level*

Level measured by a sensor.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, 0 offset	
Data Range:	0 to 6,425.5 mm (0 to 6.4255 m)	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65164	

SPN 3156 Blade Control Mode Switch

This parameter indicates the blade control mode switch state the user has set for the land leveling system. The switch value directly correlates to the current switch state, regardless of the switch being used. This parameter is intended for use in systems using only one parameter to control the blade movement (i.e. elevation). Systems using two independent parameters to control blade position, i.e. one blade edge maintains a constant elevation and the other blade edge maintains a constant blade angle, should use parameters specific to that usage. Only one of the following states will be active at a time. Below are the data values defined for each switch type that may be used in this application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. A toggle button with two states can be used, in which the button is either in the manual or the auto position at all times. Toggle button usage is as follows:

Manual Position = 0010 Manual button pressed
Auto Position = 0011 Automatic button pressed

2. The momentary rocker switch may be used, where the default is the no button pressed position. The user can press the rocker into the manual position, and when pressure is released, it will return to the no button pressed position. The user may also press the rocker into the auto position, and when pressure is released, it will return to the no button pressed position. Momentary rocker button usage is as follows:

No Button Pressed = 0000 No button pressed
Manual Button Pressed = 0010 Manual button pressed
Auto Button Pressed = 0011 Automatic button pressed

3. The momentary contact button pair may be used, where the default is no buttons being pressed. The user can press the manual button, and when pressure is released, it will return to the no button pressed position. The user may press the auto button, and when pressure is released, it will return to the no button pressed position. Momentary contact buttons (button pair) usage is as follows:

No Button Pressed = 0000 No button pressed
Manual Button Pressed = 0010 Manual button pressed
Auto Button Pressed = 0011 Automatic button pressed

4. The momentary contact single button may be used, where the default is no button being pressed. The user can press the button, which is the button pressed position, and when pressure is released, it will return to the no button pressed position. The controller receiving this command will keep track of what mode the blade is in, auto or manual. When the button is pressed, the "mode button pressed" state is reported and the receiving controller then changes the current mode to its opposite value (i.e. manual to automatic or vice-versa). Momentary contact button (single button) usage is as follows:

No Button Pressed = 0000 No button pressed
Button Pressed = 0001 Mode button pressed

Data Values and Descriptions:

0000 No button pressed
0001 Mode button pressed
0010 Manual button pressed
0011 Automatic button pressed
1110 Error Indicator
1111 Not Installed
All other values are reserved

Notes:

1. The switch state can be read in two ways. One method uses the direct analog switch input to determine the switch state, while the second method relies on a secondary control to read the analog input, then relay the information on the data link. The parameter is designed to provide the actual switch state to other controls that need the information.
2. Other systems with automated blade controls should be able to use this parameter, since it is a measured switch value.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61453	

SPN 3157 *Desired Grade Offset Switch*

This parameter indicates the grade offset switch state the user has set for the land leveling system. The desired grade offset value is the vertical offset measured from a given elevation reference point to the bottom edge of the blade. This parameter is intended for use in systems using only elevation offset to control the blade movement (i.e. elevation). Systems using two independent parameters to control blade position, i.e. one edge maintains a constant elevation and the other blade edge maintains a constant angle, should use parameters specific to that usage. Only one of the following states will be active at a time. Below are the data values defined for each switch type that may be used in this application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. The momentary rocker switch may be used, where the default is the no button pressed position. The user can press the rocker into the increment button pressed position, and when pressure is released, it will return to the no button pressed position. The user may also press the rocker into the decrement button pressed position, and when pressure is released, it will return to the no button pressed position. Momentary rocker button usage is as follows:

No Button Pressed = 0000 No button pressed
 Increment Button Pressed = 0001 Increment button pressed
 Decrement Button Pressed = 0010 Decrement button pressed

2. The momentary contact button pair may be used, where the default is the no buttons pressed position. The user can press the increment button, and when pressure is released, it will return to the no buttons pressed position. The user may press the decrement button, and when pressure is released, it will return to the no buttons pressed position. Momentary contact button (button pair) usage is as follows:

No Button Pressed = 0000 No button pressed
 Increment Button Pressed = 0001 Increment button pressed
 Decrement Button Pressed = 0010 Decrement button pressed

Data Values and Descriptions:
 0000 No button pressed
 0001 Increment button pressed
 0010 Decrement button pressed
 1110 Error Indicator
 1111 Not installed
 All other values are reserved

Notes:

1. The switch state can be read in two ways. One method uses the direct analog switch input to determine the switch state, while the second method relies on a secondary control to read the analog input, then relay the information on the data link. The parameter is designed to provide the actual switch state to other controls that need the information.
2. Other systems with automated blade controls should be able to use this parameter, since it is a measured switch value.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61453	

SPN 3158 Blade Auto Mode Command

Allows other controllers to command to the primary control system what they think is the appropriate auto control mode to be engaged in, based on the information they have available to them. When in automatic mode, the blade automatically adjusts its position to the center of the blade to maintain a desired grade offset. Only one of the following states will be active at a time. Below is extended information describing each command. The purpose of this information is to define what command state should be reported based on what auto control mode command is deemed appropriate by the operational specifications of the system.

0000 Auto Allowed - Auto mode permitted as appropriate (auto button was pushed or directly returned from Suspend Auto condition)

0001 Activity Allows Auto - Auto mode permitted only if the primary control system detects operator activity. The control issuing this command does not have sufficient information/reason to absolutely allow Auto mode (state 0000) or not allow Auto mode (state 0100). The control issuing this command is permitting the primary control system to operate in auto mode only if the primary control system detects operator activity, such as direct input to the primary control system. If the primary control system does not detect operator activity, then the control issuing this command is not allowing auto mode. For example, the control issuing this command has detected no operator activity yet it acknowledges that there may be other sources of operator activity that might make auto mode permissible.

0010 Suspend Auto - Auto mode is temporarily not allowed and the control issuing this command wants the primary control system to automatically return to the previous state (Auto or Manual) when the suspend auto condition is removed.

0011 Service Mode - Auto mode is permitted only for special services such as calibrations.

0100 Auto Not Allowed - Auto mode is not allowed under any condition

Data Values and Descriptions:

0000 Auto Allowed

0001 Activity Allows Auto - must detect operator before auto allowed

0010 Suspend Auto - temporarily suspend auto mode

0011 Service Mode - auto allowed only during service modes

0100 Auto Not Allowed

1110 Error Indicator

1111 Not Supported

All other values are reserved

Note:

The control issuing this command is aware that it does not have access to all information that the primary controller of the Land Leveling System attachment has access to. Therefore, it commands the Land Leveling system to activate a auto blade mode based on the input it has access to. In some cases, like in the "Activity Allows Auto" situation, the control knows the Land Leveling system has access to an additional display (which has switches and several buttons) which may help determine if an operator is present. On the other hand, the control may also have information the primary controller of the Land Leveling System does not have access to, like the parking brake status.

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61453

SPN 3159 Trip Number

The identity number assigned to this trip.

Data Length: 2 bytes

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 65,535

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64956

SPN 3160 *Assigned Route*

The identity number assigned to this route.

Note: This is the numerical value for the route as opposed to the "Transit Assigned Route Identity" (SPN 3074) which is variable length ASCII or the "Route number" (SPN 3169) which is 12 bit numeric.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 65,535	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64956	

SPN 3161 *Pattern Number*

The agency defined pattern number for this trip

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 65,535	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64956	

SPN 3162 *Assigned Run*

The agency defined run number for this trip

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 65,535	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64956	

SPN 3163 *Assigned Block*

The agency defined block number for this trip

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 65,535	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64956	

SPN 3164 *Driver's farebox security code*

Security code for the farebox, numerical only.

Note: 0 = Farebox is in reporting status
1 - 65535 = security code

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 65,535	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64956	

SPN 3165 *Fare Validity*

Agency defined value indicating validity of this fare

Data Length:	4 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64955	

SPN 3166 *Pass Category*

Agency defined value indicating the category of the passenger associated with this fare

Data Length:	4 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64955	

SPN 3167 *Initial Fare Agency*

Identifies where the initial fare is paid

Note: The definition of the agency numbering plan shall be agreed by the operating agency and the farebox manufacturer. The value of 0 is reserved, the usable range is 1 to 31.

Data Length:	5 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 31	Operational Range: 1 to 31
Type:	Measured	
Supporting Information:		
PGN reference:	64955	

SPN 3168 *Transfer Sold*

Indicates that a transfer was sold or issued on this transaction including its type and/or restrictions. The final definitions of the transfer issued information shall be agreed by the operating agency and the farebox manufacturer.

Note: A non-zero value indicates that a transfer was sold or issued. The value of zero is reserved to indicate that no transfer has been sold or issued.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64955	

SPN 3169 *Route Number*

The route number issuing the transfer.

Data Length:	12 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4095	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64955	

SPN 3170 Transaction Type

Enumerated value representing the type of transaction completed

0000 = Cash

0001 = Token

0010 = Ticket

0011 = Pass

0100 = Card

0101 = Permit

0110 = Transfer

0111 = Free

1000-1011 = Reserved for assignment

1100-1111 = Agency defined

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64955

SPN 3171 Passenger Type

Enumerated value representing the type/class of passenger, as defined by the agency.

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64955

SPN 3172 Type of Service

The type of service provided

000 = Local service

001 = Express service

010-111 = Agency defined

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64955

SPN 3173 Transfer Type

The kind of transfer used

00000 = North
 00001 = South
 00010 = East
 00011 = West
 00100 = In
 00101 = Out
 00110-11111 = Agency defined

Data Length: 5 bits
 Resolution: 32 states/5 bit, 0 offset
 Data Range: 0 to 31
 Type: Measured
 Supporting Information:
 PGN reference: 64955

Operational Range: same as data range

SPN 3174 Trip Direction

The general direction of travel for this trip.

0000 = North
 0001 = South
 0010 = East
 0011 = West
 0100 = In
 0101 = Out
 0110-1111 = Agency defined

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Measured
 Supporting Information:
 PGN reference: 64956

Operational Range: same as data range

SPN 3175 Fare Presets

Fare Presets

00000000 to 00001111 = Agency defined
 00010000 to 11111111 = Reserved for assignment

Data Length: 8 bits
 Resolution: 256 states/8 bit, 0 offset
 Data Range: 0 to 255
 Type: Measured
 Supporting Information:
 PGN reference: 64956

Operational Range: same as data range

SPN 3176 Type of Fare

Type of Fare

0000 = Cash/No detail

0001 = Token A

0010 = Token B

0011 = Ticket A

0100 = Ticket B

0101 = Pass A

0110 = Pass B

0111-1010 = Reserved for assignment

1011-1111 = Agency defined

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Type: Measured

Supporting Information:

PGN reference: 64955

Operational Range: same as data range

SPN 3177 Payment Details

Payment details.

0000 = Not an upgrade

0001 = Cash

0010 = Token

0011 = Ticket

0100 = Pass

0101 = Card

0110-1010 = Reserved for assignment

1011-1111 = Agency defined

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Type: Measured

Supporting Information:

PGN reference: 64955

Operational Range: same as data range

SPN 3178 Farebox Service Status

Indicates if the farebox is in or out of service.

00 = Farebox out of service

01 = Farebox in service

10 = Error Condition

11 = Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Measured

Supporting Information:

PGN reference: 64956

Operational Range: same as data range

SPN 3179 ***Farebox Emergency Status***

Indicates if a farebox emergency condition exists.

00 = Non-emergency condition

01 = Emergency condition

10 = Error Condition

11 = Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Measured

Supporting Information:

PGN reference: 64954

Operational Range: same as data range

SPN 3180 ***Trip Status***

Trip Status

000 = Undefined

001 = Trip start

010 = Trip end

011 = Undefined

100 = Undefined

101 = Layover start

110 = Layover end

111 = Undefined

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Type: Measured

Supporting Information:

PGN reference: 64956

Operational Range: same as data range

SPN 3181***Farebox Alarm Identifier***

Indicates the nature of the farebox alarm condition.

0000000 = Voltage dropout
 0000001 = Voltage restored
 0000010 = Probe started
 0000011 = Probe completed
 0000100 = Cashbox removed
 0000101 = Cashbox restored
 0000110 = Cashbox door timeout
 0000111 = Cashbox opened in service, considered an alarm condition
 0001000 = Insufficient fare accepted
 0001001 = Coinbox 75% full
 0001010 = Coinbox full
 0001011 = Currency box 75% full
 0001100 = Currency box less than 75% full
 0001101 = Currency box full
 0001110 = Card/pass box 75% full
 0001111 = Card/pass box less than 75% full
 0010000 = Card/pass box full
 0010001 = Coin de-jam operated
 0010010 = Farebox set in manual bypass
 0010011 = Farebox reset to automatic mode
 0010100 = Pass/transfer jam
 0010101 = Pass/transfer jam cleared
 0010110 = Paper currency jam
 0010111 = Paper currency jam cleared
 0011000 = Maintenance access in service, considered an alarm condition
 0011001 = Maintenance access out of service
 0011010-1100000 = Reserved - to be assigned
 1100001-1111111 = Agency defined

Data Length: 7 bits

Resolution: 128 states/7 bit, 0 offset

Data Range: 0 to 127

Type: Measured

Supporting Information:

PGN reference: 64954

Operational Range: same as data range

SPN 3188 XBR Message Checksum

The XBR message checksum is used to verify the signal path from the demanding device to the brake controller on electronic brake systems. The support of this parameter is mandatory if PGN 1024 is supported as there is no means to indicate "not available".

The 4 bit XBR message checksum is calculated using the first 7 data bytes, the 4 bit message counter and the bytes of the message identifier. It is calculated as follows:

Checksum = (Byte1 + Byte2 + Byte3 + Byte4 + Byte5 + Byte6 + Byte7 + message counter & 0x0F + message ID low byte + message ID mid low byte + message ID mid high byte + message ID high byte)

XBR Message Checksum = ((Checksum >> 4) + Checksum) & 0x0F

Note: A failure in the communication sets the XBR system state:

- to '01' for failed XBR 'priority 01, 10 or 11' messages
- to '10' for failed XBR 'priority 00' messages.

Data Length:	4 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	1024	

SPN 3189 XBR Message Counter

The XBR message counter is to verify the signal path from the demanding device to the brake controller on electronic brake systems.. The support of this parameter is mandatory.

Note: The initial value of the 4 bit message counter for the first message during a driving cycle is arbitrary. In every following message the counter is incremented by 1 (0 follows 15).

Data Length:	4 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	1024	

SPN 3190 *Tire Location*

Identifies which tire is associated with the parametric data in this PGN.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64953	

SPN 3191 *Reference Tire Pressure*

Reference value of the tire pressure as basis for the tire pressure monitoring

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64953	

SPN 3192 *Tire Location*

Identifies which tire is associated with the parametric data in this PGN.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	44544	

SPN 3193 *Reference Tire Pressure Setting*

Reference value of the tire pressure setting as basis for the tire pressure monitoring

Data Length:	1 byte	
Resolution:	8 kPa/bit, 0 offset	
Data Range:	0 to 2,000 kPa	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	44544	

SPN 3215 *Prohibit air suspension control*

This parameter is an external request to the air suspension control system to prohibit all air suspension control. If the request is accepted, response intended to be sent in ASC1 (additional status requested in ASC1), there will be no control either for height changes or axle load distribution changes, i.e. hold current pressures in all suspension devices.

00 No request
 01 Request prohibit air suspension control
 10 Error indicator
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 3216 *Aftertreatment 1 Intake NOx*

The amount of combined NO and NO₂ in the exhaust entering the aftertreatment system measured by a NO_x sensor at the aftertreatment intake, represented in NO_x molecule parts per million non-NO_x molecules in exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.05 ppm/bit, -200 ppm offset	
Data Range:	-200 to 3012.75 ppm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61454	

SPN 3217 *Aftertreatment 1 Intake O₂*

The actual oxidation factor (%O₂) of the gas within the exhaust stream. For positive values, the parameter represents the percent oxygen in excess of the amount required for stoichiometric combustion. For negative values, the parameter is proportional to the amount of oxygen being pumped by the sensor. This value is measured by a sensor at the aftertreatment intake in exhaust bank 1.

A value of -12% (0x0000) indicates rich, a value of 21% (0xFAFF) indicates lean. These data points could optionally be used with switching O₂ sensors to indicate those states as alternatives to broadcasting the threshold %O₂ values. Diagnostic Tools could change display to use the text "Rich" or "Lean" in place of the implied %O₂ values which would also be acceptable for display.

Data Length:	2 bytes	
Resolution:	0.000514 %/bit, -12 % offset	
Data Range:	-12% to 21%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61454	

(R) SPN 3218 *Aftertreatment 1 Intake Gas Sensor Power Status*

Indicates that the power supplied to the aftertreatment intake gas sensor, either NO_x or O₂, is within the manufacturer's specification in exhaust bank 1. This parameter reports the status as reported by the sensor.

00 - Not in range
 01 - In range
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61454	

SPN 3219 *Aftertreatment 1 Intake Gas Sensor at Temperature*

Indicates that the heater element of the aftertreatment intake gas sensor, either NOx or O2, is within the manufacturer's specified range for accurate measurements in exhaust bank 1.

00 - Not in range
01 - In range
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61454

Operational Range: same as data range

SPN 3220 *Aftertreatment 1 Intake NOx Reading Stable*

Indicates that the NOx reading of the aftertreatment intake NOx sensor is stable as determined by the manufacturer's control software in exhaust bank 1.

00 - Not stable
01 - Stable
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61454

Operational Range: same as data range

SPN 3221 *Aftertreatment 1 Intake Wide-Range % O2 Reading Stable*

Indicates that the %O2 reading of the aftertreatment intake gas sensor, either NOx or O2, is stable as determined by the manufacturer's control software in exhaust bank 1.

00 - Not stable
01 - Stable
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61454

Operational Range: same as data range

SPN 3222 *Aftertreatment 1 Intake Gas Sensor Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the heater of the intake exhaust gas sensor, either NOx or O2, by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61454	

SPN 3223 *Aftertreatment 1 Intake Gas Sensor Heater Control*

Indicates the heater status in the warm-up process. Upon receiving a power-up command, the gas sensor ramps up according to a manufacturer defined profile. The Preheat 1, Preheat 2, and Automatic messages are regions within this profile in exhaust bank 1.

00 - Automatic
 01 - Preheat 2
 10 - Preheat 1
 11 - Heater off

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61454	

SPN 3224 *Aftertreatment 1 Intake NOx Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment intake NOx sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61454	

SPN 3225 *Aftertreatment 1 Intake Oxygen Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment intake oxygen sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61454	

SPN 3226 *Aftertreatment 1 Outlet NOx*

The amount of combined NO and NO₂ in the exhaust exiting the aftertreatment system measured by a NO_x sensor at the aftertreatment outlet, represented in NO_x molecule parts per million non-NO_x molecules in exhaust bank 1.

Data Length: 2 bytes
 Resolution: 0.05 ppm/bit, -200 ppm offset
 Data Range: -200 to 3012.75 ppm
 Type: Measured
 Supporting Information:
 PGN reference: 61455

Operational Range: same as data range

SPN 3227 *Aftertreatment 1 Outlet O2*

The actual oxidation factor (%O₂) of the gas within the exhaust stream. For positive values, the parameter represents the percent oxygen in excess of the amount required for stoichiometric combustion. For negative values, the parameter is proportional to the amount of oxygen being pumped by the sensor. This value is measured by a sensor at the aftertreatment outlet in exhaust bank 1.

A value of -12% (0x0000) indicates rich, a value of 21% (0xFAFF) indicates lean. These data points could optionally be used with switching O₂ sensors to indicate those states as alternatives to broadcasting the threshold %O₂ values. Diagnostic Tools could change display to use the text "Rich" or "Lean" in place of the implied %O₂ values which would also be acceptable for display.

Data Length: 2 bytes
 Resolution: 0.000514 %/bit, -12 % offset
 Data Range: -12% to 21%
 Type: Measured
 Supporting Information:
 PGN reference: 61455

Operational Range: same as data range

(R) SPN 3228 *Aftertreatment 1 Outlet Gas Sensor Power Status*

Indicates that the power supplied to the aftertreatment outlet gas sensor, either NO_x or O₂, is within the manufacturer's specification in exhaust bank 1. This parameter reports the status as reported by the sensor.

00 - Not in range
 01 - In range
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61455

Operational Range: same as data range

SPN 3229 *Aftertreatment 1 Outlet Gas Sensor at Temperature*

Indicates that the heater element of the aftertreatment outlet gas sensor, either NOx or O2, is within the manufacturer's specified range for accurate measurements in exhaust bank 1.

00 - Not in range
01 - In range
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61455

Operational Range: same as data range

SPN 3230 *Aftertreatment 1 Outlet NOx Reading Stable*

Indicates that the NOx reading of the aftertreatment outlet NOx sensor is stable as determined by the manufacturer's control software in exhaust bank 1.

00 - Not stable
01 - Stable
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61455

Operational Range: same as data range

SPN 3231 *Aftertreatment 1 Outlet Wide-Range %O2 Reading Stable*

Indicates that the %O2 reading of the aftertreatment outlet gas sensor, either NOx or O2, is stable as determined by the manufacturer's control software in exhaust bank 1.

00 - Not stable
01 - Stable
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61455

Operational Range: same as data range

SPN 3232 *Aftertreatment 1 Outlet Gas Sensor Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the heater of the outlet exhaust gas sensor, either NOx or O2, by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61455	

SPN 3233 *Aftertreatment 1 Outlet Gas Sensor Heater Control*

Indicates the heater status in the warm-up process. Upon receiving a power-up command, the gas sensor ramps up according to a manufacturer defined profile. The Preheat 1, Preheat 2, and Automatic messages are regions within this profile in exhaust bank 1.

00 - Automatic
 01 - Preheat 2
 10 - Preheat 1
 11 - Heater off

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61455	

SPN 3234 *Aftertreatment 1 Outlet NOx Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment outlet NOx sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61455	

SPN 3235 *Aftertreatment 1 Outlet Oxygen Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment outlet oxygen sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61455	

SPN 3236 *Aftertreatment 1 Exhaust Gas Mass Flow*

Measured/calculated exhaust gas mass upstream of the aftertreatment system in exhaust bank 1 and 2.

Data Length:	2 bytes	
Resolution:	0.2 kg/h per bit, 0 offset	
Data Range:	0 to 12851 kg/h per bit	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65247	

SPN 3237 *Aftertreatment 1 Intake Dew Point*

Indicates that the temperature on the intake side of the aftertreatment system has exceeded the dew point, as estimated by the ECM in exhaust bank 1.

00 - Not exceeded the dew point
 01 - Exceeded the dew point
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65247	

SPN 3238 *Aftertreatment 1 Exhaust Dew Point*

Indicates that the temperature on the exhaust side of the aftertreatment has exceeded the dew point, as estimated by the ECM in exhaust bank 1.

00 - Not exceeded the dew point
 01 - Exceeded the dew point
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65247	

SPN 3239 *Aftertreatment 2 Intake Dew Point*

Indicates that the temperature on the intake side of the aftertreatment system has exceeded the dew point, as estimated by the ECM in exhaust bank 2.

00 - Not exceeded the dew point
 01 - Exceeded the dew point
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65247	

SPN 3240 *Aftertreatment 2 Exhaust Dew Point*

Indicates that the temperature on the exhaust side of the aftertreatment has exceeded the dew point, as estimated by the ECM in exhaust bank 2.

00 - Not exceeded the dew point
 01 - Exceeded the dew point
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65247	

SPN 3241 *Aftertreatment 1 Exhaust Gas Temperature 1*

The reading from the exhaust gas temperature sensor located farthest upstream in the aftertreatment system in exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64948	

SPN 3242 *Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature*

Temperature of engine combustion byproducts entering the diesel particulate filter in exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64948	

SPN 3243 *Aftertreatment 1 Exhaust Gas Temperature 1 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the exhaust gas temperature 1 sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64948	

SPN 3244 *Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel particulate filter intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64948	

SPN 3245 *Aftertreatment 1 Exhaust Gas Temperature 3*

The reading from the exhaust gas temperature sensor located farthest downstream in the aftertreatment system in exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64947	

SPN 3246 *Aftertreatment 1 Diesel Particulate Filter Outlet Gas Temperature*

Temperature of engine combustion byproducts leaving the diesel particulate filter exhaust in exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64947	

SPN 3247 *Aftertreatment 1 Exhaust Gas Temperature 3 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the exhaust gas temperature 3 sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64947	

SPN 3248 *Aftertreatment 1 Diesel Particulate Filter Outlet Exhaust Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel particulate filter outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64947	

SPN 3249 *Aftertreatment 1 Exhaust Gas Temperature 2*

The reading from the exhaust gas temperature sensor located midstream of the other two temperature sensors in the aftertreatment system in exhaust bank 1.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64946

SPN 3250 *Aftertreatment 1 Diesel Particulate Filter Intermediate Gas Temperature*

Temperature of engine combustion byproducts at a mid-point in the diesel particulate filter in exhaust bank 1.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64946

SPN 3251 *Aftertreatment 1 Diesel Particulate Filter Differential Pressure*

Exhaust differential pressure measured between the intake and exhaust of a diesel particulate filter in exhaust bank 1.

Data Length: 2 bytes
 Resolution: 0.1 kPa/bit, 0 offset
 Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64946

SPN 3252 *Aftertreatment 1 Exhaust Gas Temperature 2 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the exhaust gas temperature 2 sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64946

SPN 3253 *Aftertreatment 1 Diesel Particulate Filter Delta Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel particulate filter differential pressure sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64946

SPN 3254 *Aftertreatment 1 Diesel Particulate Filter Intermediate Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel particulate filter intermediate gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64946	

SPN 3255 *Aftertreatment 2 Intake NOx*

The amount of combined NO and NO₂ in the exhaust entering the aftertreatment system measured by a NO_x sensor at the aftertreatment intake, represented in NO_x molecule parts per million non-NO_x molecules in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247.)

Data Length:	2 bytes	
Resolution:	0.05 ppm/bit, -200 ppm offset	
Data Range:	-200 to 3012.75 ppm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61456	

SPN 3256 *Aftertreatment 2 Intake O₂*

The actual oxidation factor (%O₂) of the gas within the exhaust stream. For positive values, the parameter represents the percent oxygen in excess of the amount required for stoichiometric combustion. For negative values, the parameter is proportional to the amount of oxygen being pumped by the sensor. This value is measured by a sensor at the aftertreatment intake in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

A value of -12% (0x0000) indicates rich, a value of 21% (0xFAFF) indicates lean. These data points could optionally be used with switching O₂ sensors to indicate those states as alternatives to broadcasting the threshold %O₂ values. Diagnostic Tools could change display to use the text "Rich" or "Lean" in place of the implied %O₂ values which would also be acceptable for display.

Data Length:	2 bytes	
Resolution:	0.000514 %/bit, -12 % offset	
Data Range:	-12% to 21%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61456	

(R) SPN 3257 *Aftertreatment 2 Intake Gas Sensor Power Status*

Indicates that the power supplied to the aftertreatment intake gas sensor, either NOx or O2, is within the manufacturer's specification in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247). This parameter reports the status as reported by the sensor.

00 - Not in range
 01 - In range
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61456

Operational Range: same as data range

(R) SPN 3258 *Aftertreatment 2 Intake Gas Sensor at Temperature*

Indicates that the heater element of the aftertreatment intake gas sensor, either NOx or O2, is within the manufacturer's specified range for accurate measurements in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247).

00 - Not in range
 01 - In range
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61456

Operational Range: same as data range

SPN 3259 *Aftertreatment 2 Intake NOx Reading Stable*

Indicates that the NOx reading of the aftertreatment intake NOx sensor is stable as determined by the manufacturer's control software in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

00 - Not stable
 01 - Stable
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61456

Operational Range: same as data range

SPN 3260 *Aftertreatment 2 Intake Wide-Range % O2 Reading Stable*

Indicates that the %O2 reading of the aftertreatment intake gas sensor, either NOx or O2, is stable as determined by the manufacturer's control software in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

00 - Not stable
 01 - Stable
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61456

Operational Range: same as data range

SPN 3261 *Aftertreatment 2 Intake Gas Sensor Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the heater of the intake exhaust gas sensor, either NOx or O2, by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31
 Type: Status
 Supporting Information:
 PGN reference: 61456

Operational Range: same as data range

SPN 3262 *Aftertreatment 2 Intake Gas Sensor Heater Control*

Indicates the heater status in the warm-up process. Upon receiving a power-up command, the gas sensor ramps up according to a manufacturer defined profile. The Preheat 1, Preheat 2, and Automatic messages are regions within this profile in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

00 - Automatic
 01 - Preheat 2
 10 - Preheat 1
 11 - Heater off

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61456

Operational Range: same as data range

SPN 3263 *Aftertreatment 2 Intake NOx Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment intake NOx sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61456	

SPN 3264 *Aftertreatment 2 Intake Oxygen Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment intake oxygen sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61456	

SPN 3265 *Aftertreatment 2 Outlet NOx*

The amount of combined NO and NO₂ in the exhaust entering the aftertreatment system measured by a NOx sensor at the aftertreatment outlet, represented in NOx molecule parts per million non-NOx molecules in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	2 bytes	
Resolution:	0.05 ppm/bit, -200 ppm offset	
Data Range:	-200 to 3012.75 ppm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61457	

SPN 3266 *Aftertreatment 2 Outlet O2*

The actual oxidation factor (%O₂) of the gas within the exhaust stream. For positive values, the parameter represents the percent oxygen in excess of the amount required for stoichiometric combustion. For negative values, the parameter is proportional to the amount of oxygen being pumped by the sensor. This value is measured by a sensor at the aftertreatment outlet in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

A value of -12% (0x0000) indicates rich, a value of 21% (0xFAFF) indicates lean. These data points could optionally be used with switching O₂ sensors to indicate those states as alternatives to broadcasting the threshold %O₂ values. Diagnostic Tools could change display to use the text "Rich" or "Lean" in place of the implied %O₂ values which would also be acceptable for display.

Data Length:	2 bytes	
Resolution:	0.000514 %/bit, -12 % offset	
Data Range:	-12% to 21%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61457	

(R) SPN 3267 *Aftertreatment 2 Outlet Gas Sensor Power Status*

Indicates that the power supplied to the aftertreatment outlet gas sensor, either NOx or O2, is within the manufacturer's specification in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247). This parameter reports the status as reported by the sensor.

00 - Not in range
 01 - In range
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61457

Operational Range: same as data range

SPN 3268 *Aftertreatment 2 Outlet Gas Sensor at Temperature*

Indicates that the heater element of the aftertreatment outlet gas sensor, either NOx or O2, is within the manufacturer's specified range for accurate measurements in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

00 - Not in range
 01 - In range
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61457

Operational Range: same as data range

SPN 3269 *Aftertreatment 2 Outlet NOx Reading Stable*

Indicates that the NOx reading of the aftertreatment outlet NOx sensor is stable as determined by the manufacturer's control software in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

00 - Not stable
 01 - Stable
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61457

Operational Range: same as data range

SPN 3270 *Aftertreatment 2 Outlet Wide-Range % O2 Reading Stable*

Indicates that the %O2 reading of the aftertreatment outlet gas sensor, either NOx or O2, is stable as determined by the manufacturer's control software in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

00 - Not stable
 01 - Stable
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61457

Operational Range: same as data range

SPN 3271 *Aftertreatment 2 Outlet Gas Sensor Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the heater of the outlet exhaust gas sensor, either NOx or O2, by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31
 Type: Status
 Supporting Information:
 PGN reference: 61457

Operational Range: same as data range

SPN 3272 *Aftertreatment 2 Outlet Gas Sensor Heater Control*

Indicates the heater status in the warm-up process. Upon receiving a power-up command, the gas sensor ramps up according to a manufacturer defined profile. The Preheat 1, Preheat 2, and Automatic messages are regions within this profile in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

00 - Automatic
 01 - Preheat 2
 10 - Preheat 1
 11 - Heater off

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61457

Operational Range: same as data range

SPN 3273 *Aftertreatment 2 Outlet NOx Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment outlet NOx sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61457	

SPN 3274 *Aftertreatment 2 Outlet Oxygen Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment outlet oxygen sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61457	

SPN 3275 *Aftertreatment 2 Exhaust Gas Temperature 1*

The reading from the exhaust gas temperature sensor located farthest upstream in the aftertreatment system in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64945	

SPN 3276 *Aftertreatment 2 Diesel Particulate Filter Intake Gas Temperature*

Temperature of engine combustion byproducts entering the diesel particulate filter in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64945	

SPN 3277 *Aftertreatment 2 Exhaust Gas Temperature 1 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the exhaust gas temperature 1 sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64945	

SPN 3278 *Aftertreatment 2 Diesel Particulate Filter Intake Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel particulate filter intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64945	

SPN 3279 *Aftertreatment 2 Exhaust Gas Temperature 3*

The reading from the exhaust gas temperature sensor located farthest downstream in the aftertreatment system in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64944	

SPN 3280 *Aftertreatment 2 Diesel Particulate Filter Outlet Gas Temperature*

Temperature of engine combustion byproducts leaving the diesel particulate filter exhaust in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64944	

SPN 3281 *Aftertreatment 2 Exhaust Gas Temperature 3 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the exhaust gas temperature 3 sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64944	

SPN 3282 *Aftertreatment 2 Diesel Particulate Filter Exhaust Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel particulate filter outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64944	

SPN 3283 *Aftertreatment 2 Exhaust Gas Temperature 2*

The reading from the exhaust gas temperature sensor located midstream of the other two temperature sensors in the aftertreatment system in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64943	

SPN 3284 *Aftertreatment 2 Diesel Particulate Filter Intermediate Gas Temperature*

Temperature of engine combustion byproducts at a mid-point in the diesel particulate filter in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64943	

SPN 3285 *Aftertreatment 2 Diesel Particulate Filter Differential Pressure*

Exhaust differential pressure measured between the intake and exhaust of a diesel particulate filter in exhaust bank 2. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64943	

SPN 3286 *Aftertreatment 2 Exhaust Gas Temperature 2 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the exhaust gas temperature 2 sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64943	

SPN 3287 *Aftertreatment 2 Diesel Particulate Filter Delta Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel particulate filter differential pressure sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64943	

SPN 3288 *Aftertreatment 2 Diesel Particulate Filter Intermediate Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel particulate filter intermediate gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. (For a single exhaust bank system, refer to parameters in PGNs 61454, 61455, 64946, 64947, 64948, and 65247)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64943	

SPN 3289 *Transmission Requested Gear Feedback*

Feedback of the SPN 525 Transmission Requested Gear input as received from the shift selector, ABS or engine via PGN 256, Transmission Control 1 (TC1) or other transmission selector input. Scaling, values and parameter specific indicators are identical to those listed for SPN 525 Requested Gear.

This feedback from the transmission allows shift selectors and other TC1 input devices to verify that their Transmission Requested Gear command has been properly received by the transmission. (This parameter is not intended for driver display purposes).

In systems with mechanical or electrical shift selectors which do not support J1939 communication, this parameter allows the transmission ECU to convey the requested gear as interpreted by the transmission from its mechanical or electrical input.

Data Length:	1 byte	
Resolution:	1 gear value/bit, -125 offset	
Data Range:	-125 to 125	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65098	

SPN 3307 *Fifth Wheel Error Status*

Fifth wheel error state which conveys information when coupling status is incomplete or bad.

0000	0 - Improper Couple
0001	1 - Locks Closed / No Kingpin at Startup
0010	2 - Kingpin / Locks Open at Startup
0011	3 - Not Used
0100	4 - Not Used
0101	5 - Coupling Sequence Error
0110	6 - Coupling Sequence Error / Kingpin
0111	7 - Coupling Timing Error
1000	8 - Kingpin Missing More Than 5 Seconds
1001	9 - Kingpin / Lock Open (Handle Pulled)
1010	10 - Not Used
1011	11 - Not Used
1100	12 - Not Used
1101	13 - Not Used
1110	14 - Not Used
1111	15 - Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64942	

SPN 3308 *Fifth Wheel Vertical Force*

The amount of load being applied to the fifth wheel by the trailer. Zero load is indicated without a trailer.

Data Length:	2 bytes	
Resolution:	5 N/bit, 0 offset	
Data Range:	0 to 321,275 N	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61458	

SPN 3309 *Fifth Wheel Drawbar Force*

Fifth wheel drawbar force, with the trailer held stationary a positive force is generated by the vehicle pulling forward.

Data Length:	2 bytes	
Resolution:	10 N/bit, -320,000 N offset	
Data Range:	-320,000 to 322,550 N	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61458	

SPN 3310 *Fifth Wheel Roll Moment*

Fifth wheel roll moment force - If the moment is positive, the trailer is rolling clockwise relative to the normal vehicle forward motion.

Data Length:	2 bytes	
Resolution:	10 N/bit, -320,000 N offset	
Data Range:	-320,000 to 322,550 N	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61458	

SPN 3311 *Fifth Wheel Slider Position*

Slider position measurement. Zero equals fully back position, that is, the farthest to the rear of the vehicle.

Data Length:	1 byte	
Resolution:	10 mm/bit, 0 offset	
Data Range:	0 to 2500 mm (0 to 2.500 m)	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64942	

SPN 3312 *Fifth Wheel Lock Ready to Couple Indicator*

Indicates to the vehicle operator that the fifth wheel lock is open and ready to couple.

00 Lock not open, not ready to couple
 01 Lock open, ready to couple
 10 Error
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64942	

SPN 3313 ***Fifth Wheel Lock Couple Status Indicator***

Indicates results of coupling operation to the vehicle operator. For incomplete couples further information can be obtained from the fifth wheel error status SPN.

- 00 Incomplete or bad couple, truck should not be moved
- 01 Successful couple detected
- 10 Error
- 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64942	

SPN 3314 ***Fifth Wheel Release Control***

Operator input used to release the fifth wheel. Fifth Wheel Release Control Security Lockout and other conditions must be properly enabled before this will function.

- 00 Coupler Locked
- 01 Coupler Unlocked, trailer can be unhitched or hitched
- 10 Error
- 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64980	

SPN 3315 ***Fifth Wheel Release Control Security Lockout***

Operator's fifth wheel release control interlock. This operator input must be enabled prior to activating the fifth wheel release control (SPN 3314).

- 00 Fifth wheel release Disabled
- 01 Fifth wheel release Enabled
- 10 Error
- 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64980	

SPN 3316 ***Fifth Wheel Slider Lock Indicator***

Indicates to vehicle operator that the fifth wheel slider is in position and locked.

00 Not Locked

01 Locked

10 Error

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64942

SPN 3317 ***Fifth Wheel Roll Warning Indicator***

Indicates to the vehicle operator that the roll moment has exceeded a preset limit.

00 Limit not exceeded

01 Limit exceeded

10 error

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61458

SPN 3318 ***Pitch Angle***

The angle between the vehicle x-axis and the ground plane (i.e. rotation about the vehicle Y-axis). The pitch angle for an angle of ascent is reported with a positive value. This parameter is defined according to a Z-Down axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Down Axis System has positive X directed forward, positive Y to the right, and positive Z directed down. See SPN 4976 for an alternate range and resolution.

Data Length: 2 bytes

Resolution: 0.002 deg/bit, -64 offset

Data Range: -64 to 64.51 deg

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61459

SPN 3319 ***Roll Angle***

The angle between the vehicle y-axis and the ground plane (i.e. rotation about the X-axis). The roll angle for a roll to the right is reported with a positive value. Roll angle is the same for both Z-Down and Z-Up axis systems, since both systems have positive X axis directed forward. The sign of the value is in accordance to the right-hand rule, as specified in SAE J670. See SPN 4977 for an alternate range and resolution.

Data Length: 2 bytes

Resolution: 0.002 deg/bit, -64 offset

Data Range: -64 to 64.51 deg

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61459

SPN 3322 Pitch Rate

Pitch rate is the rate-of-change of the pitch angle over time, where the pitch angle vector is in the direction of travel of the vehicle. The pitch rate for increasing ascent over time is reported with a positive value. This parameter is defined according to a Z-Down axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Down Axis System has positive X directed forward, positive Y to the right, and positive Z directed down. See SPN 4983 for an alternate range and resolution.

Data Length: 2 bytes
 Resolution: 0.002 deg/sec per bit, -64 deg/sec offset
 Data Range: -64 to 64.51 deg/sec Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 61459

SPN 3323 Pitch Angle Figure of Merit

Figure of merit for pitch angle measurement.

Bit 2 Bit 1

0 0 Pitch angle fully functional. Data is within sensor specification.
 0 1 Pitch angle degraded. Data is suspect due to environmental conditions.
 1 0 Error
 1 1 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 61459

SPN 3324 Roll Angle Figure of Merit

Figure of merit for roll angle measurement.

Bit 4 Bit 3

0 0 Roll angle fully functional. Data is within sensor specification.
 0 1 Roll angle degraded. Data is suspect due to environmental conditions.
 1 0 Error
 1 1 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 61459

SPN 3325 ***Pitch Rate Figure of Merit***

Figure of merit for the pitch rate measurement.

Bit 6 Bit 5

- 0 0 Pitch rate fully functional. Data is within sensor specification.
- 0 1 Pitch rate degraded. Data is suspect due to environmental conditions.
- 1 0 Error
- 1 1 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61459

SPN 3326 ***Pitch and Roll Compensated***

Compensated mode for the pitch and roll measurements. Compensation is the use of multiple sensors together to enhance the output of pitch and roll measurements.

Bit 8 Bit 7

- 0 0 Compensation Off
- 0 1 Compensation On
- 1 0 Error
- 1 1 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61459

SPN 3327 ***Roll and Pitch Measurement Latency***

The estimated measurement latency of the measurement. NOTE: This is only the sensor latency and does not include any additional latencies that might exist because of the CAN Bus or overall system implementation.

Latency is the time from sensor readings to the queuing of the message data for CAN transmission.

Data Length: 1 byte

Resolution: 0.5 ms/bit, 0 offset

Data Range: 0 to 125 ms

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61459

SPN 3331 ***Blade Rotation Angle***

The blade rotation angle measurement around the yaw (z-axis). The Blade Rotation Angle is defined to be the angle from the null position on the machine. The null position is orthogonal from the z-axis along the x-axis. A positive blade angle results when the blade is rotated clockwise from the null position. This parameter is defined according to a Z-Down axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Down Axis System has positive X directed forward, positive Y to the right, and positive Z directed down.

Data Length: 2 bytes

Resolution: 1/128 deg/bit, -200 deg offset

Data Range: -200 to 301.99 deg

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61460

SPN 3332 *Blade Rotation Angle Figure of Merit*

Figure of merit for blade rotation measurement.

Bits

- 00 Blade Rotation Angle fully functional. Data is within sensor specification.
- 01 Blade Rotation Angle degraded. Data is suspect due to environmental conditions.
- 10 Blade Rotation Angle failed. Roll sensor failed to operate correctly.
- 11 Blade Rotation Angle not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 61460

Operational Range: same as data range

SPN 3334 *Left Blade Control Mode Operator Control*

This parameter indicates the left blade control mode operator control state the user has set for the land leveling system. The operator control value directly relates to the current operator control state correlating to the left edge of the blade. The purpose of this parameter is to set the control mode (auto/manual) for the left side of the blade. For this system, the left and right side of the blade can be adjusted independently of each other to either change the elevation from a given reference point or the blade angle (also known as blade tilt)/cross slope depending on the function requested by the operator.

This parameter is intended for use in systems using two parameters (right/left) to control the blade as described above. Systems using only one parameter to control blade position, i.e. elevation, should use the Blade Control Mode Switch parameter. Only one of the following states will be active at a time. In the example below, data values are defined for each switch type that may be used in an application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. A toggle button with two states can be used, in which the button is either in the manual or the auto position at all times.

Toggle button usage is as follows:

Manual Button Pressed	= 0010	Manual Operator Control Request
Automatic Button Pressed	= 0011	Automatic Operator Control Request
Invalid Switch Input(ex. auto and manual read/pressed simultaneously)	= 1110	Error Indicator

2. The momentary rocker switch may be used, where the default is the no button pressed position. The user can press the rocker into the manual position, and when pressure is released, it will return to the no button pressed position. The user may also press the rocker into the auto position, and when pressure is released, it will return to the no button pressed position.

Momentary rocker button usage is as follows:

No button pressed	= 0000	No change
Manual Button Pressed	= 0010	Manual Operator Control Request
Automatic Button Pressed	= 0011	Automatic Operator Control Request
Invalid Switch Input(ex. auto and manual read/pressed simultaneously)	= 1110	Error Indicator

3. The momentary contact button pair may be used, where the default is no buttons being pressed. The user can press the manual button, and when pressure is released, it will return to the no button pressed position. The user may press the auto button, and when pressure is released, it will return to the no button pressed position.

Momentary contact buttons (button pair) usage is as follows:

No button pressed	= 0000	No change
Manual Button Pressed	= 0010	Manual Operator Control Request
Automatic Button Pressed	= 0011	Automatic Operator Control Request
Invalid Switch Input(ex. auto and manual read/pressed simultaneously)	= 1110	Error Indicator

4. The momentary contact single button may be used, where the default is no button being pressed. The user can press the button, which is the button pressed position, and when pressure is released, it will return to the no button pressed position. The controller receiving this command will keep track of what mode the blade is in, auto or manual. If the blade is in manual mode to begin with, one press of the button will change to mode to auto. If the button is pressed again, the blade will be put into manual mode.

Momentary contact button (single button) usage is as follows:

No button pressed	= 0000	No change
Mode Button Pressed	= 0001	Momentary Operator Control Request

Data Values and Descriptions:

0000 No Change
0001 Momentary Operator Control Request
0010 Manual Operator Control Request
0011 Automatic Operator Control Request
1100 - 1101 Reserved
1110 Error Indicator
1111 Not Installed

Notes:

1. The operator control state can be read in two ways. One method uses the direct operator control input to determine the operator control state, while the second method relies on a secondary control to read the operator control input, then relay the information on the data link. The parameter is designed to provide the actual operator control state to other controls that need the information.
2. Other systems with automated blade controls should be able to use this parameter, since it is an actual operator control value.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61453	

SPN 3335 *Right Blade Control Mode Operator Control*

This parameter indicates the right blade control mode operator control state the user has set for the land leveling system. The operator control value directly relates to the current operator control state correlating to the left edge of the blade. The purpose of this parameter is to set the control mode (auto/manual) for the left side of the blade. For this system, the left and right side of the blade can be adjusted independently of each other to either change the elevation from a given reference point or the blade angle (also known as blade tilt)/cross slope depending on the function requested by the operator.

This parameter is intended for use in systems using two parameters(right/left) to control the blade as described above. Systems using only one parameter to control blade position, i.e. elevation, should use the Blade Control Mode Switch parameter. Only one of the following states will be active at a time. In the example below, data values are defined for each switch type that may be used in an application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. A toggle button with two states can be used, in which the button is either in the manual or the auto position at all times.

Toggle button usage is as follows:

Manual Button Pressed = 0010 Manual Operator Control Request
Automatic Button Pressed = 0011 Automatic Operator Control Request
Invalid Switch Input(ex. auto and manual read/pressed simultaneously) = 1110 Error Indicator

2. The momentary rocker switch may be used, where the default is the no button pressed position. The user can press the rocker into the manual position, and when pressure is released, it will return to the no button pressed position. The user may also press the rocker into the auto position, and when pressure is released, it will return to the no button pressed position.

Momentary rocker button usage is as follows:

No button pressed = 0000 No change
Manual Button Pressed = 0010 Manual Operator Control Request
Automatic Button Pressed = 0011 Automatic Operator Control Request
Invalid Switch Input(ex. auto and manual read/pressed simultaneously) = 1110 Error Indicator

3. The momentary contact button pair may be used, where the default is no buttons being pressed. The user can press the manual button, and when pressure is released, it will return to the no button pressed position. The user may press the auto button, and when pressure is released, it will return to the no button pressed position.

Momentary contact buttons (button pair) usage is as follows:

No button pressed = 0000 No change
Manual Button Pressed = 0010 Manual Operator Control Request
Automatic Button Pressed = 0011 Automatic Operator Control Request
Invalid Switch Input(ex. auto and manual read/pressed simultaneously) = 1110 Error Indicator

4. The momentary contact single button may be used, where the default is no button being pressed. The user can press the button, which is the button pressed position, and when pressure is released, it will return to the no button pressed position. The controller receiving this command will keep track of what mode the blade is in, auto or manual. If the blade is in manual mode to begin with, one press of the button will change to mode to auto. If the button is pressed again, the blade will be put into manual mode.

Momentary contact button (single button) usage is as follows:

No button pressed = 0000 No change
Mode Button Pressed = 0001 Momentary Operator Control Request

Data Values and Descriptions:

0000 No Change
0001 Momentary Operator Control Request
0010 Manual Operator Control Request
0011 Automatic Operator Control Request

1110 Error Indicator
 1111 Not Installed
 All other values reserved

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15 Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 61453

SPN 3336 Left Desired Blade Offset Operator Control

This parameter indicates the left blade offset operator control state the user has set for the land leveling system. The left desired blade offset value is the offset measured from a given reference point to the bottom left edge of the blade. This parameter will only be used when the control mode for land leveling system has been set to auto. The purpose of this parameter is to adjust the elevation from a given reference point or the blade angle(also known as blade tilt)/cross slope depending on the function being requested by the operator for the left side of the blade.

This parameter is intended for use in systems using two parameters(left/right) to control the blade as described above. Systems using only one parameter to control blade position, i.e. elevation, should use the Desired Blade Offset Switch parameter. Only one of the following states will be active at a time.

In the example below, data values are defined for each switch type that may be used in an application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. The momentary rocker switch may be used, where the default is the neutral position with no buttons pressed. The user can press the rocker into the increment button pressed position, and when pressure is released, it will return to the neutral position. The user may also press the rocker into the decrement button pressed position, and when pressure is released, it will return to the neutral position. Momentary rocker button usage is as follows:

Neutral position = 0000 No Operator Control Request
 Increment Button Pressed = 0001 Increment Operator Control Request
 Decrement Button Pressed = 0010 Decrement Operator Control Request
 Invalid Switch Input(ex. inc./dec. values read simultaneously) = 1110 Error Indicator

2. The momentary contact button pair may be used, where the default is the neutral position with no buttons pressed. The user can press the increment button, and when pressure is released, it will return to the neutral position. The user may press the decrement button, and when pressure is released, it will return to the neutral position. Momentary contact button (button pair) usage is as follows:

No Button Pressed = 0000 No Operator Control Request
 Increment Button Pressed = 0001 Increment Operator Control Request
 Decrement Button Pressed = 0010 Decrement Operator Control Request
 Invalid Switch Input(ex. inc./dec. values read simultaneously) = 1110 Error Indicator

Data Values and Descriptions:

0000 No Operator Control Request
 0001 Increment Operator Control Request
 0010 Decrement Operator Control Request
 0011 - 1101 Reserved
 1110 Error Indicator
 1111 Not installed

Notes:

1. The operator control state can be read in two ways. One method uses the direct operator control input to determine the operator control state, while the second method relies on a secondary control to read the operator control input, then

relay the information on the data link. The parameter is designed to provide the actual operator control state to other controls that need the information.

2. Other systems with automated blade controls should be able to use this parameter, since it is an actual operator control value.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61453	

SPN 3337 *Right Desired Blade Offset Operator Control*

This parameter indicates the right blade offset operator control state the user has set for the land leveling system. The right desired blade offset value is the offset measured from a given reference point to the bottom right edge of the blade. This parameter will only be used when the control mode for land leveling system has been set to auto. The purpose of this parameter is to adjust the elevation from a given reference point or the blade angle(also known as blade tilt)/cross slope depending on the function being requested by the operator for the left side of the blade.

This parameter is intended for use in systems using two parameters(left/right) to control the blade as described above. Systems using only one parameter to control blade position, i.e. elevation, should use the Desired Blade Offset Switch parameter. Only one of the following states will be active at a time.

In the example below, data values are defined for each switch type that may be used in an application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. The momentary rocker switch may be used, where the default is the neutral position with no buttons pressed. The user can press the rocker into the increment button pressed position, and when pressure is released, it will return to the neutral position. The user may also press the rocker into the decrement button pressed position, and when pressure is released, it will return to the neutral position. Momentary rocker button usage is as follows:

Neutral position = 0000 No Operator Control Request
 Increment Button Pressed = 0001 Increment Operator Control Request
 Decrement Button Pressed = 0010 Decrement Operator Control Request
 Invalid Switch Input(ex. inc./dec. values read simultaneously) = 1110 Error Indicator

2. The momentary contact button pair may be used, where the default is the neutral position with no buttons pressed. The user can press the increment button, and when pressure is released, it will return to the neutral position. The user may press the decrement button, and when pressure is released, it will return to the neutral position. Momentary contact button (button pair) usage is as follows:

No Button Pressed = 0000 No Operator Control Request
 Increment Button Pressed = 0001 Increment Operator Control Request
 Decrement Button Pressed = 0010 Decrement Operator Control Request
 Invalid Switch Input(ex. inc./dec. values read simultaneously) = 1110 Error Indicator

Data Values and Descriptions:
 0000 No Operator Control Request
 0001 Increment Operator Control Request
 0010 Decrement Operator Control Request
 0011 - 1101 Reserved
 1110 Error Indicator
 1111 Not installed

Notes:

1. The operator control state can be read in two ways. One method uses the direct operator control input to determine the operator control state, while the second method relies on a secondary control to read the operator control input, then

relay the information on the data link. The parameter is designed to provide the actual operator control state to other controls that need the information.

2. Other systems with automated blade controls should be able to use this parameter, since it is an actual operator control value.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61453	

SPN 3338 *Side-shift Blade Control Mode Operator Control*

This parameter indicates the side-shift offset operator control state the user has set for the land leveling system. When an implement moves in a side-shift direction, it moves from side to side, usually along its longitudinal axis. The desired side-shift offset value is the offset measured from a given vertical reference point to the center of the blade.

Only one of the following states will be active at a time. In the example below, the data values are defined for each switch type that may be used in an application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. The momentary rocker switch may be used, where the default is the neutral position with no buttons pressed. The user can press the rocker into the increment button pressed position, and when pressure is released, it will return to the neutral position. The user may also press the rocker into the decrement button pressed position, and when pressure is released, it will return to the neutral position. Momentary rocker button usage is as follows:

- Neutral position = 0000 No Operator Control Request
- Increment Button Pressed = 0001 Increment Operator Control Request
- Decrement Button Pressed = 0010 Decrement Operator Control Request

2. The momentary contact button pair may be used, where the default is the neutral position with no buttons pressed. The user can press the increment button, and when pressure is released, it will return to the neutral position. The user may press the decrement button, and when pressure is released, it will return to the neutral position. Momentary contact button (button pair) usage is as follows:

- No Button Pressed = 0000 No Operator Control Request
- Increment Button Pressed = 0001 Increment Operator Control Request
- Decrement Button Pressed = 0010 Decrement Operator Control Request

Data Values and Descriptions:

0000 No Operator Control Request
 0001 Increment Operator Control Request
 0010 Decrement Operator Control Request
 0011-1101 Reserved
 1110 Error Indicator
 1111 Not installed

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61453	

SPN 3339 Side-shift Desired Blade Offset Operator Control

This parameter indicates the side-shift blade control mode operator control state the user has set for the land leveling system. When an implement moves in a side-shift direction, it moves from side to side, usually along its longitudinal axis.

The operator control value directly correlates to the current operator control state. Only one of the following states will be active at a time. In the example below, the data values are defined for each switch type that may be used in an application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. A toggle button with two states can be used, in which the button is either in the manual or the auto position at all times. Toggle button usage is as follows:

Manual Position = 0010 Manual Operator Control Request
Auto Position = 0011 Automatic Operator Control Request

2. The momentary rocker switch may be used, where the default is the no button pressed position. The user can press the rocker into the manual position, and when pressure is released, it will return to the no button pressed position. The user may also press the rocker into the auto position, and when pressure is released, it will return to the no button pressed position. Momentary rocker button usage is as follows:

No Button Pressed = 0000 No Operator Control Request
Manual Button Pressed = 0010 Manual Operator Control Request
Auto Button Pressed = 0011 Automatic Operator Control Request

3. The momentary contact button pair may be used, where the default is no buttons being pressed. The user can press the manual button, and when pressure is released, it will return to the no button pressed position. The user may press the auto button, and when pressure is released, it will return to the no button pressed position. Momentary contact buttons (button pair) usage is as follows:

No Button Pressed = 0000 No Operator Control Request
Manual Button Pressed = 0010 Manual Operator Control Request
Auto Button Pressed = 0011 Automatic Operator Control Request

4. The momentary contact single button may be used, where the default is no button being pressed. The user can press the button, which is the button pressed position, and when pressure is released, it will return to the no button pressed position. The controller receiving this command will keep track of what mode the blade is in, auto or manual. If the blade is in manual mode to begin with, one press of the button will change to mode to auto. If the button is pressed again, the blade will be put into manual mode. Momentary contact button (single button) usage is as follows:

No Button Pressed = 0000 No Operator Control Request
Button Pressed = 0001 Momentary Operator Control Request

Data Values and Descriptions:

0000 No Operator Control Request
0001 Momentary Operator Control Request
0010 Manual Operator Control Request
0011 Automatic Operator Control Request
0100 - 1101 Reserved
1110 Error Indicator
1111 Not Installed

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15
Type: Measured
Supporting Information:
PGN reference: 61453

Operational Range: same as data range

SPN 3340 Engine Charge Air Cooler 1 Intake Pressure

Pressure of air at intake to 1st or only charge air cooler, from multiple first stage turbochargers being cooled and feeding multiple second stage turbochargers.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64938	

SPN 3341 Engine Charge Air Cooler 2 Intake Pressure

Pressure of air at intake to 2nd charge air cooler, from multiple first stage turbochargers being cooled and feeding multiple second stage turbochargers.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64938	

SPN 3342 Engine Coolant Pump Differential Pressure

The differential pressure measured across the input and output of the engine coolant pump.

Data Length:	1 byte	
Resolution:	1.64 kPa/bit, -7 kPa offset	
Data Range:	-7 to 403 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64938	

SPN 3343 Engine Centrifugal Oil Filter speed

The speed of a rotating (centrifugal) engine oil filter.

Data Length:	2 bytes	
Resolution:	4 rpm/bit, 0 offset	
Data Range:	0 to 257,020 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64938	

SPN 3344 Support Variable Rate TSC1 Message

This parameter indicates which TSC1 transmission rates are supported by the engine ECU in addition to the required 10ms transmission rate for temporary powertrain control purposes.

Bit Position	Transmission Rate
1	1000 ms transmission rate
2	750 ms transmission rate
3	500 ms transmission rate
4	250 ms transmission rate
5	100 ms transmission rate
6	50 ms transmission rate
7	20 ms transmission rate
8	Reserved for SAE assignment (set to one)

Where 0 = Transmission Rate Supported by Engine and 1 = Transmission Rate Not supported by Engine

Note: FF for this byte implies that the engine only supports standard temporary power train control (e.g. 10 ms)

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65251	

SPN 3345 Support TSC1 Control Purpose Group 1

This parameter indicates which TSC1 control purposes are supported in group 1 of 4. One bit is used to convey the support of each Control Purpose. A value of 0 equals supported and a value of 1 equals not supported. This bit logic is used to allow the default to FF to be backward compatible.

This group of 4 parameters (SPNs 3345, 3346, 3347, and 3348) indicates which TSC1 Control Purposes are supported by the engine ECU in addition to the Temporary Powertrain Control Purpose (which is denoted as control purpose P32). All ones in the Group 1 through 4 parameters indicates the engine only supports Temporary Powertrain Control.

Group 1 of 4

Bit Position	Control Purpose Value	Control Purpose Description
1	P1	Accelerator Pedal/Operator Selection
2	P2	Cruise Control
3	P3	PTO Governor
4	P4	Road Speed Governor
5	P5	Engine protection
6	P6	Reserved for assignment by SAE
7	P7	Reserved for assignment by SAE
8	P8	Reserved for assignment by SAE

Where 0 = Control Purpose is supported and 1 = Control Purpose is not supported

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65251	

SPN 3346 Support TSC1 Control Purpose Group 2

This parameter indicates which TSC1 control purposes are supported in group 2 of 4. One bit is used to convey the support of each Control Purpose. A value of 0 equals supported and a value of 1 equals not supported. This bit logic is used to allow the default to FF to be backward compatible.

This group of 4 parameters (SPNs 3345, 3346, 3347, and 3348) indicates which TSC1 Control Purposes are supported by the engine ECU in addition to the Temporary Powertrain Control Purpose (which is denoted as control purpose P32). All ones in the Group 1 through 4 parameters indicates the engine only supports Temporary Powertrain Control.

Group 2 of 4

Bit Position	Control Purpose Value	Control Purpose Description
1	P9	Reserved for assignment by SAE
2	P10	Reserved for assignment by SAE
3	P11	Reserved for assignment by SAE
4	P12	Reserved for assignment by SAE
5	P13	Reserved for assignment by SAE
6	P14	Reserved for assignment by SAE
7	P15	Reserved for assignment by SAE
8	P16	Reserved for assignment by SAE

Where 0 = Control Purpose is supported and 1 = Control Purpose is not supported

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65251	

SPN 3347 Support TSC1 Control Purpose Group 3

This parameter indicates which TSC1 control purposes are supported in group 3 of 4. One bit is used to convey the support of each Control Purpose. A value of 0 equals supported and a value of 1 equals not supported. This bit logic is used to allow the default to FF to be backward compatible.

This group of 4 parameters (SPNs 3345, 3346, 3347, and 3348) indicates which TSC1 Control Purposes are supported by the engine ECU in addition to the Temporary Powertrain Control Purpose (which is denoted as control purpose P32). All ones in the Group 1 through 4 parameters indicates the engine only supports Temporary Powertrain Control.

Group 3 of 4

Bit Position	Control Purpose Value	Control Purpose Description
1	P17	Reserved for assignment by SAE
2	P18	Reserved for assignment by SAE
3	P19	Reserved for assignment by SAE
4	P20	Reserved for assignment by SAE
5	P21	Reserved for assignment by SAE
6	P22	Reserved for assignment by SAE
7	P23	Reserved for assignment by SAE
8	P24	Reserved for assignment by SAE

Where 0 = Control Purpose is supported and 1 = Control Purpose is not supported

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65251	

SPN 3348 Support TSC1 Control Purpose Group 4

This parameter indicates which TSC1 control purposes are supported in group 4 of 4. One bit is used to convey the support of each Control Purpose. A value of 0 equals supported and a value of 1 equals not supported. This bit logic is used to allow the default to FF to be backward compatible.

This group of 4 parameters (SPNs 3345, 3346, 3347, and 3348) indicates which TSC1 Control Purposes are supported by the engine ECU in addition to the Temporary Powertrain Control Purpose (which is denoted as control purpose P32). All ones in the Group 1 through 4 parameters indicates the engine only supports Temporary Powertrain Control.

Group 4 of 4

Bit Position	Control Purpose Value	Control Purpose Description
1	P25	Reserved for assignment by SAE
2	P26	Reserved for assignment by SAE
3	P27	Reserved for assignment by SAE
4	P28	Reserved for assignment by SAE
5	P29	Reserved for assignment by SAE
6	P30	Reserved for assignment by SAE
7	P31	Reserved for assignment by SAE
8	See Note	Not assignable, must always be set to 1.

Where 0 = Control Purpose is supported and 1 = Control Purpose is not supported

NOTE: P32 is always supported and is Temporary Power Train Control (the original use of the TSC1 Command). The engine configuration will not indicate separate support of Temporary Power Train Control mode.

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65251	

SPN 3349 TSC1 Transmission Rate

This parameter indicates the transmission rate at which the sending device will transmit the TSC1 message. The engine shall adjust its timeout for TSC1 messages accordingly. Variable TSC1 transmission rates shall only apply to messages sent to the engine.

A value of all ones is to be used in TSC1 messages directed to retarders because the TSC1 Transmission Rate parameter is not applicable for retarders. All TSC1 messages sent to the retarder shall use the standard 50 ms rate.

Devices sending TSC1 messages to the engine should only invoke alternative transmission rates which the engine has indicated it supports in SPN 3344 – Support Variable Rate TSC1 Message.

000 = 1000 ms transmission rate
 001 = 750 ms transmission rate
 010 = 500 ms transmission rate
 011 = 250 ms transmission rate
 100 = 100 ms transmission rate
 101 = 50 ms transmission rate
 110 = 20 ms transmission rate
 111 = Use standard TSC1 transmission rates of 10 ms to engine

Note: Sending devices shall not send variable rate TSC1 messages to the engine for unsupported control purposes.

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	0	

SPN 3350 TSC1 Control Purpose

State signal which indicates which control mode the sending device is using to generate the TSC1 command. Note that the modes are not in prioritized order. Not all modes may be relevant for a given device. Some devices may not implement all functions. For typical priorities refer to Figures SPN512_A, SPN512_B for engine control and Figure SPN695_A. The TSC1 control purpose shall only apply to messages sent to the engine.

A value of all ones is to be used in TSC1 messages directed to retarders because the TSC1 Control Purpose parameter is not applicable for retarders.

00000 = P1 = Accelerator Pedal/Operator Selection
 00001 = P2 = Cruise Control
 00010 = P3 = PTO Governor
 00011 = P4 = Road Speed Governor
 00100 = P5 = Engine Protection
 00101 - 11110 = P6-P31 = Reserved for SAE Assignment
 11111 = P32 = Temporary Power Train Control (Original use of TSC1 Command)

Note: Sending devices shall not send variable rate TSC1 messages to the engine for unsupported control purposes.

Data Length:	5 bits	
Resolution:	32 states/5 bit, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	0	

SPN 3353 Alternator 1 Status

Alternator 1 operating status.

00 Alternator 1 not charging

01 Alternator 1 charging

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Measured

Supporting Information:

PGN reference: 65237

Operational Range: same as data range

SPN 3354 Alternator 2 Status

Alternator 2 operating status.

00 Alternator 2 not charging

01 Alternator 2 charging

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Measured

Supporting Information:

PGN reference: 65237

Operational Range: same as data range

SPN 3355 Alternator 3 Status

Alternator 3 operating status.

00 Alternator 3 not charging

01 Alternator 3 charging

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Measured

Supporting Information:

PGN reference: 65237

Operational Range: same as data range

SPN 3356 Alternator 4 Status

Alternator 4 operating status.

00 Alternator 4 not charging

01 Alternator 4 charging

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65237

SPN 3357 Actual Maximum Available Engine - Percent Torque

This is the maximum amount of torque that the engine can immediately deliver as a percentage of the reference engine torque (SPN 544). The Actual Maximum Available Engine - Percent Torque shall take into consideration all engine torque derates (e.g. air fuel ratio control (AFC), noise control, etc.) that could potentially be active in the system. This parameter differentiates itself from the engine percent torque points 1 through 5 of the engine configuration map because it takes into account all dynamic internal inputs such as AFC and that it is updated on a 50ms basis.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61443

SPN 3358 Engine Exhaust Gas Recirculation 1 Intake Pressure

EGR intake gage pressure is measured after the EGR cooler and before the EGR valve.

Data Length: 1 byte

Resolution: 2 kPa/bit, 0 offset

Data Range: 0 to 500 kPa

Operational Range: same as data range

Type: Measured

Supporting Information: See Appendix D - SPN 27

PGN reference: 64961

SPN 3359 Transmission Oil Filter Restriction Switch

This switch indicates whether the transmission oil filter is clogged.

00 - No restriction

01 - Restriction exists on oil filter

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64917

SPN 3363 *Aftertreatment 1 Diesel Exhaust Fluid Tank Heater*

Percentage of heating applied to the aftertreatment 1 diesel exhaust fluid tank heater. A value of 0% means no heating applied, a value of 100% means full heating applied. The diesel exhaust fluid tank heater warms the diesel exhaust fluid in the diesel exhaust fluid tank. See SPN 5137 for the command for this tank heater.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	65110	

SPN 3365 *Relative Blade Height*

The measured vertical distance from a fixed location on the machine blade to a ground-based reference (i.e. relative height). Examples of a ground based reference include a curb, a stringline or the ground itself. The measurement may be positive or negative based on the initial reference used.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, -3,200 mm offset	
Data Range:	-3,200 to 3,225.5 mm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61460	

SPN 3366 *Relative Blade Height and Blade Rotation Angle Measurement Latency*

The estimated measurement latency of the measurement.

NOTE: This is only the sensor latency and does not include any additional latencies that might exist because of the CAN Bus or overall system implementation.

For example, if the technique used is a sonic pulse/echo system, the round trip time divided by two will be a reasonably accurate estimate of the measurement latency if the processing time is small with respect to the propagation time.

Data Length:	1 byte	
Resolution:	0.5 ms/bit, 0 offset	
Data Range:	0 to 125 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61460	

SPN 3367 *Relative Blade Height Figure of Merit*

Figure of merit for blade height measurement.

Bits

- 00 Relative Blade Height fully functional. Data is within sensor specification.
- 01 Relative Blade Height degraded. Data is suspect due to environmental conditions.
- 10 Relative Blade Height failed.
- 11 Relative Blade Height not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61460	

SPN 3368 Network Transceiver Status 1

Indicates the status of the transceiver for the wireless communications network type

0 = Off

1 = On

2 = Not Authorized to Operate on Network

3-250 = Reserved for Future Assignment

251-253 = Reserved

254 = Error

255 = Not Available

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64937

SPN 3369 Network Service Status 1

Indicates the status of the Service for the wireless communications network type

0 = Local Service

1 = Roaming Service

2 = Service not available

3 = Not Authorized to Operate on Service

4-250 = Reserved for Future Assignment

251-253 = Reserved

254 = Error

255 = Not Available

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64937

SPN 3370 Network Antenna Status 1

Indicates the status of the antenna for the wireless communications network type

0 = Off

1 = On

2-250 = Reserved for Future Assignment

251-253 = Reserved

254 = Error

255 = Not Available

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64937

SPN 3371 Network Signal Strength 1

Indicates the signal strength for the wireless communications network type.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64937	

SPN 3372 Wireless Communication Network Type 1

Type of Wireless Communication Network

0 = Cellular network #1
 1 = Cellular network #2
 2 = Wireless LAN #1
 3 = Wireless LAN #2
 4 = Satellite network
 5-250 = Reserved for Future Assignment
 251-253 = Reserved
 254 = Error
 255 = Not Available

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64937	

SPN 3387 Engine Cylinder 1 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #1

00 No combustion
 01 Combustion exists
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61462	

SPN 3388 Engine Cylinder 2 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #2

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3389 Engine Cylinder 3 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #3

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3390 Engine Cylinder 4 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #4

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3391 Engine Cylinder 5 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #5

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3392 Engine Cylinder 6 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #6

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3393 Engine Cylinder 7 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #7

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3394 Engine Cylinder 8 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #8

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3395 Engine Cylinder 9 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #9

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3396 Engine Cylinder 10 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #10

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3397 Engine Cylinder 11 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #11

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3398 Engine Cylinder 12 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #12

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3399 Engine Cylinder 13 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #13

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3400 Engine Cylinder 14 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #14

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3401 Engine Cylinder 15 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #15

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3402 Engine Cylinder 16 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #16

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3403 Engine Cylinder 17 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #17

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3404 Engine Cylinder 18 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #18

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3405 Engine Cylinder 19 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #19

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3406 Engine Cylinder 20 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #20

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3407 Engine Cylinder 21 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #21

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3408 Engine Cylinder 22 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #22

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3409 Engine Cylinder 23 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #23

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3410 Engine Cylinder 24 Combustion Status

This parameter is used to indicate state of combustion in engine cylinder #24

00 No combustion
01 Combustion exists
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61462

SPN 3411 Status 2 of doors

Composite indication of all bus door statuses. Enabled means the bus doors are able to be automatically opened or closed.

00 all bus doors are disabled
01 at least 1 bus door enabled
10 error
11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65102

SPN 3412 Lock Status of Door 1

Lock status of bus door 1

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3413 Open Status of Door 1

Open status of bus door 1

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3414 Enable Status of Door 1

Enable status of bus door 1. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3415 Lock Status of Door 2

Lock status of bus door 2

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3416 Open Status of Door 2

Open status of bus door 2

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3417 Enable Status of Door 2

Enable status of bus door 2. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3418 Lock Status of Door 3

Lock status of bus door 3

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3419 Open Status of Door 3

Open status of bus door 3

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3420 Enable Status of Door 3

Enable status of bus door 3. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3421 Lock Status of Door 4

Lock status of bus door 4

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3422 Open Status of Door 4

Open status of bus door 4

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3423 Enable Status of Door 4

Enable status of bus door 4. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3424 Lock Status of Door 5

Lock status of bus door 5

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3425 Open Status of Door 5

Open status of bus door 5

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3426 Enable Status of Door 5

Enable status of bus door 5. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3427 Lock Status of Door 6

Lock status of bus door 6

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3428 Open Status of Door 6

Open status of bus door 6

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3429 Enable Status of Door 6

Enable status of bus door 6. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3430 Lock Status of Door 7

Lock status of bus door 7

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3431 Open Status of Door 7

Open status of bus door 7

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3432 Enable Status of Door 7

Enable status of bus door 7. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3433 Lock Status of Door 8

Lock status of bus door 8

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3434 Open Status of Door 8

Open status of bus door 8

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3435 Enable Status of Door 8

Enable status of bus door 8. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3436 Lock Status of Door 9

Lock status of bus door 9

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3437 Open Status of Door 9

Open status of bus door 9

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3438 Enable Status of Door 9

Enable status of bus door 9. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3439 Lock Status of Door 10

Lock status of bus door 10

00 unlocked
01 locked
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3440 Open Status of Door 10

Open status of bus door 10

00 door closed
01 door opened
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3441 Enable Status of Door 10

Enable status of bus door 10. Enabled means the bus doors are able to be automatically opened or closed.

00 door disabled
01 door enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64933

Operational Range: same as data range

SPN 3442 Network Transceiver Status 2

Indicates the status of the transceiver for the wireless communications network type

0 = Off

1 = On

2 = Not Authorized to Operate on Network

3-250 = Reserved for Future Assignment

251-253 = Reserved

254 = Error

255 = Not Available

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255

Type: Status

Supporting Information:

PGN reference: 64936

Operational Range: same as data range

SPN 3443 Network Service Status 2

Indicates the status of the Service for the wireless communications network type

0 = Local Service

1 = Roaming Service

2 = Service not available

3 = Not Authorized to Operate on Service

4-250 = Reserved for Future Assignment

251-253 = Reserved

254 = Error

255 = Not Available

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255

Type: Status

Supporting Information:

PGN reference: 64936

Operational Range: same as data range

SPN 3444 Network Antenna Status 2

Indicates the status of the antenna for the wireless communications network type

0 = Off

1 = On

2-250 = Reserved for Future Assignment

251-253 = Reserved

254 = Error

255 = Not Available

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255

Type: Status

Supporting Information:

PGN reference: 64936

Operational Range: same as data range

SPN 3445 Network Signal Strength 2

Indicates the signal strength for the wireless communications network type.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64936	

SPN 3446 Wireless Communication Network Type 2

Type of Wireless Communication Network

0 = Cellular network #1
 1 = Cellular network #2
 2 = Wireless LAN #1
 3 = Wireless LAN #2
 4 = Satellite network
 5-250 = Reserved for Future Assignment
 251-253 = Reserved
 254 = Error
 255 = Not Available

Data Length:	8 bits	
Resolution:	256 states/8 bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64936	

SPN 3447 Remote PTO Governor Preprogrammed Speed Control Switch #2

Switch signal which indicates that the remote PTO governor toggle switch #2 is in the enabled (ON) position. If the toggle switch is enabled and other conditions are satisfied then the remote PTO governor control feature is activated and the PTO governor will control at the preprogrammed speed #2.

00 - Off
 01 - On
 10 - Error
 11 - Not Available

Note: This switch is different than the 1-8 Preprogrammed Set Speeds because this is a physical switch input, not a user programmable set speed (although the associated PTO set speed for this toggle switch is user defined).

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65264	

SPN 3448 Auxiliary Input Ignore Switch

Switch signal which overrides other switch input's ability to disable an engine's operating condition.

00 - Off
 01 - On
 10 - Error
 11 - Not Available

This switch input can be used to prevent the PTO from disengaging if another switch input's state changes. For example, if the PTO is normally disengaged when the clutch is depressed, then this switch would allow the user to use PTO while depressing the clutch.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65264	

(R) SPN 3452 Enable Switch – Transmission input shaft PTO 1

Status of the operator's switch or other input which indicates the desire for engaging the first PTO drive mounted on the transmission case. There may be more than one PTO drive mounted on the transmission case.

00 Enable switch off – PTO operation not desired
 01 Enable switch on – PTO operation desired
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

(R) SPN 3453 Enable Switch – Transmission input shaft PTO 2

Status of the operator's switch or other input which indicates the desire for engaging the second PTO drive mounted on the transmission case. If there is only one PTO drive on the transmission case, use SPN 3452 Enable Switch – Transmission input shaft PTO 1.

00 Enable switch off – PTO operation not desired
 01 Enable switch on – PTO operation desired
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

(R) SPN 3454 Enable Switch – Transmission output shaft PTO

Status of the operator's switch or other input which indicates the desire for engaging the PTO drive mounted on the transmission output shaft.

- 00 Enable switch off – PTO operation not desired
- 01 Enable switch on – PTO operation desired
- 10 Error
- 11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64932

(R) SPN 3455 Enable Switch – Transfer case output shaft PTO

Status of the operator's switch or other input which indicates the desire for engaging the PTO drive mounted on the output shaft of the transfer case.

- 00 Enable switch off – PTO operation not desired
- 01 Enable switch on – PTO operation desired
- 10 Error
- 11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64932

SPN 3456 Engagement Consent – Transmission input shaft PTO 1

Status of the transmission controller's consent to engage the first or sole PTO drive mounted on the transmission case. The controller in charge of the PTO drive should monitor this parameter and only engage the drive when consent is given. If consent is removed, while the PTO drive is engaged, the drive controller should disengage the drive as soon as possible. Engaging the drive or continuing drive engagement when consent is removed may result in damage to the transmission and / or the PTO drive mechanism.

- 00 Consent not given – PTO drive should not be engaged
- 01 Consent given – PTO drive may be engaged
- 10 Error
- 11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64932

SPN 3457 Engagement Consent – Transmission input shaft PTO 2

Status of the transmission controller's consent to engage the second PTO drive mounted on the transmission case. The controller in charge of the PTO drive should monitor this parameter and only engage the drive when consent is given. If consent is removed while the PTO drive is engaged, the drive controller should disengage the drive as soon as possible. Engaging the drive or continuing drive engagement when consent is removed may result in damage to the transmission

and / or the PTO drive mechanism. If there is only one PTO drive on the transmission case, use SPN 3456 Engagement Consent – Transmission input shaft PTO 1.

- 00 Consent not given – PTO drive should not be engaged
- 01 Consent given – PTO drive may be engaged
- 10 Error
- 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

SPN 3458 *Engagement Consent – Transmission output shaft PTO*

Status of the transmission controller's consent to engage the PTO drive connected to the transmission output shaft. The controller in charge of the PTO drive should monitor this parameter and only engage the drive when consent is given. If consent is removed, while the PTO drive is engaged, the drive controller should disengage the drive as soon as possible. Engaging the drive or continuing drive engagement when consent is removed may result in damage to the transmission and / or the PTO drive mechanism.

- 00 Consent not given – PTO drive should not be engaged
- 01 Consent given – PTO drive may be engaged
- 10 Error
- 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

SPN 3459 *Engagement Consent – Transfer case output shaft PTO*

Status of the transmission controller's consent to engage the PTO drive connected to the transfer case output shaft. The controller in charge of the PTO drive should monitor this parameter and only engage the drive when consent is given. If consent is removed, while the PTO drive is engaged, the drive controller should disengage the drive as soon as possible. Engaging the drive or continuing drive engagement when consent is removed may result in damage to the transmission and / or the PTO drive mechanism.

- 00 Consent not given – PTO drive should not be engaged
- 01 Consent given – PTO drive may be engaged
- 10 Error
- 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

SPN 3460 Engagement Status – Transmission input shaft PTO 1

Reports if this specific PTO drive is engaged. This parameter should be broadcast only by the controller(s) receiving feedback about the specific drive.

For example, a pressure switch may be used to determine if a PTO-driven pump has been engaged. If the Body Controller (SA33) were monitoring this feedback signal, it should be the node broadcasting this parameter.

00 Drive not engaged
01 Drive is engaged
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64932

SPN 3461 Engagement Status – Transmission input shaft PTO 2

Reports if this specific PTO drive is engaged. This parameter should be broadcast only by the controller(s) receiving feedback about the specific drive.

For example, a pressure switch may be used to determine if a PTO-driven pump has been engaged. If the Body Controller (SA33) were monitoring this feedback signal, it should be the node broadcasting this parameter.

If there is only one PTO drive on the transmission case, SPN 3460 Engagement Status – Transmission input shaft PTO 1 should be used.

00 Drive not engaged
01 Drive is engaged
10 Error
11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64932

SPN 3462 Engagement Status – Transmission output shaft PTO

Reports if this specific PTO drive is engaged. This parameter should be broadcast only by the controller(s) receiving feedback about the specific drive.

For example, a pressure switch may be used to determine if a PTO-driven pump has been engaged. If the Body Controller (SA33) were monitoring this feedback signal, it should be the node broadcasting this parameter.

00 Drive not engaged
 01 Drive is engaged
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64932

Operational Range: same as data range

SPN 3463 Engagement Status – Transfer case output shaft PTO

Reports if this specific PTO drive is engaged. This parameter should be broadcast only by the controller(s) receiving feedback about the specific drive.

For example, a pressure switch may be used to determine if a PTO-driven pump has been engaged. If the Body Controller (SA33) were monitoring this feedback signal, it should be the node broadcasting this parameter.

00 Drive not engaged
 01 Drive is engaged
 10 Error
 11 Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64932

Operational Range: same as data range

SPN 3464 Engine Throttle Actuator 1 Control Command

The control command to throttle actuator 1, normalized to percent, where 0% represents fully closed and 100% represents fully open. Typically, this throttle actuator is used to regulate air or air / fuel mix to the engine. Using the standard convention for determining the position. Left/front is #1 and right/rear is #2 (SPN 3465).

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 %
 Type: Status
 Supporting Information:
 PGN reference: 61466

Operational Range: 0 to 100%

SPN 3465 Engine Throttle Actuator 2 Control Command

The control command to throttle actuator 2, normalized to percent, where 0% represents fully closed and 100% represents fully open. Typically, this throttle actuator is used to regulate air or air / fuel mix to the engine. Using the standard convention for determining the position. Left/front is #1 (SPN 3464) and right/rear is #2.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: 0 to 100%
Type:	Status	
Supporting Information:		
PGN reference:	61466	

SPN 3466 Engine Fuel Valve 2 Intake Absolute Pressure

Absolute pressure of gas on intake side of the second fuel system control valve, using standard convention for determining position. Left/front is #1 (SPN 1390) and right/rear is #2.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64930	

SPN 3467 Engine Gas 2 Mass Flow Rate

Gas mass flow rate delivered to an engine through its second fuel control system, using standard convention for determining position. Left/front is #1 (SPN 1241) and right/rear is #2.

Data Length:	2 bytes	
Resolution:	0.05 kg/h per bit, 0 offset	
Data Range:	0 to 3212.75 kg/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64930	

SPN 3468 Engine Fuel Temperature 2

Temperature 2 of fuel (or gas). See SPN 174 for fuel temperature 1.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64930	

SPN 3469 Engine Fuel Valve 2 Outlet Absolute Pressure

Absolute pressure of gas on outlet side of the second fuel system control valve. See SPN 2980 for the first or only fuel system control valve.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64930	

SPN 3470 Engine Turbocharger Compressor Bypass Actuator 1 Command

The command to a compressor bypass actuator, normalized to percent, where 0% nominally represents fully closed and 100% represents fully open. Typically, the turbocharger compressor bypass actuator is used to keep the engine out of surge by metering compressed air (charge).

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: 0 to 100%
 Type: Status
 Supporting Information:
 PGN reference: 64931

SPN 3479 Aftertreatment 1 Fuel Pressure 1 Control

Position that the controller is commanding the aftertreatment 1 fuel pressure control to maintain. 0% = fully closed, 100% = fully open.

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64929

SPN 3480 Aftertreatment 1 Fuel Pressure 1

First fuel pressure measurement for the aftertreatment 1 system

Data Length: 2 bytes
 Resolution: 0.1 kPa/bit, 0 offset
 Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64929

SPN 3481 Aftertreatment 1 Fuel Rate

Rate of fuel being delivered to aftertreatment 1 for regeneration

Data Length: 2 bytes
 Resolution: 0.05 L/h per bit, 0 offset
 Data Range: 0 to 3,212.75 L/h Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64929

SPN 3482 *Aftertreatment 1 Fuel Enable Actuator*

Indicates whether aftertreatment 1 fuel enable actuator is on or off

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64929	

SPN 3483 *Aftertreatment 1 Regeneration Status*

Indicates whether regeneration is active or inactive in aftertreatment 1.

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64929	

SPN 3484 *Aftertreatment 1 Ignition*

Indicates whether aftertreatment 1 ignition circuit is energized by the ECM.

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64929	

SPN 3485 *Aftertreatment 1 Supply Air Pressure*

Pressure of the supply air for aftertreatment 1. Supply air is the air supplied from a pneumatic line for an air-assisted or pneumatic actuator. One example is an air assisted fuel injector (the supply air assists in the atomization of fuel).

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64927	

SPN 3486 *Aftertreatment 1 Purge Air Pressure*

Pressure of the purge air supply for aftertreatment 1

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64927	

SPN 3487 *Aftertreatment 1 Air Pressure Control*

Position that the controller is commanding the aftertreatment 1 air pressure control to maintain. 0% = fully closed, 100% = fully open

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64927	

SPN 3488 *Aftertreatment 1 Air Pressure Actuator Position*

Position of the aftertreatment 1 air pressure actuator as measured by a position feedback sensor.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64927	

SPN 3489 *Aftertreatment 1 Air Enable Actuator*

Indicates whether aftertreatment 1 air enable actuator is on or off

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64927	

SPN 3490 *Aftertreatment 1 Purge Air Actuator*

Indicates whether aftertreatment 1 purge air actuator is on or off

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64927	

SPN 3491 *Aftertreatment 1 Atomization Air Actuator*

Indicates whether aftertreatment 1 atomization air actuator is on or off

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64927	

SPN 3492 *Aftertreatment 1 Air System Relay*

Indicates whether aftertreatment 1 air system relay is on or off

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64927	

SPN 3493 *Aftertreatment 2 Fuel Pressure 1 Control*

Position that the controller is commanding the aftertreatment 2 fuel pressure control to maintain. 0% = fully closed, 100% = fully open.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64928	

SPN 3494 *Aftertreatment 2 Fuel Pressure 1*

Pressure of the fuel for Aftertreatment 2.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64928	

SPN 3495 *Aftertreatment 2 Fuel Rate*

Rate of fuel being delivered to aftertreatment 2 for regeneration

Data Length:	2 bytes	
Resolution:	0.05 L/h per bit, 0 offset	
Data Range:	0 to 3,212.75 L/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64928	

SPN 3496 *Aftertreatment 2 Fuel Enable Actuator*

Indicates whether aftertreatment 2 fuel enable actuator is on or off

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64928	

SPN 3497 *Aftertreatment 2 Regeneration Status*

Indicates whether regeneration is active or inactive in aftertreatment 2.

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64928	

SPN 3498 *Aftertreatment 2 Ignition*

Indicates whether aftertreatment 2 ignition circuit is energized by the ECM.

00 not active

01 active

10 reserved for SAE assignment

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64928

SPN 3499 *Aftertreatment 2 Supply Air Pressure*

Pressure of the supply air for aftertreatment 2. Supply air is the air supplied from a pneumatic line for an air-assisted or pneumatic actuator. One example is an air assisted fuel injector (the supply air assists in the atomization of fuel).

Data Length: 2 bytes

Resolution: 0.1 kPa/bit, 0 offset

Data Range: 0 to 6,425.5 kPa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64926

SPN 3500 *Aftertreatment 2 Purge Air Pressure*

Pressure of the purge air supply for aftertreatment 2

Data Length: 2 bytes

Resolution: 0.1 kPa/bit, 0 offset

Data Range: 0 to 6,425.5 kPa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64926

SPN 3501 *Aftertreatment 2 Air Pressure Control*

Position that the controller is commanding the aftertreatment 2 air pressure control to maintain. 0% = fully closed, 100% = fully open

Data Length: 2 bytes

Resolution: 0.0025 %/bit, 0 offset

Data Range: 0 to 160.6375 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64926

SPN 3502 *Aftertreatment 2 Air Pressure Actuator Position*

Position of the aftertreatment 2 air pressure actuator as measured by a position feedback sensor.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64926

SPN 3503 *Aftertreatment 2 Air Enable Actuator*

Indicates whether aftertreatment 2 air enable actuator is on or off

00 not active
01 active
10 reserved for SAE assignment
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64926

Operational Range: same as data range

SPN 3504 *Aftertreatment 2 Purge Air Actuator*

Indicates whether aftertreatment 2 purge air actuator is on or off

00 not active
01 active
10 reserved for SAE assignment
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64926

Operational Range: same as data range

SPN 3505 *Aftertreatment 2 Atomization Air Actuator*

Indicates whether aftertreatment 2 atomization air actuator is on or off

00 not active
01 active
10 reserved for SAE assignment
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64926

Operational Range: same as data range

SPN 3506 *Aftertreatment 2 Air System Relay*

Indicates whether aftertreatment 2 air system relay is on or off

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64926

Operational Range: same as data range

SPN 3509 *Sensor supply voltage 1*

Sensor ECU supply voltage 1

Data Length: 2 bytes
 Resolution: 0.05 V/bit, 0 offset
 Data Range: 0 to 3212.75 V
 Type: Measured
 Supporting Information:
 PGN reference: 64925

Operational Range: same as data range

SPN 3510 *Sensor supply voltage 2*

Sensor ECU supply voltage 2

Data Length: 2 bytes
 Resolution: 0.05 V/bit, 0 offset
 Data Range: 0 to 3212.75 V
 Type: Measured
 Supporting Information:
 PGN reference: 64925

Operational Range: same as data range

SPN 3511 *Sensor supply voltage 3*

Sensor ECU supply voltage 3

Data Length: 2 bytes
 Resolution: 0.05 V/bit, 0 offset
 Data Range: 0 to 3212.75 V
 Type: Measured
 Supporting Information:
 PGN reference: 64925

Operational Range: same as data range

SPN 3512 *Sensor supply voltage 4*

Sensor ECU supply voltage 4

Data Length: 2 bytes
 Resolution: 0.05 V/bit, 0 offset
 Data Range: 0 to 3212.75 V
 Type: Measured
 Supporting Information:
 PGN reference: 64925

Operational Range: same as data range

SPN 3513 *Sensor supply voltage 5*

Sensor ECU supply voltage 5

Data Length:	2 bytes	
Resolution:	0.05 V/bit, 0 offset	
Data Range:	0 to 3212.75 V	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64924	

SPN 3514 *Sensor supply voltage 6*

Sensor ECU supply voltage 6

Data Length:	2 bytes	
Resolution:	0.05 V/bit, 0 offset	
Data Range:	0 to 3212.75 V	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64924	

SPN 3515 *Aftertreatment 1 Diesel Exhaust Fluid Temperature 2*

Temperature of the diesel exhaust fluid at the device measuring diesel exhaust fluid quality

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64923	

SPN 3516 *Aftertreatment 1 Diesel Exhaust Fluid Concentration*

A measure of the concentration of urea in water. Zero percent means that the tank contains no urea. A 32.5% value indicates that the diesel exhaust fluid is of the proper concentration. The 32.5% value indicates that the concentration is highest quality.

Data Length:	1 byte	
Resolution:	0.25 %/bit, 0 offset	
Data Range:	0 to 62.5 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64923	

SPN 3517 *Aftertreatment 1 Diesel Exhaust Fluid Tank Level 2*

The measure of the diesel exhaust fluid level in the diesel exhaust fluid tank.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, 0 offset	
Data Range:	0 to 6,425.5 mm (0 to 6.4255 m)	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	65110	

SPN 3518 *Aftertreatment 1 Diesel Exhaust Fluid Conductivity*

A measure of the conductivity of the diesel exhaust fluid at the sensor. The conductivity is an indication of the diesel exhaust fluid's chemical make up.

Data Length:	1 byte	
Resolution:	5 microSiemens/mm, 0 offset	
Data Range:	0 to 1250 microSiemens/mm	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64923	

(R) SPN 3519 *Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 Preliminary FMI*

Used to identify the applicable J1939-73 FMI that applies to the most significant failure of the diesel exhaust fluid temperature sensor. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64923	

(R) SPN 3520 *Aftertreatment 1 Diesel Exhaust Fluid Properties Preliminary FMI*

Used to identify the applicable J1939-73 FMI that applies to the most significant failure of the diesel exhaust fluid properties sensor. This may be used for indicating failures of the diesel exhaust fluid concentration, diesel exhaust fluid conductivity or diesel exhaust fluid type. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64923	

SPN 3521 *Aftertreatment 1 Diesel Exhaust Fluid Property*

This parameter indicates the property of the fluid compound in the tank. A value of 0011 indicates uncontaminated Diesel Exhaust Fluid.

0000 - Urea concentration too high
 0001 - Urea concentration too low
 0010 - Fluid is diesel
 0011 - Diesel exhaust fluid is proper mixture
 0101 to 1100 - Reserved for SAE assignment
 1101 - Not able to determine diesel exhaust fluid property (fluid type unknown)
 1110 - Error with diesel exhaust fluid property detection
 1111 - Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64923	

SPN 3522 *Aftertreatment 1 Total Fuel Used*

Total amount of fuel used by aftertreatment device 1 over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64920	

SPN 3523 *Aftertreatment 1 Total Regeneration Time*

Total amount of time that aftertreatment device 1 has been regenerating over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64920	

SPN 3524 *Aftertreatment 1 Total Disabled Time*

Total amount of time that aftertreatment 1 regeneration has been manually disabled.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64920	

(R) SPN 3525 *Aftertreatment 1 Total Number of Active Regenerations*

Total number of active regenerations by aftertreatment device 1 over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64920	

SPN 3526 *Aftertreatment 2 Total Fuel Used*

Total amount of fuel used by aftertreatment device 2 over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64921	

SPN 3527 *Aftertreatment 2 Total Regeneration Time*

Total amount of time that aftertreatment device 2 has been regenerating over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64921	

SPN 3528 *Aftertreatment 2 Total Disabled Time*

Total amount of time that aftertreatment 2 regeneration has been manually disabled.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64921	

(R) SPN 3529 *Aftertreatment 2 Total Number of Active Regenerations*

Total number of active regenerations by aftertreatment device 2 over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64921	

(R) SPN 3532 *Aftertreatment 1 Diesel Exhaust Fluid Tank Level Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank level sensor by the manufacturer's sensor control software. This FMI is applicable to either the diesel exhaust fluid tank level 1 or diesel exhaust fluid tank level 2 parameters. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65110	

SPN 3533 *Transmission Oil Level Switch*

This switch indicates whether transmission oil level is full or empty.

00 - Empty

01 - Full or not empty

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64917

SPN 3543 *Engine Operating State*

This parameter is used to indicate the current state, or mode, of operation by the engine. This is a status parameter.

Bit state 0000 = Engine Stopped

Bit state 0001 = Pre-Start

Bit state 0010 = Starting

Bit state 0011 = Warm-Up

Bit state 0100 = Running

Bit state 0101 = Cool-down

Bit state 0110 = Engine Stopping

Bit state 0111 = Post-Run

Bit states 1000-1101 = available for SAE assignment

Bit state 1110 = <reserved>

Bit state 1111 = not available

STOPPED -

In the stopped state, the ECM is powered and the engine is not turning. The engine is ready to start.

PRE-START -

In the PRE-START state, the engine is not running. Actions are taken by various subsystem controls to prepare the engine for cranking and starting. This may include any priming, prelubrication, preheating sequences, interlocks or other start permissives. These subsystems have their own state based control and communicate their status to the engine state control logic.

STARTING -

During the STARTING state, actions are taken by various subsystem controls to attempt to start the engine.

WARM-UP -

During the WARM-UP state, the engine operates at reduced speed and / or load to allow the engine to come up to operating temperature.

RUNNING -

In the RUNNING state, the engine is turning and is prepared to output power.

COOL-DOWN -

During the COOLDOWN state, the engine operates at reduced speed and / or load to allow the engine to cool off before the engine is stopped.

STOPPING -

In the STOPPING state, actions are taken by various subsystem controls to attempt to stop the engine.

POST-RUN -

During the POST-RUN state, the engine is not turning. Actions are taken by various subsystem controls to prevent engine damage and extend component life. The engine is not ready to start.

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64914

SPN 3544 *Time Remaining in Engine Operating State*

This parameter is used to indicate the time remaining in the current engine operating state, based on the state defined in the SPN "Engine Operating State" (SPN 3543). For the states in which time remaining is not applicable, use 65535 (\$FFFF).

Data Length:	2 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 64,255 s	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64914	

SPN 3548 *Engine Waste Oil Reservoir Level*

Level of crankcase blowby emulsion collected by a container. Normalized to percent, 0% represents completely empty and 100% represents completely full.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65130	

SPN 3549 *Engine Oil-Filter Outlet Pressure*

Oil pressure (gauge) measured just downstream of oil filter. Used in conjunction with SPN1208 (pre-filter oil pressure) to determine oil filter health.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65130	

SPN 3550 *Engine Oil Priming Pump Switch*

Switch input for activating the engine oil priming pump.

00 = Off
 01 = On
 10 = Error
 11 = Not available or not installed

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65130	

SPN 3551 Engine Oil Priming State

Determination of whether or not the engine is (or has recently been) sufficiently lubricated for starting purposes.

00 = Not sufficiently lubricated

01 = Sufficiently lubricated

10 = Unable to determine if sufficiently lubricated

11 = Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65130

SPN 3552 Engine Oil Pre-Heated State

Indicates whether the engine oil pre-heated sufficiently for starting purposes.

00 = Not sufficiently pre-heated

01 = Sufficiently pre-heated

10 = Unable to determine if engine oil is pre-heated sufficiently

11 = Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65130

SPN 3553 Engine Coolant Pre-heated State

Indicates whether the engine coolant is pre-heated sufficiently for starting purposes.

00 = Not sufficiently pre-heated

01 = Sufficiently pre-heated

10 = Unable to determine engine coolant pre-heated sufficiently

11 = Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65130

SPN 3554 Engine Ventilation Status

Engine ventilation control states.

000 = Sufficiently vented (all combustible gases have been evacuated from intake and exhaust systems)
 001 = Ventilation needed (combustible gases may be present in intake and exhaust systems)
 010 = Ventilation delay (delay without cranking between ventilation and start engine states)
 011 = Currently venting (engine cranks w/o gas or ignition to clear intake and exhaust systems with air)
 100 = Reserved for SAE assignment
 101 = Reserved for SAE assignment
 110 = Not able to determine if sufficiently vented
 111 = Not available or not installed

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65130	

SPN 3557 Parking Brake Red Warning Signal

This parameter commands the Parking Brake red optical warning signal.

00 – off
 01 – on
 10 – Reserved
 11 – Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65274	

SPN 3558 AETC Data Collection Standard

Indicates the standardized method by which torque data was obtained for the Advertised Engine Torque Curve (AETC). For example, in North America, heavy duty diesel engine specifications are typically based on SAE J1995. Other applicable SAE, ISO, or DIN standards may be added as necessary in the future.

0000 SAE J1995
 0001-1101 Not Defined
 1111 Not Available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64912	

SPN 3559 Number of AETC data points

Indicates the number of speed / torque data points contained in the Advertised Engine Torque Curve broadcast (AETC). A minimum of 5 points is required, with a maximum of 15 points available as needed to accurately convey the curve.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: 5 to 15 points
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64912	
PGN reference:	64912	

SPN 3560 AETC Speed Value

Engine speed value of the data points in PGN 64912 – Advertised Engine Torque Curve (AETC).

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64912	
PGN reference:	64912	

SPN 3561 AETC Torque value

Engine torque value of the data points in PGN 64912 – Advertised Engine Torque Curve (AETC).

Data Length:	2 bytes	
Resolution:	1 Nm/bit, 0 offset	
Data Range:	0 to 64,255 Nm	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64912	
PGN reference:	64912	

SPN 3562 Engine Intake Manifold #2 Pressure

The gage pressure measurement of the air intake manifold for bank #2 or the second air intake manifold. If there are multiple air pressure sensors in the second intake stream, this is the last one in flow direction before entering the combustion chamber. See also SPNs 1127-1130 and SPN 102 for alternate range and resolution.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64976	

SPN 3563 Engine Intake Manifold #1 Absolute Pressure

The absolute pressure measurement of the air intake manifold. If there are multiple air pressure sensors in the intake stream, this is the last one in flow direction before entering the combustion chamber.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64976	

SPN 3564 Lane Departure Warning Enable Command

Command to enable/disable Lane Departure Indication

- 00 Disable Lane Departure Warning
- 01 Enable Lane Departure Warning
- 10 Reserved
- 11 Don't care

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	43264	

SPN 3565 Lane Departure Left

Indicates that the middle of vehicle departs the lane on the left side. The parameter indicates that the vehicle is changing the lane to the left.

- 00 Middle of the vehicle does not depart the lane to the left side
- 01 Middle of the vehicle departs the lane to the left side
- 10 Reserved
- 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61447	

SPN 3566 Lane Departure Right

Indicates that the middle of vehicle departs the lane on the right side. The parameter indicates that the vehicle is changing the lane to the right.

- 00 Middle of the vehicle does not depart the lane to the right side
- 01 Middle of the vehicle departs the lane to the right side
- 10 Reserved
- 11 Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61447	

SPN 3589 Engine Oil Priming Pump Control

This control is used to activate a pump that lubricates the engine, particularly prior to initial engine startup.

00 = Off

01 = On

10 = Reserved

11 = unavailable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64914

SPN 3597 ECU Power Output Supply Voltage #1

The first power output from an ECM

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65165

SPN 3598 ECU Power Output Supply Voltage #2

The second power output from an ECM.

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65165

SPN 3599 ECU Power Output Supply Voltage #3

The third power output from an ECM.

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65165

SPN 3600 *Steering Straight Ahead Position Reset*

Used to reset the straight ahead position for a steering sensor in the steering column or a steering controller's straight ahead position on any steerable axle.

00 Take no action - Do not Reset

01 Reset

10 Reserved, take no action

11 Not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 56832

SPN 3601 *Engine Fuel Shutoff Valve Leak Test Control*

Control setting for fuel shutoff valve proving system test. Typically, this type of system can only be used with a dual fuel shutoff system. The test consists of a small pump to pressurize the chamber between the dual fuel shutoffs when they are closed. After pressurizing, the test is passed if the pressure is above a certain threshold, indicating the fuel shutoffs are sealed completely shut without leaks. Otherwise, a low pressure indicates a leak is present past one or both of the fuel shutoffs.

00 = Off (reset / no test in process)

01 = On (test in process / test complete)

10 = Reserved

11 = Don't care / take no action

In addition to communicating desired action of the fuel shutoff valve proving system test and its driver status, this new SPN can be used to communicate whether the fuel shutoff valve proving system test failed, through the use of FMIs.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64914

SPN 3602 *Engine Oil Pre-heater Control*

Control setting for an electrically actuated oil pre-heating device.

00 = Off

01 = On

10 = Reserved

11 = Don't care / take no action

In addition to communicating desired action of the electrically actuated oil pre-heater and its driver status, this new SPN can be used to communicate if any attempts to adequately pre-heat the oil are unsuccessful, through the use of FMIs.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64914

SPN 3603 Engine Electrical System Power Conservation Control

Control setting for cutting power to various devices when the engine is not in use. Useful if it is desired to keep the engine in standby, with main control ECM still powered on and communicating with outside world, but actuators and certain other ECMs can be de-powered.

00 - Off (No Power conservation; all systems with supply power available)
 01 - On (power conservation active; certain systems have supply power withheld)
 10 - Reserved
 11 - Unavailable

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64914	

SPN 3604 Engine Block / Coolant Pre-heater Control

Control setting for an electrically actuated engine block or coolant pre-heating device.

00 - Off
 01 - On
 10 - Reserved
 11 - Unavailable

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64914	

SPN 3605 Engine Coolant Circulating Pump Control

Control setting for an electrically actuated engine coolant circulating pump.

00 = Off
 01 = On
 10 = Reserved
 11 = Don't care / take no action
 .

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64914	

SPN 3606 Engine Controlled Shutdown Request

A signal issued by the engine control system to a user or external system requesting for a controlled shutdown. This request is made when engine protection diagnostics determine a condition warrants a shutdown soon, but it is not severe enough to necessitate an immediate shutdown. This function gives notice such that the engine can be unloaded and cooled down before stopping.

00 = Off (No Shutdown Requested)

01 = On (Shutdown Requested)

10 = Reserved

11 = Don't care / take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64914

SPN 3607 Engine Emergency (Immediate) Shutdown Indication

A signal issued by the engine control system to a user or external system indicating that it is immediately shutting the engine down. This indication is made when engine protection diagnostics determine a condition necessitates an immediate shutdown. This function gives notice that this has occurred.

00 = Off (No Shutdown Requested)

01 = On (Shutdown Requested)

10 = Reserved

11 = Don't care / take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64914

SPN 3608 Engine Fuel Shutoff Vent Control

Control setting for a fuel shutoff vent. Typically, for a dual fuel shutoff system, the vent line is located between them and is plumbed to vent outside to atmosphere. The vent control typically always actuates opposite to that of the fuel shutoff(s) control. Thus, when the fuel shutoff(s) are closed, the vent is open, thereby 'ventilating' any leftover or leaking gas from the fuel shutoff. When the fuel shutoff(s) are open, the vent is closed, thereby all gas passes through to the engine.

00 = Closed (vent closed)

01 = Open (vent open)

10 = Reserved

11 = Don't care / take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64914

SPN 3609 Diesel Particulate Filter Intake Pressure 1

This parameter indicates the diesel particulate filter intake gage pressure 1 (bank 1).

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting Information: See Appendix D - PGN 64739
PGN reference: 64908

SPN 3610 Diesel Particulate Filter Outlet Pressure 1

This parameter indicates the diesel particulate filter outlet gage pressure 1 (bank 1).

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64908

SPN 3611 Diesel Particulate Filter Intake Pressure 2

This parameter indicates the diesel particulate filter intake gage pressure 2 (bank 2).

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64907

SPN 3612 Diesel Particulate Filter Outlet Pressure 2

This parameter indicates the diesel particulate filter outlet gage pressure 2 (bank 2).

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64907

SPN 3613 *Text Display Instructions*

This parameter describes the status for the display how to show the information.

0000 Clear display - The displayed information should be deleted or not displayed any more.

0001 Hold display - The presently displayed information should be retained

0010 Append at end of display - The transmitted information should be displayed at the end of the presently displayed information

0011 Overwrite display - The presently displayed information is to be overwritten with the transmitted information

0100 Overwrite substring - A portion of the presently displayed information is to be overwritten with the transmitted information starting at display text index (SPN 3614)

0101 Highlight substring

0110 Blink substring

0111-1110 Reserved

1111 - Not applicable

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 43008

SPN 3614 *Text Display Index*

Used for overwriting consecutive bytes of a displayed string when byte 1 "Text Display Instructions" state is set for "overwrite substring" mode. When used, this byte declares where in the text string that the new text will start overwriting, this number is also known as the start byte. As usual for the transmitted text string, the Text Display Characters will be sent and then terminated by the null character, this will be the stop byte indicator to declare when to stop overwriting.

EXAMPLE: To only modify 3 bytes (50, 51, 52) of an 87 byte character string.

Text Display Instructions - set to 0100b (Overwrite substring)

Text Display Index - set to 50d (starting byte of desired overwrite)

Text Display Characters - 3 characters sent, then the null ending byte

Data Length: 1 byte

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 250

Operational Range: 0 to 200

Type: Status

Supporting Information:

PGN reference: 43008

SPN 3615 *Text Display Character*

From 1 up to 200 characters to be presented on a display. Up to 4 characters can be displayed without using Transport Protocol. The Display Text characters will follow the standard J1939-71 display method. Control characters can be used but not displayed. The characters are to be terminated with a 00h which is the "null" or "/0" character.

EXAMPLE: Since this parameter starts in byte position 4, the first displayed byte would be in byte 4 of the Data Frame, the fourth displayed byte would be in byte 7 of the Data Frame, byte 8 would be the null character.

Data Length: Variable - up to 200 bytes followed by an NULL delimiter

Resolution: ASCII, 0 offset

Data Range: 0 to 255 per byte

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 43008

SPN 3619 Number of J2012 DTCs

The number J2012 DTCs being conveyed in PGN 64906. If the value of this parameter is zero, the device broadcasting PGN 64906 has no active or previously active J2012 DTCs.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64906	

SPN 3620 J2012 DTC

Five character ASCII SAE J2012 DTC, sent most significant byte first.

Data Length:	5 bytes	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64906	

SPN 3621 J2012 DTC Status

Indicates if the respective SAE J2012 DTC is active or previously active.

0 - DTC is previously active
1 - DTC is active

Data Length:	1 bit	
Resolution:	2 states/1 bit, 0 offset	
Data Range:	0 to 1	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64906	

SPN 3622 J2012 DTC Occurrence Count

Number of occurrences of the respective SAE J2012 DTC being conveyed.

If more than 126 occurrences happen the value shall be set to 126.

If the occurrence count is not available to be sent then this value shall be set to 127.

Data Length:	7 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 127	Operational Range: 0 to 126
Type:	Measured	
Supporting Information:		
PGN reference:	64906	

SPN 3623 Vehicle Roll

This parameter indicates the roll in degrees from level. Facing the direction of travel a tip to the left would be indicated by a negative number and a tip to the right would be indicated by a positive number.

Data Length:	2 bytes	
Resolution:	1/128 deg/bit, -200 deg offset	
Data Range:	-200 to 301.99 deg	Operational Range: -90 to 90 degrees
Type:	Measured	
Supporting Information:		
PGN reference:	64905	

SPN 3624 Engine Intake Valve Actuation Oil Pressure for Cylinder #1

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #1.

This intake valve pressure is at the first cylinder in the engine, while SPN 2948 reflects the intake valve pressure of the entire engine system.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64904	

SPN 3625 Engine Intake Valve Actuation Oil Pressure for Cylinder #2

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #2.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64904	

SPN 3626 Engine Intake Valve Actuation Oil Pressure for Cylinder #3

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #3.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64904	

SPN 3627 Engine Intake Valve Actuation Oil Pressure for Cylinder #4

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #4.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64904	

SPN 3628 Engine Intake Valve Actuation Oil Pressure for Cylinder #5

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #5.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64903	

SPN 3629 Engine Intake Valve Actuation Oil Pressure for Cylinder #6

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #6.

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64903

SPN 3630 Engine Intake Valve Actuation Oil Pressure for Cylinder #7

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #7.

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64903

SPN 3631 Engine Intake Valve Actuation Oil Pressure for Cylinder #8

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #8.

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64903

SPN 3632 Engine Intake Valve Actuation Oil Pressure for Cylinder #9

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #9.

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64902

SPN 3633 Engine Intake Valve Actuation Oil Pressure for Cylinder #10

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #10.

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64902

SPN 3634 Engine Intake Valve Actuation Oil Pressure for Cylinder #11

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #11.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64902	

SPN 3635 Engine Intake Valve Actuation Oil Pressure for Cylinder #12

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #12.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64902	

SPN 3636 Engine Intake Valve Actuation Oil Pressure for Cylinder #13

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #13.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64901	

SPN 3637 Engine Intake Valve Actuation Oil Pressure for Cylinder #14

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #14.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64901	

SPN 3638 Engine Intake Valve Actuation Oil Pressure for Cylinder #15

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #15.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64901	

SPN 3639 Engine Intake Valve Actuation Oil Pressure for Cylinder #16

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #16.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64901	

SPN 3640 Engine Intake Valve Actuation Oil Pressure for Cylinder #17

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #17.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64900	

SPN 3641 Engine Intake Valve Actuation Oil Pressure for Cylinder #18

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #18.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64900	

SPN 3642 Engine Intake Valve Actuation Oil Pressure for Cylinder #19

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #19.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64900	

SPN 3643 Engine Intake Valve Actuation Oil Pressure for Cylinder #20

The gage pressure of the oil in the hydraulic accumulator that powers the engine intake valve for cylinder #20.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64900	

SPN 3644 Engine Derate Request

This parameter is a derate request made from the engine control system to an external system, where the engine is requesting an external device to reduce the load being applied. A zero value indicates that there is no derate being requested and 100% means full derate being requested. Any non-zero value represents a derate is being requested, at a percentage of full load. The engine control system identifies any problems and determines the amount of derate the

situation calls for. This parameter can be useful to customer applications that prefer awareness and control of the engine derate.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64914	

SPN 3645 *Transfer case status*

This parameter describes the feedback from the transfer case controller . Used by instrument clusters, tachographs, PTOs , etc.

000 2 wheel high (normal or 'On Highway' Range)
 001 4 wheel high (normal or 'On Highway' Range)
 010 neutral
 011 2 wheel low (or 'Off Highway' Range)
 100 4 wheel low (or 'Off Highway' Range)
 101 Transfer Case Shift in Progress or gear not confirmed
 110 error
 111 not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64899	

SPN 3667 *Engine Air Shutoff Status*

State signal which indicates the actual measured position of the Air Shutoff.

00 - Air flow allowed to engine
 01 - Air flow restricted
 10 - Error
 11 - Not Available

Note: This parameter, in conjunction with SPN 2813 - "Engine Air Shutoff Command Status", is provided to allow an external system to annunciate and/or alarm on either an accidental air shutoff (shutoff detected but not commanded), or a failed air shutoff (shutoff commanded but not detected).

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65252	

SPN 3668 *Engine Intercooler Coolant Level*

Ratio of volume of liquid found in an engine intercooler cooling system to total engine intercooler cooling system volume.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64938	

SPN 3669 Engine Rotation Direction

Direction of engine rotation, as reported by the engine. Direction convention as viewed by an observer standing at the rear of the engine, viewing the flywheel.

00 - CounterClockWise (CCW)

01 - ClockWise (CW)

10 - Reserved

11 - Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65214

SPN 3670 Maximum Crank Attempts per Start Attempt

The number of cranking cycles that will be performed before ending the start attempt. This is intended to be used in conjunction with Crank Attempt Count on Present Start Attempt, in order to give a FMI 0 diagnostic on the latter.

Data Length: 1 byte

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 250

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64895

SPN 3671 Crank Attempt Count on Present Start Attempt

Reports the number of cranking cycles undergone during the present start attempt.

Note: This is intended to be used in conjunction with Maximum Crank Attempts per Start Attempt, in order to give a FMI 0 diagnostic on this parameter when the count exceeds the maximum. When the engine is not in a start attempt, this parameter can either hold the last value or return a Not Available (0xFF).

Data Length: 1 byte

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 250

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65214

SPN 3672 EGR1 Cooler Bypass Actuator Postion

The parameter gives the % open of the EGR Cooler Bypass Actuator, where 0% = Fully Closed (no gas flowing through the bypass), and 100% = Fully Open.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Measured

Supporting Information: See Appendix D - SPN 27

PGN reference: 64897

SPN 3673 Engine Throttle Valve 2 Position

The sensed position feedback of the valve, coming from a second electrical actuator for a second throttle plate, used to regulate the supply of a fluid, usually air or fuel/air mixture. 0% represents no supply and 100% is full supply. SPN 51 is used for the first throttle position feedback.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65266	

SPN 3675 Engine Turbocharger Compressor Bypass Actuator 1 Position

Measures the position of the turbocharger compressor bypass actuator, where 0% represents bypass fully closed and 100% represents bypass fully open. Typically, the compressor bypass is used to lower the compressor outlet pressure and/or intake manifold pressure during situations where too much boost is being generated by the turbocharger. Typically, a compressor bypass will be plumbed from the compressor outlet or intake manifold back to the compressor intake, with the compressor bypass actuator and valve in place to regulate bypass flow.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64931	

SPN 3676 Engine Aftercooler Coolant Level

Ratio of aftercooler coolant system volume of liquid to total cooling system volume. The engine aftercooler coolant level is for the low temperature (LT) cooling circuit used for the compressor outlet air or charge aftercooling.

SPN 111 "Coolant Level" is assumed to represent a high temperature (HT) cooling circuit used for cooling the engine and its various components.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64938	

SPN 3683 Steering Wheel Angle

The main operator's steering wheel angle (on the steering column, not the actual wheel angle). The vehicle being steered to the left (counterclockwise) results in a positive steering wheel angle. This is the yaw angle of the steering wheel with the z-axis along the centerline of the steering column. This parameter is defined according to a Z-Up axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Up Axis System has positive X directed forward, positive Y to the left, and positive Z directed up.

Data Length:	2 bytes	
Resolution:	1/1024 rad per bit, -31.374 rad offset	
Data Range:	-31.374 to +31.374 rad	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61469	

SPN 3684 Steering Wheel Angle Range Counter

The signal indicates the number of steering wheel angle range overflows if the operating range of steering wheel is greater than the measuring range of sensor element. Positive values indicate left turns (counterclockwise). If the steering wheel angle range is +/-180 degrees this signal is equivalent to a steering wheel turn counter. This parameter is defined according to a Z-Up axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Up Axis System has positive X directed forward, positive Y to the left, and positive Z directed up.

Data Length:	6 bits	
Resolution:	1 range/bit, -32 ranges offset	
Data Range:	-32 to 29 ranges	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61469	

SPN 3685 Steering Wheel Angle Range Counter Type

The signal indicates whether the steering wheel angle sensor is capable of absolute measuring of the number of steering wheel angle ranges or not. Absolute measuring means that the steering wheel angle range counter signal indicates the real position of steering wheel at ignition on. Relative measuring means that the steering wheel angle range counter signal is zero at ignition on independent of the real position of steering wheel.

00 - relative number of counts
 01 - absolute number of counts
 10 - not defined
 11 - signal not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61469	

SPN 3686 Steering Wheel Angle Range

The signal indicates the range of the steering wheel angle the sensor element is capable to measure. The steering wheel angle signal ranges between the negative and the positive value of the steering wheel angle range.

For example, a steering angle sensor transmits +13.6 rad to indicate a range of +/- 13.6 rad.

Data Length:	2 bytes	
Resolution:	1/1024 rad per bit, -31.374 rad offset	
Data Range:	-31.374 to +31.374 rad	Operational Range: 0 to +31.374 rad
Type:	Measured	
Supporting Information:		
PGN reference:	61469	

SPN 3687 *Steering Angle Sensor Active Mode*

This signal indicates the operational mode of the steering angle sensor.

00 – Programming mode active
 01 – Normal mode active
 10 – Reserved
 11 – Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61469	

SPN 3688 *Steering Angle Sensor Calibrated*

This signal indicates the calibration status of the steering angle sensor.

00 – SAS not calibrated
 01 – SAS calibrated
 10 – Reserved
 11 – Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61469	

SPN 3689 *Message Counter*

The message counter is to verify the signal path from the demanding device to the steering controller. The support of this parameter is mandatory.

Note: The initial value of the 4 bit message counter for the first message during a driving cycle is arbitrary. In every following message the counter is incremented by 1 (0 follows 15).

Data Length:	4 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61469	

SPN 3690 Message Checksum

The message checksum is used to verify the signal path from the demanding device to the steering controller. The support of this parameter is mandatory if PGN 61469 is supported as there is no means to indicate "not available".

The 4 bit checksum is the sum of the high nibble and the low nibble of the sum of the identifier, the first 7 data bytes and the 4 bit message counter. It is calculated as follows:

Checksum = (Byte1 + Byte2 + Byte3 + Byte4 + Byte5 + Byte6 + Byte7 + message counter & 0x0F + message ID low byte + message ID mid low byte + message ID mid high byte + message ID high byte)

Checksum = ((Checksum >> 4) + Checksum) & 0x0F

Data Length: 4 bits

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61469

SPN 3691 Left Headlamp Dynamic Bending Light

This parameter indicates whether the dynamic bending light of the left headlamp is working properly.

000 Dynamic bending light deactivated. There is no problem but for some reasons (e.g. daylight present) the bending light is deactivated.

001 Dynamic bending light is working properly. Normal operation mode. Bending light is working properly.

010 Dynamic bending light fail safe position. Bending light is damaged, current position does not affect oncoming traffic.

011 Dynamic bending light failure. Bending light does not work, current position may affect oncoming traffic.

100 – 110 Reserved

111 Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64894

SPN 3692 Right Headlamp Dynamic Bending Light

This parameter indicates whether the dynamic bending light of the left headlamp is working properly.

000 Dynamic bending light deactivated. There is no problem but for some reasons (e.g. daylight present) the bending light is deactivated.

001 Dynamic bending light is working properly. Normal operation mode. Bending light is working properly.

010 Dynamic bending light fail safe position. Bending light is damaged, current position does not affect oncoming traffic.

011 Dynamic bending light failure. Bending light does not work, current position may affect oncoming traffic.

100 – 110 Reserved

111 Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64894

SPN 3693 *Left Headlamp Light Distribution*

This parameter indicates what kind of light distribution is set by the AFS system for the left headlamp.

- 0000 Light distribution town - The basic light distribution for town light is generated with a symmetrical cut-off line (Class V)
- 0001 Light distribution country - Country light is mostly similar to the actual SAE low beam pattern. (Class C)
- 0010 Light distribution motorway - The task of motorway light is an improved overall viewing distance and an optimum of illumination of the second lane on roads with more than one lane and without oncoming traffic. (Class E)
- 0011 Light distribution high beam - The high beam distribution of the module generates an illumination level that an additional high beam spot is not necessary.
- 0100 Light distribution adverse weather - The adverse weather light improves the viewing situation for the driver on wet roads and reduces the amount of glare from reflections on wet roads for the oncoming traffic. (Class W)
- 0101 Light distribution fail safe position - Module is damaged, current light distribution does not affect oncoming traffic.
- 0110 Light distribution failure - Module is damaged, current position may affect oncoming traffic.
- 0111 Different light distributions not available - No AFS distributions available. Head lamp has only one distribution.
- 1000 – 1110 Reserved
- 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64894	

SPN 3694 *Right Headlamp Light Distribution*

This parameter indicates what kind of light distribution is set by the AFS system for the right headlamp.

- 0000 Light distribution town - The basic light distribution for town light is generated with a symmetrical cut-off line (Class V)
- 0001 Light distribution country - Country light is mostly similar to the actual SAE low beam pattern. (Class C)
- 0010 Light distribution motorway - The task of motorway light is an improved overall viewing distance and an optimum of illumination of the second lane on roads with more than one lane and without oncoming traffic. (Class E)
- 0011 Light distribution high beam - The high beam distribution of the module generates an illumination level that an additional high beam spot is not necessary.
- 0100 Light distribution adverse weather - The adverse weather light improves the viewing situation for the driver on wet roads and reduces the amount of glare from reflections on wet roads for the oncoming traffic. (Class W)
- 0101 Light distribution fail safe position - Module is damaged, current light distribution does not affect oncoming traffic.
- 0110 Light distribution failure - Module is damaged, current position may affect oncoming traffic.
- 0111 Different light distributions not available - No AFS distributions available. Head lamp has only one distribution.
- 1000 – 1110 Reserved
- 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64894	

SPN 3695 Diesel Particulate Filter Regeneration Inhibit Switch

Indicates the state of a switch available to the operator that inhibits diesel particulate filter regeneration.

00 not active
01 active
10 error
11 not available

This SPN would be “not active” when diesel particulate filter regeneration is allowed to occur normally (diesel particulate filter regeneration is not inhibited).

The engine controller shall inhibit regeneration when SPN 3695 is in the ON state. Regeneration shall be activated by SPN 3696 when it is in the ON state and SPN 3695 is in the OFF state.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	57344	

SPN 3696 Diesel Particulate Filter Regeneration Force Switch

Indicates the state of a switch available to the operator that forces diesel particulate filter regeneration.

00 not active
01 active
10 error
11 not available

This SPN would be “not active” when diesel particulate filter regeneration is allowed to occur normally (diesel particulate filter regeneration is not being forced).

The engine controller shall inhibit regeneration when SPN 3695 is in the ON state. Regeneration shall be activated by SPN 3696 when it is in the ON state and SPN 3695 is in the OFF state.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	57344	

SPN 3697 Diesel Particulate Filter Lamp Command

Command to control the diesel particulate filter lamp.

000 Off
 001 On – solid
 010 reserved for SAE assignment
 011 reserved for SAE assignment
 100 On – fast blink (1 HZ)
 101 reserved for SAE assignment
 110 reserved for SAE assignment
 111 not available

This SPN would be “off” when diesel particulate filter lamp is unlit. The “on - solid” should indicate that diesel particulate filter active regeneration is needed at the lowest level of urgency and that operator intervention is required. The flashing state indicates a more severe condition requiring regeneration.

This SPN shall not be used to convey information regarding operator switch feedback from SPNs 3695 and 3696.

The ISO 2575 Symbol F21 is recommended for use with this message.

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 3697	
PGN reference:	64892	

SPN 3698 Exhaust System High Temperature Lamp Command

Command to control the exhaust system high temperature lamp. This lamp indicates that the exhaust system temperature is high.

000 Off
 001 On – solid
 010 reserved for SAE assignment
 011 reserved for SAE assignment
 100 reserved for SAE assignment
 101 reserved for SAE assignment
 110 reserved for SAE assignment
 111 not available

This SPN would be “off” when the lamp is unlit. The “on - solid” status indicates that the exhaust gas temperature is high.

This SPN shall not be used to convey information regarding operator switch feedback from SPNs 3695 and 3696.

The ISO 2575 Symbol "F.26" is recommended for use with this message. This symbol is the ISO exhaust gas symbol with the temperature symbol added to it.

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 3697	
PGN reference:	64892	

SPN 3699 Diesel Particulate Filter Passive Regeneration Status

Indicates the state of diesel particulate filter passive regeneration.

00 not active

01 active

10 reserved for SAE assignment

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64892

SPN 3700 Diesel Particulate Filter Active Regeneration Status

Indicates the state of diesel particulate filter active regeneration.

00 not active

01 active

10 regeneration needed - automatically initiated active regeneration imminent

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3697

PGN reference: 64892

SPN 3701 Diesel Particulate Filter Status

Indicates the state of the diesel particulate filter regeneration need and urgency.

000 Regeneration not needed

001 Regeneration needed - lowest level

010 Regeneration needed - moderate level

011 Regeneration needed - highest level

100 reserved for SAE assignment

101 reserved for SAE assignment

110 reserved for SAE assignment

111 not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3697

PGN reference: 64892

SPN 3702 Diesel Particulate Filter Active Regeneration Inhibited Status

Indicates the state of diesel particulate filter active regeneration inhibition.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active, the system will not initiate an active regeneration or will exit an active regeneration. If the reason for inhibiting is not covered by SPNs 3703 thru 3717 or 5629, a request for a status parameter should be submitted to the SAE Truck and Bus J1939 Request Processing Group to have the reason added.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3703 Diesel Particulate Filter Active Regeneration Inhibited Due to Inhibit Switch

Indicates the state of diesel particulate filter active regeneration inhibition due to the Diesel Particulate Filter Regeneration Inhibit Switch.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 3697	
PGN reference:	64892	

SPN 3704 Diesel Particulate Filter Active Regeneration Inhibited Due to Clutch Disengaged

Indicates the state of diesel particulate filter active regeneration inhibition due to the clutch being disengaged.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3705 Diesel Particulate Filter Active Regeneration Inhibited Due to Service Brake Active

Indicates the state of diesel particulate filter active regeneration inhibition due to the service brake being active.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3706 Diesel Particulate Filter Active Regeneration Inhibited Due to PTO Active

Indicates the state of diesel particulate filter active regeneration inhibition due to the PTO being active.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3707 Diesel Particulate Filter Active Regeneration Inhibited Due to Accelerator Pedal Off Idle

Indicates the state of diesel particulate filter active regeneration inhibition due to the accelerator pedal being off idle.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3708 Diesel Particulate Filter Active Regeneration Inhibited Due to Out of Neutral

Indicates the state of diesel particulate filter active regeneration inhibition due to the transmission being out of neutral.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3709 Diesel Particulate Filter Active Regeneration Inhibited Due to Vehicle Speed Above Allowed Speed

Indicates the state of diesel particulate filter active regeneration inhibition due to the vehicle speed being above an allowed limit.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3710 Diesel Particulate Filter Active Regeneration Inhibited Due to Parking Brake Not Set

Indicates the state of diesel particulate filter active regeneration inhibition due to the parking brake being not set.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3711 Diesel Particulate Filter Active Regeneration Inhibited Due to Low Exhaust Gas Temperature

Indicates the state of diesel particulate filter active regeneration inhibition due to the exhaust gas temperature being too low. This implies that the diesel particulate filter and/or oxidation catalyst are likewise too cold for active regeneration.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64892	

SPN 3712 Diesel Particulate Filter Active Regeneration Inhibited Due to System Fault Active

Indicates the state of diesel particulate filter active regeneration inhibition due to a system fault being active.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3713 Diesel Particulate Filter Active Regeneration Inhibited Due to System Timeout

Indicates the state of diesel particulate filter active regeneration inhibition due to a system timeout.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3714 Diesel Particulate Filter Active Regeneration Inhibited Due to Temporary System Lockout

Indicates the state of diesel particulate filter active regeneration inhibition due to a temporary system lockout.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3715 Diesel Particulate Filter Active Regeneration Inhibited Due to Permanent System Lockout

Indicates the state of diesel particulate filter active regeneration inhibition due to a permanent system lockout.

00 not inhibited
01 inhibited
10 reserved for SAE assignment
11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64892	

SPN 3716 Diesel Particulate Filter Active Regeneration Inhibited Due to Engine Not Warmed Up

Indicates the state of diesel particulate filter active regeneration inhibition due to the engine not being warmed up.

00 not inhibited
 01 inhibited
 10 reserved for SAE assignment
 11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3717 Diesel Particulate Filter Active Regeneration Inhibited Due to Vehicle Speed Below Allowed Speed

Indicates the state of diesel particulate filter active regeneration inhibition due to vehicle speed being less than the allowed vehicle speed.

00 not inhibited
 01 inhibited
 10 reserved for SAE assignment
 11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3718 Diesel Particulate Filter Automatic Active Regeneration Initiation Configuration

Indicates the configuration of diesel particulate filter active regeneration automatic initiation.

00 not enabled
 01 enabled
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3719 Diesel Particulate Filter 1 Soot Load Percent

Indicates the soot load percent of diesel particulate filter 1. 100% is the level at which active diesel particulate filter regeneration should be triggered.

100% level is the active regeneration trigger level (and if conditions are not favorable for regeneration, soot loading can continue beyond 100%). During normal operation and regeneration a value 0% will indicate a fully regenerated diesel particulate filter. Values of 25%, 50% and 75% will indicate the general level of soot prior to the 100% level where an active regeneration is needed.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64891	

SPN 3720 Diesel Particulate Filter 1 Ash Load Percent

Indicates the ash load percent of diesel particulate filter 1. 100% is the level at which diesel particulate filter ash service should be performed.

100% level is the target ash service interval (and if ash service is not immediately performed, ash loading can continue beyond 100%).

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64891	

SPN 3721 Diesel Particulate Filter 1 Time Since Last Active Regeneration

Indicates the time since the last active regeneration event of diesel particulate filter 1.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64891	

SPN 3722 Diesel Particulate Filter 2 Soot Load Percent

Indicates the soot load percent of diesel particulate filter 2. 100% is the level at which active diesel particulate filter regeneration should be triggered.

100% level is the active regeneration trigger level (and if conditions are not favorable for regeneration, soot loading can continue beyond 100%). During normal operation and regeneration a value 0% will indicate a fully regenerated diesel particulate filter. Values of 25%, 50% and 75% will indicate the general level of soot prior to the 100% level where an active regeneration is needed.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64890	

SPN 3723 Diesel Particulate Filter 2 Ash Load Percent

Indicates the ash load percent of diesel particulate filter 2. 100% is the level at which diesel particulate filter ash service should be performed.

100% level is the target ash service interval (and if ash service is not immediately performed, ash loading can continue beyond 100%).

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64890	

SPN 3724 Diesel Particulate Filter 2 Time Since Last Active Regeneration

Indicates the time since the last active regeneration event of diesel particulate filter 2.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64890	

(R) SPN 3725 Aftertreatment 1 Diesel Particulate Filter Total Passive Regeneration Time

Total amount of time that aftertreatment 1 diesel particulate filter has been in passive regeneration over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64920	

(R) SPN 3726 Aftertreatment 1 Diesel Particulate Filter Total Number of Passive Regenerations

Total number of passive regenerations by aftertreatment device 1 over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64920	

(R) SPN 3727 Aftertreatment 1 Diesel Particulate Filter Total Number of Active Regeneration Inhibit Requests

Total number of aftertreatment device 1 active regeneration inhibit requests by the operator over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64920	

(R) SPN 3728 *Aftertreatment 1 Diesel Particulate Filter Total Number of Active Regeneration Manual Requests*

Total number of aftertreatment device 1 active regeneration manual requests by the operator over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64920	

(R) SPN 3729 *Aftertreatment 2 Diesel Particulate Filter Total Passive Regeneration Time*

Total amount of time that Aftertreatment device 2 has been in passive regeneration over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64921	

(R) SPN 3730 *Aftertreatment 2 Diesel Particulate Filter Total Number of Passive Regenerations*

Total number of passive regenerations by Aftertreatment device 2 over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64921	

(R) SPN 3731 *Aftertreatment 2 Diesel Particulate Filter Total Number of Active Regeneration Inhibit Requests*

Total number of Aftertreatment device 2 active regeneration inhibit requests by the operator over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64921	

(R) SPN 3732 *Aftertreatment 2 Diesel Particulate Filter Total Number of Active Regeneration Manual Requests*

Total number of Aftertreatment device 2 active regeneration manual requests by the operator over the lifetime of the device.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64921	

(R) SPN 3733 *Aftertreatment 1 Diesel Particulate Filter Trip Fuel Used*

Total amount of fuel used by the aftertreatment 1 diesel particulate filter during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64889	

(R) SPN 3734 *Aftertreatment 1 Diesel Particulate Filter Trip Active Regeneration Time*

Total amount of time that the aftertreatment 1 diesel particulate filter has been in active regeneration during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64889	

(R) SPN 3735 *Aftertreatment 1 Diesel Particulate Filter Trip Disabled Time*

Total amount of time that aftertreatment 1 diesel particulate filter regeneration has been manually disabled during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64889	

(R) SPN 3736 *Aftertreatment 1 Diesel Particulate Filter Trip Number of Active Regenerations*

Total number of active regenerations of the aftertreatment 1 diesel particulate filter during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64889	

(R) SPN 3737 *Aftertreatment 1 Diesel Particulate Filter Trip Passive Regeneration Time*

Total amount of time that the aftertreatment 1 diesel particulate filter has been in passive regeneration during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64889	

(R) SPN 3738 *Aftertreatment 1 Diesel Particulate Filter Trip Number of Passive Regenerations*

Total number of passive regenerations of the aftertreatment 1 diesel particulate filter during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64889	

(R) SPN 3739 *Aftertreatment 1 Diesel Particulate Filter Trip Number of Active Regeneration Inhibit Requests*

Total number of aftertreatment 1 diesel particulate filter active regeneration inhibit requests by the operator during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64889	

(R) SPN 3740 *Aftertreatment 1 Diesel Particulate Filter Trip Number of Active Regeneration Manual Requests*

Total number of aftertreatment 1 diesel particulate filter active regeneration manual requests by the operator during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64889	

(R) SPN 3741 *Aftertreatment 2 Diesel Particulate Filter Trip Fuel Used*

Total amount of fuel used by the aftertreatment 2 diesel particulate filter during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	0.5 L/bit, 0 offset	
Data Range:	0 to 2,105,540,607.5 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64888	

(R) SPN 3742 *Aftertreatment 2 Diesel Particulate Filter Trip Active Regeneration Time*

Total amount of time that the aftertreatment 2 diesel particulate filter has been in active regeneration during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64888	

(R) SPN 3743 *Aftertreatment 2 Diesel Particulate Filter Trip Disabled Time*

Total amount of time that aftertreatment 2 diesel particulate filter regeneration has been manually disabled during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64888	

(R) SPN 3744 *Aftertreatment 2 Diesel Particulate Filter Trip Number of Active Regenerations*

Total number of active regenerations of the aftertreatment 2 diesel particulate filter during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64888	

(R) SPN 3745 *Aftertreatment 2 Diesel Particulate Filter Trip Passive Regeneration Time*

Total amount of time that the aftertreatment 2 diesel particulate filter has been in passive regeneration during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64888	

(R) SPN 3746 *Aftertreatment 2 Diesel Particulate Filter Trip Number of Passive Regenerations*

Total number of passive regenerations of the aftertreatment 2 diesel particulate filter during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64888	

(R) SPN 3747 *Aftertreatment 2 Diesel Particulate Filter Trip Number of Active Regeneration Inhibit Requests*

Total number of aftertreatment 2 diesel particulate filter active regeneration inhibit requests by the operator during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64888	

(R) SPN 3748 *Aftertreatment 2 Diesel Particulate Filter Trip Number of Active Regeneration Manual Requests*

Total number of aftertreatment 2 diesel particulate filter active regeneration manual requests by the operator during the current trip period.

NOTE: This SPN needs to be reset by the reset PGN 56832.

Data Length:	4 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 4,211,081,215	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64888	

SPN 3750 Diesel Particulate Filter 1 Conditions Not Met for Active Regeneration

Indicates that diesel particulate filter 1 is not able to begin or continue an active regenerate event at the current engine operating conditions.

00 active DPF regeneration not inhibited
 01 active DPF regeneration inhibited
 10 reserved for SAE assignment
 11 not available

This SPN would indicate that the diesel particulate filter (bank 1) is not able to begin or continue an active regeneration event due to current engine operating conditions.

The conditions on these SPNs are exclusive to the conditions in the PGN 64892

Examples of these other conditions are:

- Engine Speed/Load Conditions not met
- Soot Load Percent not high enough
- Engine is a working mode scenario

SPN 3702 should be set to inhibited when SPN 3750 goes to inhibited status.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 3785 Tractor Brake Stroke Axle 1 Left

Brake stroke status for left brake actuator on tractor axle 1.

000 - OK (Normal operation)
 001 - Non-functioning
 010 - Overstroke
 011 - Dragging brake
 100 - Reserved
 101 - Reserved
 110 - Sensor error
 111 - Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 3785	
PGN reference:	64881	

SPN 3786 *Tractor Brake Stroke Axle 1 Right*

Brake stroke status for right brake actuator on tractor axle 1.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3787 *Tractor Brake Stroke Axle 2 Left*

Brake stroke status for left brake actuator on tractor axle 2.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3788 *Tractor Brake Stroke Axle 2 Right*

Brake stroke status for right brake actuator on tractor axle 2.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3789 *Tractor Brake Stroke Axle 3 Left*

Brake stroke status for left brake actuator on tractor axle 3.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3790 *Tractor Brake Stroke Axle 3 Right*

Brake stroke status for right brake actuator on tractor axle 3.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3791 *Tractor Brake Stroke Axle 4 Left*

Brake stroke status for left brake actuator on tractor axle 4.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3792 Tractor Brake Stroke Axle 4 Right

Brake stroke status for right brake actuator on tractor axle 4.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3793 Tractor Brake Stroke Axle 5 Left

Brake stroke status for left brake actuator on tractor axle 5.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3794 Tractor Brake Stroke Axle 5 Right

Brake stroke status for right brake actuator on tractor axle 5.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3795 Trailer Brake Stroke Axle 1 Left

Brake stroke status for left brake actuator on trailerr axle 1.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3796 Trailer Brake Stroke Axle 1 Right

Brake stroke status for right brake actuator on trailer axle 1.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3797 Trailer Brake Stroke Axle 2 Left

Brake stroke status for left brake actuator on trailer axle 2.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3798 Trailer Brake Stroke Axle 2 Right

Brake stroke status for right brake actuator on trailer axle 2.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3799 Trailer Brake Stroke Axle 3 Left

Brake stroke status for left brake actuator on trailer axle 3.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3800 Trailer Brake Stroke Axle 3 Right

Brake stroke status for right brake actuator on trailer axle 3.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3801 Trailer Brake Stroke Axle 4 Left

Brake stroke status for left brake actuator on trailer axle 4.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3802 Trailer Brake Stroke Axle 4 Right

Brake stroke status for right brake actuator on trailer axle 4.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3803 Trailer Brake Stroke Axle 5 Left

Brake stroke status for left brake actuator on trailer axle 5.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3804 Trailer Brake Stroke Axle 5 Right

Brake stroke status for right brake actuator on trailer axle 5.

000 - OK (Normal operation)

001 - Non-functioning

010 - Overstroke

011 - Dragging brake

100 - Reserved

101 - Reserved

110 - Sensor error

111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 3785

PGN reference: 64881

SPN 3807 Park Brake Release Inhibit Request

Park Brake Release Inhibit Request signals the desire that an applied park brake remain applied and limit the ability of the vehicle to be moved.

00 - Park Brake Release Inhibit not requested

01 - Park Brake Release Inhibit requested

10 - SAE reserved

11 - Unavailable

This parameter provides the capability to request the device controlling a parking brake to inhibit its release. This is intended for devices to request the park brake remain applied. Status 00b is provided when conditions recommending the application of the park brake no longer exist for the sender.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65265

SPN 3808 Park Brake Release Inhibit Status

This parameter provides reports on the status of the Park Brake Release Inhibit function.

00 - Park Brake release is not inhibited

01 - Park Brake release is inhibited

10 - Error (for example: Park Brake release is not inhibited, but is requested to be inhibited)

11 - Unavailable

The device controlling the Park Brake sends a status of the inhibit function. The allowed release of the park brake is provided as status 00b. 01b indicates that the release of the park brake is inhibited. The release may be inhibited by either an external request or by local information available to the controlling device.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65274

SPN 3809 *Transmission Oil Level Request*

Conveys operator or vehicle system desire for a transmission oil level reading to be taken.

00 - No transmission oil level reading desired
01 - Transmission oil level reading desired
10 - Reserved
11 - Don't care / take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64980

Operational Range: same as data range

SPN 3810 *Retract Status of ramp 1*

Retract status of ramp at doorway 1, counting from front to back on the vehicle.

00 ramp retracted
01 ramp extended
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64880

Operational Range: same as data range

SPN 3811 *Enable status of ramp 1*

Enable status of ramp at doorway 1, counting from front to back on the vehicle.

00 ramp disabled
01 ramp enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64880

Operational Range: same as data range

SPN 3812 *Movement status of ramp 1*

Movement status of ramp at doorway 1, counting from front to back on the vehicle.

00 ramp not being moved

01 ramp being moved

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64880

SPN 3813 *Retract Status of ramp 2*

Retract status of ramp at doorway 2, counting from front to back on the vehicle.

00 ramp retracted

01 ramp extended

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64880

SPN 3814 *Enable status of ramp 2*

Enable status of ramp at doorway 2, counting from front to back on the vehicle.

00 ramp disabled

01 ramp enabled

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64880

SPN 3815 *Movement status of ramp 2*

Movement status of ramp at doorway 2, counting from front to back on the vehicle.

00 ramp not being moved

01 ramp being moved

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64880

SPN 3816 *Retract Status of ramp 3*

Retract status of ramp at doorway 3, counting from front to back on the vehicle.

00 ramp retracted

01 ramp extended

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64880

SPN 3817 *Enable status of ramp 3*

Enable status of ramp at doorway 3, counting from front to back on the vehicle.

00 ramp disabled

01 ramp enabled

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64880

SPN 3818 *Movement status of ramp 3*

Movement status of ramp at doorway 3, counting from front to back on the vehicle.

00 ramp not being moved

01 ramp being moved

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64880

SPN 3819 *Front axle group engagement status*

Front axle group engagement status

00 front axle group disengaged

01 front axle group engaged

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61446

SPN 3820 *Rear axle group engagement status*

Rear axle group engagement status

00 rear axle group disengaged

01 rear axle group engaged

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61446

SPN 3821 *Engine Exhaust Gas Recirculation 1 (EGR1) Valve 2 Control*

Desired percentage of maximum Exhaust Gas Recirculation (EGR) valve opening for valve 2. 0% means valve is closed.

100% means maximum valve opening (full gas flow).

Data Length: 2 bytes

Resolution: 0.0025 %/bit, 0 offset

Data Range: 0 to 160.6375 %

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 27

PGN reference: 64879

SPN 3822 Engine Exhaust Gas Recirculation 1 Valve 2 Position

The position of the second exhaust gas recirculation valve expressed as a percentage of full travel. Zero percent means the valve is closed and no exhaust gas is flowing into the intake air stream. One hundred percent means the valve is fully opened.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 27	
PGN reference:	64916	

SPN 3823 Transmission Torque Converter Oil Outlet Temperature

Temperature of transmission torque converter outlet oil.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64917	

SPN 3826 Aftertreatment 1 Diesel Exhaust Fluid Average Consumption

Measured use of diesel exhaust fluid by a Selective Catalytic Reduction system for exhaust emission control, averaged over the previous 15 hours of engine operation.

Used to determine whether the SCR system is using an appropriate amount of diesel exhaust fluid, by comparing with the Aftertreatment 1 Commanded Diesel Exhaust Fluid Consumption parameter (SPN 3828).

Data Length:	2 bytes	
Resolution:	0.05 L/h per bit, 0 offset	
Data Range:	0 to 3,212.75 L/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64878	

SPN 3828 Aftertreatment 1 Commanded Diesel Exhaust Fluid Consumption

This parameter transmits the amount of diesel exhaust fluid that the emissions control system has requested to be used, averaged over the past 15 hours of engine operation.

Used to determine whether the SCR system is using an appropriate amount of diesel exhaust fluid, by comparing with the Aftertreatment 1 Average Diesel Exhaust Fluid Consumption parameter (SPN 3826).

Data Length:	2 bytes	
Resolution:	0.05 L/h per bit, 0 offset	
Data Range:	0 to 3,212.75 L/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64878	

SPN 3830 *Aftertreatment 1 Secondary Air Differential Pressure*

Indicates the secondary air differential pressure for aftertreatment 1. Secondary air is air provided to the exhaust system (per SAE J2403).

Data Length:	2 bytes	
Resolution:	1/128 kPa/bit, -250 kPa offset	
Data Range:	-250 kPa TO 251.99 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64877	

SPN 3831 *Aftertreatment 1 Secondary Air Temperature*

Indicates the secondary air temperature for aftertreatment 1. Secondary air is air provided to the exhaust system (per SAE J2403).

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64877	

SPN 3832 *Aftertreatment 1 Secondary Air Mass Flow*

Indicates the secondary air mass flow for aftertreatment 1. Secondary air is the air provided to the exhaust system (per SAE J2403).

Data Length:	2 bytes	
Resolution:	0.2 kg/h per bit, 0 offset	
Data Range:	0 to 12851 kg/h per bit	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64877	

SPN 3833 *Aftertreatment 2 Secondary Air Differential Pressure*

Indicates the secondary air differential pressure for aftertreatment 2. Secondary air is air provided to the exhaust system (per SAE J2403).

Data Length:	2 bytes	
Resolution:	1/128 kPa/bit, -250 kPa offset	
Data Range:	-250 kPa TO 251.99 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64876	

SPN 3834 *Aftertreatment 2 Secondary Air Temperature*

Indicates the secondary air temperature for aftertreatment 2. Secondary air is air provided to the exhaust system (per SAE J2403).

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64876	

SPN 3835 *Aftertreatment 2 Secondary Air Mass Flow*

Indicates the secondary air mass flow for aftertreatment 2. Secondary air is the air provided to the exhaust system (per SAE J2403).

Data Length:	2 bytes	
Resolution:	0.2 kg/h per bit, 0 offset	
Data Range:	0 to 12851 kg/h per bit	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64876	

SPN 3837 *Aftertreatment 1 Secondary Air Pressure*

Pressure of the secondary air for aftertreatment 1. Secondary air is air provided to the exhaust system (per SAE J2403).

For absolute pressure, see SPN 5589.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64877	

SPN 3838 *Aftertreatment 2 Secondary Air Pressure*

Pressure of the secondary air for aftertreatment 2. Secondary air is air provided to the exhaust system (per SAE J2403).

For absolute pressure, see SPN 5590.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64876	

SPN 3839 *Brake Temperature Warning*

This parameter indicates if the temperature in the service brakes exceeds a certain value. It can be used for a warning information for the driver. The temperature warning value is vehicle manufacturer specific.

00 Not Active
01 Active
10 Reserved
11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64964	

SPN 3840 Auxiliary I/O #17

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3841 Auxiliary I/O #18

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3842 Auxiliary I/O #19

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3843 Auxiliary I/O #20

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3844 Auxiliary I/O #21

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3845 Auxiliary I/O #22

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3846 Auxiliary I/O #23

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off

01 - Auxiliary channel on

10 - Error Indicator or Not Used , depending on application

11 - Not Available or Take No Action, depending on application

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Dependent upon Application

Supporting Information:

PGN reference: 42752

SPN 3847 Auxiliary I/O #24

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off

01 - Auxiliary channel on

10 - Error Indicator or Not Used , depending on application

11 - Not Available or Take No Action, depending on application

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Dependent upon Application

Supporting Information:

PGN reference: 42752

SPN 3848 Auxiliary I/O #25

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off

01 - Auxiliary channel on

10 - Error Indicator or Not Used , depending on application

11 - Not Available or Take No Action, depending on application

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Dependent upon Application

Supporting Information:

PGN reference: 42752

SPN 3849 Auxiliary I/O #26

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3850 Auxiliary I/O #27

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3851 Auxiliary I/O #28

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3852 Auxiliary I/O #29

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3853 Auxiliary I/O #30

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3854 Auxiliary I/O #31

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3855 Auxiliary I/O #32

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3856 Auxiliary I/O #33

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3857 Auxiliary I/O #34

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3858 Auxiliary I/O #35

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3859 Auxiliary I/O #36

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3860 Auxiliary I/O #37

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3861 Auxiliary I/O #38

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3862 Auxiliary I/O #39

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3863 Auxiliary I/O #40

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3864 Auxiliary I/O #41

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3865 Auxiliary I/O #42

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3866 Auxiliary I/O #43

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3867 Auxiliary I/O #44

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3868 Auxiliary I/O #45

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3869 Auxiliary I/O #46

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42752	

SPN 3870 Auxiliary I/O #47

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off

01 - Auxiliary channel on

10 - Error Indicator or Not Used , depending on application

11 - Not Available or Take No Action, depending on application

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Dependent upon Application

Supporting Information:

PGN reference: 42752

SPN 3871 Auxiliary I/O #48

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off

01 - Auxiliary channel on

10 - Error Indicator or Not Used , depending on application

11 - Not Available or Take No Action, depending on application

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Dependent upon Application

Supporting Information:

PGN reference: 42752

SPN 3872 Auxiliary I/O #49

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off

01 - Auxiliary channel on

10 - Error Indicator or Not Used , depending on application

11 - Not Available or Take No Action, depending on application

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Dependent upon Application

Supporting Information:

PGN reference: 42496

SPN 3873 Auxiliary I/O #50

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3874 Auxiliary I/O #51

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3875 Auxiliary I/O #52

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3876 Auxiliary I/O #53

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3877 Auxiliary I/O #54

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3878 Auxiliary I/O #55

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3879 Auxiliary I/O #56

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off

01 - Auxiliary channel on

10 - Error Indicator or Not Used , depending on application

11 - Not Available or Take No Action, depending on application

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Dependent upon Application

Supporting Information:

PGN reference: 42496

SPN 3880 Auxiliary I/O #57

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off

01 - Auxiliary channel on

10 - Error Indicator or Not Used , depending on application

11 - Not Available or Take No Action, depending on application

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Dependent upon Application

Supporting Information:

PGN reference: 42496

SPN 3881 Auxiliary I/O #58

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

00 - Auxiliary channel off

01 - Auxiliary channel on

10 - Error Indicator or Not Used , depending on application

11 - Not Available or Take No Action, depending on application

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Dependent upon Application

Supporting Information:

PGN reference: 42496

SPN 3882 Auxiliary I/O #59

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3883 Auxiliary I/O #60

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3884 Auxiliary I/O #61

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3885 Auxiliary I/O #62

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3886 Auxiliary I/O #63

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3887 Auxiliary I/O #64

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3888 Auxiliary I/O #65

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3889 Auxiliary I/O #66

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3890 Auxiliary I/O #67

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3891 Auxiliary I/O #68

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3892 Auxiliary I/O #69

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3893 Auxiliary I/O #70

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3894 Auxiliary I/O #71

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3895 Auxiliary I/O #72

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3896 Auxiliary I/O #73

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3897 Auxiliary I/O #74

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3898 Auxiliary I/O #75

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3899 Auxiliary I/O #76

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3900 Auxiliary I/O #77

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3901 Auxiliary I/O #78

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3902 Auxiliary I/O #79

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3903 Auxiliary I/O #80

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42496	

SPN 3904 Auxiliary I/O #81

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3905 Auxiliary I/O #82

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3906 Auxiliary I/O #83

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3907 Auxiliary I/O #84

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3908 Auxiliary I/O #85

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3909 Auxiliary I/O #86

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3910 Auxiliary I/O #87

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3911 Auxiliary I/O #88

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3912 Auxiliary I/O #89

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3913 Auxiliary I/O #90

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3914 Auxiliary I/O #91

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3915 Auxiliary I/O #92

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3916 Auxiliary I/O #93

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3917 Auxiliary I/O #94

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3918 Auxiliary I/O #95

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3919 Auxiliary I/O #96

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3920 Auxiliary I/O #97

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3921 Auxiliary I/O #98

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3922 Auxiliary I/O #99

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3923 Auxiliary I/O #100

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3924 Auxiliary I/O #101

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3925 Auxiliary I/O #102

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3926 Auxiliary I/O #103

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3927 Auxiliary I/O #104

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3928 Auxiliary I/O #105

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3929 Auxiliary I/O #106

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3930 Auxiliary I/O #107

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3931 Auxiliary I/O #108

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3932 Auxiliary I/O #109

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3933 Auxiliary I/O #110

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3934 Auxiliary I/O #111

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3935 Auxiliary I/O #112

Identifies the current status of auxiliary input/output functions that are configured uniquely per application.

- 00 - Auxiliary channel off
- 01 - Auxiliary channel on
- 10 - Error Indicator or Not Used , depending on application
- 11 - Not Available or Take No Action, depending on application

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	42240	

SPN 3939 *Enable Switch - PTO Engine Flywheel*

Status of the PTO Engine Flywheel enable switch

00 Enable switch off – PTO operation not desired

01 Enable switch on – PTO operation desired

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64932

SPN 3940 *Engagement Consent - PTO Engine Flywheel*

Engagement Consent status for the PTO Engine Flywheel

00 Consent not given – PTO drive may not be engaged

01 Consent given – PTO drive may be engaged

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64932

SPN 3941 *Engagement Status - PTO Engine Flywheel*

Engagement status of the PTO Engine Flywheel

00 Drive not engaged

01 Drive engaged

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64932

SPN 3942 *Enable Switch - PTO Engine Accessory Drive 1*

Status of the PTO engine accessory drive 1 enable switch

00 Enable switch off – PTO operation not desired
01 Enable switch on – PTO operation desired
10 Error
11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

SPN 3943 *Engagement Consent - PTO Engine Accessory Drive 1*

Engagement consent status for the PTO engine accessory drive 1

00 Consent not given – PTO drive may not be engaged
01 Consent given – PTO drive may be engaged
10 Error
11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

SPN 3944 *Engagement Status - PTO Engine Accessory Drive 1*

Engagement status of the PTO engine accessory drive 1

00 Drive not engaged
01 Drive engaged
10 Error
11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

SPN 3945 *Enable Switch - PTO Engine Accessory Drive 2*

Status of the PTO engine accessory drive 2 enable switch

- 00 Enable switch off – PTO operation not desired
- 01 Enable switch on – PTO operation desired
- 10 Error
- 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

SPN 3946 *Engagement Consent - PTO Engine Accessory Drive 2*

Engagement Consent status for the PTO engine accessory drive 2

- 00 Consent not given – PTO drive may not be engaged
- 01 Consent given – PTO drive may be engaged
- 10 Error
- 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

SPN 3947 *Engagement Status - PTO Engine Accessory Drive 2*

Engagement status of the PTO engine accessory drive 2

- 00 Drive not engaged
- 01 Drive engaged
- 10 Error
- 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64932	

SPN 3948 *At least one PTO engaged*

Indicates that at least one PTO is engaged

00 No PTO drive is engaged

01 At least one PTO drive is engaged

10 Error

11 Not available

Note: This parameter should only be sent by the controller that has knowledge of all PTO drives on the vehicle (e.g, the FMS gateway). Individual PTO drive controllers should broadcast this parameter as "not available".

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64932

SPN 3987 *Compression Brake Enable Switch Indicator Lamp Command*

Command signal directly controlling Compression Brake Enable Switch Indicator Lamp. The compression brake switch indicator signals the status of the compression brake enable switch to the operator.

00 - Lamp OFF

01 - Lamp ON

10 - Reserved

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64775

SPN 4059 *Steer Axle Group Weight Available*

Indicates the availability of the steer axle group for purposes of weight measurement

00 = Steer axle group not present

01 = Steer axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4060 *Lift Axle Group Weight Available*

Indicates the availability of the lift axle group for purposes of weight measurement

00 = Lift axle group not present

01 = Lift axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4061 *Drive Axle Group Weight Available*

Indicates the availability of the drive axle group for purposes of weight measurement

00 = Drive axle group not present

01 = Drive axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4062 *Tag Axle Group Weight Available*

Indicates the availability of the tag axle group for purposes of weight measurement

00 = Tag axle group not present

01 = Tag axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4063 *Additional Tractor Axle Group Weight Available*

Indicates the availability of the additional tractor axle group for purposes of weight measurement

00 = Additional tractor axle group not present

01 = Additional tractor axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4064 *Trailer A Axle Group Weight Available*

Indicates the availability of the trailer A axle group for purposes of weight measurement

00 = Trailer A axle group not present

01 = Trailer A axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4065 *Trailer B Axle Group Weight Available*

Indicates the availability of the trailer B axle group for purposes of weight measurement

00 = Trailer B axle group not present

01 = Trailer B axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4066 Trailer C Axle Group Weight Available

Indicates the availability of the trailer C axle group for purposes of weight measurement

00 = Trailer C axle group not present

01 = Trailer C axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4067 Trailer D Axle Group Weight Available

Indicates the availability of the trailer D axle group for purposes of weight measurement

00 = Trailer D axle group not present

01 = Trailer D axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4068 Trailer E Axle Group Weight Available

Indicates the availability of the trailer E axle group for purposes of weight measurement

00 = Trailer E axle group not present

01 = Trailer E axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4069 Trailer F Axle Group Weight Available

Indicates the availability of the trailer F axle group for purposes of weight measurement

00 = Trailer F axle group not present

01 = Trailer F axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4070 Trailer G Axle Group Weight Available

Indicates the availability of the trailer G axle group for purposes of weight measurement

00 = Trailer G axle group not present

01 = Trailer G axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4071 Trailer H Axle Group Weight Available

Indicates the availability of the trailer H axle group for purposes of weight measurement

00 = Trailer H axle group not present

01 = Trailer H axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4072 Additional Trailer Axle Group Weight Available

Indicates the availability of the additional trailer axle group for purposes of weight measurement

00 = Additional trailer axle group not present

01 = Additional trailer axle group present

10 = Reserved

11 = Not available / not applicable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64875

SPN 4073 Axle Group Location

Specific axle group used in conjunction with and when communicating the axle group weight, listed from the front of the vehicle to the rear.

0 = Reserved

1 = Steer axle group

2 = Lift axle group

3 = Drive axle group

4 = Tag axle group

5 = Additional tractor axle group

6 = Trailer A axle group

7 = Trailer B axle group

8 = Trailer C axle group

9 = Trailer D axle group

10 = Trailer E axle group

11 = Trailer F axle group

12 = Trailer G axle group

13 = Trailer H axle group

14 = Additional trailer axle group

15 = Reserved

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64874

SPN 4074 Axle Group Location

Specific axle group used in conjunction with and when communicating the axle group calibration, listed from the front of the vehicle to the rear.

- 0 = Reserved
- 1 = Steer axle group
- 2 = Lift axle group
- 3 = Drive axle group
- 4 = Tag axle group
- 5 = Additional tractor axle group
- 6 = Trailer A axle group
- 7 = Trailer B axle group
- 8 = Trailer C axle group
- 9 = Trailer D axle group
- 10 = Trailer E axle group
- 11 = Trailer F axle group
- 12 = Trailer G axle group
- 13 = Trailer H axle group
- 14 = Additional trailer axle group
- 15 = Reserved

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64873	

SPN 4075 Zero Net Vehicle Weight Change

Zero Net Vehicle Weight Change command. A controller receiving this command will record the current Gross Combination Weight as the new Zero, and future requests for Net Vehicle Weight Change will be answered with the difference between the (then) current Gross Combination Weight and the recorded value.

- 00 - No change to Net Vehicle Weight Change
- 01 - Zero Net Vehicle Weight Change
- 10 - Reserved
- 11 - Not available / Not applicable

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64871	

SPN 4076 Engine Coolant Temperature 2

Second temperature of liquid found in the engine cooling system. See also SPN 110.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64870	

SPN 4077 *Aftertreatment 1 Fuel Pressure 2*

Second fuel pressure measurement for the aftertreatment 1 system

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64869	

SPN 4082 *Fuel Pump Primer Control*

Parameter used to activate or deactivate a priming system on the fuel transfer system. The fuel priming system is a system that purges air in the fuel lines and may assist fuel delivery to a second pump at lower speeds.

00 = Deactivate
 01 = Activate
 10 = Reserved
 11 = Unavailable

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64914	

SPN 4083 *Fuel Pump Primer Status*

Parameter used to transmit the actual status of the fuel priming system. The fuel priming system is a system that purges air in the fuel lines and may assist fuel delivery to a second pump at lower speeds.

00 – Off
 01 – On
 10 – Error
 11 – Unavailable

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65130	

SPN 4086 *Valve Load Sense Pressure*

The maximum of the currently measured pressures of a valve's work port A and work port B.

Data Length:	2 bytes	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 321,275 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	1792	

SPN 4087 Valve Pilot Pressure

Pressure of a valve's pilot supply port.

Data Length:	1 byte	
Resolution:	16 kPa/bit, 0 offset	
Data Range:	0 to 4000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	1792	

SPN 4088 Valve Assembly Load sense Pressure

The maximum pressure of a valve assembly's current collective load sense pressures where a valve assembly can consist of two or more valves.

Data Length:	2 bytes	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 321,275 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	1792	

SPN 4089 Valve Assembly Supply Pressure

Pressure of the hydraulic supply port to a valve assembly.

Data Length:	2 bytes	
Resolution:	5 kPa/bit, 0 offset	
Data Range:	0 to 321,275 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	1792	

SPN 4097 Aftertreatment 1 Fuel Drain Actuator

Indicates whether aftertreatment 1 fuel drain actuator is on or off

00 not active
 01 active
 10 reserved for SAE assignment
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64929	

SPN 4098 *Aftertreatment 2 Fuel Drain Actuator*

Indicates whether aftertreatment 2 fuel drain actuator is on or off

00 not active

01 active

10 reserved for SAE assignment

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64928

SPN 4099 *XBR urgency*

The idea of the urgency value is to adjust the endurance brake integration behavior in the EBS system according to the traffic situation.

On low urgency values (0%, e.g. downhill cruise control or preceding vehicle far ahead) the brake system shall primarily use endurance brakes to reduce lining wear.

On high urgency values (100%, e.g. vehicle close up or a vehicle cuts into the traffic line just before host vehicle) the brake system is expected to gain the demanded deceleration (acceleration) as fast as possible.

Values:

0% - Situation not critical; low retarder dynamics are tolerated. Activation of the foundation brakes after a time if retarder performance is insufficient

y % - Faster activation of foundation brakes to compensate retarder performance, linear interpolation between 0 and 100%

100% - Low retarder dynamics shall be fully compensated by the foundation brakes

Notes:

- This parameter has only an effect if XBR EBI switch is set to "10: endurance brake integration allowed"

- XBR urgency makes sense only if the XBR request(s) is (are) processed in one device like the EBS controller which also sends TSC1 to the retarder(s). Such a data flow diagram is shown in figure PGN1024_A. When the Retarder is controlled directly by the XBR transmitter XBR urgency should be set to not available.

In adaptive cruise control (ACC) operation there are situations where it is useful to have as less lining wear as possible like keeping the set speed on going downhill. It would not be useful to activate foundation brakes in such a situation except when the capabilities of the endurance brakes are not sufficient.

In other situations like emergency braking or fast reaction on a car that cut in at a short distance in front of the own vehicle a reaction as fast as possible is needed. In such cases low retarder dynamics must be compensated by the foundation brakes.

There are two different ways to integrate the endurance brakes into the adaptive cruise control.

a) the request for deceleration could be processed by the EBS system completely. This means that the EBS receives the deceleration demand and activates the friction and/or the endurance brakes accordingly. EBS is sending the TSC1 to the retarder. (see figure PGN1024_A dataflow diagram for external brake request)

b) the ACC sends XBR to the brake controller and TSC1 to the endurance brakes.

In case "a)" the ACC system does not have direct control of the endurance brakes. To adjust the endurance brakes according to the traffic situation (high or low urgency values see above) this new SPN is needed.

If the retarder performance is not sufficient (e.g. because of high retarder temperature) the foundation brakes will be added automatically. This case of not sufficient retarder performance cannot be covered by switching EBI mode from 01

(endurance brakes only) to EBI mode 10 (endurance brake integration allowed) because the actual deceleration caused by the retarder is less than the requested deceleration. A simple switching (01 to 10) would cause an uncomfortable jerk.

NOTE: This parameter is defined in European patent EP 1 386 774 B1 (see reference in section 2.1.3) and is included with permission from the patent holder. The patent holder is prepared to grant a free license to an unrestricted number of applicants on a worldwide, non-discriminatory basis to comply with this recommended practice.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	1024	

SPN 4151 *Engine Exhaust Gas Temperature Average*

The calculated average temperature based upon all of the engine exhaust port temperatures. This is the average temperature based upon the exhaust port temperature measurements at each of the engine cylinders.

Notes:

Use SPN 173 - Engine Exhaust Gas Temperature to report the actual measured temperature of the exhaust for the entire engine, after the turbocharger.

See SPN 2433 - Engine Exhaust Gas Temperature - Right Manifold, and SPN 2434 - Engine Exhaust Gas Temperature - Left Manifold to report the actual measured temperature of the manifold for engines requiring more than one exhaust temperature measurement.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 4151	
PGN reference:	64851	

SPN 4152 *Engine Exhaust Gas Temperature Average - Bank 2*

The calculated average temperature based upon all of the Bank 2 (right bank) engine exhaust port temperatures. This is the average temperature based upon the exhaust port temperature measurements of each of the engine cylinders on the right bank before the turbocharger.

Use SPN 2433 Engine Exhaust Gas Temperature - Right Manifold to report the actual measured temperature of the manifold on the right side as seen from the flywheel end of the engine.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 4151	
PGN reference:	64851	

SPN 4153 Engine Exhaust Gas Temperature Average - Bank 1

The calculated average temperature based upon all of the Bank 1 (left bank) engine exhaust port temperatures. This is the average temperature based upon the exhaust port temperature measurements of each of the engine cylinders on the left bank prior to the turbocharger.

Use SPN 2434 Engine Exhaust Gas Temperature - Left Manifold to report the actual measured temperature of the manifold on the left side as seen from the flywheel end of the engine.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Status
 Supporting Information: See Appendix D - SPN 4151
 PGN reference: 64851

SPN 4154 Actual Engine - Percent Torque High Resolution

This parameter displays an additional torque in percent of the reference engine torque.

When the MSB is set to 1, this parameter is not available. When the MSB is set to 0, bits 1 to 3 indicate the desired torque with resolution of 0.125%/bit. Range is from 0 to 0.875% of reference torque.

The parameter is used in combination with SPN 513 Actual Engine Torque. The resulting actual engine torque will be calculated by adding these two parameters.

Additional torque representations

0000 = +0.000%
 0001 = +0.125%
 .
 .
 .
 0111 = +0.875%
 1000 - 1111 = not available

For example, if SPN 513 = 150 (or 25%) and this parameter is 0100, the torque would be 25.5%.

If SPN 513 = 175 (or 50%) and this parameter is 0001, the torque would be 50.125%

If SPN 513 = 175 (or 50%) and this parameter is 1111, the torque would remain 50% (no high resolution available)

Data Length: 4 bits
 Resolution: 0.125%/bit, 0 offset
 Data Range: 0 to 0.875% Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 61444

SPN 4155 Auxiliary I/O Channel #6

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length: 2 bytes
 Resolution: 1 count/bit, 0 offset
 Data Range: 0 to 64,255 Operational Range: same as data range
 Type: Dependent upon Application
 Supporting Information:
 PGN reference: 2048

SPN 4156 Auxiliary I/O Channel #5

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 64,255	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	2048	

SPN 4157 Auxiliary I/O Channel #4

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 64,255	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	2048	

SPN 4158 Auxiliary I/O Channel #3

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 64,255	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	2048	

SPN 4159 Auxiliary I/O Channel #10

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	40192	

SPN 4160 Auxiliary I/O Channel #9

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	40192	

SPN 4161 Auxiliary I/O Channel #8

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	40192	

SPN 4162 Auxiliary I/O Channel #7

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	40192	

SPN 4163 Auxiliary I/O Channel #14

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	40192	

SPN 4164 Auxiliary I/O Channel #13

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	40192	

SPN 4165 Auxiliary I/O Channel #12

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	40192	

SPN 4166 Auxiliary I/O Channel #11

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	40192	

SPN 4167 Auxiliary I/O Channel #18

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	39936	

SPN 4168 Auxiliary I/O Channel #17

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	39936	

SPN 4169 Auxiliary I/O Channel #16

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	39936	

SPN 4170 Auxiliary I/O Channel #15

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	39936	

SPN 4171 Auxiliary I/O Channel #22

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	39936	

SPN 4172 Auxiliary I/O Channel #21

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	39936	

SPN 4173 Auxiliary I/O Channel #20

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	39936	

SPN 4174 Auxiliary I/O Channel #19

Identifies the current value of auxiliary input/output channels that are configured uniquely per application.

Data Length:	1 byte	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Dependent upon Application	
Supporting Information:		
PGN reference:	39936	

SPN 4175 Diesel Particulate Filter Active Regeneration Forced Status

Indicates the forced execution status of diesel particulate filter regeneration.

000 Not Active

001 Active – Forced by Switch (See SPN 3696)

010 Active – Forced by Service Tool

011 Reserved for SAE Assignment

100 Reserved for SAE Assignment

101 Reserved for SAE Assignment

110 Reserved for SAE Assignment

111 not available

This SPN indicates the forced execution status of diesel particulate filter regeneration. The SPN would be “Not Active” when the execution of diesel particulate filter regeneration has not been forced. Either of the states “Active – Forced by Switch” and “Active – Forced by Service Tool” will be active when execution of diesel particulate filter regeneration is forced, providing feedback as to which entity forced the execution of diesel particulate filter regeneration.

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64892

SPN 4176 Transmission Current Range Display Blank State

State signal indicating a transmission request for the display of the Transmission Current Range parameter (SPN 163) to be blanked or not blanked. The 'Transmission Current Range Display Blank State' indicator can be utilized by (but not limited to) the shift console, instrument cluster, or cab display. Definition of the cause of this state is at the discretion of the transmission manufacturer.

00=Not Blanked

01=Blanked

10=Error

11=Not Supported

Note: This is a companion of SPN 1850, that will allow the "current range" display to be blanked as needed while still retaining a valid current range broadcast in SPN 163.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65098

SPN 4177 Transmission Oil Life Remaining

Signal which indicates the actual oil life remaining in percent. 100% means the transmission oil is brand new, and 0% means the transmission oil is at the end of its life.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64917

SPN 4178 *Transmission Service Indicator*

Signal from transmission indicating that some aspect of the gearbox requires servicing, such as the oil, filter, clutch(es) or other component.

- 00 Transmission Service Indicator is off
- 01 Transmission Service Indicator is on continuously
- 10 Transmission Service Indicator is flashing
- 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65098	

SPN 4180 *Data Dictionary Manufacturer Code*

The J1939 Manufacturer Code (see J1939 Table B10) associated with the manufacturer who defined the proprietary communications method. 0x7FF reserved for "Not Available"

Data Length:	11 bits	
Resolution:	2047 states/11bit, 0 offset	
Data Range:	0 to 2047	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	39680	

SPN 4181 *Data Dictionary Method*

A manufacturer defined code to define the proprietary communications method. The structure and interpretation of the code is manufacturer specific. This allows manufacturers to establish their own methods for reporting proprietary support for PropA, PropA2, and PropB messages.

Data Length:	21 bits	
Resolution:	2097151 states/21bit, 0 offset	
Data Range:	0 to 2097151	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	39680	

SPN 4191 Engine Requested Torque - High Resolution

This parameter displays an additional torque in percent of the reference engine torque.

When the MSB is set to 1, this parameter is not available. When the MSB is set to 0, bits 1 to 3 indicate the desired torque with resolution of 0.125%/bit . Range is from 0 to 0.875% of reference torque.

The parameter is used in combination with SPN 518 Engine Requested Torque/Torque Limit. The resulting torque/torque limit will be calculated by adding these two parameters.

Validity of Engine Requested Torque High Res has no effect on SPN 518.

Additional torque representations

0000 = +0.000%

0001 = +0.125%

.

.

.

0111 = +0.875%

1000 - 1111 = not available

For example, if SPN 518 = 150 (or 25%) and this parameter is 0100, the torque would be 25.5%.

If SPN 518 = 175 (or 50%) and this parameter is 0001, the torque would be 50.125%

If SPN 518 = 175 (or 50%) and this parameter is 1111, the torque would remain 50% (no high resolution available)

Data Length: 4 bits

Resolution: 0.125%/bit, 0 offset

Data Range: 0 to 0.875%

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 0

SPN 4193 Engine Coolant Pump Outlet Temperature

The actual value of engine coolant temperature at the coolant pump outlet

Data Length: 1 byte

Resolution: 1 deg C/bit, -40 deg C offset

Data Range: -40 to 210 deg C

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64870

SPN 4194 Engine Coolant Thermostat Opening

The current position of the Thermostat used to regulate the temperature of the engine coolant. 0% represents the thermostat allows flow to completely bypass the radiator and 100% represents the flow is fully through the radiator.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64870

SPN 4195 Engine Coolant Thermostat Mode

Specifies if the engine coolant thermostat valve will operate in temperature control mode or position control mode.

00 = temperature control mode

01 = position control mode (used for service only)

10 = reserved

11 = don't care/reserved

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64850

SPN 4196 Desired Engine Coolant Pump Outlet Temperature

Desired engine coolant temperature of the engine to an electronic thermostat. If the electronic thermostat valve is operating in position control mode (see SPN 4195) then transmit 0xFF.

Data Length: 1 byte

Resolution: 1 deg C/bit, -40 deg C offset

Data Range: -40 to 210 deg C

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64850

SPN 4197 Desired Engine Coolant Thermostat Opening

Indicates the desired position of the engine coolant control valve. 0% represents the thermostat allows flow to completely bypass the radiator and 100% represents the flow is fully through the radiator. If the electronic thermostat is operating in temperature control mode (SPN 4195) then transmit 0xFF.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64850

SPN 4198 Aftercooler Coolant Thermostat Mode

Specifies if the aftercooler coolant thermostat valve will operate in temperature control mode or position control mode.

00 = temperature control mode

01 = position control mode (used for service only)

10 = reserved

11 = don't care/reserved

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64849

SPN 4199 *Desired Aftercooler Coolant Intake Temperature*

Indicates the desired temperature of the fluid in the low temperature aftercooler circuit to an electronic thermostat. If the aftercooler coolant thermostat valve is operating in position control mode (see SPN 4198) then this value should be 0xFF.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64849	

SPN 4200 *Desired Aftercooler Coolant Thermostat Opening*

Used to transmit the desired position of the low temperature aftercooler temperature control valve. 0% represents the thermostat allows flow to completely bypass the aftercooler and 100% represents the flow is fully through the aftercooler. If the aftercooler coolant thermostat is operating in temperature control mode (see SPN 4198) then this value should be 0xFF.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64849	

SPN 4201 *Engine Speed 1*

The engine speed as measured by speed sensor 1.

Note: This is for the engine speed from the 1st engine speed sensor. This may be different than SPN 190 when used in multiple engine speed sensor configurations. In an application with only one speed sensor, SPN 190 will represent both the speed and the sensor for diagnostic purposes and SPN 4201 will not be used. However, in an application with multiple engine speed sensors, SPN 190 data can be derived from any of the speed sensors.

Data Length:	2 bytes	
Resolution:	0.5 rpm/bit, 0 offset	
Data Range:	0 to 32,127.5 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61473	

SPN 4202 *Engine Speed 3*

The engine speed as measured by speed sensor 3.

Note: This is for the engine speed from the 3rd engine speed sensor. This may be different than SPN 190 when used in multiple engine speed sensor configurations. In an application with multiple engine speed sensors, SPN 190 data can be derived from any of the speed sensors.

Data Length:	2 bytes	
Resolution:	0.5 rpm/bit, 0 offset	
Data Range:	0 to 32,127.5 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61473	

SPN 4203 *Engine Speed Sensor 1 Timing Pattern Status*

This is the timing pattern status of the engine speed sensor signal for sensor 1. The sensor may be sending a speed signal but the pattern may not be valid. Since the speed is considered valid, the error indicator will not be used in the

engine speed parameter (SPN 4201). The sensor does give a speed but the pattern is not matched. In this condition, the position of the crank has not been determined so injection is not enabled. The engine speed signal provides both engine speed and crankshaft location information to the engine control. A "Not OK" status may be caused by extra or missing teeth, gear runout, etc.

00 = Not OK
01 = OK
10 = Error
11 = Not available

Note: This is intended to be used on a service tool for troubleshooting a no start condition.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61473	

SPN 4204 *Engine Speed Sensor 2 Timing Pattern Status*

This is the timing pattern status of the engine speed sensor signal for sensor 2. The sensor may be sending a speed signal but the pattern may not be valid. Since the speed is considered valid, the error indicator will not be used in the engine speed parameter (SPN 723).

00 = Not OK
01 = OK
10 = Error
11 = Not available

Note: This is intended to be used on a service tool for troubleshooting a no start condition. The sensor does give a speed but the pattern is not matched. In this condition, the position of the crank has not been determined so injection is not enabled. The engine speed signal provides both engine speed and crankshaft location information to the engine control. A "Not OK" status may be caused by extra or missing teeth, gear runout, etc.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61473	

SPN 4205 Engine Speed Sensor 3 Timing Pattern Status

This is the timing pattern status of the engine speed sensor signal for sensor 3. The sensor may be sending a speed signal but the pattern may not be valid. Since the speed is considered valid, the error indicator will not be used in the engine speed parameter (SPN 4202).

00 = Not OK

01 = OK

10 = Error

11 = Not available

Note: This is intended to be used on a service tool for troubleshooting a no start condition. The sensor does give a speed but the pattern is not matched. In this condition, the position of the crank has not been determined so injection is not enabled. The engine speed signal provides both engine speed and crankshaft location information to the engine control. A "Not OK" status may be caused by extra or missing teeth, gear runout, etc.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61473

SPN 4206 Message Counter

The message counter is used to detect situations where the transmitting ECU malfunction repeats the same frame all the time. The receiver of the information may use the counter parameter to detect this situation. The transmitting device will increase the message counter in every cycle. The message counter will count from 0 to 7 and then wrap.

The values 0x8 thru 0xE are SAE reserved and should be ignored by the receiver.

Value 0xF (all bits set to 1) will indicate that the message counter is not available. For compatibility purposes, TSC1 should also be honored if the message counter is not available from the transmitting device.

Data Length: 4 bits

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 15

Operational Range: 0 to 7 and 15 exclusively

Type: Status

Supporting Information:

PGN reference: 0

SPN 4207 Message Checksum

The message checksum is used to verify the signal path from the transmitting device to the receiving device.

The message checksum is calculated using the first 7 data bytes, the message counter and the bytes of the message identifier. It is calculated as follows:

Checksum = (Byte1 + Byte2 + Byte3 + Byte4 + Byte5 + Byte6 + Byte7 + message counter & 0x0F + message ID low byte + message ID mid low byte + message ID mid high byte + message ID high byte)

Message Checksum = (((Checksum >> 6) & 0x03) + (Checksum >>3) + Checksum) & 0x07

Value 0xF (all bits set to 1) will indicate that the checksum is not available. For compatibility purposes, TSC1 should also be honored if the checksum is not available from the transmitting device.

Data Length: 4 bits

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 0

SPN 4211 Hydraulic Fan Motor Pressure

The hydraulic pressure used to drive the fan system, sensed before the hydraulic fan motor.

Data Length:	2 bytes	
Resolution:	0.5 kPa/bit, 0 offset	
Data Range:	0 to 32,127.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65213	

SPN 4212 Fan Drive Bypass Command Status

Status of the Fan Drive Bypass Command as being commanded by the ECU. The fan drive bypass diverts pump pressure away from the hydraulic motor to maintain the fan drive pressure. 0% is defined as no bypass (i.e. diverting no fan drive pressure) and 100% is defined as full bypass (i.e. diverting the maximum fan drive pressure) from the fan motor.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65213	

SPN 4233 Retarder Road Speed Limit Switch

Retarder road speed limit switch states:

00 Road speed limiting by retarder is disabled
 01 Road speed limiting by retarder is enabled. The road speed that the retarder will limit will be determined when the switch transitions from 00 to 01
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61440	

SPN 4234 Retarder Road Speed Exceeded Status

Retarder Road Speed Exceeded Status:

00 Road speed is below threshold
 01 Road speed is above threshold and retarder is allowed to be activated
 10 Reserved
 11 Don't care/Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61440	

SPN 4236 Short-term Fuel Trim - Bank 1

This parameter is the short-term percent change in fueling based on the O2 sensor feedback for cylinder bank 1, based on the operating point in the nominal fuel map.

Note: This is similar to SPN 1695, but with higher resolution.

Data Length:	2 bytes	
Resolution:	0.1 %/bit, -100 offset	
Data Range:	-100 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64841	

SPN 4237 Long-term Fuel Trim - Bank 1

This parameter is the long-term percent change in fueling based on the O2 sensor feedback for cylinder bank 1, based on the operating point in the nominal fuel map.

Data Length:	2 bytes	
Resolution:	0.1 %/bit, -100 offset	
Data Range:	-100 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64841	

SPN 4238 Short-term Fuel Trim - Bank 2

This parameter is the short-term percent change in fueling based on the O2 sensor feedback for cylinder bank 2, based on the operating point in the nominal fuel map.

Data Length:	2 bytes	
Resolution:	0.1 %/bit, -100 offset	
Data Range:	-100 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64840	

SPN 4239 Long-term Fuel Trim - Bank 2

This parameter is the long-term percent change in fueling based on the O2 sensor feedback for cylinder bank 2, based on the operating point in the nominal fuel map.

Data Length:	2 bytes	
Resolution:	0.1 %/bit, -100 offset	
Data Range:	-100 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64840	

SPN 4240 Engine Exhaust Gas Oxygen Sensor Closed Loop Operation, Bank 1

This parameter indicates the status of the bank 1 O2 sensor feedback closed loop operation

0000 = Open loop - has not yet satisfied conditions to go closed loop

0001 = Closed loop - using oxygen sensor(s) as feedback for fuel control

0010 = Open loop due to driving conditions (e.g., power enrichment, deceleration enleanment)

0011 = Open loop - due to detected system fault

0100 = Closed loop, but fault with at least one oxygen sensor - may be using single oxygen sensor for fuel control

0101-1110 = reserved

1111 = not supported

See also SPN 1696 as an prior implementation.

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64841

SPN 4241 Engine Exhaust Gas Oxygen Sensor Closed Loop Operation, Bank 2

This parameter indicates the status of the bank 2 O2 sensor feedback closed loop operation

0000 = Open loop - has not yet satisfied conditions to go closed loop

0001 = Closed loop - using oxygen sensor(s) as feedback for fuel control

0010 = Open loop due to driving conditions (e.g., power enrichment, deceleration enleanment)

0011 = Open loop - due to detected system fault

0100 = Closed loop, but fault with at least one oxygen sensor - may be using single oxygen sensor for fuel control

0101-1110 = reserved

1111 = not supported

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64840

SPN 4242 *Transmission Reverse Gear Shift Inhibit Request*

Allows devices external to the normal transmission shift selector system to request the transmission to inhibit shifts into any Reverse gear and force the transmission into Neutral if it is currently in Reverse or attempting to shift to Reverse. These transmission responses occur regardless of shift selector (Forward, Neutral or Reverse) position at the time the request is received.

This request would typically come from a component wishing to override the vehicle operator's ability to shift or keep the transmission in Reverse. For example, the control system of a rear-loading refuse packer may wish to prevent shifts to reverse when it detects the presence of someone behind the vehicle.

Reverse gear shift inhibits include all 'Neutral-to-Reverse' shifts and 'Forward-to-Reverse' shifts; the ability of the transmission to complete 'Neutral-to-Forward' or 'Forward-to-Forward' gear shifts is not impacted.

If the transmission is in Reverse or attempting to shift to Reverse and receives an active Reverse gear shift inhibit request (0b01), the transmission will shift to Neutral. When the request subsequently goes inactive (0b00), the transmission will remain in Neutral until it receives a selector input from the vehicle operator requesting it to shift into a Non-Neutral gear. The transmission should not automatically return to the previous gear when this signal goes inactive.

Transmission response to this request can be monitored via SPN 4261 – Transmission Reverse Gear Shift Inhibit Status, SPN 523 Transmission Current Gear, and SPN 524 Transmission Selected Gear.

00 = Allow shifts into Reverse gear

01 = Inhibit shifts into Reverse gear, and shift transmission to Neutral if already in Reverse or attempting to shift to Reverse

10 = Reserved

11 = Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 256

(R) SPN 4245 *Fuel energy content*

Energy content (lower heating value) of the gaseous fuel.

Note: For gaseous fuels, the fuel's energy content (lower heating value) is commonly defined in terms of energy / volume. The gas volume is defined for regular pressure and temperature conditions and is stated in terms of normal cubic meters.

For the purpose of measuring energy content in gaseous fuels, the normal conditions are defined to be 101.31 kPa and 0 degC as defined in ISO 10780:1994 – Stationary source emissions, Measurement of velocity and volume flowrate of gas streams in ducts

Data Length: 2 bytes

Resolution: 1/256 MJ/Nm³ per bit, 0 offset

Data Range: 0 to 250.996 MJ/Nm³

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65109

SPN 4246 Transmission Mode 5

Indicates whether transmission mode 5 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 4250.

00 Disable
01 Enable
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 256

Operational Range: same as data range

SPN 4247 Transmission Mode 6

Indicates whether transmission mode 6 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 4251.

00 Disable
01 Enable
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 256

Operational Range: same as data range

SPN 4248 Transmission Mode 7

Indicates whether transmission mode 7 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 4252.

00 Disable
01 Enable
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 256

Operational Range: same as data range

SPN 4249 *Transmission Mode 8*

Indicates whether transmission mode 8 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 4253.

00 Disable
 01 Enable
 10 Reserved
 11 Take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 256

Operational Range: same as data range

SPN 4250 *Transmission Mode 5 Indicator*

Indicates whether transmission mode 5 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 4246.

00 Disable
 01 Enable
 10 Reserved
 11 Take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65098

Operational Range: same as data range

SPN 4251 *Transmission Mode 6 Indicator*

Indicates whether transmission mode 6 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 4247.

00 Disable
 01 Enable
 10 Reserved
 11 Take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65098

Operational Range: same as data range

SPN 4252 *Transmission Mode 7 Indicator*

Indicates whether transmission mode 7 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 4248.

00 Disable
 01 Enable
 10 Reserved
 11 Take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65098

Operational Range: same as data range

SPN 4253 *Transmission Mode 8 Indicator*

Indicates whether transmission mode 8 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 4249.

00 Disable
 01 Enable
 10 Reserved
 11 Take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65098

Operational Range: same as data range

SPN 4254 *Transmission Mode Label*

Conveys ASCII 'labels' for each of the manufacturer-specified TC1 Transmission Mode 'x' / ETC7 Transmission Mode Indicator 'x' pairs. Intended for use with on-board or service tool displays.

NOTE – Non-printable or non-graphic ASCII characters are not allowed, and the ASCII character "*" is reserved as a delimiter

Data Length: Variable - up to 25 bytes followed by an "*" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte
 Type: Measured
 Supporting Information: See Appendix D - PGN 64839
 PGN reference: 64839

Operational Range: same as data range

SPN 4255 *Transmission Requested Launch Gear*

Initial gear for the transmission to start out in when the vehicle is launched from a standing stop, as specified by the vehicle operator or vehicle system. Automatic transmissions typically default to starting out in 1st gear. However, in applications such as those with very low gearing, it is desirable to launch the vehicle in a range higher than 1st. For example, when the vehicle has little or no payload, the operator may wish to launch from 2nd or 3rd gear to avoid stacked, unnecessary shifts in the lower ranges.

0000 = No specific launch gear requested; use default launch gear

0001 = Launch the vehicle in 1st gear

0010 = Launch the vehicle in 2nd gear

0011 = Launch the vehicle in 3rd gear

0100 = Launch the vehicle in 4th gear

0101 = Launch the vehicle in 5th gear

0110 = Launch the vehicle in 6th gear

0111 = Launch the vehicle in 7th gear

1000 = Launch the vehicle in 8th gear

1001 = Launch the vehicle in Reverse 1

1010 = Launch the vehicle in Reverse 2

1011 = Launch the vehicle in Reverse 3

1100 = Launch the vehicle in Reverse 4

1101 = Reserved

1110 = Error

1111 = Not Available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 256

SPN 4261 *Transmission Reverse Gear Shift Inhibit Status*

Reflects the status of transmission reverse inhibit activity in response to requests via SPN 4242 - Transmission Reverse Gear Shift Inhibit Request. Typically broadcast by the transmission controller.

00 = Reverse gear shifts are currently allowed

01 = Reverse gear shifts are currently inhibited

10 = Error

11 = Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 65098

SPN 4287 *Engine Exhaust Valve Actuation System Oil Pressure*

The absolute pressure of the oil in the hydraulic system that powers the engine exhaust valve actuation system

Data Length: 2 bytes

Resolution: 1/256 MPa/bit, 0 offset

Data Range: 0 to 250.996 Mpa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64961

SPN 4288 Engine Exhaust Valve Actuation System Oil Temperature

The temperature of the oil in the hydraulic system that powers the engine exhaust valve actuation system

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64870

SPN 4289 Aftertreatment 1 Three Way Catalytic Converter Intake Gas Temperature

Temperature of engine combustion byproducts entering the Three Way Catalytic Converter in exhaust bank 1.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64838

SPN 4290 Aftertreatment 1 Three Way Catalytic Converter Outlet Gas Temperature

Temperature of engine combustion byproducts leaving the Three Way Catalytic Converter in exhaust bank 1.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64838

SPN 4291 Aftertreatment 1 Three Way Catalytic Converter Differential Pressure

Exhaust differential pressure measured between the intake and exhaust of a Three Way Catalytic Converter in exhaust bank 1.

Data Length: 2 bytes
 Resolution: 0.1 kPa/bit, 0 offset
 Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64838

SPN 4292 Aftertreatment 1 Three Way Catalytic Converter Intake Gas Temperature Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Three Way Catalytic Converter intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64838

SPN 4293 *Aftertreatment 1 Three Way Catalytic Converter Outlet Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the Three Way Catalytic Converter outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64838	

SPN 4294 *Aftertreatment 1 Three Way Catalytic Converter Differential Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the Three Way Catalytic Converter differential pressure sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64838	

SPN 4295 *Aftertreatment 2 Three Way Catalytic Converter Intake Gas Temperature*

Temperature of engine combustion byproducts entering the Three Way Catalytic Converter in exhaust bank 2.

(For a single exhaust bank system, refer to parameters in PGN AT1TWCC.)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64837	

SPN 4296 *Aftertreatment 2 Three Way Catalytic Converter Outlet Gas Temperature*

Temperature of engine combustion byproducts leaving the Three Way Catalytic Converter in exhaust bank 2.

(For a single exhaust bank system, refer to parameters in PGN AT1TWCC.)

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64837	

SPN 4297 *Aftertreatment 2 Three Way Catalytic Converter Differential Pressure*

Exhaust differential pressure measured between the intake and exhaust of a Three Way Catalytic Converter in exhaust bank 2.

(For a single exhaust bank system, refer to parameters in PGN AT1TWCC.)

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64837	

SPN 4298 *Aftertreatment 2 Three Way Catalytic Converter Intake Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the Three Way Catalytic Converter intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

(For a single exhaust bank system, refer to parameters in PGN AT1TWCC.)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64837	

SPN 4299 *Aftertreatment 2 Three Way Catalytic Converter Outlet Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the Three Way Catalytic Converter outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

(For a single exhaust bank system, refer to parameters in PGN AT1TWCC.)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64837	

SPN 4300 *Aftertreatment 2 Three Way Catalytic Converter Differential Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the Three Way Catalytic Converter differential pressure sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

(For a single exhaust bank system, refer to parameters in PGN AT1TWCC.)

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64837	

SPN 4301 *Aftertreatment 1 Fuel Injector 1 Heater Control*

Heating level that the controller is commanding the aftertreatment 1 fuel injector 1 heater control to maintain. 0% = off, 100% = maximum.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64929	

SPN 4302 *Aftertreatment 2 Fuel Injector 1 Heater Control*

Heating level that the controller is commanding the aftertreatment 2 fuel injector 1 heater control to maintain. 0% = off, 100% = maximum.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64928	

SPN 4303 *Aftertreatment 2 Fuel Pressure 2*

Second fuel pressure measurement for the aftertreatment 2 system.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64836	

SPN 4304 *ECU Manufacturer Name*

The name of the manufacturer of the physical ECU.

This name may be different than the manufacturer identified by the Manufacturer Code (SPN 2838) and listed in table B10 of J1939.

Data Length:	Variable - up to 200 bytes followed by an "" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64965	

SPN 4331 *Aftertreatment 1 Diesel Exhaust Fluid Actual Dosing Quantity*

Actual reducing agent quantity of SCR-system

Data Length:	2 bytes	
Resolution:	0.3 g/h per bit, 0 offset	
Data Range:	0 to 19276.5 g/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61475	

SPN 4332 *Aftertreatment 1 SCR System State*

Actual state of SCR system

0000 Dormant (sleep mode)
 0001 Preparing dosing readiness (wake up; prepare to operate; wait for start)
 0010 Normal dosing operation
 0011 System error pending
 0100 Reserved for future assignment by SAE
 0101 Protect mode against heat (pressure buildup)
 0110 Protect mode against cold (defreeze)
 0111 Shutoff (wait for afterrun)
 1000 Diagnosis (afterrun)
 1001 Service test mode, dosing allowed
 1010 Service test mode, dosing not allowed
 1011-1101 Reserved for future assignment by SAE
 1110 Error
 1111 Not available

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 61475

Operational Range: same as data range

SPN 4333 *Aftertreatment 1 Diesel Exhaust Fluid Actual Quantity of Integrator*

The SCR requested diesel exhaust fluid integrator total quantity for aftertreatment system 1 (exhaust bank 1).

Data Length: 2 bytes
 Resolution: 0.10 g/bit, 0 offset
 Data Range: 0 to 6425.5 g
 Type: Measured
 Supporting Information: See Appendix D - SPN 1761
 PGN reference: 61475

Operational Range: same as data range

SPN 4334 *Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure*

The SCR dosing diesel exhaust fluid absolute pressure (measured closest to dosing valve) for aftertreatment system 1 (exhaust bank 1).

Data Length: 1 byte
 Resolution: 8 kPa/bit, 0 offset
 Data Range: 0 to 2,000 kPa
 Type: Measured
 Supporting Information: See Appendix D - SPN 1761
 PGN reference: 61475

Operational Range: same as data range

SPN 4335 *Aftertreatment 1 SCR Dosing Air Assist Absolute Pressure*

The SCR dosing system air assist absolute pressure for aftertreatment system 1 (exhaust bank 1). The air assist system is used to improve the dosed reagent atomization.

Data Length: 1 byte
 Resolution: 8 kPa/bit, 0 offset
 Data Range: 0 to 2,000 kPa
 Type: Measured
 Supporting Information: See Appendix D - SPN 1761
 PGN reference: 64833

Operational Range: same as data range

SPN 4336 *Aftertreatment 1 SCR Dosing Air Assist Valve*

The position of the valve used to regulate the air supply of an air assist SCR dosing system for an engine. 0% represents no supply and 100% is full supply.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64833	

SPN 4337 *Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature*

The diesel exhaust fluid dosing temperature (measured closest to dosing valve) for aftertreatment system 1 (exhaust bank 1).

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64833	

SPN 4338 *Aftertreatment 1 SCR Dosing Valve Exhaust Temperature Reduction Request*

Protection request for the dosing valve of the SCR-system to prevent overheating

000:	no request
001:	reduction request stage 1
010:	reduction request stage 2
011:	reserved for future assignment by SAE
100:	reserved for future assignment by SAE
101:	reserved for future assignment by SAE
110:	error
111:	not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64833	

SPN 4339 *Aftertreatment 1 SCR Feedback Control Status*

The SCR feedback control status (open/closed loop) for aftertreatment system 1 (exhaust bank 1).

000 open loop control active

001 closed loop control active

010 reserved for future assignment by SAE

011 reserved for future assignment by SAE

100 reserved for future assignment by SAE

101 reserved for future assignment by SAE

110 error

111 not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64833

SPN 4340 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State*

The diesel exhaust fluid line heater 1 state for aftertreatment system 1 (exhaust bank 1).

00 heater inactive

01 heater active

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 1761

PGN reference: 64833

SPN 4341 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid line heater 1, by the manufacturer's control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: Binary, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64833

SPN 4342 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State*

The diesel exhaust fluid line heater 2 state for aftertreatment system 1 (exhaust bank 1).

00 heater inactive
 01 heater active
 10 error
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64833	

SPN 4343 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid line heater 2, by the manufacturer's control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64833	

SPN 4344 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State*

The diesel exhaust fluid line heater 3 state for aftertreatment system 1 (exhaust bank 1).

00 heater inactive
 01 heater active
 10 error
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64833	

SPN 4345 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid line heater 3, by the manufacturer's control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64833	

SPN 4346 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 4 State*

The diesel exhaust fluid line heater 4 state for aftertreatment system 1 (exhaust bank 1).

00 heater inactive

01 heater active

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 1761

PGN reference: 64833

SPN 4347 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 4 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid line heater 4, by the manufacturer's control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: Binary, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64833

SPN 4348 *Aftertreatment 1 Diesel Exhaust Fluid Dosing Requested Quantity*

Actual requested dosing quantity of diesel exhaust fluid.

Data Length: 2 bytes

Resolution: 0.3 g/h per bit, 0 offset

Data Range: 0 to 19276.5 g/h

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61476

SPN 4349 *Aftertreatment 1 SCR System Requested State*

Requested state of SCR system for aftertreatment system 1 (exhaust bank 1).

0000 Dormant (sleep mode)
 0001 Preparing dosing readiness (wake up; prepare to operate; wait for start)
 0010 Normal dosing operation
 0011 System error pending
 0100 Reserved for future assignment by SAE
 0101 Protect mode against heat (pressure buildup)
 0110 Protect mode against cold (defreeze)
 0111 Shutoff (wait for afterrun)
 1000 Diagnosis (afterrun)
 1001 Service test mode, dosing allowed
 1010 Service test mode, dosing not allowed
 1011-1101 Reserved for future assignment by SAE
 1110 Error
 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61476	

SPN 4350 *Aftertreatment 1 Diesel Exhaust Fluid Requested Quantity of Integrator*

Represents the command for the diesel exhaust fluid quantity integrator in the dosing control unit

Data Length:	2 bytes	
Resolution:	0.10 g/bit, 0 offset	
Data Range:	0 to 6425.5 g	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	61476	

SPN 4352 *Aftertreatment 1 Diesel Exhaust Fluid Doser Fault Suppression Request*

Used if external devices can warn of conditions that require suppression of potential faults in the doser due to environmental conditions.

00 Error suppression off
 01 Error suppression on
 10 Reserved
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64832	

SPN 4353 *Aftertreatment 1 Diesel Exhaust Fluid Doser Heating Mode Request*

Used if multiple heater modes are available in the Doser.

000 Heater off
 001 Heater economy mode
 010 Heater automatic mode
 011 Heater on
 100 - 110 Reserved
 111 Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64832	

SPN 4354 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1*

The diesel exhaust fluid line heater 1 request for aftertreatment system 1 (exhaust bank 1).

00 request for heater to be inactive
 01 request for heater to be active
 10 reserved for future assignment by SAE
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64832	

SPN 4355 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2*

The diesel exhaust fluid line heater 2 request for aftertreatment system 1 (exhaust bank 1).

00 request for heater to be inactive
 01 request for heater to be active
 10 reserved for future assignment by SAE
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64832	

SPN 4356 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3*

The diesel exhaust fluid line heater 3 request for aftertreatment system 1 (exhaust bank 1).

00 request for heater to be inactive

01 request for heater to be active

10 reserved for future assignment by SAE

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 1761

PGN reference: 64832

SPN 4357 *Aftertreatment 1 Diesel Exhaust Fluid Line Heater 4*

The diesel exhaust fluid line heater 4 request for aftertreatment system 1 (exhaust bank 1).

00 request for heater to be inactive

01 request for heater to be active

10 reserved for future assignment by SAE

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - SPN 1761

PGN reference: 64832

SPN 4358 *Aftertreatment 1 SCR Exhaust Gas Differential Pressure*

Exhaust differential pressure measured between the intake and exhaust of an SCR component in exhaust bank 1.

Data Length: 2 bytes

Resolution: 0.1 kPa/bit, 0 offset

Data Range: 0 to 6,425.5 kPa

Operational Range: same as data range

Type: Measured

Supporting Information: See Appendix D - SPN 1761

PGN reference: 64831

SPN 4359 *Aftertreatment 1 SCR Exhaust Gas Differential Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the SCR differential pressure sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: 32 states/5 bit, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64831

SPN 4360 *Aftertreatment 1 SCR Catalyst Intake Gas Temperature*

Temperature of engine combustion byproducts entering the SCR catalyst in exhaust bank 1.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - SPN 1761
 PGN reference: 64830

SPN 4361 *Aftertreatment 1 SCR Catalyst Intake Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the SCR catalyst intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
 Resolution: 32 states/5 bit, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64830

SPN 4362 *Aftertreatment 1 SCR Catalyst Outlet Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the SCR catalyst outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
 Resolution: 32 states/5 bit, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64830

SPN 4363 *Aftertreatment 1 SCR Catalyst Outlet Gas Temperature*

Temperature of engine combustion byproducts leaving the SCR catalyst exhaust in exhaust bank 1.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - SPN 1761
 PGN reference: 64830

SPN 4364 *Aftertreatment 1 SCR Conversion Efficiency*

The SCR conversion efficiency percentage. Calculated as 100 times the catalyst intake NOx minus the catalyst outlet NOx divided by the catalyst intake NOx. The catalyst conversion efficiency number in itself does not imply emissions compliance or system function or system malfunction.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64878

(R) SPN 4365 *Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 1 temperature, by the manufacturer's control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65110	

(R) SPN 4366 *Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 1 heater, by the manufacturer's control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	65110	

SPN 4367 *Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Level*

The diesel exhaust fluid tank 2 level percentage for aftertreatment system 1 (exhaust bank 1). 0% is empty and 100% is full. Tank 2 is used as a quick thaw diesel exhaust fluid tank.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64829	

SPN 4368 *Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Temperature*

The diesel exhaust fluid tank 2 temperature for aftertreatment system 1 (exhaust bank 1). Tank 2 is used as a quick thaw diesel exhaust fluid tank.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64829	

SPN 4369 *Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Level 2*

The diesel exhaust fluid tank 2 level height in mm for aftertreatment system 1 (exhaust bank 1). Tank 2 is used as a quick thaw diesel exhaust fluid tank.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, 0 offset	
Data Range:	0 to 6,425.5 mm (0 to 6.4255 m)	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64829	

SPN 4370 *Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Level Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 2 level, by the manufacturer's control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64829	

SPN 4371 *Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 2 temperature, by the manufacturer's control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64829	

SPN 4372 *Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Heater*

The diesel exhaust fluid tank 2 heater percentage for aftertreatment system 1 (exhaust bank 1). 0% is off. See SPN 5414 for the command for this tank heater.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64829	

SPN 4373 *Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 2 heater, by the manufacturer's control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64829	

SPN 4374 *Aftertreatment 1 Diesel Exhaust Fluid Pump Motor Speed*

Rotational speed of the motor driving a pump for diesel exhaust fluid used in an aftertreatment system.

Data Length:	2 bytes	
Resolution:	0.5 rpm/bit, 0 offset	
Data Range:	0 to 32,127.5 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64828	

SPN 4375 *Aftertreatment 1 Diesel Exhaust Fluid Pump Drive Percentage*

The percent (command) sent to the motor to control the speed of the diesel exhaust fluid pump.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64828	

SPN 4376 *Aftertreatment 1 Diesel Exhaust Fluid Return Valve*

Command to the valve which determines whether the diesel exhaust fluid is delivered to the injector or is routed back to the diesel exhaust fluid tank. Zero directs all diesel exhaust fluid flow to the injector, 100% sends all diesel exhaust fluid back to the tank.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 1761	
PGN reference:	64828	

SPN 4377 *Aftertreatment 1 Outlet NH3*

The amount of NH3 in the exhaust exiting the aftertreatment system measured by a NH3 sensor at the aftertreatment outlet, represented in NH3 molecule parts per million non-NH3 molecules in exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.05 ppm/bit, -200 ppm offset	
Data Range:	-200 to 3012.75 ppm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61477	

SPN 4378 *Aftertreatment 1 Outlet NH3 Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment outlet NH3 sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61477	

SPN 4379 *Aftertreatment 1 Outlet NH3 Reading Stable*

Indicates that the NH3 reading of the aftertreatment outlet NH3 sensor is stable as determined by the manufacturer's control software in exhaust bank 1.

00 - Reading is not stable

01 - Reading is stable

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61477

SPN 4380 *Aftertreatment 1 Outlet NH3 Gas Sensor Power In Range*

Indicates that the power supplied to the aftertreatment outlet NH3 gas sensor is within the manufacturer's specification in exhaust bank 1.

00 - Power is not in range

01 - Power is in range

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61477

SPN 4381 *Aftertreatment 1 Outlet NH3 Gas Sensor at Temperature*

Indicates that the heater element of the aftertreatment outlet NH3 gas sensor is within the manufacturer's specified range for accurate measurements in exhaust bank 1.

00 - Heater element is not in range

01 - Heater element is in range

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61477

SPN 4382 *Aftertreatment 1 Outlet NH3 Gas Sensor Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the heater of the outlet NH3 exhaust gas sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61477	

SPN 4383 *Aftertreatment 1 Outlet NH3 Gas Sensor Heater Control*

Indicates the heater status in the warm-up process. Upon receiving a power-up command, the NH3 gas sensor ramps up according to a manufacturer defined profile. The Preheat 1, Preheat 2, and Automatic messages are regions within this profile in exhaust bank 1.

00 - Automatic
 01 - Preheat 2
 10 - Preheat 1
 11 - Heater off or not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61477	

SPN 4384 *Aftertreatment 2 Diesel Exhaust Fluid Actual Dosing Quantity*

Actual reducing agent quantity of SCR system.

Data Length:	2 bytes	
Resolution:	0.3 g/h per bit, 0 offset	
Data Range:	0 to 19276.5 g/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61478	

SPN 4385 *Aftertreatment 2 SCR System State*

Actual state of SCR system

0000 Dormant (sleep mode)
 0001 Preparing dosing readiness (wake up; prepare to operate; wait for start)
 0010 Normal dosing operation
 0011 System error pending
 0100 Reserved for future assignment by SAE
 0101 Protect mode against heat (pressure buildup)
 0110 Protect mode against cold (defreeze)
 0111 Shutoff (wait for aftertreatment)
 1000 Diagnosis (aftertreatment)
 1001 Service test mode, dosing allowed
 1010 Service test mode, dosing not allowed
 1011-1101 Reserved for future assignment by SAE
 1110 Error
 1111 Not available

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 61478

Operational Range: same as data range

SPN 4386 *Aftertreatment 2 Diesel Exhaust Fluid Actual Quantity of Integrator*

The SCR requested diesel exhaust fluid integrator total quantity for aftertreatment system 2 (exhaust bank 2).

Data Length: 2 bytes
 Resolution: 0.10 g/bit, 0 offset
 Data Range: 0 to 6425.5 g
 Type: Measured
 Supporting Information:
 PGN reference: 61478

Operational Range: same as data range

SPN 4387 *Aftertreatment 2 Diesel Exhaust Fluid Dosing Absolute Pressure*

The SCR dosing diesel exhaust fluid absolute pressure (measured closest to dosing valve) for aftertreatment system 2 (exhaust bank 2).

Data Length: 1 byte
 Resolution: 8 kPa/bit, 0 offset
 Data Range: 0 to 2,000 kPa
 Type: Measured
 Supporting Information:
 PGN reference: 61478

Operational Range: same as data range

SPN 4388 *Aftertreatment 2 SCR Dosing Air Assist Absolute Pressure*

The SCR dosing system air assist absolute pressure for aftertreatment system 2 (exhaust bank 2). The air assist system is used to improve the dosed reagent atomization.

Data Length: 1 byte
 Resolution: 8 kPa/bit, 0 offset
 Data Range: 0 to 2,000 kPa
 Type: Measured
 Supporting Information:
 PGN reference: 64827

Operational Range: same as data range

SPN 4389 *Aftertreatment 2 SCR Dosing Air Assist Valve*

The position of the valve used to regulate the air supply of an air assist SCR dosing system for an engine. 0% represents no supply and 100% is full supply.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64827	

SPN 4390 *Aftertreatment 2 Diesel Exhaust Fluid Dosing Temperature*

The diesel exhaust fluid dosing temperature (measured closest to dosing valve) for aftertreatment system 2 (exhaust bank 2).

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64827	

SPN 4391 *Aftertreatment 2 SCR Dosing Valve Exhaust Temp. Reduction Request*

Protection request for the dosing valve of the SCR-system to prevent overheating

000:	no request
001:	reduction request stage 1
010:	reduction request stage 2
011:	reserved for future assignment by SAE
100:	reserved for future assignment by SAE
101:	reserved for future assignment by SAE
110:	error
111:	not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64827	

SPN 4392 *Aftertreatment 2 SCR Feedback Control Status*

The SCR feedback control status (open/closed loop) for aftertreatment system 2 (exhaust bank 2).

000 open loop control active

001 closed loop control active

010 reserved for future assignment by SAE

011 reserved for future assignment by SAE

100 reserved for future assignment by SAE

101 reserved for future assignment by SAE

110 error

111 not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64827

SPN 4393 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 1 State*

The diesel exhaust fluid line heater 1 state for aftertreatment system 2 (exhaust bank 2).

00 heater inactive

01 heater active

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64827

SPN 4394 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 1 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid line heater 1, by the manufacturer's control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: Binary, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64827

SPN 4395 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 2 State*

The diesel exhaust fluid line heater 2 state for aftertreatment system 2 (exhaust bank 2).

00 heater inactive
 01 heater active
 10 error
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64827	

SPN 4396 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 2 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid line heater 2, by the manufacturer's control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64827	

SPN 4397 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 3 State*

The diesel exhaust fluid line heater 3 state for aftertreatment system 2 (exhaust bank 2).

00 heater inactive
 01 heater active
 10 error
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64827	

SPN 4398 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 3 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid line heater 3, by the manufacturer's control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64827	

SPN 4399 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 4 State*

The diesel exhaust fluid line heater 4 state for aftertreatment system 2 (exhaust bank 2).

00 heater inactive

01 heater active

10 error

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64827

SPN 4400 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 4 Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid line heater 4, by the manufacturer's control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: Binary, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64827

SPN 4401 *Aftertreatment 2 Diesel Exhaust Fluid Dosing Requested Quantity*

Actual requested dosing quantity of diesel exhaust fluid.

Data Length: 2 bytes

Resolution: 0.3 g/h per bit, 0 offset

Data Range: 0 to 19276.5 g/h

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61479

SPN 4402 *Aftertreatment 2 SCR System Requested State*

Requested state of SCR system for aftertreatment system 2 (exhaust bank 2).

0000 Dormant (sleep mode)
 0001 Preparing dosing readiness (wake up; prepare to operate; wait for start)
 0010 Normal dosing operation
 0011 System error pending
 0100 Reserved for future assignment by SAE
 0101 Protect mode against heat (pressure buildup)
 0110 Protect mode against cold (defreeze)
 0111 Shutoff (wait for afterrun)
 1000 Diagnosis (afterrun)
 1001 Service test mode, dosing allowed
 1010 Service test mode, dosing not allowed
 1011-1101 Reserved for future assignment by SAE
 1110 Error
 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61479	

SPN 4403 *Aftertreatment 2 Diesel Exhaust Fluid Requested Quantity of Integrator*

Represents the command for the diesel exhaust fluid quantity integrator in the dosing control unit

Data Length:	2 bytes	
Resolution:	0.10 g/bit, 0 offset	
Data Range:	0 to 6425.5 g	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61479	

SPN 4405 *Aftertreatment 2 Diesel Exhaust Fluid Doser Fault Suppression Request*

Used if external devices can warn of conditions that require suppression of potential faults in the doser due to environmental conditions.

00 Error suppression off
 01 Error suppression on
 10 Reserved
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64826	

SPN 4406 *Aftertreatment 2 Diesel Exhaust Fluid Doser Heating Mode Request*

Used if multiple heater modes are available in the Doser.

000 Heater off
 001 Heater economy mode
 010 Heater automatic mode
 011 Heater on
 100 - 110 Reserved
 111 Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64826	

SPN 4407 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 1*

The diesel exhaust fluid line heater 1 request for aftertreatment system 2 (exhaust bank 2).

00 request for heater to be inactive
 01 request for heater to be active
 10 reserved for future assignment by SAE
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64826	

SPN 4408 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 2*

The diesel exhaust fluid line heater 2 request for aftertreatment system 2 (exhaust bank 2).

00 request for heater to be inactive
 01 request for heater to be active
 10 reserved for future assignment by SAE
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64826	

SPN 4409 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 3*

The diesel exhaust fluid line heater 3 request for aftertreatment system 2 (exhaust bank 2).

00 request for heater to be inactive

01 request for heater to be active

10 reserved for future assignment by SAE

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64826

SPN 4410 *Aftertreatment 2 Diesel Exhaust Fluid Line Heater 4*

The diesel exhaust fluid line heater 4 request for aftertreatment system 2 (exhaust bank 2).

00 request for heater to be inactive

01 request for heater to be active

10 reserved for future assignment by SAE

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64826

SPN 4411 *Aftertreatment 2 SCR Exhaust Gas Differential Pressure*

Exhaust differential pressure measured between the intake and exhaust of an SCR component in exhaust bank 2.

Data Length: 2 bytes

Resolution: 0.1 kPa/bit, 0 offset

Data Range: 0 to 6,425.5 kPa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64825

SPN 4412 *Aftertreatment 2 SCR Exhaust Gas Differential Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the SCR differential pressure sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: 32 states/5 bit, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64825

SPN 4413 *Aftertreatment 2 SCR Catalyst Intake Gas Temperature*

Temperature of engine combustion byproducts entering the SCR catalyst in exhaust bank 2.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64824

SPN 4414 *Aftertreatment 2 SCR Catalyst Intake Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the SCR catalyst intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
 Resolution: 32 states/5 bit, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64824

SPN 4415 *Aftertreatment 2 SCR Catalyst Outlet Gas Temperature*

Temperature of engine combustion byproducts leaving the SCR catalyst exhaust in exhaust bank 2.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64824

SPN 4416 *Aftertreatment 2 SCR Catalyst Outlet Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the SCR catalyst outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
 Resolution: 32 states/5 bit, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64824

SPN 4417 *Aftertreatment 2 Diesel Exhaust Fluid Average Consumption*

Measured use of diesel exhaust fluid by a Selective Catalytic Reduction system for exhaust emission control, averaged over the previous 15 hours of engine operation.

Used to determine whether the SCR system is using an appropriate amount of diesel exhaust fluid, by comparing with the Aftertreatment 2 Commanded Diesel Exhaust Fluid Consumption parameter (SPN 4418).

Data Length:	2 bytes	
Resolution:	0.05 L/h per bit, 0 offset	
Data Range:	0 to 3,212.75 L/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64823	

SPN 4418 *Aftertreatment 2 SCR Commanded Catalyst Diesel Exhaust Fluid Consumption*

This parameter transmits the amount of diesel exhaust fluid that the emissions control system has requested to be used, averaged over the past 15 hours of engine operation.

Used to determine whether the SCR system is using an appropriate amount of diesel exhaust fluid, by comparing with the Aftertreatment 2 Average Diesel Exhaust Fluid Consumption parameter (SPN 4417).

Data Length:	2 bytes	
Resolution:	0.05 L/h per bit, 0 offset	
Data Range:	0 to 3,212.75 L/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64823	

SPN 4419 *Aftertreatment 2 SCR Conversion Efficiency*

The SCR conversion efficiency percentage. Calculated as 100 times the catalyst intake NO_x minus the catalyst outlet NO_x divided by the catalyst intake NO_x. The catalyst conversion efficiency number in itself does not imply emissions compliance or system function or system malfunction.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64823	

SPN 4420 *Aftertreatment 2 Diesel Exhaust Fluid Temperature 2*

Temperature of the diesel exhaust fluid at the device measuring diesel exhaust fluid quality

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64822	

SPN 4421 *Aftertreatment 2 Diesel Exhaust Fluid Concentration*

A measure of the concentration of urea in water. Zero percent means that the tank contains no urea. A 32.5% value indicates that the reagent is of the proper concentration. The 32.5% value indicates that the concentration is highest quality.

Data Length:	1 byte	
Resolution:	0.25 %/bit, 0 offset	
Data Range:	0 to 62.5 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64822	

SPN 4422 *Aftertreatment 2 Diesel Exhaust Fluid Conductivity*

A measure of the conductivity of the diesel exhaust fluid at the sensor. The conductivity is an indication of the diesel exhaust fluid's chemical make up.

Data Length:	1 byte	
Resolution:	5 microSiemens/mm, 0 offset	
Data Range:	0 to 1250 microSiemens/mm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64822	

(R) SPN 4423 *Aftertreatment 2 Diesel Exhaust Fluid Temperature 2 Preliminary FMI*

Used to identify the applicable J1939-73 FMI that applies to the most significant failure of the diesel exhaust fluid temperature sensor. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64822	

(R) SPN 4424 *Aftertreatment 2 Diesel Exhaust Fluid Properties Preliminary FMI*

Used to identify the applicable J1939-73 FMI that applies to the most significant failure of the diesel exhaust fluid properties sensor. This may be used for indicating failures of the diesel exhaust fluid concentration, diesel exhaust fluid conductivity or diesel exhaust fluid type. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64822	

SPN 4425 *Aftertreatment 2 Diesel Exhaust Fluid Type*

This parameter indicates the property of the fluid compound in the tank. A value of 0011 indicates uncontaminated Diesel Exhaust Fluid.

0000 - Urea concentration too high
 0001 - Urea concentration too low
 0010 - Fluid is diesel
 0011 - Diesel exhaust fluid is proper mixture
 0101 to 1100 - Reserved for SAE assignment
 1101 - Not able to determine diesel exhaust fluid property (fluid type unknown)
 1110 - Error with diesel exhaust fluid property detection
 1111 - Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64822	

SPN 4426 *Aftertreatment 2 Diesel Exhaust Fluid Tank Level*

Ratio of volume of diesel exhaust fluid to the total volume of diesel exhaust fluid storage container.

0 % = Empty
 100% = Full

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64821	

SPN 4427 *Aftertreatment 2 Diesel Exhaust Fluid Tank Temperature*

Temperature of the diesel exhaust fluid in the storage tank.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64821	

SPN 4428 *Aftertreatment 2 Diesel Exhaust Fluid Tank Level 2*

The measure of the diesel exhaust fluid level in the diesel exhaust fluid tank.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, 0 offset	
Data Range:	0 to 6,425.5 mm (0 to 6.4255 m)	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64821	

(R) SPN 4429 *Aftertreatment 2 Diesel Exhaust Fluid Tank Level Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank level sensor by the manufacturer's sensor control software. This FMI is applicable to either the diesel exhaust fluid tank level 1 or diesel exhaust fluid tank

level 2 parameters. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64821	

SPN 4430 *Aftertreatment 2 Diesel Exhaust Fluid Tank 1 Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 1 temperature by the manufacturer's control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64821	

SPN 4431 *Aftertreatment 2 Diesel Exhaust Fluid Tank Heater*

Percentage of heating applied to the aftertreatment 2 diesel exhaust fluid tank heater. A value of 0% means no heating applied, a value of 100% means full heating applied. The diesel exhaust fluid tank heater warms the diesel exhaust fluid in the diesel exhaust fluid tank. See SPN 5138 for the command for this tank heater.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64821	

SPN 4432 *Aftertreatment 2 Diesel Exhaust Fluid Tank 1 Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 1 heater, by the manufacturer's control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64821	

SPN 4433 *Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Level*

The diesel exhaust fluid tank 2 level percentage for aftertreatment system 2 (exhaust bank 2). 0% is empty and 100% is full. Tank 2 is used as a quick thaw diesel exhaust fluid tank.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64820	

SPN 4434 *Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Temperature*

The diesel exhaust fluid tank 2 temperature for aftertreatment system 2 (exhaust bank 2). Tank 2 is used as a quick thaw diesel exhaust fluid tank.

Data Length: 1 byte
 Resolution: 1 deg C/bit, -40 deg C offset
 Data Range: -40 to 210 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64820

SPN 4435 *Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Level 2*

The diesel exhaust fluid tank 2 level height in mm for aftertreatment system 2 (exhaust bank 2). Tank 2 is used as a quick thaw diesel exhaust fluid tank.

Data Length: 2 bytes
 Resolution: 0.1 mm/bit, 0 offset
 Data Range: 0 to 6,425.5 mm (0 to 6.4255 m) Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64820

SPN 4436 *Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Level Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 2 level, by the manufacturer's control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64820

SPN 4437 *Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 2 temperature, by the manufacturer's control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64820

SPN 4438 *Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Heater*

The diesel exhaust fluid tank 2 heater percentage for aftertreatment system 1 (exhaust bank 1). 0% is off. See SPN 5415 for the command for this tank heater.

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15 Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64820

SPN 4439 *Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel exhaust fluid tank 2 heater by the manufacturer's control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64820	

SPN 4440 *Aftertreatment 2 Diesel Exhaust Fluid Pump Motor Speed*

Rotational speed of the motor driving a pump for diesel exhaust fluid used in an aftertreatment system.

Data Length:	2 bytes	
Resolution:	0.5 rpm/bit, 0 offset	
Data Range:	0 to 32,127.5 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64819	

SPN 4441 *Aftertreatment 2 Diesel Exhaust Fluid Pump Drive Percentage*

The percent (command) sent to the motor to control the speed of the diesel exhaust fluid pump.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64819	

SPN 4442 *Aftertreatment 2 Diesel Exhaust Fluid Return Valve*

Command to the valve which determines whether the diesel exhaust fluid is delivered to the injector or is routed back to the diesel exhaust fluid tank. Zero directs all diesel exhaust fluid flow to the injector, 100% sends all diesel exhaust fluid back to the tank.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64819	

SPN 4443 *Aftertreatment 2 Outlet NH3*

The amount of NH3 in the exhaust exiting the aftertreatment system measured by a NH3 sensor at the aftertreatment outlet, represented in NH3 molecule parts per million non-NH3 molecules in exhaust bank 2.

Data Length:	2 bytes	
Resolution:	0.05 ppm/bit, -200 ppm offset	
Data Range:	-200 to 3012.75 ppm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61480	

SPN 4444 *Aftertreatment 2 Outlet NH3 Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment outlet NH3 sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61480	

SPN 4445 *Aftertreatment 2 Outlet NH3 Reading Stable*

Indicates that the NH3 reading of the aftertreatment outlet NH3 sensor is stable as determined by the manufacturer's control software in exhaust bank 2.

00 - Reading is not stable
 01 - Reading is stable
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61480	

SPN 4446 *Aftertreatment 2 Outlet NH3 Gas Sensor Power In Range*

Indicates that the power supplied to the aftertreatment outlet NH3 gas sensor is within the manufacturer's specification in exhaust bank 2.

00 - Heater element is not in range
 01 - Heater element is in range
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61480	

SPN 4447 *Aftertreatment 2 Outlet NH3 Gas Sensor at Temperature*

Indicates that the heater element of the aftertreatment outlet NH3 gas sensor is within the manufacturer's specified range for accurate measurements in exhaust bank 2.

00 - Heater element is not in range

01 - Heater element is in range

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61480

SPN 4448 *Aftertreatment 2 Outlet NH3 Gas Sensor Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the heater of the outlet NH3 exhaust gas sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: Binary, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61480

SPN 4449 *Aftertreatment 2 Outlet NH3 Gas Sensor Heater Control*

Indicates the heater status in the warm-up process. Upon receiving a power-up command, the NH3 gas sensor ramps up according to a manufacturer defined profile. The Preheat 1, Preheat 2, and Automatic messages are regions within this profile in exhaust bank 1.

00 - Automatic

01 - Preheat 2

10 - Preheat 1

11 - Heater off or Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61480

SPN 4454 *Retract Status of ramp 4*

Retract status of ramp at doorway 4, counting from front to back on the vehicle.

00 ramp retracted
01 ramp extended
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64880

Operational Range: same as data range

SPN 4455 *Enable status of ramp 4*

Enable status of ramp at doorway 4, counting from front to back on the vehicle.

00 ramp disabled
01 ramp enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64880

Operational Range: same as data range

SPN 4456 *Movement status of ramp 4*

Movement status of ramp at doorway 4, counting from front to back on the vehicle.

00 ramp not being moved
01 ramp being moved
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64880

Operational Range: same as data range

SPN 4457 *Retract Status of ramp 5*

Retract status of ramp at doorway 5, counting from front to back on the vehicle.

00 ramp retracted
01 ramp extended
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64880

Operational Range: same as data range

SPN 4458 *Enable status of ramp 5*

Enable status of ramp at doorway 5, counting from front to back on the vehicle.

00 ramp disabled
01 ramp enabled
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64880

Operational Range: same as data range

SPN 4459 *Movement status of ramp 5*

Movement status of ramp at doorway 5, counting from front to back on the vehicle.

00 ramp not being moved
01 ramp being moved
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64880

Operational Range: same as data range

SPN 4460 Joystick 1 Lamp 1 Command

Tells joystick 1 to switch on/off/blinking lamp 1.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4461 Joystick 1 Lamp 2 Command

Tells joystick 1 to switch on/off/blinking lamp 2.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4462 Joystick 1 Lamp 3 Command

Tells joystick 1 to switch on/off/blinking lamp 3.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4463 Joystick 1 Lamp 4 Command

Tells joystick 1 to switch on/off/blinking lamp 4.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4464 Joystick 1 Lamp 5 Command

Tells joystick 1 to switch on/off/blinking lamp 5.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4465 Joystick 1 Lamp 6 Command

Tells joystick 1 to switch on/off/blinking lamp 6.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4466 Joystick 1 Lamp 7 Command

Tells joystick 1 to switch on/off/blinking lamp 7.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4467 Joystick 1 Lamp 8 Command

Tells joystick 1 to switch on/off/blinking lamp 8.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4468 Joystick 1 Lamp 9 Command

Tells joystick 1 to switch on/off/blinking lamp 9.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4469 Joystick 1 Lamp 10 Command

Tells joystick 1 to switch on/off/blinking lamp 10.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 39168

Operational Range: same as data range

SPN 4470 Joystick 2 Lamp 1 Command

Tells joystick 2 to switch on/off/blinking lamp 1.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 39168

Operational Range: same as data range

SPN 4471 Joystick 2 Lamp 2 Command

Tells joystick 2 to switch on/off/blinking lamp 2.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 39168

Operational Range: same as data range

SPN 4472 Joystick 2 Lamp 3 Command

Tells joystick 2 to switch on/off/blinking lamp 3.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4473 Joystick 2 Lamp 4 Command

Tells joystick 2 to switch on/off/blinking lamp 4.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4474 Joystick 2 Lamp 5 Command

Tells joystick 2 to switch on/off/blinking lamp 5.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4475 Joystick 2 Lamp 6 Command

Tells joystick 2 to switch on/off/blinking lamp 6.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4476 Joystick 2 Lamp 7 Command

Tells joystick 2 to switch on/off/blinking lamp 7.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4477 Joystick 2 Lamp 8 Command

Tells joystick 2 to switch on/off/blinking lamp 8.

00 - Off
01 - On
10 - Blinking
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 39168

Operational Range: same as data range

SPN 4478 Joystick 2 Lamp 9 Command

Tells joystick 2 to switch on/off/blinking lamp 9.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 39168

SPN 4479 Joystick 2 Lamp 10 Command

Tells joystick 2 to switch on/off/blinking lamp 10.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 39168

SPN 4480 Joystick 3 Lamp 1 Command

Tells joystick 3 to switch on/off/blinking lamp 1.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 39168

SPN 4481 Joystick 3 Lamp 2 Command

Tells joystick 3 to switch on/off/blinking lamp 2.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 39168

Operational Range: same as data range

SPN 4482 Joystick 3 Lamp 3 Command

Tells joystick 3 to switch on/off/blinking lamp 3.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 39168

Operational Range: same as data range

SPN 4483 Joystick 3 Lamp 4 Command

Tells joystick 3 to switch on/off/blinking lamp 4.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 39168

Operational Range: same as data range

SPN 4484 Joystick 3 Lamp 5 Command

Tells joystick 3 to switch on/off/blinking lamp 5.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 39168

Operational Range: same as data range

SPN 4485 Joystick 3 Lamp 6 Command

Tells joystick 3 to switch on/off/blinking lamp 6.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 39168

Operational Range: same as data range

SPN 4486 Joystick 3 Lamp 7 Command

Tells joystick 3 to switch on/off/blinking lamp 7.

00 - Off

01 - On

10 - Blinking

11 - Not available or not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 39168

Operational Range: same as data range

SPN 4487 Joystick 3 Lamp 8 Command

Tells joystick 3 to switch on/off/blinking lamp 8.

00 - Off
 01 - On
 10 - Blinking
 11 - Not available or not installed

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 39168

Operational Range: same as data range

SPN 4488 Joystick 3 Lamp 9 Command

Tells joystick 3 to switch on/off/blinking lamp 9.

00 - Off
 01 - On
 10 - Blinking
 11 - Not available or not installed

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 39168

Operational Range: same as data range

SPN 4489 Joystick 3 Lamp 10 Command

Tells joystick 3 to switch on/off/blinking lamp 10.

00 - Off
 01 - On
 10 - Blinking
 11 - Not available or not installed

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 39168

Operational Range: same as data range

SPN 4490 Specific Humidity

Specific humidity of the ambient intake air.

Data Length: 2 bytes
 Resolution: 0.01 g/kg per bit, 0 offset
 Data Range: 0 to 642.55 g/kg
 Type: Measured
 Supporting Information:
 PGN reference: 64992

Operational Range: same as data range

SPN 4491 Joystick 4 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4492 Joystick 4 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4493 Joystick 4 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4494 Joystick 4 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64816	

SPN 4495 Joystick 4 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64816	

SPN 4496 Joystick 4 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64816	

SPN 4497 Joystick 4 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4498 Joystick 4 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4499 Joystick 4 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4500 Joystick 4 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4501 Joystick 4 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64816

Operational Range: same as data range

SPN 4502 Joystick 4 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64816

Operational Range: same as data range

SPN 4503 Joystick 4 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64816

Operational Range: same as data range

SPN 4504 Joystick 4 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64816

Operational Range: same as data range

SPN 4505 Joystick 4 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64816

Operational Range: same as data range

SPN 4506 Joystick 4 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64816

Operational Range: same as data range

SPN 4507 Joystick 4 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64816

Operational Range: same as data range

SPN 4508 Joystick 4 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64816

Operational Range: same as data range

SPN 4509 Joystick 4 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64816

Operational Range: same as data range

SPN 4510 Joystick 4 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4511 Joystick 4 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4512 Joystick 4 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64816

SPN 4513 *Joystick 4 Grip X-Axis Neutral Position Status*

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4514 *Joystick 4 Grip X-Axis Lever Left Negative Position Status*

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4515 *Joystick 4 Grip X-Axis Lever Right Positive Position Status*

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4516 Joystick 4 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64815	

SPN 4517 Joystick 4 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64815	

SPN 4518 Joystick 4 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64815	

SPN 4519 Joystick 4 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4520 Joystick 4 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4521 Joystick 4 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4522 Joystick 4 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4523 Joystick 4 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4524 Joystick 4 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4525 Joystick 4 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4526 Joystick 4 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4527 Joystick 4 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64815

SPN 4528 Joystick 5 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64814

SPN 4529 Joystick 5 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64814

SPN 4530 Joystick 5 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64814

SPN 4531 Joystick 5 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64814

SPN 4532 Joystick 5 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64814

SPN 4533 Joystick 5 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64814

SPN 4534 Joystick 5 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64814

SPN 4535 Joystick 5 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64814	

SPN 4536 Joystick 5 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64814	

SPN 4537 Joystick 5 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64814	

SPN 4538 Joystick 5 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64814	

SPN 4539 Joystick 5 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64814

Operational Range: same as data range

SPN 4540 Joystick 5 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64814

Operational Range: same as data range

SPN 4541 Joystick 5 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64814

Operational Range: same as data range

SPN 4542 Joystick 5 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64814

Operational Range: same as data range

SPN 4543 Joystick 5 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64814

Operational Range: same as data range

SPN 4544 Joystick 5 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64814

Operational Range: same as data range

SPN 4545 Joystick 5 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64814

Operational Range: same as data range

SPN 4546 Joystick 5 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64814

Operational Range: same as data range

SPN 4547 Joystick 5 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64814

Operational Range: same as data range

SPN 4548 Joystick 5 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64814

Operational Range: same as data range

SPN 4549 Joystick 5 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64814

Operational Range: same as data range

SPN 4550 Joystick 5 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
 01 In Neutral Position
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64813

Operational Range: same as data range

SPN 4551 Joystick 5 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64813

SPN 4552 Joystick 5 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64813

SPN 4553 Joystick 5 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64813

SPN 4554 *Joystick 5 Grip Y-Axis Neutral Position Status*

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64813

SPN 4555 *Joystick 5 Grip Y-Axis Lever Back Negative Position Status*

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64813

SPN 4556 *Joystick 5 Grip Y-Axis Lever Forward Positive Position Status*

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64813

SPN 4557 *Joystick 5 Grip Y-Axis Position*

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64813	

SPN 4558 *Joystick 5 Theta-Axis Neutral Position Status*

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64813	

SPN 4559 *Joystick 5 Theta-Axis Counter Clockwise Negative Position Status*

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64813	

SPN 4560 Joystick 5 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64813	

SPN 4561 Joystick 5 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64813	

SPN 4562 Joystick 5 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64813	

SPN 4563 Joystick 5 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64813	

SPN 4564 *Joystick 5 Grip X-Axis Detent Position Status*

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64813

SPN 4565 *Joystick 6 X-Axis Neutral Position Status*

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4566 *Joystick 6 X-Axis Lever Left Negative Position Status*

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4567 Joystick 6 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4568 Joystick 6 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4569 Joystick 6 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4570 Joystick 6 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4571 Joystick 6 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4572 Joystick 6 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4573 Joystick 6 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4574 Joystick 6 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4575 Joystick 6 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4576 Joystick 6 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4577 Joystick 6 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4578 Joystick 6 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4579 Joystick 6 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4580 Joystick 6 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4581 Joystick 6 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4582 Joystick 6 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4583 Joystick 6 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4584 Joystick 6 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4585 Joystick 6 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64812

SPN 4586 Joystick 6 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64812

Operational Range: same as data range

SPN 4587 Joystick 6 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
 01 In Neutral Position
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64811

Operational Range: same as data range

SPN 4588 Joystick 6 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
 01 On negative side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64811

Operational Range: same as data range

SPN 4589 Joystick 6 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64811

SPN 4590 Joystick 6 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64811

SPN 4591 Joystick 6 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64811

SPN 4592 Joystick 6 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64811

SPN 4593 Joystick 6 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64811

SPN 4594 Joystick 6 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64811

SPN 4595 Joystick 6 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64811

SPN 4596 Joystick 6 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64811

SPN 4597 Joystick 6 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64811

SPN 4598 Joystick 6 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64811	

SPN 4599 Joystick 6 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64811	

SPN 4600 Joystick 6 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64811	

SPN 4601 Joystick 6 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64811	

SPN 4602 Joystick 7 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64810

SPN 4603 Joystick 7 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64810

SPN 4604 Joystick 7 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64810

SPN 4605 Joystick 7 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64810	

SPN 4606 Joystick 7 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64810	

SPN 4607 Joystick 7 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64810	

SPN 4608 Joystick 7 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64810	

SPN 4609 Joystick 7 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64810	

SPN 4610 Joystick 7 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64810	

SPN 4611 Joystick 7 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64810	

SPN 4612 Joystick 7 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64810

Operational Range: same as data range

SPN 4613 Joystick 7 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64810

Operational Range: same as data range

SPN 4614 Joystick 7 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64810

Operational Range: same as data range

SPN 4615 Joystick 7 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64810

Operational Range: same as data range

SPN 4616 Joystick 7 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64810

Operational Range: same as data range

SPN 4617 Joystick 7 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64810

Operational Range: same as data range

SPN 4618 Joystick 7 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64810

SPN 4619 Joystick 7 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64810

SPN 4620 Joystick 7 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64810

SPN 4621 Joystick 7 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64810

SPN 4622 Joystick 7 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64810

SPN 4623 Joystick 7 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64810

SPN 4624 *Joystick 7 Grip X-Axis Neutral Position Status*

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4625 *Joystick 7 Grip X-Axis Lever Left Negative Position Status*

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4626 *Joystick 7 Grip X-Axis Lever Right Positive Position Status*

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4627 Joystick 7 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64809	

SPN 4628 Joystick 7 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64809	

SPN 4629 Joystick 7 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64809	

SPN 4630 Joystick 7 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4631 Joystick 7 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4632 Joystick 7 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4633 Joystick 7 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4634 Joystick 7 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4635 Joystick 7 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4636 Joystick 7 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4637 Joystick 7 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4638 Joystick 7 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64809

SPN 4639 Joystick 8 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4640 Joystick 8 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4641 Joystick 8 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4642 Joystick 8 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4643 Joystick 8 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4644 Joystick 8 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4645 Joystick 8 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4646 Joystick 8 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64808	

SPN 4647 Joystick 8 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64808	

SPN 4648 Joystick 8 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64808	

SPN 4649 Joystick 8 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64808	

SPN 4650 Joystick 8 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64808

Operational Range: same as data range

SPN 4651 Joystick 8 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64808

Operational Range: same as data range

SPN 4652 Joystick 8 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64808

Operational Range: same as data range

SPN 4653 Joystick 8 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64808

Operational Range: same as data range

SPN 4654 Joystick 8 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64808

Operational Range: same as data range

SPN 4655 Joystick 8 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64808

Operational Range: same as data range

SPN 4656 Joystick 8 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4657 Joystick 8 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4658 Joystick 8 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64808

SPN 4659 Joystick 8 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64808

Operational Range: same as data range

SPN 4660 Joystick 8 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64808

Operational Range: same as data range

SPN 4661 Joystick 8 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
 01 In Neutral Position
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64807

Operational Range: same as data range

SPN 4662 Joystick 8 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64807

SPN 4663 Joystick 8 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64807

SPN 4664 Joystick 8 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64807

SPN 4665 *Joystick 8 Grip Y-Axis Neutral Position Status*

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64807

SPN 4666 *Joystick 8 Grip Y-Axis Lever Back Negative Position Status*

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64807

SPN 4667 *Joystick 8 Grip Y-Axis Lever Forward Positive Position Status*

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64807

SPN 4668 *Joystick 8 Grip Y-Axis Position*

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64807	

SPN 4669 *Joystick 8 Theta-Axis Neutral Position Status*

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64807	

SPN 4670 *Joystick 8 Theta-Axis Counter Clockwise Negative Position Status*

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64807	

SPN 4671 Joystick 8 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64807

Operational Range: same as data range

SPN 4672 Joystick 8 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
 Resolution: 0.1 %/bit, 0 offset
 Data Range: 0 to 102 %
 Type: Measured
 Supporting Information:
 PGN reference: 64807

Operational Range: same as data range

SPN 4673 Joystick 8 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64807

Operational Range: same as data range

SPN 4674 Joystick 8 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64807

Operational Range: same as data range

SPN 4675 *Joystick 8 Grip X-Axis Detent Position Status*

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64807

SPN 4676 *Joystick 9 X-Axis Neutral Position Status*

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4677 *Joystick 9 X-Axis Lever Left Negative Position Status*

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4678 Joystick 9 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4679 Joystick 9 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4680 Joystick 9 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4681 Joystick 9 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4682 Joystick 9 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4683 Joystick 9 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4684 Joystick 9 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4685 Joystick 9 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4686 Joystick 9 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4687 Joystick 9 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4688 Joystick 9 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64806

Operational Range: same as data range

SPN 4689 Joystick 9 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64806

Operational Range: same as data range

SPN 4690 Joystick 9 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64806

Operational Range: same as data range

SPN 4691 Joystick 9 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4692 Joystick 9 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4693 Joystick 9 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64806

SPN 4694 Joystick 9 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64806

Operational Range: same as data range

SPN 4695 Joystick 9 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64806

Operational Range: same as data range

SPN 4696 Joystick 9 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64806

Operational Range: same as data range

SPN 4697 Joystick 9 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
 01 Button pressed
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64806

Operational Range: same as data range

SPN 4698 Joystick 9 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
 01 In Neutral Position
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64805

Operational Range: same as data range

SPN 4699 Joystick 9 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
 01 On negative side of Neutral
 10 Error Indicator
 11 Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64805

Operational Range: same as data range

SPN 4700 Joystick 9 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64805	

SPN 4701 Joystick 9 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64805	

SPN 4702 Joystick 9 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
 01 In Neutral Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64805	

SPN 4703 Joystick 9 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64805

SPN 4704 Joystick 9 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64805

SPN 4705 Joystick 9 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64805

SPN 4706 Joystick 9 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64805

SPN 4707 Joystick 9 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64805

SPN 4708 Joystick 9 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64805

SPN 4709 Joystick 9 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64805	

SPN 4710 Joystick 9 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64805	

SPN 4711 Joystick 9 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64805	

SPN 4712 Joystick 9 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64805	

SPN 4713 Joystick 10 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4714 Joystick 10 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4715 Joystick 10 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4716 *Joystick 10 X-Axis Position*

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64804	

SPN 4717 *Joystick 10 Y-Axis Neutral Position Status*

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64804	

SPN 4718 *Joystick 10 Y-Axis Lever Back Negative Position Status*

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64804	

SPN 4719 Joystick 10 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
 01 On positive side of Neutral
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64804	

SPN 4720 Joystick 10 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64804	

SPN 4721 Joystick 10 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64804	

SPN 4722 Joystick 10 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
 01 In the Detent Position
 10 Error Indicator
 11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64804	

SPN 4723 Joystick 10 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4724 Joystick 10 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4725 Joystick 10 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4726 Joystick 10 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4727 Joystick 10 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4728 Joystick 10 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4729 Joystick 10 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4730 Joystick 10 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4731 Joystick 10 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed

01 Button pressed

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64804

SPN 4732 Joystick 10 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64804

Operational Range: same as data range

SPN 4733 Joystick 10 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64804

Operational Range: same as data range

SPN 4734 Joystick 10 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference: 64804

Operational Range: same as data range

SPN 4735 Joystick 10 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4736 Joystick 10 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4737 Joystick 10 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4738 Joystick 10 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length:	10 bits	
Resolution:	0.1 %/bit, 0 offset	
Data Range:	0 to 102 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64803	

SPN 4739 Joystick 10 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64803	

SPN 4740 Joystick 10 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64803	

SPN 4741 Joystick 10 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4742 Joystick 10 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4743 Joystick 10 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position

01 In Neutral Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4744 Joystick 10 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral

01 On negative side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4745 Joystick 10 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral

01 On positive side of Neutral

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4746 Joystick 10 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits

Resolution: 0.1 %/bit, 0 offset

Data Range: 0 to 102 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4747 Joystick 10 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4748 Joystick 10 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4749 Joystick 10 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position

01 In the Detent Position

10 Error Indicator

11 Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64803

SPN 4750 Engine Exhaust Gas Recirculation 1 (EGR1) Cooler Intake Temperature

Exhaust Gas Recirculation (EGR) Temperature measured at the EGR cooler intake. See SPN 412 for Engine EGR temperature which is typically measured at the EGR cooler outlet.

Data Length: 2 bytes

Resolution: 0.03125 deg C/bit, -273 deg C offset

Data Range: -273 to 1734.96875 deg C

Operational Range: same as data range

Type: Measured

Supporting Information: See Appendix D - SPN 27

PGN reference: 64879

SPN 4751 Engine Exhaust Gas Recirculation 1 (EGR1) Cooler Intake Gas Absolute Pressure

Exhaust Gas Recirculation gas absolute pressure is measured at the EGR cooler intake. See SPN 3358 for EGR pressure measured at the EGR cooler outlet before the valve.

Data Length: 2 bytes

Resolution: 0.5 kPa/bit, 0 offset

Data Range: 0 to 32,127.5 kPa

Operational Range: same as data range

Type: Measured

Supporting Information: See Appendix D - SPN 27

PGN reference: 64879

SPN 4752 Engine Exhaust Gas Recirculation 1 (EGR1) Cooler Efficiency

Exhaust Gas Recirculation cooler efficiency is an indication of the cooler's ability to reduce the temperature of the exhaust gas that is being recirculated back to the intake. 0% = no reduction in temperature, 100% = maximum cooling. The EGR

cooler efficiency is calculated as (EGR cooler intake temperature minus EGR gas temperature) divided by (EGR cooler intake temperature minus engine coolant temperature).

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Status
 Supporting Information: See Appendix D - SPN 27
 PGN reference: 64879

SPN 4753 *Aftertreatment 1 Gas Oxidation Catalyst Intake Gas Temperature*

Temperature of engine combustion byproducts entering the gas oxidation catalyst in exhaust bank 1. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64802

SPN 4754 *Aftertreatment 1 Gas Oxidation Catalyst Outlet Gas Temperature*

Temperature of engine combustion byproducts leaving the gas oxidation catalyst in exhaust bank 1. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64802

SPN 4755 *Aftertreatment 1 Gas Oxidation Catalyst Differential Pressure*

Exhaust differential pressure measured between the intake and exhaust of the gas oxidation catalyst in exhaust bank 1. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length: 2 bytes
 Resolution: 0.1 kPa/bit, 0 offset
 Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64802

SPN 4756 *Aftertreatment 1 Gas Oxidation Catalyst Intake Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the gas oxidation catalyst intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64802	

SPN 4757 *Aftertreatment 1 Gas Oxidation Catalyst Outlet Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the gas oxidation catalyst outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64802	

SPN 4758 *Aftertreatment 1 Gas Oxidation Catalyst Differential Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the gas oxidation catalyst differential pressure sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64802	

SPN 4759 *Aftertreatment 2 Gas Oxidation Catalyst Intake Gas Temperature*

Temperature of engine combustion byproducts entering the gas oxidation catalyst in exhaust bank 2. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64801	

SPN 4760 *Aftertreatment 2 Gas Oxidation Catalyst Outlet Gas Temperature*

Temperature of engine combustion byproducts leaving the gas oxidation catalyst in exhaust bank 2. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64801

SPN 4761 *Aftertreatment 2 Gas Oxidation Catalyst Differential Pressure*

Exhaust differential pressure measured between the intake and exhaust of the gas oxidation catalyst in exhaust bank 2. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length: 2 bytes
 Resolution: 0.1 kPa/bit, 0 offset
 Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64801

SPN 4762 *Aftertreatment 2 Gas Oxidation Catalyst Intake Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the gas oxidation catalyst intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64801

SPN 4763 *Aftertreatment 2 Gas Oxidation Catalyst Outlet Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the gas oxidation catalyst outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64801

SPN 4764 *Aftertreatment 2 Gas Oxidation Catalyst Differential Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the gas oxidation catalyst differential pressure sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64801	

SPN 4765 *Aftertreatment 1 Diesel Oxidation Catalyst Intake Gas Temperature*

Temperature of engine combustion byproducts entering the diesel oxidation catalyst in exhaust bank 1. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64800	

SPN 4766 *Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature*

Temperature of engine combustion byproducts leaving the diesel oxidation catalyst exhaust in exhaust bank 1. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64800	

SPN 4767 *Aftertreatment 1 Diesel Oxidation Catalyst Differential Pressure*

Exhaust differential pressure measured between the intake and exhaust of a diesel oxidation catalyst in exhaust bank 1. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64800	

SPN 4768 *Aftertreatment 1 Diesel Oxidation Catalyst Intake Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel oxidation catalyst intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64800	

SPN 4769 *Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel oxidation catalyst outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64800	

SPN 4770 *Aftertreatment 1 Diesel Oxidation Catalyst Differential Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel oxidation catalyst differential pressure sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64800	

SPN 4771 *Aftertreatment 2 Diesel Oxidation Catalyst Intake Gas Temperature*

Temperature of engine combustion byproducts entering the diesel oxidation catalyst in exhaust bank 2. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64799	

SPN 4772 *Aftertreatment 2 Diesel Oxidation Catalyst Outlet Gas Temperature*

Temperature of engine combustion byproducts leaving the diesel oxidation catalyst exhaust in exhaust bank 2. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64799

SPN 4773 *Aftertreatment 2 Diesel Oxidation Catalyst Differential Pressure*

Exhaust differential pressure measured between the intake and exhaust of a diesel oxidation catalyst in exhaust bank 2. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length: 2 bytes
 Resolution: 0.5 kPa/bit, 0 offset
 Data Range: 0 to 32,127.5 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64799

SPN 4774 *Aftertreatment 2 Diesel Oxidation Catalyst Intake Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel oxidation catalyst intake gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64799

SPN 4775 *Aftertreatment 2 Diesel Oxidation Catalyst Outlet Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel oxidation catalyst outlet gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This gas parameter should be used with engines fueled by gaseous fuel like natural gas or propane. A separate parameter has been defined for diesel fueled engines.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64799

SPN 4776 *Aftertreatment 2 Diesel Oxidation Catalyst Differential Pressure Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the diesel oxidation catalyst differential pressure sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64799	

SPN 4777 *Aftertreatment 1 Gas Oxidation Catalyst Differential Gas Temperature*

The differential engine combustion byproducts gas temperature measured between the intake and outlet of the gas oxidation catalyst for exhaust bank 1. This gas parameter should be used with engine fueled by gaseous fuel like natural gas or propane. Diesel engines should not use this parameter.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64798	

SPN 4778 *Aftertreatment 2 Gas Oxidation Catalyst Differential Gas Temperature*

The differential engine combustion byproducts gas temperature measured between the intake and outlet of the gas oxidation catalyst for exhaust bank 2. This gas parameter should be used with engine fueled by gaseous fuel like natural gas or propane. Diesel engines should not use this parameter.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64798	

SPN 4779 *Aftertreatment 1 Three Way Catalyst Differential Gas Temperature*

The differential engine combustion byproducts gas temperature measured between the intake and outlet of the three way catalyst for exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64948	
PGN reference:	64797	

SPN 4780 *Aftertreatment 2 Three Way Catalyst Differential Gas Temperature*

The differential engine combustion byproducts gas temperature measured between the intake and outlet of the three way catalyst for exhaust bank 2.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information: See Appendix D - PGN 64948
 PGN reference: 64797

SPN 4781 *Diesel Particulate Filter 1 Soot Mass*

Soot mass in diesel particulate filter 1.

Data Length: 1 byte
 Resolution: 4 g/bit, 0 offset
 Data Range: 0 to 1000 g Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64796

SPN 4782 *Diesel Particulate Filter 1 Soot Density*

Soot density in diesel particulate filter 1.

Data Length: 1 byte
 Resolution: 0.08 g/L per bit, 0 offset
 Data Range: 0 to 20.0 g/L Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64796

SPN 4783 *Diesel Particulate Filter 1 Mean Soot Signal*

Mean output signal level from diesel particulate filter 1 soot sensor.

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64796

SPN 4784 *Diesel Particulate Filter 1 Median Soot Signal*

Median output signal level from diesel particulate filter 1 soot sensor.

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64796

SPN 4785 Diesel Particulate Filter 1 Soot Sensor Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the soot sensor signal by the manufacturer's sensor control software in diesel particulate filter 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64796	

SPN 4786 Diesel Particulate Filter 2 Soot Mass

Soot mass in diesel particulate filter 2.

Data Length:	1 byte	
Resolution:	4 g/bit, 0 offset	
Data Range:	0 to 1000 g	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64795	

SPN 4787 Diesel Particulate Filter 2 Soot Density

Soot density in diesel particulate filter 2.

Data Length:	1 byte	
Resolution:	0.08 g/L per bit, 0 offset	
Data Range:	0 to 20.0 g/L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64795	

SPN 4788 Diesel Particulate Filter 2 Mean Soot Signal

Mean output signal level from diesel particulate filter 2 soot sensor.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64795	

SPN 4789 Diesel Particulate Filter 2 Median Soot Signal

Median output signal level from diesel particulate filter 2 soot sensor.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64795	

SPN 4790 Diesel Particulate Filter 2 Soot Sensor Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the soot sensor signal by the manufacturer's sensor control software in diesel particulate filter 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64795	

SPN 4809 Aftertreatment 1 Warm Up Diesel Oxidation Catalyst Intake Temperature

This is the temperature measured at the intake of the warm up oxidation catalytic converter in exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64794	

SPN 4810 Aftertreatment 1 Warm Up Diesel Oxidation Catalyst Outlet Temperature

This is the temperature measured at the outlet of the warm up oxidation catalytic converter in exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64794	

SPN 4811 Engine Oil Pressure in Piston Cooling Gallery

Pressure of the engine lubricating oil in the gallery that feeds the piston cooling spray nozzles. The pressure in this gallery varies from the main engine oil fed to the bearings, and is usually lower.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:		

SPN 4812 Engine Piston Cooling Oil Supply Valve Opening

Command for the Piston Cooling Valve opening; zero is closed (no oil to cool the pistons) and 100% is open (all possible oil flowing to cool the pistons.)

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:		

SPN 4813 *Engine Oil Thermostat Bypass Valve Opening*

Command to the valve that directs engine oil around the oil thermostat. Zero means closed (all oil flows through the thermostat passage) and 100% means open (all possible oil bypasses the thermostat.)

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:		

SPN 4814 *Engine Coolant Pump command*

Command for a coolant pump that can be driven at varying output level. A command of zero is pump OFF, 100% results in maximum coolant flow. The pump may allow adjustment of coolant flow by varying the pump speed. The ECU commands a percentage of maximum pump output.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:		

SPN 4815 *Engine Cooling Fan Thermal Switch Position*

This is a feedback measurement of the position of a thermal switch that turns on an engine cooling fan.

0 = OFF (cooling flow not needed)
 1 = ON (cooling flow demanded)
 2 = ERROR
 3 = Not Available

Note that this is not a command to turn the fan on, nor a direct measurement of fan speed to assure that the fan is working. It is a measurement of the position of a switch that is activated by temperature, and provides feedback to the ECU of the state of that thermal switch.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:		

SPN 4816 *Transmission Torque Converter Lockup Transition in Process*

State signal indicating whether or not the transmission torque converter lock up clutch is transitioning between being applied and being released. The broadcast value should be set to 01 as soon as an apply or release of the lockup clutch is initiated, and then set to 00 once the given transition is complete. This parameter is a companion to SPN 573 Transmission Torque Converter Lockup Engaged.

00 - Transition is not in process

01 - Transition is in process

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61442

SPN 4817 *Engine Intake Manifold #1 Absolute Pressure (High Resolution)*

The absolute pressure measurement of the air intake manifold. If there are multiple air pressure sensors in the intake stream, this is the last one in flow direction before entering the combustion chamber. This SPN is a high resolution measurement. See SPN 3563 if high resolution is not needed.

Data Length: 2 bytes

Resolution: 0.1 kPa/bit, 0 offset

Data Range: 0 to 6,425.5 kPa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64976

SPN 4818 *Driver Airbag Ignitor Loop 1st Stage - Resistance*

Resistance of Driver Airbag Ignitor Loop 1st Stage.

Data Length: 2 bytes

Resolution: 0.1 ohm/bit, 0 offset

Data Range: 0 to 6425.5 ohm

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64793

SPN 4819 *Passenger Airbag Ignitor Loop 1st Stage - Resistance*

Resistance of Passenger Airbag Ignitor Loop 1st Stage.

Data Length: 2 bytes

Resolution: 0.1 ohm/bit, 0 offset

Data Range: 0 to 6425.5 ohm

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64793

SPN 4820 Driver Airbag Ignitor Loop 2nd Stage - Resistance

Resistance of Driver Airbag Ignitor Loop 2nd Stage.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4821 Passenger Airbag Ignitor Loop 2nd Stage - Resistance

Resistance of Passenger Airbag Ignitor Loop 2nd Stage.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4822 Driver Belt Tensioner Ignitor Loop - Resistance

Resistance of Driver Belt Tensioner Ignitor Loop 1st Stage.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4823 Passenger Belt Tensioner Ignitor Loop - Resistance

Resistance of Passenger Belt Tensioner Ignitor Loop 1st Stage.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4824 Side Bag Ignitor Loop 1 - Left - Resistance

Resistance of Side Bag Ignitor Loop 1 - Left.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4825 Side Bag Ignitor Loop 2 - Left - Resistance

Resistance of Side Bag Ignitor Loop 2 - Left.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4826 Side Bag Ignitor Loop 1 - Right - Resistance

Resistance of Side Bag Ignitor Loop 1 - Right.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4827 Side Bag Ignitor Loop 2 - Right - Resistance

Resistance of Side Bag Ignitor Loop 2 - Right.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4828 Special Ignitor Loop 1 - Resistance

Resistance of Special Ignitor Loop 1. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4829 Special Ignitor Loop 2 - Resistance

Resistance of Special Ignitor Loop 2. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4830 *Special Ignitor Loop 3 - Resistance*

Resistance of Special Ignitor Loop 3. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4831 *Special Ignitor Loop 4 - Resistance*

Resistance of Special Ignitor Loop 4. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4832 *Special Ignitor Loop 5 - Resistance*

Resistance of Special Ignitor Loop 5. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4833 *Special Ignitor Loop 6 - Resistance*

Resistance of Special Ignitor Loop 6. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4834 *Special Ignitor Loop 7 - Resistance*

Resistance of Special Ignitor Loop 7. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4835 Special Ignitor Loop 8 - Resistance

Resistance of Special Ignitor Loop 8. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4836 Special Ignitor Loop 9 - Resistance

Resistance of Special Ignitor Loop 9. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4837 Special Ignitor Loop 10 - Resistance

Resistance of Special Ignitor Loop 10. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4838 Special Ignitor Loop 11 - Resistance

Resistance of Special Ignitor Loop 11. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4839 Special Ignitor Loop 12 - Resistance

Resistance of Special Ignitor Loop 12. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4840 Special Ignitor Loop 13 - Resistance

Resistance of Special Ignitor Loop 13. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4841 Special Ignitor Loop 14 - Resistance

Resistance of Special Ignitor Loop 14. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4842 Special Ignitor Loop 15 - Resistance

Resistance of Special Ignitor Loop 15. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4843 Special Ignitor Loop 16 - Resistance

Resistance of Special Ignitor Loop 16. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4844 Special Ignitor Loop 17 - Resistance

Resistance of Special Ignitor Loop 17. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4845 Special Ignitor Loop 18 - Resistance

Resistance of Special Ignitor Loop 18. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4846 Special Ignitor Loop 19 - Resistance

Resistance of Special Ignitor Loop 19. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4847 Special Ignitor Loop 20 - Resistance

Resistance of Special Ignitor Loop 20. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4848 Special Ignitor Loop 21 - Resistance

Resistance of Special Ignitor Loop 21. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4849 Special Ignitor Loop 22 - Resistance

Resistance of Special Ignitor Loop 22. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4850 Special Ignitor Loop 23 - Resistance

Resistance of Special Ignitor Loop 23. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4851 Special Ignitor Loop 24 - Resistance

Resistance of Special Ignitor Loop 24. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4852 Special Ignitor Loop 25 - Resistance

Resistance of Special Ignitor Loop 25. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4853 Special Ignitor Loop 26 - Resistance

Resistance of Special Ignitor Loop 26. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4854 Special Ignitor Loop 27 - Resistance

Resistance of Special Ignitor Loop 27. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4855 Special Ignitor Loop 28 - Resistance

Resistance of Special Ignitor Loop 28. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4856 Special Ignitor Loop 29 - Resistance

Resistance of Special Ignitor Loop 29. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4857 Special Ignitor Loop 30 - Resistance

Resistance of Special Ignitor Loop 30. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4858 Special Ignitor Loop 31 - Resistance

Resistance of Special Ignitor Loop 31. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4859 Special Ignitor Loop 32 - Resistance

Resistance of Special Ignitor Loop 32. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4860 Special Ignitor Loop 33 - Resistance

Resistance of Special Ignitor Loop 33. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4861 Special Ignitor Loop 34 - Resistance

Resistance of Special Ignitor Loop 34. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4862 Special Ignitor Loop 35 - Resistance

Resistance of Special Ignitor Loop 35. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4863 Special Ignitor Loop 36 - Resistance

Resistance of Special Ignitor Loop 36. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4864 Special Ignitor Loop 37 - Resistance

Resistance of Special Ignitor Loop 37. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4865 Special Ignitor Loop 38 - Resistance

Resistance of Special Ignitor Loop 38. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4866 Special Ignitor Loop 39 - Resistance

Resistance of Special Ignitor Loop 39. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4867 Special Ignitor Loop 40 - Resistance

Resistance of Special Ignitor Loop 40. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4868 Special Ignitor Loop 41 - Resistance

Resistance of Special Ignitor Loop 41. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4869 Special Ignitor Loop 42 - Resistance

Resistance of Special Ignitor Loop 42. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4870 Special Ignitor Loop 43 - Resistance

Resistance of Special Ignitor Loop 43. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4871 Special Ignitor Loop 44 - Resistance

Resistance of Special Ignitor Loop 44. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4872 Special Ignitor Loop 45 - Resistance

Resistance of Special Ignitor Loop 45. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4873 Special Ignitor Loop 46 - Resistance

Resistance of Special Ignitor Loop 46. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4874 Special Ignitor Loop 47 - Resistance

Resistance of Special Ignitor Loop 47. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4875 Special Ignitor Loop 48 - Resistance

Resistance of Special Ignitor Loop 48. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4876 Special Ignitor Loop 49 - Resistance

Resistance of Special Ignitor Loop 49. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4877 Special Ignitor Loop 50 - Resistance

Resistance of Special Ignitor Loop 50. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4878 Special Ignitor Loop 51 - Resistance

Resistance of Special Ignitor Loop 51. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4879 Special Ignitor Loop 52 - Resistance

Resistance of Special Ignitor Loop 52. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4880 Special Ignitor Loop 53 - Resistance

Resistance of Special Ignitor Loop 53. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4881 Special Ignitor Loop 54 - Resistance

Resistance of Special Ignitor Loop 54. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4882 Special Ignitor Loop 55 - Resistance

Resistance of Special Ignitor Loop 55. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4883 Special Ignitor Loop 56 - Resistance

Resistance of Special Ignitor Loop 56. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4884 Special Ignitor Loop 57 - Resistance

Resistance of Special Ignitor Loop 57. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4885 *Special Ignitor Loop 58 - Resistance*

Resistance of Special Ignitor Loop 58. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4886 *Special Ignitor Loop 59 - Resistance*

Resistance of Special Ignitor Loop 59. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4887 *Special Ignitor Loop 60 - Resistance*

Resistance of Special Ignitor Loop 60. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4888 *Special Ignitor Loop 61 - Resistance*

Resistance of Special Ignitor Loop 61. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4889 *Special Ignitor Loop 62 - Resistance*

Resistance of Special Ignitor Loop 62. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4890 Special Ignitor Loop 63 - Resistance

Resistance of Special Ignitor Loop 63. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4891 Special Ignitor Loop 64 - Resistance

Resistance of Special Ignitor Loop 64. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4892 Special Ignitor Loop 65 - Resistance

Resistance of Special Ignitor Loop 65. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4893 Special Ignitor Loop 66 - Resistance

Resistance of Special Ignitor Loop 66. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4894 Special Ignitor Loop 67 - Resistance

Resistance of Special Ignitor Loop 67. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4895 Special Ignitor Loop 68 - Resistance

Resistance of Special Ignitor Loop 68. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4896 Special Ignitor Loop 69 - Resistance

Resistance of Special Ignitor Loop 69. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4897 Special Ignitor Loop 70 - Resistance

Resistance of Special Ignitor Loop 70. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4898 Special Ignitor Loop 71 - Resistance

Resistance of Special Ignitor Loop 71. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4899 Special Ignitor Loop 72 - Resistance

Resistance of Special Ignitor Loop 72. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4900 Special Ignitor Loop 73 - Resistance

Resistance of Special Ignitor Loop 73. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4901 Special Ignitor Loop 74 - Resistance

Resistance of Special Ignitor Loop 74. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4902 Special Ignitor Loop 75 - Resistance

Resistance of Special Ignitor Loop 75. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4903 Special Ignitor Loop 76 - Resistance

Resistance of Special Ignitor Loop 76. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4904 Special Ignitor Loop 77 - Resistance

Resistance of Special Ignitor Loop 77. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4905 Special Ignitor Loop 78 - Resistance

Resistance of Special Ignitor Loop 78. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4906 Special Ignitor Loop 79 - Resistance

Resistance of Special Ignitor Loop 79. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4907 Special Ignitor Loop 80 - Resistance

Resistance of Special Ignitor Loop 80. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4908 Special Ignitor Loop 81 - Resistance

Resistance of Special Ignitor Loop 81. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4909 Special Ignitor Loop 82 - Resistance

Resistance of Special Ignitor Loop 82. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4910 Special Ignitor Loop 83 - Resistance

Resistance of Special Ignitor Loop 83. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4911 Special Ignitor Loop 84 - Resistance

Resistance of Special Ignitor Loop 84. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4912 Special Ignitor Loop 85 - Resistance

Resistance of Special Ignitor Loop 85. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4913 Special Ignitor Loop 86 - Resistance

Resistance of Special Ignitor Loop 86. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4914 Special Ignitor Loop 87 - Resistance

Resistance of Special Ignitor Loop 87. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4915 *Special Ignitor Loop 88 - Resistance*

Resistance of Special Ignitor Loop 88. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4916 *Special Ignitor Loop 89 - Resistance*

Resistance of Special Ignitor Loop 89. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4917 *Special Ignitor Loop 90 - Resistance*

Resistance of Special Ignitor Loop 90. Since there are many different vehicle types (e.g. truck, bus, firetruck or ambulance), the ignitor loop configuration has a wide variation.

Data Length:	2 bytes	
Resolution:	0.1 ohm/bit, 0 offset	
Data Range:	0 to 6425.5 ohm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64793	

SPN 4918 *Frontal Collision Sensor 1 - Type*

Type of Frontal Collision Sensor 1.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4919 Frontal Collision Sensor 2 - Type

Type of Frontal Collision Sensor 2.

0000 = acceleration sensor
0001 = pressure sensor
0010 = rollrate sensor
0011 = sonic sensor
0100 = fiber-optic sensor
0101 = radar sensor
0110 = lidar sensor
0111 = optical sensor
1000-1101 = Reserved
1110 = Error - Type of sensor cannot be determined (unknown sensor)
1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4920 Frontal Collision Sensor 3 - Type

Type of Frontal Collision Sensor 3.

0000 = acceleration sensor
0001 = pressure sensor
0010 = rollrate sensor
0011 = sonic sensor
0100 = fiber-optic sensor
0101 = radar sensor
0110 = lidar sensor
0111 = optical sensor
1000-1101 = Reserved
1110 = Error - Type of sensor cannot be determined (unknown sensor)
1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4921 Frontal Collision Sensor 4 - Type

Type of Frontal Collision Sensor 4.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4922 Side Collision Sensor Front Left - Type

Type of Side Collision Sensor Front - Left.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4923 Side Collision Sensor Mid Front Left - Type

Type of Side Collision Sensor Mid Front - Left.

0000 = acceleration sensor
0001 = pressure sensor
0010 = rollrate sensor
0011 = sonic sensor
0100 = fiber-optic sensor
0101 = radar sensor
0110 = lidar sensor
0111 = optical sensor
1000-1101 = Reserved
1110 = Error - Type of sensor cannot be determined (unknown sensor)
1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4924 Side Collision Sensor Mid Rear Left - Type

Type of Side Collision Sensor Mid Rear - Left.

0000 = acceleration sensor
0001 = pressure sensor
0010 = rollrate sensor
0011 = sonic sensor
0100 = fiber-optic sensor
0101 = radar sensor
0110 = lidar sensor
0111 = optical sensor
1000-1101 = Reserved
1110 = Error - Type of sensor cannot be determined (unknown sensor)
1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4925 Side Collision Sensor Rear Left - Type

Type of Side Collision Sensor Rear - Left.

0000 = acceleration sensor
0001 = pressure sensor
0010 = rollrate sensor
0011 = sonic sensor
0100 = fiber-optic sensor
0101 = radar sensor
0110 = lidar sensor
0111 = optical sensor
1000-1101 = Reserved
1110 = Error - Type of sensor cannot be determined (unknown sensor)
1111 = not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64792

SPN 4926 Side Collision Sensor Front Right - Type

Type of Side Collision Sensor Front - Right.

0000 = acceleration sensor
0001 = pressure sensor
0010 = rollrate sensor
0011 = sonic sensor
0100 = fiber-optic sensor
0101 = radar sensor
0110 = lidar sensor
0111 = optical sensor
1000-1101 = Reserved
1110 = Error - Type of sensor cannot be determined (unknown sensor)
1111 = not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64792

SPN 4927 Side Collision Sensor Mid Front Right - Type

Type of Side Collision Sensor Mid Front - Right.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64792

SPN 4928 Side Collision Sensor Mid Rear Right - Type

Type of Side Collision Sensor Mid Rear - Right.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64792

SPN 4929 Side Collision Sensor Rear Right - Type

Type of Side Collision Sensor Rear - Right.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4930 Rear Collision Sensor 1 - Type

Type of Rear Collision Sensor 1.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4931 *Rear Collision Sensor 2 - Type*

Type of Rear Collision Sensor 2.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4932 *Rear Collision Sensor 3 - Type*

Type of Rear Collision Sensor 3.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4933 Rear Collision Sensor 4 - Type

Type of Rear Collision Sensor 4.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4934 Rollover Sensor - Type

Type of Rollover Sensor.

0000 = acceleration sensor
 0001 = pressure sensor
 0010 = rollrate sensor
 0011 = sonic sensor
 0100 = fiber-optic sensor
 0101 = radar sensor
 0110 = lidar sensor
 0111 = optical sensor
 1000-1101 = Reserved
 1110 = Error - Type of sensor cannot be determined (unknown sensor)
 1111 = not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4935 Frontal Collision Sensor 1 - Serial Number

Serial Number of Frontal Collision Sensor 1.

Data Length:	Variable - up to 32 bytes followed by an "" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64792	

SPN 4936 Frontal Collision Sensor 2 - Serial Number

Serial Number of Frontal Collision Sensor 2.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64792

SPN 4937 Frontal Collision Sensor 3 - Serial Number

Serial Number of Frontal Collision Sensor 3.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64792

SPN 4938 Frontal Collision Sensor 4 - Serial Number

Serial Number of Frontal Collision Sensor 4.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64792

SPN 4939 Side Collision Sensor Front Left - Serial Number

Serial Number of Side Collision Sensor Front - Left.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64792

SPN 4940 Side Collision Sensor Mid Front Left - Serial Number

Serial Number of Side Collision Sensor Mid Front - Left.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64792

SPN 4941 Side Collision Sensor Mid Rear Left - Serial Number

Serial Number of Side Collision Sensor Mid Rear - Left.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64792

SPN 4942 Side Collision Sensor Rear Left - Serial Number

Serial Number of Side Collision Sensor Rear - Left.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64792

SPN 4943 Side Collision Sensor Front Right - Serial Number

Serial Number of Side Collision Sensor Front - Right.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64792

SPN 4944 Side Collision Sensor Mid Front Right - Serial Number

Serial Number of Side Collision Sensor Mid Front - Right.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64792

SPN 4945 Side Collision Sensor Mid Rear Right - Serial Number

Serial Number of Side Collision Sensor Mid Rear - Right.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting Information:
PGN reference: 64792

SPN 4946 Side Collision Sensor Rear Right - Serial Number

Serial Number of Side Collision Sensor Rear - Right.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64792

SPN 4947 Rear Collision Sensor 1 - Serial Number

Serial Number of Rear Collision Sensor 1.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64792

SPN 4948 Rear Collision Sensor 2 - Serial Number

Serial Number of Rear Collision Sensor 2.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64792

SPN 4949 Rear Collision Sensor 3 - Serial Number

Serial Number of Rear Collision Sensor 3.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64792

SPN 4950 Rear Collision Sensor 4 - Serial Number

Serial Number of Rear Collision Sensor 4.

Data Length: Variable - up to 32 bytes followed by an "" delimiter
 Resolution: ASCII, 0 offset
 Data Range: 0 to 255 per byte Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64792

SPN 4951 Rollover Sensor - Serial Number

Serial Number of Rollover Sensor.

Data Length:	Variable - up to 32 bytes followed by an "" delimiter	
Resolution:	ASCII, 0 offset	
Data Range:	0 to 255 per byte	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64792	

SPN 4952 Driver Beltlock Status

State of switch used to determine if Driver Beltlock is buckled.

00 = unlocked
 01 = locked
 10 = Error - Beltlock state cannot be determined
 11 = not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64791	

SPN 4953 Passenger Beltlock Status

State of switch used to determine if Passenger Beltlock is buckled.

00 = unlocked
 01 = locked
 10 = Error - Beltlock state cannot be determined
 11 = not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64791	

SPN 4954 Beltlock 3 Status

State of switch used to determine if Beltlock 3 is buckled.

00 = unlocked
 01 = locked
 10 = Error - Beltlock state cannot be determined
 11 = not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64791	

SPN 4955***Beltlock 4 Status***

State of switch used to determine if Beltlock 4 is buckled.

00 = unlocked

01 = locked

10 = Error - Beltlock state cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 64791

Operational Range: same as data range

SPN 4956***Beltlock 5 Status***

State of switch used to determine if Beltlock 5 is buckled.

00 = unlocked

01 = locked

10 = Error - Beltlock state cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 64791

Operational Range: same as data range

SPN 4957***Beltlock 6 Status***

State of switch used to determine if Beltlock 6 is buckled.

00 = unlocked

01 = locked

10 = Error - Beltlock state cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 64791

Operational Range: same as data range

SPN 4958***Beltlock 7 Status***

State of switch used to determine if Beltlock 7 is buckled.

00 = unlocked

01 = locked

10 = Error - Beltlock state cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 64791

Operational Range: same as data range

SPN 4959***Beltlock 8 Status***

State of switch used to determine if Beltlock 8 is buckled.

00 = unlocked

01 = locked

10 = Error - Beltlock state cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 64791

Operational Range: same as data range

SPN 4960***Beltlock 9 Status***

State of switch used to determine if Beltlock 9 is buckled.

00 = unlocked

01 = locked

10 = Error - Beltlock state cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Type: Status

Supporting Information:

PGN reference: 64791

Operational Range: same as data range

SPN 4961 *Beltlock 10 Status*

State of switch used to determine if Beltlock 10 is buckled.

00 = unlocked

01 = locked

10 = Error - Beltlock state cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64791

SPN 4962 *Passenger Airbag Deactivation Switch Status*

State of switch used to deactivate Passenger Airbag manually.

00 = passenger airbag activated

01 = passenger airbag deactivated

10 = Error - State of deactivation switch cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64791

SPN 4963 *Driver Occupant Classification System Status*

State of Occupant Classification System for driver.

000 = empty

001 = child

010 = small adult

011 = adult

100 = large adult

101 = reserved

110 = Error - Classification of occupant cannot be determined

111 = not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4964***Passenger Occupant Classification System Status***

State of Occupant Classification System for passenger.

000 = empty

001 = child

010 = small adult

100 = reserved

011 = adult

100 = large adult

101 = Error - Classification of occupant cannot be determined

111 = not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4965***Occupant Classification System 3 Status***

State of Occupant Classification System for seat position 3.

00 = empty

01 = occupied

10 = Error - Classification cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4966***Occupant Classification System 4 Status***

State of Occupant Classification System for seat position 4.

00 = empty

01 = occupied

10 = Error - Classification cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4967 Occupant Classification System 5 Status

State of Occupant Classification System for seat position 5.

00 = empty

01 = occupied

10 = Error - Classification cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4968 Occupant Classification System 6 Status

State of Occupant Classification System for seat position 6.

00 = empty

01 = occupied

10 = Error - Classification cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4969 Occupant Classification System 7 Status

State of Occupant Classification System for seat position 7.

00 = empty

01 = occupied

10 = Error - Classification cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4970 Occupant Classification System 8 Status

State of Occupant Classification System for seat position 8.

00 = empty

01 = occupied

10 = Error - Classification cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4971 Occupant Classification System 9 Status

State of Occupant Classification System for seat position 9.

00 = empty

01 = occupied

10 = Error - Classification cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4972 Occupant Classification System 10 Status

State of Occupant Classification System for seat position 10.

00 = empty

01 = occupied

10 = Error - Classification cannot be determined

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64790

SPN 4973 Crash Type

Type of crash event.

00001 = frontal crash
 00010 = rear crash
 00100 = side crash (left)
 01000 = side crash (right)
 10000 = rollover

It is possible to combine different Crash Types. (e.g. frontal and side crash (left) = 00101)

Data Length:	5 bits	
Resolution:	5 bit bit-mapped, 0 offset	
Data Range:	bit-mapped	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61483	

SPN 4974 Crash Counter

The Crash Counter prevents other ECUs from reacting to a faulty transmission of the Crash Notification PGN and serves as a safety mechanism. The Crash Counter becomes incremented by 1 for every sent message, starting with "0". (15 follows 0)

Data Length:	4 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61483	

SPN 4975 Crash Checksum

The Crash Checksum is used to verify the signal path from the airbag ECU to other devices in case of a crash.

The 4 bit checksum is the sum of the high nibble and the low nibble of the sum of the identifier, the first 7 data bytes and the 4 bit message counter. It is calculated as follows:

Checksum = (Byte1 + Byte2 + Byte3 + Byte4 + Byte5 + Byte6 + Byte7 + message counter & 0x0F + message ID low byte + message ID mid low byte + message ID mid high byte + message ID high byte)

Checksum = ((Checksum >> 4) + Checksum) & 0x0F

Data Length:	4 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61483	

SPN 4976 *Pitch Angle Extended Range*

The angle between the vehicle x-axis and the ground plane (i.e. rotation about the vehicle Y-axis). The pitch angle for an angle of ascent is reported with a positive value. This parameter is defined according to a Z-Down axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Down Axis System has positive X directed forward, positive Y to the right, and positive Z directed down. See SPN 3318 for an alternate range and resolution.

Data Length:	3 bytes	
Resolution:	1/32768 deg/bit, -250 deg offset	
Data Range:	-250 to 250.9999 deg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61481	

SPN 4977 *Roll Angle Extended Range*

The angle between the vehicle y-axis and the ground plane (i.e. rotation about the X-axis). The roll angle for a roll to the right is reported with a positive value. Roll angle is the same for both Z-Down and Z-Up axis systems, since both systems have positive X axis directed forward. The sign of the value is in accordance to the right-hand rule, as specified in SAE J670. See SPN 3319 for an alternate range and resolution.

Data Length:	3 bytes	
Resolution:	1/32768 deg/bit, -250 deg offset	
Data Range:	-250 to 250.9999 deg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61481	

SPN 4978 *Pitch Angle Extended Range Compensation*

Compensated mode for the pitch measurement. Compensation is the use of multiple sensors together to enhance the output of the pitch measurement.

00 = On
 01 = Off
 10 = Error
 11 = Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61481	

SPN 4979 *Pitch Angle Extended Range Figure of Merit*

Figure of merit for pitch angle measurement.

00 = Pitch angle fully functional. Data is within sensor specification.
 01 = Pitch angle degraded. Data is suspect due to environmental conditions.
 10 = Error
 11 = Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61481	

SPN 4980 *Roll Angle Extended Range Compensation*

Compensated mode for the roll angle measurement. Compensation is the use of multiple sensors together to enhance the output of the roll angle measurement.

00 = On
 01 = Off
 10 = Error
 11 = Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61481	

SPN 4981 *Roll Angle Extended Range Figure of Merit*

Figure of merit for roll angle measurement.

00 = Roll angle fully functional. Data is within sensor specification.
 01 = Roll angle degraded. Data is suspect due to environmental conditions.
 10 = Error
 11 = Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61481	

SPN 4982 *Roll and Pitch Extended Range Measurement Latency*

Time between start of sensor processing and CAN transmission

Data Length:	1 byte	
Resolution:	0.5 ms/bit, 0 offset	
Data Range:	0 to 125 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61481	

SPN 4983 *Pitch Rate Extended Range*

Pitch rate is the rate-of-change of the pitch angle over time, where the pitch angle vector is in the direction of travel of the vehicle. The pitch rate for increasing ascent over time is reported with a positive value. This parameter is defined according to a Z-Down axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Down Axis System has positive X directed forward, positive Y to the right, and positive Z directed down. See SPN 3322 for an alternate range and resolution.

Data Length:	2 bytes	
Resolution:	1/128 deg/sec per bit, -250 deg/sec offset	
Data Range:	-250 to 250.992 deg/sec	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61482	

SPN 4984 Roll Rate Extended Range

Roll rate is the rate-of-change of the roll angle over time. The roll rate for increasing roll to the right is reported with a positive value. Roll angle is the same for both Z-Down and Z-Up axis systems, since both systems have positive X axis directed forward. The sign of the value is in accordance to the right-hand rule, as specified in SAE J670.

Data Length: 2 bytes
 Resolution: 1/128 deg/sec per bit, -250 deg/sec offset
 Data Range: -250 to 250.992 deg/sec Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 61482

SPN 4985 Yaw Rate Extended Range

Yaw rate is the rate-of-change of the yaw angle over time. A positive yaw rate signal results when the object turns clockwise. This parameter is defined according to a Z-Down axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Down Axis System has positive X directed forward, positive Y to the right, and positive Z directed down. See SPN 1808 for Yaw Rate with an alternate range and resolution using a Z-Up Axis System.

Data Length: 2 bytes
 Resolution: 1/128 deg/sec per bit, -250 deg/sec offset
 Data Range: -250 to 250.992 deg/sec Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 61482

SPN 4986 Pitch Rate Extended Range Figure of Merit

Figure of merit for pitch rate measurement.

00 = Pitch rate fully functional. Data is within sensor specification.

01 = Pitch rate degraded. Data is suspect due to environmental conditions.

10 = Error

11 = Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 61482

SPN 4987 Roll Rate Extended Range Figure of Merit

Figure of merit for roll rate measurement.

00 = Roll rate fully functional. Data is within sensor specification.

01 = Roll rate degraded. Data is suspect due to environmental conditions.

10 = Error

11 = Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 61482

SPN 4988 Yaw Rate Extended Range Figure of Merit

Figure of merit for yaw angle measurement.

00 = Yaw rate fully functional. Data is within sensor specification.
 01 = Yaw rate degraded. Data is suspect due to environmental conditions.
 10 = Error
 11 = Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61482	

SPN 4989 Angular Rate Measurement Latency

The estimated measurement latency of the measurement.

NOTE: This is only the sensor latency and does not include any additional latencies that might exist because of the CAN Bus or overall system implementation. Latency is the time from sensor readings to the queuing of the message data for CAN transmission.

Data Length:	1 byte	
Resolution:	0.5 ms/bit, 0 offset	
Data Range:	0 to 125 ms	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61482	

SPN 4990 Battery Charger 1 State

A state of the battery charger connected to the main battery.

0 - Idling. The power line or the battery is disconnected from the charger.
 1 - Charging the battery.
 2 - Stand-by or maintaining the battery charge.
 3 to 12 - Reserved
 13 - Battery failure. An error condition due to the battery state (high temperature, etc.)
 14 - Charger failure. An error condition due to the charger state.
 15 - Not available.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64789	

SPN 4991 Battery Charger 1 Power Line State

A state of the battery charger connection to the power line for the charger connected to the main battery.

0 - Disconnected. The power line is disconnected from the charger.

1 - Connected. The power line is connected to the charger.

2 - Error

3 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64789

SPN 4992 Battery Charger 1 Output Voltage

Output voltage measured on the battery terminals of the battery charger connected to the main battery.

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64789

SPN 4993 Battery Charger 1 Output Current

Output current of the battery charger connected to the main battery. If positive, this parameter shows the charging current of the battery charger connected to the main battery. Otherwise, if the charger hardware permits, this parameter represents the current consumed by the battery charger ECU from the main battery.

Data Length: 2 bytes

Resolution: 0.05 A/bit, -1600 A offset

Data Range: -1600 to 1612.75 A

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64789

SPN 4994 Battery Charger 2 State

A state of the offline battery charger connected to the auxiliary battery.

0 - Idling. The power line or the battery is disconnected from the charger.

1 - Charging the battery.

2 - Stand-by or maintaining the battery charge.

3 to 12 - Reserved

13 - Battery failure. An error condition due to the battery state (high temperature, etc.)

14 - Charger failure. An error condition due to the charger state.

15 - Not available.

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64788

SPN 4995 Battery Charger 2 Power Line State

A state of the battery charger connection to the power line for the charger connected to the auxiliary battery.

0 - Disconnected. The power line is disconnected from the charger.

1 - Connected. The power line is connected to the charger.

2 - Error

3 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64788

SPN 4996 Battery Charger 2 Output Voltage

Output voltage measured on the battery terminals of the offline battery charger connected to the auxiliary battery.

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64788

SPN 4997 Battery Charger 2 Output Current

Output current of the battery charger connected to the main battery. If positive, this parameter shows the charging current of the battery charger connected to the main battery. Otherwise, if the charger hardware permits, this parameter represents the current consumed by the battery charger ECU from the main battery.

Data Length: 2 bytes

Resolution: 0.05 A/bit, -1600 A offset

Data Range: -1600 to 1612.75 A

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64788

SPN 4998 Magnet Boost Time

The duration of time after the activation of the magnet circuit that a relatively high current is sent to the magnet for material pick up operations. This time is called boost time. After the boost time expires, a lower operation current is sent to the magnet to hold the material.

Data Length: 1 byte

Resolution: 0.25 s/bit, 0 offset

Data Range: 0 to 62.5 s

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64787

SPN 4999 Magnet Rated Power

The rated power that the magnet can accept during material holding operations. Note that the magnet may experience more power over short intervals, such as during initial activation of the magnet circuit to pick up material.

Data Length:	2 bytes	
Resolution:	0.5 kW/bit, 0 offset	
Data Range:	0 to 32,127.5 kW	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64787	

SPN 5000 Generator Overheat Status

The Status of Generator being Overheated.

00 = Not Overheat
 01 = Overheat
 10 = Error
 11 = Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64786	

SPN 5001 Genset System Output Voltage Range Status

Status of generator voltage in or out of desired operating range.

00 = Out of Range
 01 = In Range
 10 = Error
 11 = Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64786	

SPN 5002 Reverse Current Range Setting

The operator setting for the Reverse Current. The setting defines the maximum reverse current. The actual current limits are specific to the application.

00000 = 1
 00001 = 2
 00010 = 3
 00011 = 4
 00100 = 5
 00101 = 6
 00110 = 7
 00111 = 8
 01000 = 9
 01001 = 10
 01010 = 11
 01011 = 12
 01100 = 13
 01101 = 14
 01110 = 15
 01111 = 16
 10000-11101 = Not used
 11110 = Error
 11111 = Not Available

Data Length:	5 bits	
Resolution:	32 states/5 bit, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64786	

SPN 5003 Grapple/Magnet Selection Switch

This is a switch that can be used to select either the Grapple or Magnet function of the material handler machine.

00 = Grapple Selected
 01 = Magnet Selected
 10 = Error
 11 = Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64786	

SPN 5004 Genset Softstart Active Status

The Genset Softstart Active Status refers to the status of the genset softstart relay. The moment the Genset System is started, this relay is activated. As a result, the hydraulic power is hold on for a short period of time, and this relay will be turned off once the genset hydraulic power become stable.

00 = Off
01 = On
10 = Error
11 = Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64786

Operational Range: same as data range

SPN 5005 Genset Enable Active Status

Status of the Genset Enable Relay that enables or disables the Genset.

00 = Not Enabled
01 = Enabled
10 = Error
11 = Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64786

Operational Range: same as data range

SPN 5006 Voltage Monitor Active Status

Status of Voltage Monitor Relay. When it is activated, the Generator Voltage Monitor is connected to the generator output line so that the generator output voltage range could be monitored.

00 = Monitor is Off
01 = Monitor is On
10 = Error
11 = Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64786

Operational Range: same as data range

SPN 5007 Generator Duty Cycle Exceeded Status

The status of the duty cycle of the generator usage, indicating if the generator has been on for too much time within a defined time window. The duty cycle is the ratio of the time the generator is on and the time the generator is off within a time window.

00 = Duty Cycle Not Exceed

01 = Duty Cycle Exceed

10 = Error

11 = Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64786

SPN 5008 Magnet Forward Current

The forward current being supplied by the generator to the electric magnet to create a magnet field to lift material.

Data Length: 2 bytes

Resolution: 1 A/bit, 0 offset

Data Range: 0 to 64,255 Amps

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61484

SPN 5009 Magnet Reverse Current

A reverse current being supplied to the electric magnet to reduce the forward current generated magnet field as quick as possible so that the magnet can release material as fast as possible.

Data Length: 1 byte

Resolution: 1 A/bit, 0 offset

Data Range: 0 to 250 A

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61484

SPN 5010 Material Lift Switch

This is a switch that can be used to enable the lift functionality of the Material Handler machine. When it is activated, the magnet is energized to pick up material.

00 = Don't Lift

01 = Lift

10 = Error

11 = Not Available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61484

SPN 5011 *Material Drop Switch*

This is a switch that can be used to enable the drop functionality of the Material Handler machine.

00 = Don't Drop
 01 = Drop
 10 = Error
 11 = Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61484

Operational Range: same as data range

SPN 5012 *Generator Current Boost Active Status*

Status of generator current boost relay that can boost the generator output current for picking-up material operations. When this relay is "on", the generator is generating the maximum current for the material handler machine to pick-up material. When the relay is off, the generator is generating normal current for the material handler machine to hold material.

00 = Off
 01 = On
 10 = Error
 11 = Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61484

Operational Range: same as data range

SPN 5013 *Material Lift Active Status*

The status of Material Lift Relay. When it is on, the generator generates forward direction current so that the material handler machine can pick up material.

00 = Off
 01 = On
 10 = Error
 11 = Not Available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61484

Operational Range: same as data range

SPN 5014 *Material Drop Active Status*

The status of Material Drop Relay. When it is on, the generator generates reverse direction current so that the material handler machine can release material.

00 = Off
 01 = On
 10 = Error
 11 = Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61484	

SPN 5015 *Momentary Engine Maximum Power Enable*

Momentarily Requesting highest torque map from the engine control

00 not requesting maximum power available
 01 momentarily requesting maximum power available
 10 fault
 11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61442	

SPN 5019 *Engine Exhaust Gas Recirculation 1 Outlet Pressure*

EGR outlet pressure is measured immediately after the EGR valve.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 27	
PGN reference:	64961	

SPN 5020 *Engine Exhaust Gas Recirculation 1 Mixer Intake Temperature*

The temperature of the EGR gas entering the intake mixer, measured after the intake throttle when provided.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 27	
PGN reference:	64870	

SPN 5021 *Momentary Engine Maximum Power Enable Feedback*

Momentarily requesting Engine Maximum Power Enable - feature support feedback

00 disabled
01 supported
10 reserved
11 don't care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61443

Operational Range: same as data range

SPN 5022 *Forward Collision Warning*

This parameter indicates if a collision is imminent and strong driver reaction either by braking hard or by an avoidance maneuver are imperative to prevent a collision.

00 No warning
01 Collision is imminent
10 Error indicator
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65135

Operational Range: same as data range

SPN 5023 *ACC usage demand*

This parameter indicates the drivers demand to activate or deactivate ACC keeping distance control.

00 driver demand for not using ACC distance keeping control
01 driver demand for using ACC distance keeping control
10 reserved
11 don't care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 65105

Operational Range: same as data range

SPN 5024 *Aftertreatment 1 Intake Gas NOx Sensor Heater Ratio*

Heater ratio to determine temperature at sensor tip.

Data Length: 2 bytes
Resolution: 0.001/bit, 0 offset
Data Range: 0 to 64.255
Type: Measured
Supporting Information:
PGN reference: 64785

Operational Range: same as data range

SPN 5025 *Aftertreatment 1 Intake Gas NOx Sensor New part deviation NOx Gain*

New part deviation NOx_Gain to correct (recalculate) sensor signal on the Engine ECU side.

Data Length: 2 bytes
 Resolution: 0.1 %/bit, -100 offset
 Data Range: -100 to 100 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64785

SPN 5026 *Aftertreatment 1 Intake Gas NOx Sensor New part deviation NOx Offset*

New part deviation NOx_Offset to correct (recalculate) sensor signal on the Engine ECU side.

Data Length: 1 byte
 Resolution: 1 ppm/bit, -125 ppm offset
 Data Range: -125 to 125 ppm Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64785

SPN 5027 *Aftertreatment 1 Intake Gas NOx Sensor Correction of Pressure Lambda*

Correction of pressure Lambda-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length: 1 byte
 Resolution: 0.5%/bar per bit, 0 offset
 Data Range: 0 to 125%/bar Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64784

SPN 5028 *Aftertreatment 1 Intake Gas NOx Sensor Correction of Pressure NOx*

Correction of pressure NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length: 1 byte
 Resolution: 0.5%/bar per bit, 0 offset
 Data Range: 0 to 125%/bar Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64784

SPN 5029 *Aftertreatment 1 Intake Gas NOx Sensor NO2 Correction*

Correction of NO2 at the NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length: 1 byte
 Resolution: 0.5%/bit, 0 offset
 Data Range: 0 to 125% Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64784

SPN 5030 *Aftertreatment 1 Intake Gas NOx Sensor NH3 Correction*

Correction of NH3 at the NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bit, 0 offset	
Data Range:	0 to 125%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64784	

SPN 5031 *Aftertreatment 1 Outlet Gas NOx Sensor Heater Ratio*

Heater ratio to determine temperature at sensor tip.

Data Length:	2 bytes	
Resolution:	0.001/bit, 0 offset	
Data Range:	0 to 64.255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64783	

SPN 5032 *Aftertreatment 1 Outlet Gas NOx Sensor New Part Deviation NOx Gain*

New part deviation NOx_Gain to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	2 bytes	
Resolution:	0.1 %/bit, -100 offset	
Data Range:	-100 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64783	

SPN 5033 *Aftertreatment 1 Outlet Gas NOx Sensor New Part Deviation NOx Offset*

New part deviation NOx_Offset to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	1 ppm/bit, -125 ppm offset	
Data Range:	-125 to 125 ppm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64783	

SPN 5034 *Aftertreatment 1 Outlet Gas NOx Sensor Correction of Pressure Lambda*

Correction of pressure Lambda-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bar per bit, 0 offset	
Data Range:	0 to 125%/bar	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64782	

SPN 5035 *Aftertreatment 1 Outlet Gas NOx Sensor Correction of Pressure NOx*

Correction of pressure NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bar per bit, 0 offset	
Data Range:	0 to 125%/bar	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64782	

SPN 5036 *Aftertreatment 1 Outlet Gas NOx Sensor NO2 Correction*

Correction of NO2 at the NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bit, 0 offset	
Data Range:	0 to 125%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64782	

SPN 5037 *Aftertreatment 1 Outlet Gas NOx Sensor NH3 Correction*

Correction of NH3 at the NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bit, 0 offset	
Data Range:	0 to 125%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64782	

SPN 5038 *Aftertreatment 2 Intake Gas NOx Sensor Heater Ratio*

Heater ratio to determine temperature at sensor tip.

Data Length:	2 bytes	
Resolution:	0.001/bit, 0 offset	
Data Range:	0 to 64.255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64781	

SPN 5039 *Aftertreatment 2 Intake Gas NOx Sensor New part deviation NOx Gain*

New part deviation NOx_Gain to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	2 bytes	
Resolution:	0.1 %/bit, -100 offset	
Data Range:	-100 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64781	

SPN 5040 *Aftertreatment 2 Intake Gas NOx Sensor New part deviation NOx Offset*

New part deviation NOx_Offset to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	1 ppm/bit, -125 ppm offset	
Data Range:	-125 to 125 ppm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64781	

SPN 5041 *Aftertreatment 2 Intake Gas NOx Sensor Correction of pressure Lambda*

Correction of pressure Lambda-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bar per bit, 0 offset	
Data Range:	0 to 125%/bar	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64780	

SPN 5042 *Aftertreatment 2 Intake Gas NOx Sensor Correction of pressure Nox*

Correction of pressure NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bar per bit, 0 offset	
Data Range:	0 to 125%/bar	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64780	

SPN 5043 *Aftertreatment 2 Intake Gas NOx Sensor NO2 Correction*

Correction of NO2 at the NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bit, 0 offset	
Data Range:	0 to 125%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64780	

SPN 5044 *Aftertreatment 2 Intake Gas NOx Sensor NH3 Correction*

Correction of NH3 at the NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bit, 0 offset	
Data Range:	0 to 125%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64780	

SPN 5045 *Aftertreatment 2 Outlet Gas NOx Sensor Heater Ratio*

Heater ratio to determine temperature at sensor tip.

Data Length:	2 bytes	
Resolution:	0.001/bit, 0 offset	
Data Range:	0 to 64.255	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64779	

SPN 5046 *Aftertreatment 2 Outlet Gas NOx Sensor New part deviation NOx Gain*

New part deviation NOx_Gain to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	2 bytes	
Resolution:	0.1 %/bit, -100 offset	
Data Range:	-100 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64779	

SPN 5047 *Aftertreatment 2 Outlet Gas NOx Sensor New part deviation NOx Offset*

New part deviation NOx_Offset to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	1 ppm/bit, -125 ppm offset	
Data Range:	-125 to 125 ppm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64779	

SPN 5048 *Aftertreatment 2 Outlet Gas NOx Sensor Correction of pressure Lambda*

Correction of pressure Lambda-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bar per bit, 0 offset	
Data Range:	0 to 125%/bar	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64778	

SPN 5049 *Aftertreatment 2 Outlet Gas NOx Sensor Correction of pressure Nox*

Correction of pressure NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bar per bit, 0 offset	
Data Range:	0 to 125%/bar	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64778	

SPN 5050 *Aftertreatment 2 Outlet Gas NOx Sensor NO2 Correction*

Correction of NO2 at the NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bit, 0 offset	
Data Range:	0 to 125%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64778	

SPN 5051 *Aftertreatment 2 Outlet Gas NOx Sensor NH3 Correction*

Correction of NH3 at the NOx-signal to correct (recalculate) sensor signal on the Engine ECU side.

Data Length:	1 byte	
Resolution:	0.5%/bit, 0 offset	
Data Range:	0 to 125%	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64778	

SPN 5052 *Transmission Clutch/Converter Input Speed*

Rotational velocity of the input to a transmission's master clutch or torque converter. In most cases the rotational velocity will be the same as engine flywheel speed unless there is an intermediate device, such as a power divider, between the engine and the clutch/converter.

Data Length:	2 bytes	
Resolution:	0.125 rpm/bit, 0 offset	
Data Range:	0 to 8,031.875 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 5052	
PGN reference:	61452	

SPN 5053 *High Resolution Engine Trip Fuel*

Fuel consumed during all or part of a journey. High resolution used for calculations and fleet management systems. See SPN 182 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.001 L/bit, 0 offset	
Data Range:	0 to 4,211,081.215 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64777	

SPN 5054 *High Resolution Engine Total Fuel Used*

Accumulated amount of fuel used during vehicle operation. High resolution used for calculations and fleet management systems. See SPN 250 for alternate resolution.

Data Length:	4 bytes	
Resolution:	0.001 L/bit, 0 offset	
Data Range:	0 to 4,211,081.215 L	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64777	

SPN 5055 Engine Oil Viscosity

Dynamic viscosity of the engine oil

Data Length:	2 bytes	
Resolution:	0.015625 Cp per bit, 0 offset	
Data Range:	0 to 1003.984375 Cp	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64776	

SPN 5056 Engine Oil Density

Density of the engine oil

Data Length:	2 bytes	
Resolution:	0.00003052 g/cc per bit, 0 offset	
Data Range:	0 to 1.961 g/cc	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64776	

SPN 5057 Cab Noise Control Command

Command signal to change the state of the Cab Noise Control System to on-line or off-line

00 - Take Cab Noise Control System Off Line
 01 - Bring Cab Noise Control System On Line
 10 - Reserved
 11 - Don't Care/Not Commanded

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	38912	

SPN 5058 Cab Noise Control Tuning Command

Command values for the Tuning State of the Cab Noise Control System. The Tuning State allows the Cab Noise Control System to adjust certain system characteristics (e.g. to account for microphone or speaker degradation over time).

000 - Activate Manual Tuning, Wait for Save and Exit Commands
 001 - Activate Automatic Tuning, Wait for Save and Exit Commands
 010 - Activate Automatic Tuning State, Saving Parameters, Exit on Completion
 011 - Remain In Tuning, Save Current Parameters
 100 - Exit Tuning, Not Saving Parameters
 101 - Exit Tuning, Saving Parameters
 110 - Reserved
 111 - Don't Care, NOT Commanded

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	38912	

SPN 5059 Cab Noise Control Status

This parameter returns the current status of the Cab Noise Control system.

00 - Cab Noise Control System ON-Line
 01 - Cab Noise Control System OFF-Line
 10 - Error Indicator
 11 - Not Available/Not Requested

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	38656	

SPN 5060 Cab Noise Control Tuning Status

This parameter returns the current status of tuning function of the Cab Noise Control system. When the tuning state is active, the Cab Noise Control System adjusts certain system characteristics (e.g. to account for sensor and/or transducer degradation over time). This adjustment may be automatic or under manual control.

0000 – Manual Tuning Mode
 0001 – Manual Tuning Mode – Command Complete
 0010 – Manual Tuning Mode – Saving Data
 0011 – Reserved
 0100 – Reserved
 0101 – Reserved
 0110 – Reserved
 0111 – Manual Tuning Denied – Requires Security Verification
 1000 – Automatic Tuning Mode
 1001 – Automatic Tuning Mode – Command Complete
 1010 – Automatic Tuning Mode – Saving Data
 1011 – Reserved
 1100 – Reserved
 1101 – Reserved
 1110 – Tuning Mode – Error
 1111 – Not Available/Not Tuning/Not Requested

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	38656	

SPN 5077 Engine Protect Lamp Command

Command signal directly controlling the Engine Protect Lamp

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Note: SPN 987 should be used for reporting diagnostics of the Engine Protect Lamp.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5078 Engine Amber Warning Lamp Command

Command signal directly controlling the Engine Amber Warning Lamp

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Note: SPN 624 should be used for reporting diagnostics of the Engine Amber Warning Lamp.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5079 Engine Red Stop Lamp Command

Command signal directly controlling the Engine Red Stop Lamp

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Note: SPN 623 should be used for reporting diagnostics of the Engine Red Stop Lamp.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5080 OBD Malfunction Indicator Lamp Command

Command signal directly controlling the OBD Malfunction Indicator Lamp

00 - Lamp Off
 01 - Lamp On
 10 - Reserved
 11 - Not available

Note: SPN 1213 should be used for reporting diagnostics of the OBD Malfunction Indicator Lamp.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5081 Engine Brake Active Lamp Command

Command signal directly controlling the Engine Brake Active Lamp

00 - Lamp Off
 01 - Lamp On
 10 - Reserved
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5082 Engine Oil Pressure Low Lamp Command

Command signal directly controlling the Engine Oil Pressure Low Lamp

00 - Lamp Off
 01 - Lamp On
 10 - Reserved
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5083 Engine Coolant Temperature High Lamp Command

Command signal directly controlling the Engine Coolant Temperature High Lamp

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5084 Engine Coolant Level Low Lamp Command

Command signal directly controlling the Engine Coolant Level Low Lamp

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5085 Engine Idle Management Active Lamp Command

Command signal directly controlling the Engine Idle Management Active Lamp

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Note: SPN 1661 should be used for reporting diagnostics of the Engine Idle Management Active Lamp.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5086 Engine Air Filter Restriction Lamp Command

Command signal directly controlling the Engine Air Filter Restriction Lamp.

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5087 Vehicle Battery Voltage Low Lamp Command

Command signal directly controlling the Vehicle Battery Voltage Low Lamp.

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64774	

SPN 5088 Vehicle Fuel Level Low Lamp Command

Command signal directly controlling the Vehicle Fuel Level Low Lamp.

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64774	

SPN 5089 Vehicle Air Pressure Low Lamp Command

Command signal directly controlling the Vehicle Air Pressure Low Lamp.

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64774	

SPN 5090 Vehicle HVAC Recirculation Lamp Command

Command signal directly controlling the Vehicle HVAC Recirculation Lamp.

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64774	

SPN 5091 Vehicle Battery Charging Lamp Command

Command signal directly controlling the Vehicle Battery Charging Lamp.

00 - Lamp Off
01 - Lamp On
10 - Reserved
11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64774	

SPN 5093 Engine Protect Lamp Data

This parameter provides measured data from the Engine Protect Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5094 Engine Amber Warning Lamp Data

This parameter provides measured data from the Engine Amber Warning Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5095 Engine Red Stop Lamp Data

This parameter provides measured data from the Engine Red Stop Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5096 OBD Malfunction Indicator Lamp Data

This parameter provides measured data from the OBD Malfunction Indicator Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5097 Engine Brake Active Lamp Data

This parameter provides measured data from the Engine Brake Active Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5098 Compression Brake Enable Switch Indicator Lamp Data

This parameter provides measured data from the Compression Brake Enable Switch Indicator Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5099 Engine Oil Pressure Low Lamp Data

This parameter provides measured data from the Engine Oil Pressure Low Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5100 Engine Coolant Temperature High Lamp Data

This parameter provides measured data from the Engine Coolant Temperature High Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5101 Engine Coolant Level Low Lamp Data

This parameter provides measured data from the Engine Coolant Level Low Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5102 Engine Idle Management Active Lamp Data

This parameter provides measured data from the Engine Idle Management Active Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5103 Engine Air Filter Restriction Lamp Data

This parameter provides measured data from the Engine Air Filter Restriction Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64773

SPN 5104 Vehicle Battery Voltage Low Lamp Data

This parameter provides measured data from the Vehicle Battery Voltage Low Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64772

SPN 5105 Vehicle Fuel Level Low Lamp Data

This parameter provides measured data from the Vehicle Fuel Level Low Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64772

SPN 5106 Vehicle Air Pressure Low Lamp Data

This parameter provides measured data from the Vehicle Air Pressure Low Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64772

SPN 5107 Vehicle HVAC Recirculation Lamp Data

This parameter provides measured data from the Vehicle HVAC Recirculation Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64772

SPN 5108 Vehicle Battery Charging Lamp Data

This parameter provides measured data from the Vehicle Battery Charging Lamp.

00 - Lamp deactivated (Off)

01 - Lamp activated (On)

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64772

SPN 5125 Sensor supply voltage 7

Sensor ECU supply voltage 7

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64924

SPN 5126 Sensor supply voltage 8

Sensor ECU supply voltage 8

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64924

SPN 5127 Sensor supply voltage 9

Sensor ECU supply voltage 9

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference:

SPN 5128 Sensor supply voltage 10

Sensor ECU supply voltage 10

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference:

SPN 5129 Sensor supply voltage 11

Sensor ECU supply voltage 11

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Type: Measured

Supporting Information:

PGN reference:

Operational Range: same as data range

SPN 5130 Sensor supply voltage 12

Sensor ECU supply voltage 12

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Type: Measured

Supporting Information:

PGN reference:

Operational Range: same as data range

SPN 5131 Sensor supply voltage 13

Sensor ECU supply voltage 13

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Type: Measured

Supporting Information:

PGN reference:

Operational Range: same as data range

SPN 5132 Sensor supply voltage 14

Sensor ECU supply voltage 14

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Type: Measured

Supporting Information:

PGN reference:

Operational Range: same as data range

SPN 5133 Sensor supply voltage 15

Sensor ECU supply voltage 15

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Type: Measured

Supporting Information:

PGN reference:

Operational Range: same as data range

SPN 5134 Sensor supply voltage 16

Sensor ECU supply voltage 16

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Type: Measured

Supporting Information:

PGN reference:

Operational Range: same as data range

SPN 5135 Sensor supply voltage 17

Sensor ECU supply voltage 17

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Type: Measured

Supporting Information:

PGN reference:

Operational Range: same as data range

SPN 5136 Sensor supply voltage 18

Sensor ECU supply voltage 18

Data Length: 2 bytes

Resolution: 0.05 V/bit, 0 offset

Data Range: 0 to 3212.75 V

Type: Measured

Supporting Information:

PGN reference:

Operational Range: same as data range

SPN 5137 Aftertreatment 1 Diesel Exhaust Fluid Tank Heater Command

Command for the Aftertreatment 1 Diesel Exhaust Fluid Tank Heater. A value of 0% means no heating applied, a value of 100% means full heating applied. See SPN 3363 for the measured value of the Aftertreatment 2 Diesel Exhaust Fluid Tank Heater.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Type: Status

Supporting Information:

PGN reference: 64832

Operational Range: same as data range

SPN 5138 Aftertreatment 2 Diesel Exhaust Fluid Tank Heater Command

Command for the Aftertreatment 2 Diesel Exhaust Fluid Tank Heater. A value of 0% means no heating applied, a value of 100% means full heating applied. See SPN 4431 for the measured value of the Aftertreatment 2 Diesel Exhaust Fluid Tank Heater.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Type: Status

Supporting Information:

PGN reference: 64826

Operational Range: same as data range

SPN 5141 *Low Voltage Disconnect Manual Disconnect State*

State of the Manual Disconnect hardwired input to the LVD. Manual Disconnect is used to override the LVD's normal activity and disconnect all of the LVD outputs. Manual Disconnect is lower in priority than the Manual Connect hardwired input, but has priority over all LVD Set Operating Mode messages.

00 - Input off
 01 - Input on
 10 - Error
 11 - Not installed

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64769	

SPN 5142 *Low Voltage Disconnect Manual Connect State*

State of the Manual Connect hardwired input to the LVD. Manual Connect is used to override the LVD's normal activity and connect all of the LVD outputs. Manual Connect has priority over the Manual Disconnect hardwired input and all LVD Set Operating Mode messages.

00 - Input off
 01 - Input on
 10 - Error
 11 - Not installed

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64769	

SPN 5143 *Low Voltage Disconnect Current Operating Mode*

Current operating mode of the LVD. The current mode is dependent on the state of the Manual Disconnect/Connect hardwired inputs and on the most-recent received LVD Set Desired Operating Mode message. The hardwired inputs have priority over the LVD Set Operating Mode message, and Connects have priority over Disconnects.

0000 - Automatic
 0001-0011 - Reserved
 0100 - Manual Disconnect via J1939 request
 0101 - Manual Connect via J1939 request
 0110-0111 - Reserved
 1000 - Manual Disconnect via hardwired input
 1001 - Manual Connect via hardwired input
 1010-1110 - Reserved
 1111 - Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64769	

SPN 5144 *Low Voltage Disconnect Output #3 State*

State of the Output #3 from the LVD. Output #3 controls an external load or relay. This external load could be independent of the main output, and may apply to an application specific circuit or zone. If the LVD supports prioritization, this circuit will disconnect before Output #2 and reconnect after Output #2.

0000 - Output off or disconnected
0001 - Output on or connected
0010 - Disconnect alarm expired, output off or disconnected
0011 - Disconnect pending, alarm active
0100 - Connect pending, alarm active
0101-1101 - Reserved
1110 - Output fault
1111 - Not available or not installed

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64769

SPN 5145 *Low Voltage Disconnect Output #2 State*

State of the Output #2 from the LVD. Output #2 controls an external load or relay. This external load could be independent of the main output, and may apply to an application specific circuit or zone. If the LVD supports prioritization, this circuit will disconnect before Output #1 and reconnect after Output #1.

0000 - Output off or disconnected
0001 - Output on or connected
0010 - Disconnect alarm expired, output off or disconnected
0011 - Disconnect pending, alarm active
0100 - Connect pending, alarm active
0101-1101 - Reserved
1110 - Output fault
1111 - Not available or not installed

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64769

SPN 5146 *Low Voltage Disconnect Output #1 State*

State of the Output #1 from the LVD. Output #1 controls an external load or relay. This external load could be independent of the main output, and may apply to an application specific circuit or zone. If the LVD supports prioritization, this circuit will disconnect before the Vout output and reconnect after the Vout output.

0000 - Output off or disconnected
 0001 - Output on or connected
 0010 - Disconnect alarm expired, output off or disconnected
 0011 - Disconnect pending, alarm active
 0100 - Connect pending, alarm active
 0101-1101 - Reserved
 1110 - Output fault
 1111 - Not available or not installed

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64769	

SPN 5147 *Low Voltage Disconnect Vout Output State*

State of the Vout Output from the LVD. Vout is the LVD's main internal, controllable, high-current output. If the LVD supports prioritization, this circuit will be the last to disconnect and the first to reconnect.

0000 - Output off or disconnected
 0001 - Output on or connected
 0010 - Disconnect alarm expired, output off or disconnected
 0011 - Disconnect pending, alarm active
 0100 - Connect pending, alarm active
 0101-1101 - Reserved
 1110 - Output fault
 1111 - Not available or not installed

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64769	

SPN 5148 *Low Voltage Disconnect Temperature*

Internal temperature of the LVD.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64769	

SPN 5149 *Low Voltage Disconnect Desired Operating Mode*

Desired Operating Mode of the LVD. Used to issue a J1939 request to the LVD to change modes.

0000 - Automatic

0001-0011 - Reserved

0100 - Manual Disconnect

0101 - Manual Connect

0110-1110 - Reserved

1111 - No change

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 38400

(R) SPN 5245 *Aftertreatment Selective Catalytic Reduction Operator Inducement Active*

The desired illumination of the driver's warning indicator for diesel exhaust fluid (DEF) tank low level.

000 - Off - indicates adequate DEF level

e.g., for Euro VI this is used to indicate the driver warning system is non-active for diesel exhaust fluid level

001 - On solid - indicates low DEF level

e.g., for Euro VI this is used to indicate the driver warning system is initially activated for low diesel exhaust fluid level

010 - reserved for SAE assignment

011 - reserved for SAE assignment

100 - On fast blink (1 Hz) indicates the DEF level is lower than the level indicated by the solid illumination (state 001)

e.g., for Euro VI this is used to indicate the second driver warning system detection threshold for diesel exhaust fluid level, where the visual alarm of the driver warning system is required to "escalate in intensity".

101 - reserved for SAE assignment

110 - reserved for SAE assignment

111 - not available

Note: SPN 5245 is similar to SPN 5825. SPN 5245 is intended to be used in implementations where the warning indicator is used to convey diesel exhaust fluid tank low level information only, whereas SPN 5825 is intended to be used in implementations where the warning indicator is used to convey diesel exhaust fluid tank low level as well as specific emission control malfunction information. Thus, SPN 5245 is a subset of SPN 5825, and if both are utilized, will match only under certain conditions.

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65110

(R) SPN 5246 *Aftertreatment SCR Operator Inducement Severity*

Severity status of the operator inducement system for anomalies with the SCR system, such as tampering, low DEF quality, and DEF tank level. Higher numerical levels indicate more severe levels of inducement. Level 1 is the least severe.

000 - Driver Warning, Low-Level Inducement, and Severe Inducement Non-Active	
001 - Inducement Level 1 ... EPA defined SCR Inducement - DEF Warning	FMI 15
... Euro VI - Driver Warning System Active	FMI 15
010 - Inducement Level 2 ... DEF Warning, second level (optional)	FMI 15
... Euro VI - Low-Level Inducement Enabled	FMI 15
011 - Inducement Level 3 ... EPA defined SCR Inducement - Engine Derate	FMI 16
... Euro VI - Low-Level Inducement Active	FMI 16
100 - Inducement Level 4 ... Severe Inducement Pre-Trigger (optional)	FMI 16
... Euro VI - Severe Inducement Enabled	FMI 16
101 - Inducement Level 5 ... EPA defined SCR Inducement - Severe Inducement	FMI 0
... Euro VI - Severe Inducement Active	FMI 0
110 - Temporary Override of Inducement - The SCR inducement has been temporarily interrupted.	
111 - Not Available / Not Supported	

When SPN 5246 is used in a DTC the recommended FMI usage is as shown.

Reference EPA CISC-09-04-REVISED SCR Guidance document for more information regarding EPA implementations. Reference Euro VI implementing regulation Annex XIII, Appendix 5, section 3.1.(b), 3.1.(c), and 3.1.(d) for more information regarding Euro VI implementations.

Note: SPN 5246 is similar to SPN 5826. SPN 5246 is intended to be used to indicate the severity status of the operator inducement system for anomalies with the SCR system only, whereas SPN 5826 is intended to be used to indicate the severity status of the operator inducement system for anomalies with the SCR and EGR systems. Thus, SPN 5246 is a subset of SPN 5826, and if both are utilized, will match only under certain conditions.

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65110	

SPN 5252 *Engine Exhaust Gas Recirculation 2 Differential Pressure*

Differential Pressure across the Exhaust Gas Recirculation 2 (EGR2) system.

Data Length:	2 bytes	
Resolution:	1/128 kPa/bit, -250 kPa offset	
Data Range:	-250 kPa TO 251.99 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64768	

SPN 5253 *Engine Exhaust Gas Recirculation 2 Intake Pressure*

EGR2 intake gauge pressure is measured after EGR2 cooler and before EGR2 valve

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64768	

SPN 5254 Engine Exhaust Gas Recirculation 2 Outlet Absolute Pressure

Absolute Pressure immediately after the EGR2 valve

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64768	

SPN 5255 Engine Exhaust Gas Recirculation 2 Temperature

Temperature of Recirculated Exhaust Gas of EGR2

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64767	

SPN 5256 Engine Exhaust Gas Recirculation 2 Mixer Intake Temperature

The temperature of the EGR gas entering the intake of EGR2 system mixer.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64767	

SPN 5257 Engine Exhaust Gas Recirculation 2 (EGR2) Mass Flow Rate

Flow rate of gas through the second EGR system. Flow rate of the exhaust gas being recirculated from the 2nd EGR system into combustion air.

Data Length:	2 bytes	
Resolution:	0.05 kg/h per bit, 0 offset	
Data Range:	0 to 3212.75 kg/h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61450	

SPN 5258 Engine Exhaust Gas Recirculation 2 (EGR2) Cooler Intake Temperature

Exhaust Gas Recirculation 2 (EGR2) Temperature measured at EGR2 cooler intake. See SPN 5255 for Engine EGR2 temperature.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64766	

SPN 5259 Engine Exhaust Gas Recirculation 2 (EGR2) Cooler Intake Gas Absolute Pressure

Exhaust Gas Recirculation 2 gas absolute pressure is measured at EGR2 cooler intake. See SPN 5253 for EGR2 pressure measured at the EGR2 cooler outlet before the valve.

Data Length: 2 bytes
 Resolution: 0.5 kPa/bit, 0 offset
 Data Range: 0 to 32,127.5 kPa Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64766

SPN 5260 Engine Exhaust Gas Recirculation 2 (EGR2) Cooler Efficiency

Exhaust Gas Recirculation 2 cooler efficiency is an indication of the cooler's ability to reduce the temperature of the exhaust gas that is being recirculated back to the intake. 0% = no reduction in temperature, 100% = maximum cooling. The EGR 2 cooler efficiency is calculated as (EGR 2 cooler intake temperature minus EGR 2 gas temperature) divided by (EGR 2 cooler intake temperature minus engine coolant temperature).

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64766

SPN 5261 EGR 2 Cooler Bypass Actuator Position

EGR2 Cooler Bypass Actuator position, where 0% = Fully Closed (no gas flowing through the bypass), and 100% = Fully Open..

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64766

SPN 5262 Engine Exhaust Gas Recirculation 2 Valve Position

Position of EGR2 valve expressed as a percentage of full travel. 0% means the valve is closed and no exhaust gas is flowing into the air stream. 100% means the valve is fully opened.

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64765

SPN 5263 Engine Exhaust Gas Recirculation 2 Valve 2 Position

The position of the second exhaust gas recirculation valve of EGR 2 expressed as a percentage of full travel. 0% means the valve is closed and no exhaust gas is flowing into the air stream. 100% means the valve is fully opened.

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64765

SPN 5264 Engine Exhaust Gas Recirculation 2 (EGR2) Valve Control

Desired percentage of maximum Exhaust Gas Recirculation 2 (EGR2) valve opening. 0% means the valve is closed. 100% means maximum opening (full gas flow).

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64762	

SPN 5265 Engine Exhaust Gas Recirculation 2 (EGR2) Valve 2 Control

Desired percentage of maximum Exhaust Gas Recirculation 2 (EGR2) valve 2 opening. 0% means the valve is closed. 100% means maximum opening (full gas flow).

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64762	

SPN 5266 Diesel Particulate Filter 1 Soot Signal Standard Deviation

Standard deviation of the soot measurement from diesel particulate filter 1 soot sensor.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64761	

SPN 5267 Diesel Particulate Filter 1 Soot Signal Maximum

Maximum output signal level of the current soot measurement from diesel particulate filter 1 soot sensor. This is a statistical value, not the maximum sensing capability of the sensor.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64761	

SPN 5268 Diesel Particulate Filter 1 Soot Signal Minimum

Minimum output signal level of the current soot measurement from diesel particulate filter 1 soot sensor. This is a statistical value, not the minimum sensing capability of the sensor.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64761	

SPN 5269 Diesel Particulate Filter 2 Soot Signal Standard Deviation

Standard deviation of the soot measurement from diesel particulate filter 2 soot sensor.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64760	

SPN 5270 Diesel Particulate Filter 2 Soot Signal Maximum

Maximum output signal level of the current soot measurement from diesel particulate filter 2 soot sensor. This is a statistical value, not the maximum sensing capability of the sensor.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64760	

SPN 5271 Diesel Particulate Filter 2 Soot Signal Minimum

Minimum output signal level of the current soot measurement from diesel particulate filter 2 soot sensor. This is a statistical value, not the minimum sensing capability of the sensor.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64760	

SPN 5274 Prohibit Automatic Air Suspension Control

This parameter is an internal request to the air suspension control system to prohibit automatic air suspension control. If the request is accepted, response intended to be sent in ASC1 (additional status requested in ASC1), there will be no automatic control either for height changes or axle load distribution changes, i.e. hold current pressures in all suspension devices.

For example, to prohibit automatic air suspension control when a wheelchair lift is in use.

00 No request
 01 Request prohibit automatic air suspension control
 10 Error indicator
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 5275 *Parking Brake Actuator Fully Activated*

Signal which indicates when the parking brake actuator is fully activated. (see also SPN 70 and 619).

00 - Parking Brake Actuator not fully activated

01 - Parking Brake Actuator fully activated

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Measured

Supporting Information: See Appendix D - SPN 5275

PGN reference: 64964

SPN 5276 *Engine Exhaust Manifold Bank 1 Flow Balance Valve Actuator Control*

Commanded percentage of maximum Engine Exhaust Manifold Bank 1 Balance valve opening. 0% means valve is closed. 100% means maximum valve opening (full gas flow).

Data Length: 2 bytes

Resolution: 0.0025 %/bit, 0 offset

Data Range: 0 to 160.6375 %

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64764

SPN 5277 *Engine Exhaust Manifold Bank 1 Flow Balance Valve Actuator Position*

Actual percentage of maximum Engine Exhaust Manifold Bank 1 Balance valve opening. 0% means valve is closed. 100% means maximum valve opening (full gas flow).

Data Length: 2 bytes

Resolution: 0.0025 %/bit, 0 offset

Data Range: 0 to 160.6375 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64763

SPN 5278 *Engine Exhaust Manifold Bank 2 Flow Balance Valve Actuator Control*

Commanded percentage of maximum Engine Exhaust Manifold Bank 2 Balance valve opening. 0% means valve is closed. 100% means maximum valve opening (full gas flow).

Data Length: 2 bytes

Resolution: 0.0025 %/bit, 0 offset

Data Range: 0 to 160.6375 %

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64764

SPN 5279 Engine Exhaust Manifold Bank 2 Flow Balance Valve Actuator Position

Actual percentage of maximum Engine Manifold Bank 2 Balance valve opening. 0% means valve is closed. 100% means maximum valve opening (full gas flow).

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64763

SPN 5280 Engine Charge Air Cooler 1 Precooler Intake Temperature

Temperature of the combustion air measured at the charge air cooler 1 precooler intake.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64759

SPN 5281 Engine Charge Air Cooler 1 Precooler Outlet Temperature

Temperature of the combustion air measured at the charge air cooler 1 precooler outlet.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64759

SPN 5282 Engine Charge Air Cooler 1 Precooler Efficiency

Engine charge air cooler 1 (CAC1) precooler efficiency is an indication of the precooler's ability to reduce the temperature of the combustion air that is being routed through the precooler. 0% = no reduction in temperature, 100% = maximum cooling. The CAC1 precooler efficiency is calculated as (CAC1 precooler Intake temperature minus CAC1 precooler outlet temperature) divided by (CAC1 precooler Intake temperature minus engine coolant temperature). This calculation assumes that the precooler uses engine coolant as the cooling fluid.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64759

SPN 5283 Engine Charge Air Cooler 1 Intake Temperature

Temperature of the combustion air measured at the CAC 1 Intake.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64758

SPN 5284 Engine Charge Air Cooler 1 Ambient Air Temperature

Temperature of the air surrounding charge air cooler 1.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64758

SPN 5285 Engine Charge Air Cooler 1 Efficiency

Engine charge air cooler 1(CAC1) efficiency is an indication of the CAC's ability to reduce the temperature of the combustion air that is being routed through the CAC1. 0% = no reduction in temperature, 100% = maximum cooling. The CAC1 efficiency is calculated as (CAC1 Intake temperature minus CAC1 outlet temperature) divided by (CAC1 Intake temperature minus CAC1 ambient air temperature). This calculation assumes that the CAC uses a measured or estimated ambient air temperature as the cooling fluid temperature.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64758

SPN 5286 Engine Charge Air Cooler 2 Precooler Intake Temperature

Temperature of the combustion air measured at the charge air cooler 2 precooler Intake.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64757

SPN 5287 Engine Charge Air Cooler 2 Precooler Outlet Temperature

Temperature of the combustion air measured at the charge air cooler 2 precooler outlet.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64757

SPN 5288 Engine Charge Air Cooler 2 Precooler Efficiency

Engine charge air cooler 2 (CAC2) precooler efficiency is an indication of the precooler's ability to reduce the temperature of the gas that is being routed through the precooler. 0% = no reduction in temperature, 100% = maximum cooling. The CAC2 precooler efficiency is calculated as (CAC2 precooler Intake temperature minus CAC2 precooler outlet temperature) divided by (CAC2 precooler Intake temperature minus engine coolant temperature). This calculation assumes that the CAC2 precooler uses engine coolant as the cooling fluid.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64757

SPN 5289 Engine Charge Air Cooler 2 Intake Temperature

Temperature of the combustion air measured at the charge air cooler 2 Intake.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64756

SPN 5290 Engine Charge Air Cooler 2 Outlet Temperature

Temperature of combustion air after it exits from the Charge Air Cooler 2 but before any mixing of recirculated exhaust gas.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64756

SPN 5291 Engine Charge Air Cooler 2 Ambient Air Temperature

Temperature of the air surrounding charge air cooler 2.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64756

SPN 5292 Engine Charge Air Cooler 2 Efficiency

Engine charge air cooler 2 (CAC2) is an indication of the CAC's ability to reduce the temperature of the combustion air that is being routed through the CAC. 0% = no reduction in temperature, 100% = maximum cooling. The CAC2 efficiency is calculated as (CAC2 Intake temperature minus CAC2 outlet temperature) divided by (CAC2 Intake temperature minus CAC2 ambient air temperature). This calculation assumes that the CAC uses a measured or estimated ambient air temperature as the cooling fluid temperature.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64756	

SPN 5293 Allow Level Control During Braking Command

This parameter overrides the inhibit of level control during braking.

00 = Disallow level control during braking (normal operation)
 01 = Allow level control during braking
 10 = Reserved
 11 = Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53760	

SPN 5294 Allow Level Control During Braking Status

This parameter indicates if the function Allow Level Control During Braking is active. Functions is activated by SPN 5293.

00 = Deactivated
 01 = Activated
 10 = Reserved
 11 = Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65114	

SPN 5295 *Speed Dependent Level Control Request*

This parameter activates speed dependent level control in suspension system.

00 = Deactivate

01 = Activate

10 = Reserved

11 = Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 53760

SPN 5296 *Speed Dependant Level Control Status*

This parameter indicates if the function Speed Dependant Level Control is active. The function is activated by SPN 5295.

00 = Inactive

01 = Active

10 = Reserved

11 = Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65114

SPN 5312 *Commanded Engine Intake Manifold Pressure*

Provides the commanded set point value for the engine intake manifold gage pressure.

Data Length: 2 bytes

Resolution: 0.125 kPa/bit, 0 offset

Data Range: 0 to +8031.875 kPa (0 to 1164.62 psi) Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64916

(R) SPN 5313 *Commanded Engine Fuel Rail Pressure*

Provides the commanded set point value for the engine fuel rail gage pressure

Data Length: 2 bytes

Resolution: 1/256 MPa/bit, 0 offset

Data Range: 0 to 250.996 Mpa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64765

(R) SPN 5314 Commanded Engine Fuel Injection Control Pressure

Provides the commanded set point value for the engine fuel injection control pressure.

Data Length:	2 bytes	
Resolution:	1/256 MPa/bit, 0 offset	
Data Range:	0 to 250.996 Mpa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64765	

SPN 5315 Aftertreatment 2 Warm Up Diesel Oxidation Catalyst Intake Temperature

Temperature of engine combustion byproducts entering the warm up Diesel Oxidation Catalyst in exhaust bank 2. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64749	

SPN 5316 Aftertreatment 2 Warm Up Diesel Oxidation Catalyst Outlet Temperature

Temperature of engine combustion byproducts leaving the warm up Diesel Oxidation Catalyst in exhaust bank 2. This diesel parameter should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). A separate parameter has been defined for gas fueled engines.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64749	

SPN 5323 Engine Fuel Control Control Mode

Indicates whether the Engine Fuel Control System is in open loop or closed loop.

00	Open loop
01	Closed loop
10	SAE reserved
11	Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64981	

SPN 5324 Engine Glow Plug 1

Status of the engine glow plug 1.

- 00 - Inactive
- 01 - Active
- 10 - Error
- 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference:

Operational Range: same as data range

SPN 5325 Engine Glow Plug 2

Status of the engine glow plug 2.

- 00 - Inactive
- 01 - Active
- 10 - Error
- 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference:

Operational Range: same as data range

SPN 5326 Engine Glow Plug 3

Status of the engine glow plug 3.

- 00 - Inactive
- 01 - Active
- 10 - Error
- 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference:

Operational Range: same as data range

SPN 5327 Engine Glow Plug 4

Status of the engine glow plug 4.

- 00 - Inactive
- 01 - Active
- 10 - Error
- 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference:

Operational Range: same as data range

SPN 5328 Engine Glow Plug 5

Status of the engine glow plug 5.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5329 Engine Glow Plug 6

Status of the engine glow plug 6.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5330 Engine Glow Plug 7

Status of the engine glow plug 7.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5331 Engine Glow Plug 8

Status of the engine glow plug 8.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5332 Engine Glow Plug 9

Status of the engine glow plug 9.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5333 Engine Glow Plug 10

Status of the engine glow plug 10.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5334 Engine Glow Plug 11

Status of the engine glow plug 11.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5335 Engine Glow Plug 12

Status of the engine glow plug 12.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5336 Engine Glow Plug 13

Status of the engine glow plug 13.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5337 Engine Glow Plug 14

Status of the engine glow plug 14.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5338 Engine Glow Plug 15

Status of the engine glow plug 15.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5339 Engine Glow Plug 16

Status of the engine glow plug 16.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5340 Engine Glow Plug 17

Status of the engine glow plug 17.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5341 Engine Glow Plug 18

Status of the engine glow plug 18.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5342 Engine Glow Plug 19

Status of the engine glow plug 19.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5343 Engine Glow Plug 20

Status of the engine glow plug 20.

00 - Inactive
01 - Active
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Measured
Supporting Information:
PGN reference:

Operational Range: same as data range

SPN 5344 *Transmission Warning Indicator*

Signal from transmission indicating that some aspect of its operation is not functioning correctly, and as a result, transmission operation may be altered or restricted. The indicator is typically a lamp. Distinctions in meaning between the continuous and flashing are left to the transmission manufacturer.

- 00 - Transmission Warning Indicator is off
- 01 - Transmission Warning Indicator is on continuously
- 10 - Transmission Warning Indicator is flashing
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65098	

SPN 5345 *Transmission Overheat Indicator*

Signal from transmission indicating that its fluid temperature is above normal acceptable limits, and as a result, transmission operation may be altered or restricted. The indicator is typically a lamp. Distinctions in meaning between the continuous and flashing are left to the transmission manufacturer..

- 00 - Transmission Overheat Indicator is off
- 01 - Transmission Overheat Indicator is on continuously
- 10 - Transmission Overheat Indicator is flashing
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64917	

SPN 5346 *Driveline Retarder Overheat Indicator*

Signal from the driveline retarder indicating that its fluid temperature is above normal acceptable limits, and as a result, retarder operation may be altered or restricted. The indicator is typically a lamp. Distinctions in meaning between the continuous and flashing are left to the transmission manufacturer.

- 00 - Driveline Retarder Overheat Indicator is off
- 01 - Driveline Retarder Overheat Indicator is on continuously
- 10 - Driveline Retarder Overheat Indicator is flashing
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65275	

SPN 5347 Lateral Acceleration Extended Range

Indicates lateral acceleration of the vehicle (the component of vehicle acceleration vector along the Y-axis). A positive lateral acceleration signal results when the vehicle is accelerated to the left. This parameter is defined according to a Z-Up axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Up Axis System has positive X directed forward, positive Y to the left, and positive Z directed up. See SPN 1809 for an alternate range and resolution.

Data Length:	2 bytes	
Resolution:	0.01 m/s ² per bit, -320 m/s ² offset	
Data Range:	-320 to +322.55 m/s ²	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61485	

SPN 5348 Longitudinal Acceleration Extended Range

Indicates longitudinal acceleration of the vehicle (the component of vehicle acceleration vector along the X-axis). A positive longitudinal acceleration signal results when the vehicle speed increases in the forward direction. Longitudinal acceleration is the same for both Z-Down and Z-Up axis systems, since both systems have positive X axis directed forward. The sign of the value is in accordance to the right-hand rule, as specified in SAE J670. See SPN 1810 for an alternate longitudinal acceleration.

Data Length:	2 bytes	
Resolution:	0.01 m/s ² per bit, -320 m/s ² offset	
Data Range:	-320 to +322.55 m/s ²	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61485	

SPN 5349 Vertical Acceleration Extended Range

Indicates vertical acceleration of the vehicle and the effect of gravity (the component of vehicle acceleration vector along the Z-axis). A positive vertical acceleration signal of 1 gravity results when the vehicle is stationary on a horizontal surface. This parameter is defined according to a Z-Up axis system and the sign of the value is in accordance to the right-hand rule, as specified in SAE J670. As specified in SAE J670, a Z-Up Axis System has positive X directed forward, positive Y to the left, and positive Z directed up.

Data Length:	2 bytes	
Resolution:	0.01 m/s ² per bit, -320 m/s ² offset	
Data Range:	-320 to +322.55 m/s ²	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61485	

SPN 5350 Lateral Acceleration Extended Range Figure of Merit

Figure of merit for lateral acceleration measurement.

00 = lateral acceleration is fully functional. Data is within sensor specification
 01 = lateral acceleration is degraded. Data is suspect due to environmental conditions
 10 = error
 11 = not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61485	

SPN 5351 Longitudinal Acceleration Extended Range Figure of Merit

Figure of merit for longitudinal acceleration measurement.

00 = longitudinal acceleration is fully functional. Data is within sensor specification

01 = longitudinal acceleration is degraded. Data is suspect due to environmental conditions

10 = error

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61485

SPN 5352 Vertical Acceleration Extended Range Figure of Merit

Figure of merit for vertical acceleration measurement.

00 = vertical acceleration is fully functional. Data is within sensor specification

01 = vertical acceleration is degraded. Data is suspect due to environmental conditions

10 = error

11 = not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61485

SPN 5353 Support Variable Transmission Repetition Rate for Acceleration Sensor

Indicates which acceleration transmission rate are supported by the ECU in addition to the required 10 ms transmission rate.

Bit Position Transmission Rate

1 (bit position 7.7 of PGN 61485) 0 = 20 ms rate supported

1 = 20 ms rate not supported

2 (bit position 7.8 of PGN 61485) Reserved for SAE assignment (set to one)

Note: Both bits set to one indicates that the ECU only supports standard transmission rate of 10 ms.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61485

SPN 5366 Engine Desired Turbocharger Compressor Bypass Actuator 1 Position

The requested position of the Engine Turbocharger Compressor Bypass actuator by the engine ECM, where 0% represents bypass fully closed and 100% represents bypass fully open.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64931	

SPN 5367 Engine Turbocharger Compressor Bypass Actuator 1 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Turbocharger Compressor Bypass Actuator 1 by the manufacturers software. When there is no failure FMI 31 is transmitted. When there is multiple failures, the most severe is transmitted.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64931	

SPN 5368 Engine Turbocharger Compressor Bypass Actuator 1 Temperature Status

Used to identify the status of the Engine Turbocharger Compressor Bypass Actuator 1 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High Most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64931	

SPN 5369 Engine Turbocharger Compressor Bypass Actuator 2 command

The command to a compressor bypass actuator 2, normalized to percent, where 0% nominally represents fully closed and 100% represents fully open. Typically, the turbocharger compressor bypass actuator is used to keep the engine out of surge by metering compressed air (charge).

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64931	

SPN 5370 Engine Desired Turbocharger Wastegate Actuator 1 Position

The Requested Valve position of the Turbocharger Wastegate Valve 1, commanded by the engine ECM. A value of 0% represents fully closed and a value of 100% represents fully open.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65174	

SPN 5371 Engine Turbocharger Wastegate Actuator 1 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Turbocharger Wastegate Actuator 1 by the manufacturers software. When there is no failure FMI 31 is transmitted. When there is multiple failures, the most severe is transmitted

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65174	

SPN 5372 Engine Turbocharger Wastegate Actuator 1 Temperature Status

Used to identify the status of the Engine Turbocharger Wastegate Actuator 1 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High Most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65174	

SPN 5373 Engine Desired Turbocharger Wastegate Actuator 2 Position

The Requested Valve position of the Turbocharger Wastegate Valve 2, commanded by the engine ECM. A value of 0% represents fully closed and a value of 100% represents fully open.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65174	

SPN 5374 Engine Desired Throttle Valve 1 Position

The desired position of the Throttle valve 1 that is regulating the fluid, usually air/fuel mixture to the engine as commanded by the Engine Control unit. 0% represents no supply and 100% is full supply.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64754	

(R) SPN 5375 Engine Throttle Valve 1 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the engine throttle valve 1 (SPN 53) by the manufacturers software. When there is no failure FMI 31 is transmitted. When there is multiple failures, the most severe is transmitted.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64754	

(R) SPN 5376 Engine Throttle Valve 1 Temperature Status

Used to identify the status of the engine throttle valve 1 (SPN 53) drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64754	

(R) SPN 5377 Engine Desired Throttle Valve 2 Position

The desired position of the engine throttle valve 2 (SPN 3783) that is regulating the fluid, usually air/fuel mixture to the engine as commanded by the Engine Control Unit. 0% represents no supply and 100% is full supply.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64754	

(R) SPN 5378 Engine Throttle Valve 2 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the engine throttle valve 2 (SPN 3783) by the manufacturers software. When there is no failure FMI 31 is transmitted. When there is multiple failures, the most severe is transmitted.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64754	

(R) SPN 5379 Engine Throttle Valve 2 Temperature status

Used to identify the status of the Engine throttle valve 2 (SPN 3783) drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High Most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64754	

SPN 5380 Engine Fuel Valve 1 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Fuel Valve 1 by the manufacturers software. When there is no failure FMI 31 is transmitted. When there is multiple failures, the most severe is transmitted.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64754	

SPN 5381 Engine Fuel Valve 1 Temperature Status

Used to identify the status of the Engine Fuel valve 1 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High Most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length: 3 bits
 Resolution: 8 states/3 bit, 0 offset
 Data Range: 0 to 7
 Type: Status
 Supporting Information:
 PGN reference: 64754

Operational Range: same as data range

SPN 5382 Engine Fuel Valve 2 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Fuel Valve 2 by the manufacturers software. When there is no failure FMI 31 is transmitted. When there is multiple failures, the most severe is transmitted.

Data Length: 5 bits
 Resolution: Binary, 0 offset
 Data Range: 0 to 31
 Type: Status
 Supporting Information:
 PGN reference: 64754

Operational Range: same as data range

SPN 5383 Engine Fuel Valve 2 Temperature Status

Used to identify the status of the Engine Fuel valve 2 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length: 3 bits
 Resolution: 8 states/3 bit, 0 offset
 Data Range: 0 to 7
 Type: Status
 Supporting Information:
 PGN reference: 64754

Operational Range: same as data range

SPN 5384 Engine Turbocharger Wastegate Actuator 2 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Turbocharger Wastegate Actuator 2 by the manufacturers software. When there is no failure FMI 31 is transmitted. When there is multiple failures, the most severe is transmitted

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64753	

SPN 5385 Engine Turbocharger Wastegate Actuator 2 Temperature Status

Used to identify the status of the Engine Turbocharger Wastegate Actuator 2 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64753	

SPN 5386 Engine Turbocharger Wastegate Actuator 1 Command

The ccommand to a Turbocharger Wastegate actuator 1, normalized to percent, where 0% nominally represents fully closed (No Flow) and 100% represents fully open (Max Flow).

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61486	

SPN 5387 Engine Turbocharger Wastegate Actuator 2 Command

The command to a Turbocharger Wastegate actuator 2, normalized to percent, where 0% nominally represents fully closed (No Flow) and 100% represents fully open (Max Flow).

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61486	

SPN 5388 Engine Turbocharger Compressor Bypass Actuator 2 Position

Measures the position of the turbocharger compressor bypass actuator 2, where 0% represents bypass fully closed and 100% represents bypass fully open. Typically, the compressor bypass is used to lower the compressor outlet pressure and/or intake manifold pressure during situations where too much boost is being generated by the turbocharger. Typically, a compressor bypass will be plumbed from the compressor outlet or intake manifold back to the compressor inlet, with the compressor bypass actuator and valve in place to regulate bypass flow.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64755	

SPN 5389 Engine Desired Turbocharger Compressor Bypass Actuator 2 Position

The desired position of the Engine Turbocharger Compressor Bypass actuator 2 by the engine ECM, where 0% represents bypass fully closed and 100% represents bypass fully open.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64755	

SPN 5390 Engine Turbocharger compressor Bypass Actuator 2 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Turbocharger Compressor Bypass Actuator 1 by the manufacturers software. When there is no failure FMI 31 is transmitted. When there is multiple failures, the most severe is transmitted.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64755	

SPN 5391 Engine Turbocharger Compressor Bypass Actuator 2 Temperature Status

Used to identify the status of the Engine Turbocharger Compressor Bypass Actuator 2 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length: 3 bits
 Resolution: 8 states/3 bit, 0 offset
 Data Range: 0 to 7
 Type: Status
 Supporting Information:
 PGN reference: 64755

Operational Range: same as data range

SPN 5398 Estimated Pumping - Percent Torque

The calculated torque that indicates the estimated amount of torque loss due to the engine air handling system. The value transmitted in this parameter is included in SPN 514 (Nominal Friction - Percent Torque). The data is transmitted as a percent of reference engine torque (see the engine configuration message, PGN 65251).

Data Length: 1 byte
 Resolution: 1 %/bit, -125 % offset
 Data Range: -125 to 125 %
 Type: Measured
 Supporting Information:
 PGN reference: 61443

Operational Range: same as data range

SPN 5399 DPF Thermal Management Active

Indicates that the exhaust temperatures have been elevated for regeneration of the diesel particulate filter aftertreatment system or in preparation of regeneration of the diesel particulate aftertreatment system.

00 - DPF Thermal Management is not active
 01 - DPF Thermal Management is active
 10 - Reserved
 11 - Don't care

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 61443

Operational Range: same as data range

SPN 5400 SCR Thermal Management Active

Indicates that the exhaust temperatures have been elevated for regeneration of the SCR aftertreatment system or in preparation of regeneration of the SCR aftertreatment system.

00 - SCR Thermal Management is not active

01 - SCR Thermal Management is active

10 - Reserved

11 - Don't care

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61443

SPN 5402 Lift Relay Control

Command signal used to Engage and Disengage the Lift Relay controlling a Steady-State Magnet.

00 = Off, Disable Lift Relay Request

01 = On, Enable Lift Relay Request

10 = Reserved

11 = Take No Action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61484

SPN 5403 Drop Relay Control

Command signal used to Engage and Disengage the Drop Relay controlling a Steady-State Magnet.

00 = Off, Disable Drop Relay Request

01 = On, Enable Drop Relay Request

10 = Reserved

11 = Take No Action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61484

SPN 5404 PTO Shutdown has Shutdown Engine

Status signal which identifies whether or not the engine has been shutdown by the PTO shutdown system.

00 - No

01 - Yes

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65252

SPN 5405 Set Elevation Sensor #1 Reference Elevation

Command from a display or other external device (i.e. remote switch) to the land leveling system controller instructing the controller to set the reference elevation based on data received from the corresponding land leveling sensor.

00 = Do not Set Reference Elevation

01 = Set Reference Elevation

10 = Reserved

11 = Don't Care / Take No Action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61453

SPN 5406 Set Elevation Sensor #2 Reference Elevation

Command from a display or other external device (i.e. remote switch) to the land leveling system controller instructing the controller to set the reference elevation based on data received from the corresponding land leveling sensor.

00 = Do not Set Reference Elevation

01 = Set Reference Elevation

10 = Reserved

11 = Don't Care / Take No Action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61453

SPN 5407 Blade Control Mode - Left

Indicate if the land leveling system's automatic control is active or inactive for the elevation sensor on the left side of the blade. The "left" notation is applicable to grading machines such tractors and motor graders where "left" is the position of the elevation sensor as seen by the operator.

If the left sensor is not installed, then the value communicated should be "1111". For systems with a single elevation sensor, the system should be flexible enough to be configured in a manner which most accurately represents what is installed on the machine.

Manual: Operator controls the position of the blade as normal

Auto: The grade control system is controlling the position of the blade without operator input

Inactive Auto: An operating condition exists which prevents the grade control system from allowing automatic controls to engage. This would include conditions such as laser signal is not detected, but not faulty components.

Error: A fault exists in the system.

0000 = Manual

0001 = Auto

0010 = Inactive Auto

0011-1101 = Reserved

1110 = Error

1111 = Not Available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65138

SPN 5408 Blade Control Mode - Right

Indicate if the land leveling system's automatic control is active or inactive for the elevation sensor on the right side of the blade. The "left" notation is applicable to grading machines such tractors and motor graders where "right" is the position of the elevation sensor as seen by the operator.

If the right sensor is not installed, then the value communicated should be "1111". For systems with a single elevation sensor, the system should be flexible enough to be configured in a manner which most accurately represents what is installed on the machine.

Manual: Operator controls the position of the blade as normal

Auto: The grade control system is controlling the position of the blade without operator input

Inactive Auto: An operating condition exists which prevents the grade control system from allowing automatic controls to engage. This would include conditions such as laser signal is not detected, but not faulty components.

Error: A fault exists in the system.

0000 = Manual

0001 = Auto

0010 = Inactive Auto

0011-1101 = Reserved

1110 = Error

1111 = Not Available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65138

SPN 5409 Land Leveling System Enable Status

Communicate the enable/disable status of the Land Leveling System.

00 = Disabled

01 = Enabled

10 = Error

11 = Not available / Not installed

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65138

SPN 5410 Blade Elevation Deviation - Left

Indicate the blade's left elevation deviation with respect to the reference elevation. Serves as an indication of how far the left end of the blade is above or below grade. A positive number indicates that the blade is above the desired grade. A negative value indicates the blade is below the desired grade.

Data Length: 2 bytes

Resolution: 1 mm/bit, -32000 mm offset

Data Range: -32000 to 32255 mm (-32.000 to 32.255 m) Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64750

SPN 5411 Blade Elevation Deviation - Right

Indicate the blade's right elevation deviation with respect to the reference elevation. Serves as an indication of how far the left end of the blade is above or below grade. A positive number indicates that the blade is above the desired grade. A negative value indicates the blade is below the desired grade.

Data Length: 2 bytes
 Resolution: 1 mm/bit, -32000 mm offset
 Data Range: -32000 to 32255 mm (-32.000 to 32.255 m) Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64750

SPN 5412 Blade Reference Elevation Offset - Left

Indicates the blade's left elevation offset with respect to the reference elevation. An offset of 0 m represents no offset from the reference elevation. A positive number indicates that the offset elevation is above the original reference elevation. A negative value indicates the offset elevation is below the original reference elevation.

Data Length: 2 bytes
 Resolution: 1 mm/bit, -32000 mm offset
 Data Range: -32000 to 32255 mm (-32.000 to 32.255 m) Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64750

SPN 5413 Blade Reference Elevation Offset - Right

Indicates the blade's right elevation offset with respect to the reference elevation. An offset of 0 m represents no offset from the reference elevation. A positive number indicates that the offset elevation is above the original reference elevation. A negative value indicates the offset elevation is below the original reference elevation.

Data Length: 2 bytes
 Resolution: 1 mm/bit, -32000 mm offset
 Data Range: -32000 to 32255 mm (-32.000 to 32.255 m) Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64750

SPN 5414 Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Heater Command

This is the command for the Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Heater. See SPN 4372 for the measured value of the Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Heater.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64832

SPN 5415 *Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Heater Command*

This is the command for the Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Heater. See SPN 4438 for the measured value of the Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Heater.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64826	

SPN 5416 *Engine Wait To Start Lamp Data*

This parameter provides measured data from the Engine Wait To Start Lamp. See SPN 1081 for the command.

00 - Lamp deactivated (off)
 01 - Lamp activated (on)
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64773	

SPN 5417 *Engine Fuel Filter (Suction Side) Intake Absolute Pressure*

Absolute pressure of fuel at the intake of the fuel filter (suction side) located between the fuel tank and the fuel supply pump. See Figures SPN16_A & SPN16_B.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64752	

SPN 5422 *Engine Intake Manifold 2 Absolute Pressure*

The absolute pressure measurement of the air intake manifold for bank 2 or the second air intake manifold. If there are multiple air pressure sensors in the intake stream, this is the last one in flow direction before entering the combustion chamber.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64976	

SPN 5423 *Aftertreatment 1 Fuel Pump Relay Control*

Indicates how the device is controlling the aftertreatment 1 fuel pump relay.

00 off

01 on

10 reserved for SAE assignment

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64869

SPN 5424 *Aftertreatment 1 Fuel Flow Diverter Valve Control*

Indicates how the device is controlling the aftertreatment 1 fuel flow diverter valve. When this valve is on it diverts fuel flow from the Aftertreatment 1 Regeneration Device.

00 off

01 on

10 reserved for SAE assignment

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64869

SPN 5425 *Aftertreatment 1 Fuel Pressure 2 Actuator Control*

Indicates how the device is controlling the aftertreatment 1 fuel pressure 2 regulating control valve. 0% = fully closed, 100%=fully open.

Data Length: 2 bytes

Resolution: 0.0025 %/bit, 0 offset

Data Range: 0 to 160.6375 %

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64869

SPN 5426 *Aftertreatment 2 Fuel Pump Relay Control*

Indicates how the device is controlling the aftertreatment 2 fuel pump relay.

00 off

01 on

10 reserved for SAE assignment

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64836

SPN 5427 *Aftertreatment 2 Fuel Flow Diverter Valve Control*

Indicates how the device is controlling the aftertreatment 2 fuel flow diverter valve. When this valve is on it diverts fuel flow from the Aftertreatment 2 Regeneration Device.

00 off

01 on

10 reserved for SAE assignment

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64836

SPN 5428 *Aftertreatment 2 Fuel Pressure 2 Control*

Indicates how the device is controlling the aftertreatment 2 fuel pressure 2 regulating control valve. 0% = fully closed, 100%=fully open.

Data Length: 2 bytes

Resolution: 0.0025 %/bit, 0 offset

Data Range: 0 to 160.6375 %

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64836

SPN 5429 *Engine Exhaust Gas Recirculation 2 Intake Absolute Pressure*

EGR intake absolute pressure measured before the EGR 2 valve.

Data Length: 2 bytes

Resolution: 0.1 kPa/bit, 0 offset

Data Range: 0 to 6,425.5 kPa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64768

SPN 5430 *Engine Exhaust Gas Recirculation 1 Intake Absolute Pressure*

EGR intake absolute pressure measured before the EGR 1 valve.

Data Length: 2 bytes

Resolution: 0.1 kPa/bit, 0 offset

Data Range: 0 to 6,425.5 kPa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64751

SPN 5431 *Engine Exhaust Gas Recirculation 1 Outlet Absolute Pressure (High Resolution)*

EGR outlet absolute pressure is measured after the EGR 1 valve. See SPN 5019 for 1 byte resolution.

Data Length: 2 bytes

Resolution: 0.1 kPa/bit, 0 offset

Data Range: 0 to 6,425.5 kPa

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64751

SPN 5432 *Memory level*

Signal which indicates that the air suspension control has memory levels selected or stored.

Response to memory level request in ASC2 (byte 8.5). If the request was executed the respective status will be set. If the request was not executed "requested level not available" will be set in Suspension control refusal information (ASC1 byte 8.1).

0000: No memory level
0001: Memory level 1 selected
0010: Memory level 2 selected
0011: Memory level 3 selected
0100: Memory level 4 selected
0101: Memory level 5 selected
0110: reserved
0111: reserved
1000: reserved
1001: Memory level 1 stored
1010: Memory level 2 stored
1011: Memory level 3 stored
1100: Memory level 4 stored
1101: Memory level 5 stored
1110: Error indicator
1111: not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Type: Status

Supporting Information:

PGN reference: 65114

Operational Range: same as data range

SPN 5433 *Memory level request*

Signal which indicates that the air suspension control requests a memory level or a memory level shall be stored.

The storage of the current memory level is requested by "Store memory level x". The acknowledge is set in "memory level x stored" (ASC1 byte 8.5). A memory level demand is requested by "Memory level x request". The acknowledge is set in "memory level x selected" (ASC1 byte 8.5)

0000: No memory level request

0001: Memory level 1 request

0010: Memory level 2 request

0011: Memory level 3 request

0100: Memory level 4 request

0101: Memory level 5 request

0110: reserved

0111: reserved

1000: reserved

1001: Store Memory level 1

1010: Store Memory level 2

1011: Store Memory level 3

1100: Store Memory level 4

1101: Store Memory level 5

1110: Reserved

1111: Don't care

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 53760

SPN 5434 *Aftertreatment 1 Diesel Exhaust Fluid Tank Fill Valve Command*

Commanded percentage of maximum Aftertreatment 1 Diesel Exhaust Fluid Tank Fill Valve opening. 100% means the fill valve is fully open providing maximum flow of diesel exhaust fluid into the diesel exhaust fluid tank.

Data Length: 1 byte

Resolution: 0.4 %/bit, 0 offset

Data Range: 0 to 100 %

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64828

SPN 5435 *Aftertreatment 1 Diesel Exhaust Fluid Pump State*

State of Aftertreatment 1 Diesel Exhaust Fluid dosing pump.

00 pump operational

01 pump error

10 reserved for SAE assignment

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64828

SPN 5436 *Aftertreatment 1 Diesel Exhaust Fluid Tank Drain Valve Command*

Commanded percentage of maximum Aftertreatment 1 Diesel Exhaust Fluid Tank Drain Valve opening. 100% means the drain valve is fully open providing maximum flow of diesel exhaust fluid out of the diesel exhaust fluid tank.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64828

SPN 5437 *Aftertreatment 2 Diesel Exhaust Fluid Tank Fill Valve Command*

Commanded percentage of maximum Aftertreatment 2 Diesel Exhaust Fluid Tank Fill Valve opening. 100% means the fill valve is fully open providing maximum flow of diesel exhaust fluid into the diesel exhaust fluid tank.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64819

SPN 5438 *Aftertreatment 2 Diesel Exhaust Fluid Pump State*

State of Aftertreatment 2 Diesel Exhaust Fluid dosing pump.

00 pump operational
 01 pump error
 10 reserved for SAE assignment
 11 not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64819

SPN 5439 *Aftertreatment 2 Diesel Exhaust Fluid Tank Drain Valve Command*

Commanded percentage of maximum Aftertreatment 2 Diesel Exhaust Fluid Tank Drain Valve opening. 100% means the the drain valve is fully open providing maximum flow of diesel exhaust fluid out of the diesel exhaust fluid tank.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 % Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64819

SPN 5444 *Engine Crankcase Breather Oil Separator Speed*

The speed of a rotating (centrifugal) crankcase oil separator.

Data Length: 2 bytes
 Resolution: 1 rpm/bit, 0 offset
 Data Range: 0 to 64255 rpm Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64916

(R) SPN 5445 Engine Throttle Valve 1 Operation Status

Used to identify the status of engine throttle valve 1 (SPN 53)

0000 – Normal

0001 – Alarm (fully operational but needs service)

0010 – Alarm High Severity (functional but transient performance may be reduced)

0011 – Derate Active (torque output reduced due to environmental conditions)

0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)

0101 – Uncontrolled Shutdown Active (actuator current is off so it is limp)

0110 – 1101 Reserved for future assignment

1110 – Error

1111 – Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64754

(R) SPN 5446 Engine Throttle Valve 2 Operation Status

Used to identify the status of engine throttle valve 2 (SPN 3783)

0000 – Normal

0001 – Alarm (fully operational but needs service)

0010 – Alarm High Severity (functional but transient performance may be reduced)

0011 – Derate Active (torque output reduced due to environmental conditions)

0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)

0101 – Uncontrolled Shutdown Active (actuator current is off so it is limp)

0110 – 1101 Reserved for future assignment

1110 – Error

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64754

SPN 5447 Engine Fuel Valve 1 Operation Status

Used to identify the status of Engine Fuel Valve 1

0000 – Normal

0001 – Alarm (fully operational but needs service)

0010 – Alarm High Severity (functional but transient performance may be reduced)

0011 – Derate Active (torque output reduced due to environmental conditions)

0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)

0101 – Uncontrolled Shutdown Active (actuator current is off so it is limp)

0110 – 1101 Reserved for future assignment

1110 – Error

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64754

SPN 5448 Engine Fuel Valve 2 Operation Status

Used to identify the status of Engine Fuel Valve 2

0000 – Normal
 0001 – Alarm (fully operational but needs service)
 0010 – Alarm High Severity (functional but transient performance may be reduced)
 0011 – Derate Active (torque output reduced due to environmental conditions)
 0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)
 0101 – Uncontrolled Shutdown Active (actuator current is off so it is limp)
 0110 – 1101 Reserved for future assignment
 1110 – Error

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64754	

SPN 5449 Engine Turbocharger Compressor Bypass Actuator 1 Operation Status

Used to identify the status of Engine Turbocharger Compressor Bypass Actuator 1

0000 – Normal
 0001 – Alarm (fully operational but needs service)
 0010 – Alarm High Severity (functional but transient performance may be reduced)
 0011 – Derate Active (torque output reduced due to environmental conditions)
 0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)
 0101 – Uncontrolled Shutdown Active (actuator current is off so it is limp)
 0110 – 1101 Reserved for future assignment
 1110 – Error

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64755	

SPN 5450 Engine Turbocharger Compressor Bypass Actuator 2 Operation Status

Used to identify the status of Engine Turbocharger Compressor Bypass Actuator 2

0000 – Normal
 0001 – Alarm (fully operational but needs service)
 0010 – Alarm High Severity (functional but transient performance may be reduced)
 0011 – Derate Active (torque output reduced due to environmental conditions)
 0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)
 0101 – Uncontrolled Shutdown Active (actuator current is off so it is limp)
 0110 – 1101 Reserved for future assignment
 1110 – Error

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64755	

SPN 5451 Engine Turbocharger Wastegate Actuator 1 Operation Status

Used to identify the status of Engine Turbocharger Wastegate Actuator 1

0000 – Normal

0001 – Alarm (fully operational but needs service)

0010 – Alarm High Severity (functional but transient performance may be reduced)

0011 – Derate Active (torque output reduced due to environmental conditions)

0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)

0101 – Uncontrolled Shutdown Active (actuator current is off so it is limp)

0110 – 1101 Reserved for future assignment

1110 – Error

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64753

SPN 5452 Engine Turbocharger Wastegate Actuator 2 Operation Status

Used to identify the status of Engine Turbocharger Wastegate Actuator 2

0000 – Normal

0001 – Alarm (fully operational but needs service)

0010 – Alarm High Severity (functional but transient performance may be reduced)

0011 – Derate Active (torque output reduced due to environmental conditions)

0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)

0101 – Uncontrolled Shutdown Active (actuator current is off so it is limp)

0110 – 1101 Reserved for future assignment

1110 – Error

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64753

SPN 5454 Aftertreatment 1 Average Time Between Active Regenerations

Indicates the average time since last reset between active regenerations, that have not been forced to occur by manual request, for Aftertreatment device 1.

If the manufacturer allows this parameter to be reset, this time is the average since last reset.

Data Length: 4 bytes

Resolution: 1 s/bit, 0 offset

Data Range: 0 to 4,211,081,215 s

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64920

SPN 5455 *Aftertreatment 2 Average Time Between Active Regenerations*

Indicates the average time since last reset between active regenerations, that have not been forced to occur by manual request, for Aftertreatment device 2.

Data Length:	4 bytes	
Resolution:	1 s/bit, 0 offset	
Data Range:	0 to 4,211,081,215 s	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64921	

SPN 5456 *Aftertreatment 1 Hydrocarbon Doser Intake Fuel Temperature*

Measured temperature of the intake fuel to the hydrocarbon dosing device

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64869	

SPN 5457 *Engine Variable Geometry Turbocharger 1 Control Mode*

Indicates if the variable geometry turbocharger control status is either open loop or closed loop.

00 open loop
01 closed loop
10 SAE reserved
11 not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64981	

(R) SPN 5458 *Flexible Fuel Percentage*

Measured signal that indicates the percentage of alcohol in the fuel currently being used. 0% means no alcohol in fuel, 100% means alcohol as fuel and nothing else.

EXAMPLE: If a Bi-fuel vehicle has less than 10% ethanol in the gasoline/petrol, then the external test equipment shall display state 0x09 (See SPN 5837). In such a case, the system would be using gasoline/petrol (fuel) tables and OBD thresholds. SPN 5458 should either artificially display 0% or some number 10% or less if the system has such resolution. If the ethanol in the gasoline/petrol is above 10%, then the external test equipment shall display state 0x0B. SPN 5458 shall report the calculated ethanol/alcohol percentage.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: 0 to 100%
Type:	Measured	
Supporting Information:		
PGN reference:	65203	

SPN 5459 *Aftertreatment 1 NOx Adsorber deNOx Regeneration Status*

Indicates whether the NOx adsorber deNOx regeneration in the first aftertreatment system is active or inactive

00 Inactive
01 Active
10 Error indicator
11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64748	

SPN 5460 *Aftertreatment 2 NOx Adsorber deNOx Regeneration Status*

Indicates whether the NOx adsorber deNOx regeneration in the second aftertreatment system is active or inactive

00 Inactive
01 Active
10 Error indicator
11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64747	

SPN 5461 *Aftertreatment 1 NOx Adsorber deSOx Regeneration Status*

Indicates whether the NOx adsorber deSOx regeneration in the first aftertreatment system is active or inactive

00 Inactive
01 Active
10 Error indicator
11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64748	

SPN 5462 *Aftertreatment 2 NOx Adsorber deSOx Regeneration Status*

Indicates whether the NOx adsorber deSOx regeneration in the second aftertreatment system is active or inactive

00 Inactive
 01 Active
 10 Error indicator
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64747	

(R) SPN 5463 *Aftertreatment 1 SCR Operator Inducement Active Traveled Distance*

The distance traveled while SCR inducement (SPN 5246 is equal to level 1 to 5) is active. Distance is reset once inducement is no longer active for SCR (SPN 5246 = 0).

Emission Control System Operator Inducement Severity, SPN 5826, may be active (is equal to level 1 to 5) due to an SCR condition specified by emissions regulations that is associated with SPN 5246.

Data Length:	2 bytes	
Resolution:	1 km/bit, 0 offset	
Data Range:	0 to 64,255 km	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64878	

SPN 5464 *Hybrid Battery Pack Remaining Charge*

Indicates the hybrid battery pack remaining charge. 0% means no charge remaining, 100% means full charge remaining.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64746	

SPN 5465 *Engine Intake Manifold Pressure Control Mode*

Indicates that the Boost Pressure Closed Loop Control status either open loop or closed loop.

00 Open loop
 01 Closed loop
 10 SAE reserved
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65214	

(R) SPN 5466 *Aftertreatment 1 Diesel Particulate Filter Soot Load Regeneration Threshold*

This parameter indicates the value that will first cause DPF regeneration in aftertreatment 1. There may be multiple parameters that cause DPF regeneration (e.g. Percent Soot Load, DPF delta pressure converted to normalized percentage, etc.). If there are multiple inputs to this parameter that may cause active DPF regeneration, the highest value shall always be reported.

100% is the level at which active diesel particulate filter regeneration should be triggered. 100% level is the active regeneration trigger level (and if conditions are not favorable for regeneration, soot loading can continue beyond 100%). During normal operation and regeneration a value 0% will indicate a fully regenerated diesel particulate filter. Values of 25%, 50% and 75% will indicate the general level of soot prior to the 100% level where an active regeneration is needed.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64891	

(R) SPN 5467 *Aftertreatment 2 Diesel Particulate Filter Soot Load Regeneration Threshold*

This parameter indicates the value that will first cause DPF regeneration in aftertreatment 2. There may be multiple parameters that cause DPF regeneration (e.g. Percent Soot Load, DPF delta pressure converted to normalized percentage, etc.). If there are multiple inputs to this parameter that may cause active DPF regeneration, the highest value shall always be reported.

100% is the level at which active diesel particulate filter regeneration should be triggered. 100% level is the active regeneration trigger level (and if conditions are not favorable for regeneration, soot loading can continue beyond 100%). During normal operation and regeneration a value 0% will indicate a fully regenerated diesel particulate filter. Values of 25%, 50% and 75% will indicate the general level of soot prior to the 100% level where an active regeneration is needed.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64890	

SPN 5468 *Engine Oil Relative Dielectricity (high resolution)*

Engine oil relative dielectricity used to describe the engine oil quality.

Data Length:	2 bytes	
Resolution:	1/8192 per bit, 0 offset	
Data Range:	0 to 7.844	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64776	

SPN 5469 Engine Fuel Filter Restricted Lamp Command

Command signal directly controlling the Engine Fuel Filter Restricted Lamp.

00 - Lamp Off
 01 - Lamp On
 10 - Flash (1 hz)
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64775	

SPN 5470 Engine Fuel Filter Restricted Lamp Data

This parameter provides measured data from the Engine Fuel Filter Restricted Lamp.

00 - Lamp deactivated (Off)
 01 - Lamp activated (On)
 10 - Error
 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64773	

SPN 5471 Engine Friction Percent Torque At Idle, Point 1

The static portion of the friction torque at speed point 1 (SPN 188) of the engine torque map in the engine configuration message. This parameter does not include Estimated Pumping – Percent Torque (SPN 5398) and is expected to change with temperature. The data is transmitted as a percent of the reference engine torque (SPN 544).

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	64743	

(R) SPN 5472 Engine Friction Percent Torque, Point 2

The static portion of the friction torque at speed point 2 (SPN 528) of the engine torque map in the engine configuration message. This parameter does not include Estimated Pumping – Percent Torque (SPN 5398) and is expected to change with temperature. The data is transmitted as a percent of the reference engine torque (SPN 544).

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	64743	

(R) SPN 5473 Engine Friction Percent Torque, Point 3

The static portion of the friction torque at speed point 3 (SPN 529) of the engine torque map in the engine configuration message. This parameter does not include Estimated Pumping – Percent Torque (SPN 5398) and is expected to change with temperature. The data is transmitted as a percent of the reference engine torque (SPN 544).

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	64743	

(R) SPN 5474 Engine Friction Percent Torque, Point 4

The static portion of the friction torque at speed point 4 (SPN 530) of the engine torque map in the engine configuration message. This parameter does not include Estimated Pumping – Percent Torque (SPN 5398) and is expected to change with temperature. The data is transmitted as a percent of the reference engine torque (SPN 544).

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	64743	

(R) SPN 5475 Engine Friction Percent Torque, Point 5

The static portion of the friction torque at speed point 5 (SPN 531) of the engine torque map in the engine configuration message. This parameter does not include Estimated Pumping – Percent Torque (SPN 5398) and is expected to change with temperature. The data is transmitted as a percent of the reference engine torque (SPN 544).

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	64743	

(R) SPN 5476 Engine Friction Percent Torque, Point 6

For engine configuration map modes 1 and 2, this is the static portion of the friction torque at speed point 6 (SPN 532) of the engine torque map. For engine configuration map mode 3, this parameter is the static portion of the friction torque at the engine speed calculated by using Engine Gain (Kp) Of The Endspped Governor (SPN 545) where torque is 0. This parameter does not include Estimated Pumping – Percent Torque (SPN 5398) and is expected to change with temperature. The data is transmitted as a percent of the reference engine torque (SPN 544)..

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	64743	

(R) SPN 5477 Engine Friction Percent Torque, Point 7

The static portion of the friction torque at speed point 7 (SPN 533) of the engine torque map in the engine configuration message. This parameter does not include Estimated Pumping – Percent Torque (SPN 5398) and is expected to change with temperature. The data is transmitted as a percent of the reference engine torque (SPN 544).

Data Length:	1 byte	
Resolution:	1 %/bit, -125 % offset	
Data Range:	-125 to 125 %	Operational Range: 0 to 125%
Type:	Measured	
Supporting Information:		
PGN reference:	64743	

SPN 5492 Armrest 1 Switch 2

Status of the second switch located in armrest 1.

00: Off
 01: On
 10: Reserved
 11: Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64745	

SPN 5493 Armrest 2 Switch 1

Status of the first switch located in armrest 2.

00: Off
 01: On
 10: Reserved
 11: Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64745	

SPN 5494 Armrest 2 Switch 2

Status of the second switch located in armrest 2.

00: Off
 01: On
 10: Reserved
 11: Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64745	

SPN 5495 *Aftertreatment 1 Diesel Particulate Filter Soot Mean Calibration Offset*

Calibration offset for the soot Mean for Aftertreatment 1 Diesel Particulate Filter soot sensor.

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 37888

SPN 5496 *Aftertreatment 1 Diesel Particulate Filter Soot Standard Deviation Calibration Offset*

Calibration offset for the soot standard deviation for Aftertreatment 1 Diesel Particulate Filter soot sensor.

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 37888

SPN 5497 *Aftertreatment 2 Diesel Particulate Filter Soot Mean Calibration Offset*

Calibration offset for the soot Mean for Aftertreatment 2 Diesel Particulate Filter soot sensor.

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 38144

SPN 5498 *Aftertreatment 2 Diesel Particulate Filter Soot Standard Deviation Calibration Offset*

Calibration offset for the soot standard deviation for Aftertreatment 2 Diesel Particulate Filter soot sensor.

Data Length: 2 bytes
 Resolution: 0.0025 %/bit, 0 offset
 Data Range: 0 to 160.6375 % Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 38144

SPN 5499 *Intake Valve Actuation System Oil Pressure 1 Solenoid Control*

Indicates the current command to the solenoid that controls the intake valve actuation system oil pressure 1 valve. This valve opens or closes a connection from the intake valve actuation oil rail to tank.

00 off
 01 on
 10 reserved for SAE assignment
 11 not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3 Operational Range: same as data range
 Type: Status
 Supporting Information:
 PGN reference: 64744

SPN 5500 Intake Valve Actuation System Oil Pressure 2 Solenoid Control

Indicates the current command to the solenoid that controls the intake valve actuation system oil pressure 2 valve. This valve opens or closes a connection from the intake valve actuation oil rail to tank.

00 off

01 on

10 reserved for SAE assignment

11 not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64744

SPN 5501 Aftertreatment 1 Diesel Particulate Filter Intake Temperature Set Point

Set point temperature for the particulate filter (DPF) regeneration at the intake to the DPF for Exhaust bank 1.

Data Length: 2 bytes

Resolution: 0.03125 deg C/bit, -273 deg C offset

Data Range: -273 to 1734.96875 deg C

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64736

(R) SPN 5502 Relative Unburned Fuel Mass from Engine

The unburned amount of diesel fuel coming out of the engine. This fuel increases the temperature while oxidated in the DOC. Therefore, this amount of fuel also needs to be taken into account of the HCD temperature controller.

Data Length: 2 bytes

Resolution: 0.0025 %/bit, 0 offset

Data Range: 0 to 160.6375 %

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64736

SPN 5503 Aftertreatment 1 Fuel Mass Rate

Mass rate of total fuel being delivered to aftertreatment 1 for DPF regeneration.

Data Length: 2 bytes

Resolution: 0.05 g/m per bit, 0 offset

Data Range: 0 to 3212.75 g/m

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64736

SPN 5504 *Hydrocarbon Doser Purging Enable*

Purging enable of the Hydrocarbon Doser (HCD).

00 Purging not enabled
 01 Purging enabled - less urgent
 10 Purging enabled - urgent
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 5505 *Requested Fuel Mass Rate*

Requested fuel dosing quantity from hydrocarbon doser.

Data Length:	2 bytes	
Resolution:	0.05 g/m per bit, 0 offset	
Data Range:	0 to 3212.75 g/m	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	37376	

SPN 5506 *HC Doser Status*

Indicates whether the HC Doser/ HC Dosing system is enabled or is waiting for regeneration.

000 HC doser disabled
 001 HC doser active
 010 SAE reserved
 011 HC doser enabled, waiting for regeneration
 100 SAE reserved
 101 SAE reserved
 110 Error
 111 Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	37376	

SPN 5507 HC Doser Injecting Status

Indicates whether the Hydrocarbon Doser (HCD) is presently injecting diesel fuel into the exhaust pipe.

00 Injecting not active

01 Injecting active

10 Error

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 37376

SPN 5508 Diagnostic Status of HC Doser

Indicates whether an error is active in the Hydrocarbon Doser (HCD) or whether the internal cyclic system test of the HCD is presently active.

This is not intended to replace the DM8/DM30 - Test results requirement for OBD.

000 System test has executed and passed or System test has not yet executed

001 Internal system test is in process

010 - 101 SAE reserved

110 Error -- System test has failed

111 Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 37376

(R) SPN 5509 Hydrocarbon Doser Purging Required

Purging of the Hydrocarbon Doser (HCD) is required. Request could come from the HCD system.

00 Purging not required

01 Purging required - less urgent

10 Purging required - urgent

11 Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 37376

SPN 5510 Lubrication Cycle Mode Lock Command

Command signal to lock or unlock the ability to change the lubrication cycle mode. Locking the lubrication mode would prevent the changing of the lubrication cycle mode, perhaps by an operator.

00 - Not Locked
 01 - Locked
 10 - Reserved
 11 - No action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 37120

Operational Range: same as data range

SPN 5511 Lubrication Cycle Set Command

Command signal to change the lubrication cycle. It gives the operator or technician the ability to change the frequency of lubrication.

000 - Cycle mode # 1 (Lowest Lubrication Frequency)
 001 - Cycle mode # 2
 010 - Cycle mode # 3 (Highest Lubrication Frequency)
 011 to 110 - Reserved
 111 - No action

Data Length: 3 bits
 Resolution: 8 states/3 bit, 0 offset
 Data Range: 0 to 7
 Type: Status
 Supporting Information:
 PGN reference: 37120

Operational Range: same as data range

SPN 5512 Lubrication Operation Mode Set Command

Command signal to change lubrication system operational mode. The mode set command gives the operator and/or technician the ability to change the operational mode when diagnosing and servicing of the system is required.

Automatic is the normal operation mode of lubrication system. In this mode the operator has the privilege to change duty cycle mode, if the lubrication mode is not locked.

In manual service mode the service tool temporary takes control of the pump controller for service purposes.

The Test mode # x shall command the system to perform pre-defined greasing cycles in order to verify operation of the lubrication system.

000 - Automatic Mode
 001 - Manual Service Mode
 010 - Test Mode # 1
 011 - Test Mode # 2
 100 - Test Mode # 3
 101-110 - Reserved
 111 - Take no action

Data Length: 3 bits
 Resolution: 8 states/3 bit, 0 offset
 Data Range: 0 to 7
 Type: Status
 Supporting Information:
 PGN reference: 37120

Operational Range: same as data range

SPN 5513 *Lubrication Pump Enable Command*

Command signal to reset the lubrication pump. It allows the operator and/or technician to reset the paused lubrication pump and clear lubrication system faults. This shall enable the lubrication system to resume its normal operation.

00 - No action (Normal pump operation)

01 - Reset pump operation

10 - Reserved

11 - Take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 37120

SPN 5514 *Lubrication Timing Cycle Command*

Command signal to enable or pause the lubrication activation clock

00 - Pause

01 - Enable

10 - Reserved

11 - Take no action

Note: In some vehicles or machines the lubrication is only required when the vehicle or machine is in certain state (such as when a certain gear is engaged, operator's armrest in place etc.). To prevent unwanted grease lubrication, a timing cycle clock is used. This clock is only ticked for the time the vehicle or machine is in the defined state. Starting or stopping of the clock is controlled using an external input.

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 37120

SPN 5515 *Lubrication Cycle Mode Lock Status*

Reports status of the ability to change the lubrication cycle mode. Locking the lubrication mode would prevent the changing of the lubrication cycle mode, perhaps by an operator

00 - Not Locked

01 - Locked

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64742

SPN 5516 *Lubrication Cycle Mode Status*

Reports the current lubrication cycle mode of the lubrication system

000 - Cycle mode # 1 (Lowest Lubrication Frequency)
 001 - Cycle mode # 2
 010 - Cycle mode # 3 (Highest Lubrication Frequency)
 011 to 101 - Reserved
 110 - Error
 111 - Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Type: Status

Supporting Information:

PGN reference: 64742

Operational Range: same as data range

(R) SPN 5517 *Lubrication Operation Mode Status*

Reports the current operational mode status of the lubrication system.

Automatic is the normal operation mode of lubrication system. In this mode the operator has the privilege to change duty cycle mode, if the lubrication mode is not locked.

In manual service mode the service tool temporary takes control of the pump controller for service purposes.

The test mode # x shall command the system to perform pre-defined greasing cycles in order to verify operation of the lubrication system.

000 - Automatic Mode
 001 - Manual Service Mode
 010 - Test Mode # 1
 011 - Test Mode # 2
 100 - Test Mode # 3
 101 - Reserved
 110 - Error
 111 - Not Available

Note: In general the lubrication system shall be operating in automatic mode but, it may also be changed into manual or test mode. These test and manual modes are used to perform service and diagnostic tests on the lubrication system. This SPN shall be used to report the current operating status of grease lubrication system.

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Type: Status

Supporting Information:

PGN reference: 64742

Operational Range: same as data range

SPN 5518 *Lubrication Pump Enable Status*

Reports the operational status of the lubrication system pump. In the disabled state, the lubrication pump will not run a lubrication cycle. In the enabled state, the lubrication system will perform normal operations.

00 - Disabled
 01 - Enabled
 10 - Error
 11 - Not available

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64742

Operational Range: same as data range

SPN 5519 *Lubrication Reservoir Level*

Reports the status of the lubrication system reservoir level. The lubrication reservoir stores the grease for the lubrication system. The lubrication pump draws grease from this reservoir and pushes it into the vehicle/chassis joints

00 - Reservoir Not Low
 01 - Reservoir Low
 10 - Error
 11 - Not available or not installed

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Measured
 Supporting Information:
 PGN reference: 64742

Operational Range: same as data range

(R) SPN 5520 *Lubrication Timing Cycle Status*

Reports the status of the lubrication activation clock.

00 - Paused
 01 - Enabled
 10 - Error
 11 - Not available or not installed

Note: In some vehicles or machines, lubrication is only required when the vehicle or machine is in certain state e. g. when a certain gear is engaged. To prevent unwanted grease lubrication, a timing cycle clock is used. This clock only ticks for the time the vehicle or machine is in that defined state. Starting or stopping of the clock is controlled using an external input. The status of this timing cycle clock shall be reported to the operator by using this SPN.

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64742

Operational Range: same as data range

SPN 5532 *Switch Backlight Illumination Brightness Percent*

Commanded switch backlight brightness level for all operator control switches. This is separate from the cab display illumination Brightness Percent parameter.

Note: If a single device is used to control both the backlight brightness level of the cab display and switches, see SPN 1487.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	53248	

SPN 5533 *Hydraulic Oil Dynamic Viscosity*

Dynamic viscosity of hydraulic oil. This hydraulic fluid is for the entire hydraulics system of a piece of equipment.

Data Length:	2 bytes	
Resolution:	0.015625 Cp per bit, 0 offset	
Data Range:	0 to 1003.984375 Cp	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64741	

SPN 5534 *Hydraulic Oil Density*

Density of hydraulic oil. This hydraulic fluid is for the entire hydraulics system of a piece of equipment.

Data Length:	2 bytes	
Resolution:	0.00003052 g/cc per bit, 0 offset	
Data Range:	0 to 1.961 g/cc	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64741	

SPN 5535 *Hydraulic Oil Relative Dielectricity (high resolution)*

Hydraulic oil relative dielectricity used to describe the hydraulic oil quality. This hydraulic fluid is for the entire hydraulics system of a piece of equipment.

Data Length:	2 bytes	
Resolution:	1/8192 per bit, 0 offset	
Data Range:	0 to 7.844	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64741	

SPN 5536 *Hydraulic Oil Temperature (High Resolution)*

Hydraulic Oil Temperature. This hydraulic fluid is for the entire hydraulics system of a piece of equipment.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64741	

SPN 5537 Engine Fuel Dynamic Viscosity

Dynamic viscosity of engine fuel

Data Length:	2 bytes	
Resolution:	0.015625 Cp per bit, 0 offset	
Data Range:	0 to 1003.984375 Cp	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64740	

SPN 5538 Engine Fuel Density

Density of engine fuel

Data Length:	2 bytes	
Resolution:	0.00003052 g/cc per bit, 0 offset	
Data Range:	0 to 1.961 g/cc	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64740	

SPN 5539 Engine Fuel Dielectricity (high resolution)

Engine fuel relative dielectricity.

Data Length:	2 bytes	
Resolution:	1/8192 per bit, 0 offset	
Data Range:	0 to 7.844	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64740	

SPN 5540 Engine Fuel Temperature (High Resolution)

Engine Fuel Temperature. See also SPNs 174 or 3468 for alternate resolution.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64740	

SPN 5541 Engine Turbocharger 1 Turbine Outlet Pressure

Gage pressure of the combustion by-products exiting the turbine side of the turbocharger 1.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64739	

SPN 5542 *Desired Engine Turbocharger 1 Turbine Outlet Pressure*

The desired gage pressure of the combustion by-products exiting the turbine side of the turbocharger 1 at the current engine operating conditions.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64739	

SPN 5543 *Engine Exhaust Brake Actuator Command*

The control command applied to the engine exhaust brake actuator, where 0% represents no braking and 100% represents full braking.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64739	
PGN reference:	64739	

SPN 5544 *Engine Turbocharger 2 Turbine Outlet Pressure*

Gage pressure of the combustion by-products exiting the turbine side of the turbocharger 2.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64739	
PGN reference:	64739	

SPN 5545 *Desired Engine Turbocharger 2 Turbine Outlet Pressure*

The desired gage pressure of the combustion by-products exiting the turbine side of the turbocharger 5 at the current engine operating conditions.

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64739	

SPN 5546 *Engine Auxiliary Cooler Supply Valve 1 Actuator Command*

The control command applied to the engine auxiliary cooler supply valve 1 actuator, where 0% represents closed and 100% represents open.

See SPN 4197 for primary engine thermostat valve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64850	

SPN 5547 Engine Auxiliary Cooler Supply Valve 2 Actuator Command

The control command applied to the engine auxiliary cooler supply valve 2 actuator, where 0% represents closed and 100% represents open.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64850	

SPN 5548 Engine Cold Start Fuel Igniter Command

The engine cold start fuel igniter control command, normalized to %, where 0% represents fully off and 100% represents fully on.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - PGN 64966	
PGN reference:	64966	

SPN 5549 Engine Cold Start Fuel Igniter Relay

The engine cold start fuel igniter relay control command. This command controls the relay, not the igniter.

00 Off
 01 On
 10 Reserved
 11 Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - PGN 64966	
PGN reference:	64966	

SPN 5550 Engine Cold Start Fuel Igniter Relay Feedback

Feedback state of the engine cold start fuel igniter relay which indicates the status of the relay output.

00 Off
 01 On
 10 Error
 11 Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - PGN 64966	
PGN reference:	64966	

SPN 5551 *Magnet Generator Control*

Command signal used to Enable and Disable the Generator controlling a Magnet.

- 00 Off, Disable Generator
- 01 On, Enable Generator
- 10 Reserved
- 11 Take No Action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61484	

SPN 5552 *Supplemental Fan Enable Command*

Enable/Disable command to Supplemental Fan.

- 00 Disable
- 01 Enable
- 10 Reserved
- 11 Don't Care/Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	36864	

SPN 5553 *Supplemental Fan Direction Command*

Direction command to the Supplemental Fan. Fan can be commanded to run forward or reverse.

- 00 Forward
- 01 Reverse
- 10 Reserved
- 11 Don't care/take no action (leave function as is)

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	36864	

SPN 5554 *Supplemental Fan Speed Command*

Speed command to Supplemental Fan.

Data Length:	2 bytes	
Resolution:	0.5 rpm/bit, 0 offset	
Data Range:	0 to 32,127.5 rpm	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	36864	

SPN 5555 Supplemental Fan Power Hold

Command to allow the supplemental fan controller to remain alive independently of the electrical enable input to the fan. This allows the fan controller to remain alive after the keyswitch has disabled the electrical enable pin on the fan controller. For example, the fan can continue to run after a machine has been shutdown to provide cooling when the machine is no longer running

00 Disable
 01 Enable
 10 Reserved
 11 Don't Care/Take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 36864

Operational Range: same as data range

SPN 5556 Supplemental Fan Enable Status

Enable/Disable Status of Supplemental Fan.

00 Disabled
 01 Enabled
 10 Error
 11 Not available/Not installed

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64738

Operational Range: same as data range

SPN 5557 Supplemental Fan Direction Status

Rotational Direction of Supplemental Fan. Fan could be spinning forward or reverse.

00 Forward
 01 Reverse
 10 Error
 11 Not available/Not installed

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 64738

Operational Range: same as data range

SPN 5558 Supplemental Fan Velocity Status

Status of the rotational velocity of Supplemental Fan. Used to indicate if the fan is spinning at the desired speed. If fan is not able to obtain the commanded speed, velocity error is indicated. If fan is unable to spin, the fan is in Fan Stall condition.

0000 At Velocity (Fan OK)

0001 Velocity Error (unable to achieve commanded speed)

0010 Fan Spin Up

0011 Fan Spin Down

0100 Fan Stall

0101-1101 Reserved

1110 Error

1111 Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64738

SPN 5559 Supplemental Fan Controller Temperature Status

Internal Controller Temperature Status of Supplemental Fan.

000 High most severe

001 High Least severe

010 In Range

011 Low Least severe

100 Low Most severe

101 Not Defined

110 Error

111 Not available

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64738

SPN 5560 Supplemental Fan Drive Status

The drive status of the Supplemental Fan. This status parameter indicates the overall health of the fan drive. It will indicate that the fan is working OK or if there is an internal fault such as open winding or internal short circuit.

0000 Normal = "OK"
 0001 Alarm = Fully operational but needs service
 0010 Alarm High Severity = Functional but transient performance may be reduced
 0011 Derate Active = Torque output reduced due to environmental conditions
 0100 Controlled Shutdown Active = Driving to the default position – usually this means closed
 0101 Uncontrolled Shutdown Active = Actuator current is off so it is limp
 0110 - 1101 Reserved for future assignment = Not used
 1110 Error
 1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64738	

SPN 5561 Supplemental Fan Controller ECU Temperature

Measured temperature of Supplemental Fan Controller ECU.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64738	

SPN 5562 Supplemental Fan Speed

Measured speed of supplemental fan.

Data Length:	2 bytes	
Resolution:	0.5 rpm/bit, 0 offset	
Data Range:	0 to 32,127.5 rpm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64738	

SPN 5563 Supplemental Fan Current

Measured electrical current of supplemental fan drive.

Data Length:	1 byte	
Resolution:	1 A/bit, -125 A offset	
Data Range:	-125 to 125 A	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64738	

SPN 5564 Supplemental Fan Power

Estimated Power output of Supplemental Fan

Data Length:	2 bytes	
Resolution:	0.5 W/bit, 0 W offset	
Data Range:	0 to 32127.5 W	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64738	

SPN 5565 Coolant Level Engine Protection Shutdown Override Command

Overrides the engine protection shutdown functionality due to low coolant level.

00 - Disable engine protection shutdown override due to low coolant level
 01 - Enable engine protection shutdown override due to low coolant level
 10 - Reserved
 11 - Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	36608	

SPN 5566 Coolant Level Engine Protection Shutdown Status

Parameter which indicates the configuration of the coolant level engine protection shutdown.

00 - Disabled - calibration does not allow engine protection due to low coolant level or the override is currently active
 01 - Enabled - calibration allows engine protection due to low coolant level and the override is currently not active
 10 - Reserved
 11 - Not Available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65252	

SPN 5567 Engine Speed Governor Gain Adjust

This parameter is used to adjust multiple gains at same time to attain engine stability across a broader range of applications.

-32128 is least responsive
 0 is normal
 +32127 is most responsive

Data Length:	2 bytes	
Resolution:	1 count/bit, -32128 offset	
Data Range:	-32128 to 32127	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64915	

SPN 5568 Engine Speed Governor Droop

This is the percent speed droop adjustment relative to rated speed setpoint. The Engine Speed Droop is equal to the following equation:

$$100 * [(Engine\ Speed\ at\ no\ load - Engine\ Speed\ at\ full\ rated\ load) / (Engine\ Speed\ at\ full\ rated\ load)].$$

The engine speed will slow down as load is added. Allows for inexpensive load sharing between multiple engines.

Data Length:	1 byte	
Resolution:	0.04%/bit, 0 offset	
Data Range:	0 to 10%	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64915	

SPN 5569 Diesel Particulate Filter 1 Soot Sensor ECU Internal Temperature

Internal temperature of the diesel particulate filter 1 soot sensor ECU.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64796	

SPN 5570 Diesel Particulate Filter 2 Soot Sensor ECU Internal Temperature

Internal temperature of the diesel particulate filter 2 soot sensor ECU.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64795	

SPN 5578 Engine Fuel Delivery Absolute Pressure

Absolute pressure of fuel in system as delivered from supply pump to the injection pump. See also SPN 94 for Fuel Delivery Pressure (Gage).

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 16	
PGN reference:	64735	

SPN 5579 Engine Filtered Fuel Delivery Pressure

Gage pressure of fuel in system as delivered from supply pump to the injection pump after the pressure side fuel filter. See SPN 5580 for absolute pressure of fuel in system after the pressure side fuel filter.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 16	
PGN reference:	64735	

SPN 5580 Engine Filtered Fuel Delivery Absolute Pressure

Absolute pressure of fuel in system as delivered from supply pump to the injection pump after the pressure side fuel filter.
See SPN 5579 for gage pressure of fuel in system after the pressure side fuel filter.

Data Length:	1 byte	
Resolution:	4 kPa/bit, 0 offset	
Data Range:	0 to 1000 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:	See Appendix D - SPN 16	
PGN reference:	64735	

SPN 5581 Calculated Ambient Air Temperature

Calculated temperature of air surrounding vehicle. Use SPN 171 for actual measured ambient air temperature.

Data Length:	2 bytes	
Resolution:	0.03125 deg C/bit, -273 deg C offset	
Data Range:	-273 to 1734.96875 deg C	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64992	

SPN 5582 Static Roll Angle

The measured static roll angle between the vehicle y-axis and the ground plane about the X-axis. The sign of the roll angle is determined in accordance to the right-hand rule about the X-axis, as specified in SAE J670. Roll angle is the same for both Z-Down and Z-Up axis system, as specified in SAE J670, since both systems have positive X forward.

Data Length:	1 byte	
Resolution:	1 deg/bit, -125 deg offset	
Data Range:	-125 to 125 deg	Operational Range: -90 to 90 deg
Type:	Measured	
Supporting Information:		
PGN reference:	2304	

SPN 5583 Static Roll Angle Status

Status of the transmitted roll angle data.

000 = Sensor Busy
 001 = Sensor OK
 010 = Sensor Defect
 011 = Sensor Reboots
 100 = Angle Data Invalid
 101 = Reserved
 110 = Error
 111 = Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	2304	

SPN 5584 Engine Fuel Filter Degradation

The estimated percentage relative to the useful life of the engine fuel filter.

This is not a calculation of the physical restriction of the filter. 0% is typical of a new filter. 100% is typical of an end of life filter, the filter should be replaced. The filter can operate past 100%.

Data Length:	1 byte	
Resolution:	1 %/bit, 0 offset	
Data Range:	0 to 250 %	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - SPN 16	
PGN reference:	64735	

SPN 5589 Aftertreatment 1 Secondary Air Absolute Pressure

Absolute pressure of the secondary air for aftertreatment 1. Secondary air is air provided to the exhaust system (per SAE J2403).

For gage pressure, see SPN 3837.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64734	

SPN 5590 Aftertreatment 2 Secondary Air Absolute Pressure

Absolute pressure of the secondary air for aftertreatment 2. Secondary air is air provided to the exhaust system (per SAE J2403).

For gage pressure, see SPN 3838.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64733	

SPN 5603 Cruise Control Disable Command

This parameter is used to disable cruise control from a source other than the driver controlled switch if cruise control is active. It is also used to inhibit cruise control from becoming active if it is not currently active. If this parameter is used to disable cruise control, then cruise control will need to be re-initialized and the previous set speed will not be retained.

This parameter has priority over Cruise Control Resume Command (SPN 5604). See Figure PGN2560_A for an explanation of how this relates to other parameters.

Use of this parameter is in addition to Cruise Control Enable Switch (SPN 596). The Cruise Control Enable Switch set to OFF has priority over the Cruise Control Disable Command set to allowed.

This parameter is not the physical switch that enables cruise control. See SPN 596 for the physical switch.

- 00 - Cruise Control is allowed
- 01 - Cruise Control is not allowed
- 10 - Reserved
- 11 - Don't care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - PGN 2560	
PGN reference:	2560	

SPN 5604 Cruise Control Resume Command

This parameter is used to request the cruise control to resume operation from a source other than the driver controlled switch. Implementers may wish to restrict the conditions in which cruise control will be resumed due to this parameter. Possible restrictions include only honoring this request if it is received within a certain time period after cruise control has been disabled, a vehicle speed differential has been exceeded since cruise control has been cancelled, etc.

This request will only be honored if it is received from the same device as the one that sent the Cruise Control Pause Command (SPN 5605).

Cruise Control Disable Command (SPN 5603) and Cruise Control Pause Command (SPN 5605) both have a higher priority than this parameter. See Figure PGN2560_A for an explanation of how this relates to other parameters.

This parameter is not the physical switch that is used to resume cruise control. See SPN 601 for the physical switch.

- 00 - Cruise Control Resume not Requested
- 01 - Cruise Control Resume Requested
- 10 - Reserved
- 11 - Don't Care/take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - PGN 2560	
PGN reference:	2560	

SPN 5605 *Cruise Control Pause Command*

This parameter is used to temporarily disable cruise control from a source other than the driver controlled switch if cruise control is active. If this parameter is used to disable cruise control, then cruise control will not need to be re-initialized and the previous set speed will be retained. In order for the cruise control system to resume to the previous set speed, a valid command must be received. Valid commands include (1) the Cruise Control Resume Switch (SPN 601), (2) the Cruise Control Set Switch (SPN 599), or (3) Cruise Control Resume Command (SPN 5604).

This parameter has priority over Cruise Control Resume Command (SPN 5604). See Figure PGN2560_A for an explanation of how this relates to other parameters.

This parameter is not the physical switch that is used to pause cruise control. See SPN 1633 for the physical switch.

Receiving this parameter to disable cruise control has the same effect on cruise control as tapping the brake pedal.

00 - Cruise Control is allowed

01 - Cruise Control is not allowed

10 - Reserved

11 - Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - PGN 2560

PGN reference: 2560

SPN 5606 *Adaptive Cruise Control Readiness Status*

This parameter is used to indicate an application's state of readiness for responding to commands from an adaptive cruise control system controller.

00 - Off -- Cruise Control System is not configured to accept commands from an adaptive cruise controller

01 - On -- Cruise Control System is configured to accept commands from an adaptive cruise controller.

10 - Error Condition -- Prevents system from responding to adaptive cruise controller commands even though it is configured.

11 - Not Available/Not Supported

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64732

SPN 5607 Cruise Control System Command State

Indicates the current state of the cruise control system due to the Cruise Control System Commands, which include Cruise Control Disable Command (SPN 5603), Cruise Control Resume Command (SPN 5604), and Cruise Control Pause Command (SPN 5605).

000 - No Cruise Control System Command

001 - Cruise control has been disabled by Cruise Control Disable Command (SPN 5603)

010 - Cruise control has been disabled by Cruise Control Pause Command (SPN 5605)

011 - Cruise control has been re-activated by Cruise Control Resume Command (SPN 5604) and Cruise Control States (SPN 527) is equal to Resume (100). Cruise Control System Command State will be equal to 011 as long as Cruise Control States is equal to Resume. Cruise Control System Command State will change to the appropriate value when Cruise Control States is no longer equal to Resume.

100 - Cruise control device has received a Cruise Control Resume Command (SPN 5604), but there is no previous set speed.

101 - 110 -- SAE Reserved

111 - Not Supported

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - PGN 2560

PGN reference: 64732

SPN 5608 Source Address of Controlling Device for Disabling Cruise Control

The source address of the SAE J1939 device that is currently sending the Cruise Control Disable Command (SPN 5603).

If there are multiple devices sending Cruise Control Disable Command with a value of 01, then the value transmitted for this parameter will be the source address of the device that first began sending 01 for the command. If the device that first sent 01 for Cruise Control Disable Command is no longer sending 01 for the command, then the value of the Source Address of Controlling Device for Disabling Cruise Control shall be set to the source address of a device that is still sending the Cruise Control Disable Command with a value of 01.

See Figure PGN2560_A for an explanation of how this relates to other parameters.

This parameter is supported by the device that has the capability to receive and process the Cruise Control Disable Command (SPN 5603).

254 (0xFE) is used to indicate that the Source Address of Controlling Device for Disabling Cruise Control parameter is supported, but no device is currently inhibiting cruise control with the Cruise Control Disable Command (SPN 5603).

Data Length: 1 byte

Resolution: 1 source address/bit, 0 offset

Data Range: 0 to 255

Operational Range: same as data range

Type: Status

Supporting Information: See Appendix D - PGN 2560

PGN reference: 64732

SPN 5609 Source Address of Controlling Device for Pausing Cruise Control

The source address of the SAE J1939 device that is currently sending the Cruise Control Pause Command (SPN 5605).

If there are multiple devices sending Cruise Control Pause Command with a value of 01, then the value transmitted for this parameter will be the source address of the device that first began sending 01 for the command. If the device that first sent 01 for Cruise Control Pause Command is no longer sending 01 for the command, then the value of the Source Address of Controlling Device for Pausing Cruise Control shall be set to the source address of a device that is still sending the Cruise Control Disable Command with a value of 01.

This parameter is supported by the device that has the capability to receive and process the Cruise Control Pause Command (SPN 5605).

254 (0xFE) is used to indicate that the Source Address of Controlling Device for Pausing Cruise Control parameter is supported, but no device is currently inhibiting cruise control with the Cruise Control Pause Command (SPN 5605).

Data Length:	1 byte	
Resolution:	1 source address/bit, 0 offset	
Data Range:	0 to 255	Operational Range: same as data range
Type:	Status	
Supporting Information:	See Appendix D - PGN 2560	
PGN reference:	64732	

SPN 5624 Trailer-VDC Active

The trailer-VDC (Vehicle Dynamic Control) is an electronic vehicle stability function within the (semi) trailer braking system. It acts to stabilize the (semi) trailer during dynamic maneuvers. VDC includes Roll Over Prevention (ROP) and/or Yaw Control (YC), However, the latter information is not individually available and the VDC active parameter will be set in both cases.

This parameter maps the 6.4.2.2.36 VDC active parameter of the ISO 11992_2 bus (trailer-bus) to the SAE J1939 (vehicle bus). This makes it possible to warn the driver if one of the trailers activate the brakes because of an VDC function active in the trailer.

00 - VDC passive, but installed
 01 - VDC active
 10 - Reserved
 11 - Not available or not installed

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65103	

SPN 5625 Engine Exhaust Back Pressure Regulator Position

The position of the Exhaust Back Pressure Regulator (EBPR) expressed as a percentage of full travel. One hundred percent means the regulator is fully closed, providing the maximum restriction to exhaust gas flow from the engine. Zero percent means the regulator is fully open, providing the minimum available restriction.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64753	

SPN 5626 Engine Exhaust Back Pressure Regulator Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Exhaust Back Pressure Regulator (EBPR) by the manufacturers software. When there is no failure, FMI 31 is transmitted. When there are multiple failures, the most severe is transmitted.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64753	

SPN 5627 Engine Exhaust Back Pressure Regulator Temperature Status

Used to identify the status of the Engine Exhaust Back Pressure Regulator (EBPR) drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64753	

SPN 5628 Engine Exhaust Back Pressure Regulator Control Operation Status

Used to identify the status of Engine Exhaust Back Pressure Regulator.

0000 – Normal
 0001 – Alarm (fully operational but needs service)
 0010 – Alarm High Severity (functional but transient performance may be reduced)
 0011 – Derate Active (torque output reduced due to environmental conditions)
 0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)
 0101 – Uncontrolled Shutdown Active (actuator current is off so it is limp)
 0110 – 1101 Reserved for future assignment
 1110 – Error
 1111 – Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64753	

SPN 5629 Diesel Particulate Filter Active Regeneration Inhibited Due to Low Exhaust Gas Pressure

Indicates the state of diesel particulate filter active regeneration inhibition due to low exhaust gas pressure.

00 not inhibited
 01 inhibited
 10 reserved for SAE assignment
 11 not available

This SPN indicates the reason for the diesel particulate filter regeneration not being initiated or being exited prior to completion. When this state becomes active the system will not initiate an active regeneration or will exit an active regeneration. The state provides information that may be provided to the driver/service technician as to why the regeneration did not initiate or was exited.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64892	

SPN 5630 Park Brake Command

Request by a secondary device to command the Park Brake. The Park Brake controller should treat this as a request and should apply the Park Brake as determined by the controller.

Feedback of the park brake actuation may utilize SPN 70, SPN 619 or SPN 5275.

00 - Park Brake apply not requested
 01 - Park Brake apply requested
 10 - SAE Reserved
 11 - Don't care/Take no action

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	57344	

(R) SPN 5631 Engine Throttle Valve 1 Differential Pressure

The differential pressure between the intake and outlet of the throttle valve 1 (SPN 53). The differential pressure is measured from the intake with respect to the outlet of the throttle valve.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64961	

SPN 5632 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Request Frequency 1*

First requested analysis frequency for the diesel particulate filter 1 soot sensor.

Data Length: 2 bytes
Resolution: 0.1 MHz/bit, 0 offset
Data Range: 0 to 6425.5 MHz Operational Range: same as data range
Type: Status
Supporting Information:
PGN reference: 64731

SPN 5633 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Request Frequency 2*

Second requested analysis frequency for the diesel particulate filter 1 soot sensor.

Data Length: 2 bytes
Resolution: 0.1 MHz/bit, 0 offset
Data Range: 0 to 6425.5 MHz Operational Range: same as data range
Type: Status
Supporting Information:
PGN reference: 64731

SPN 5634 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Request Frequency 3*

Third requested analysis frequency for the diesel particulate filter 1 soot sensor.

Data Length: 2 bytes
Resolution: 0.1 MHz/bit, 0 offset
Data Range: 0 to 6425.5 MHz Operational Range: same as data range
Type: Status
Supporting Information:
PGN reference: 64731

SPN 5635 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Request Frequency 4*

Fourth requested analysis frequency for the diesel particulate filter 1 soot sensor.

Data Length: 2 bytes
Resolution: 0.1 MHz/bit, 0 offset
Data Range: 0 to 6425.5 MHz Operational Range: same as data range
Type: Status
Supporting Information:
PGN reference: 64731

SPN 5636 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Frequency 1*

The analysis frequency associated with the frequency 1 soot signal for the diesel particulate filter 1 soot sensor. See SPN 5632.

Data Length: 2 bytes
Resolution: 0.1 MHz/bit, 0 offset
Data Range: 0 to 6425.5 MHz Operational Range: same as data range
Type: Status
Supporting Information:
PGN reference: 64730

SPN 5637 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Frequency 1 Soot Signal*

The soot signal attenuation measurement for analysis frequency 1 for the diesel particulate filter 1 soot sensor. See SPN 5632.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64730	

SPN 5638 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Frequency 2*

The analysis frequency associated with the frequency 2 soot signal for the diesel particulate filter 1 soot sensor. See SPN 5633.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64730	

SPN 5639 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Frequency 2 Soot Signal*

The soot signal attenuation measurement for analysis frequency 2 for the diesel particulate filter 1 soot sensor. See SPN 5633.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64730	

SPN 5640 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Frequency 3*

The analysis frequency associated with the frequency 3 soot signal for the diesel particulate filter 1 soot sensor. See SPN 5634.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64729	

SPN 5641 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Frequency 3 Soot Signal*

The soot signal attenuation measurement for analysis frequency 3 for the diesel particulate filter 1 soot sensor. See SPN 5634.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64729	

SPN 5642 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Frequency 4*

The analysis frequency associated with the frequency 4 soot signal for the diesel particulate filter 1 soot sensor. See SPN 5635.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64729	

SPN 5643 *Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Frequency 4 Soot Signal*

The soot signal attenuation measurement for analysis frequency 4 for the diesel particulate filter 1 soot sensor. See SPN 5635.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64729	

SPN 5644 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Request Frequency 1*

First requested analysis frequency for the diesel particulate filter 2 soot sensor.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64728	

SPN 5645 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Request Frequency 2*

Second requested analysis frequency for the diesel particulate filter 2 soot sensor.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64728	

SPN 5646 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Request Frequency 3*

Third requested analysis frequency for the diesel particulate filter 2 soot sensor.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64728	

SPN 5647 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Request Frequency 4*

Fourth requested analysis frequency for the diesel particulate filter 2 soot sensor.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64728	

SPN 5648 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Frequency 1*

The analysis frequency associated with the frequency 1 soot signal for the diesel particulate filter 2 soot sensor. See SPN 5644.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64727	

SPN 5649 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Frequency 1 Soot Signal*

The soot signal attenuation measurement for analysis frequency 1 for the diesel particulate filter 2 soot sensor. See SPN 5644.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64727	

SPN 5650 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Frequency 2*

The analysis frequency associated with the frequency 2 soot signal for the diesel particulate filter 2 soot sensor. See SPN 5645.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64727	

SPN 5651 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Frequency 2 Soot Signal*

The soot signal attenuation measurement for analysis frequency 2 for the diesel particulate filter 2 soot sensor. See SPN 5645.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64727	

SPN 5652 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Frequency 3*

The analysis frequency associated with the frequency 3 soot signal for the diesel particulate filter 2 soot sensor. See SPN 5646.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64726	

SPN 5653 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Frequency 3 Soot Signal*

The soot signal attenuation measurement for analysis frequency 3 for the diesel particulate filter 2 soot sensor. See SPN 5646.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64726	

SPN 5654 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Frequency 4*

The analysis frequency associated with the frequency 4 soot signal for the diesel particulate filter 2 soot sensor. See SPN 5647.

Data Length:	2 bytes	
Resolution:	0.1 MHz/bit, 0 offset	
Data Range:	0 to 6425.5 MHz	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64726	

SPN 5655 *Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Frequency 4 Soot Signal*

The soot signal attenuation measurement for analysis frequency 4 for the diesel particulate filter 2 soot sensor. See SPN 5647.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64726	

(R) SPN 5675 Operator Shift Prompt

Command to activate an indicator that advises the operator to shift to a different gear. Typically this would be used as part of a fuel economy improvement or drivability aid.

00 - indicator(s) inactive
 01 - upshift indicator active
 10 - downshift indicator active
 11 - don't care/take no action

Data Length: 2 bits
 Resolution: 4 states/2 bit, 0 offset
 Data Range: 0 to 3
 Type: Status
 Supporting Information:
 PGN reference: 65279

Operational Range: same as data range

(R) SPN 5676 Advanced emergency braking system state

Current operational state of advanced emergency braking system

0000 - system is not ready (initialization not finished)
 0001 - system is temporarily not available (e.g. due to boundary conditions necessary for operation)
 0010 - system is deactivated by driver
 0011 - system is ready and activated (no warning and no braking active)
 0100 - driver overrides system
 0101 - collision warning active (e.g. acoustic signal, cruise control turned off, torque limitation)
 0110 - collision warning with braking (e.g. brake jerk or partial braking)
 0111 - emergency braking active
 1000...1101 - reserved for future use
 1110 - error indication
 1111 - not available / not installed

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 61487

Operational Range: same as data range

(R) SPN 5677 Collision warning level

To implement different HMI (human machine interface) concepts, e.g. visual only, visual/audible, different warning tones etc., the AEBS provides different levels of collision warning.

0000 - no warning
 0001 - warning level 1 - lowest
 0010 - warning level 2
 0011 - warning level 3
 0100 - warning level 4
 0101 - warning level 5
 0110 - warning level 6
 0111 - warning level 7 - highest
 1000...1110 - reserved
 1111 - don't care / take no action

Values between 0001 (lowest warning level) and 0111 (highest warning level) are increasing.

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61487	

(R) SPN 5678 Relevant object detected for advanced emergency braking system

Indication if the advanced emergency braking system (AEBS) is monitoring a relevant object

000 - no relevant object monitored
 001 - relevant object is being monitored
 010 - relevant object is not being detected reliably
 011..101 - reserved
 110 - error indication
 111 - signal not available / not installed

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61487	

(R) SPN 5679 *Bend off probability of relevant object*

Probability if monitored relevant object might start a turning maneuver, which could clear the travelling path of the host vehicle.

000 - no indication for a bend off maneuver of the relevant object
 001 - low probability for a bend off maneuver of the relevant object
 010 - medium probability for a bend off maneuver of the relevant object
 011 - high probability for a bend off maneuver of the relevant object
 100 - highest probability for a bend off maneuver of the relevant object
 101 - relevant object is already in a turning maneuver
 110 - error indication
 111 - signal not available / not installed

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61487	

(R) SPN 5680 *Time to collision with relevant object*

The time to collision is the duration after which the predicted travelling paths of host vehicle and relevant object lead to a distance of 0m between both.

Note: It is up to the system manufacturer to choose a suitable calculation method to predict the travelling paths of both host vehicle and relevant object.

Data Length:	1 byte	
Resolution:	0.05 s/bit, 0 offset	
Data Range:	0 to 12.5 s	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61487	

(R) SPN 5681 *Driver activation demand for Advanced Emergency Braking System*

According to the Vienna world convention on road traffic the driver must be provided with means to deactivate an Advanced Emergency Braking System. This command is to be transmitted from the respective HMI unit to the AEBS unit.

00 - the driver does not want the Advanced Emergency Braking System to warn or intervene at any time (deactivation of system)
 01 - the driver wants the Advanced Emergency Braking System to warn or intervene if necessary (no deactivation of system)
 10 - reserved
 11 - don't care / take no action

Note: The signal has to be transmitted permanently to the AEBS showing the state selected once by the driver. Typically there is a deactivation push button present in the host vehicle for the driver to choose this state.

Example: After ignition-on the signal is being transmitted as 01b (this will be the default state in Europe) all the time. As soon as the driver depresses the push button the signal's value has to change to 00b for the remaining ignition cycle as long as the driver does not depress the push button again.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	2816	

(R) SPN 5682 AEBS2 message Counter

The message counter is increased with every transmitted AEBS2 message. After reaching a value of 0xF the next value will be 0.

Data Length:	4 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	2816	

(R) SPN 5683 AEBS2 message checksum

Used to check the message checksum of the transmitting (HMI) unit within the AEBS2 system.

Checksum = (Byte1 + Byte2 + Byte3 + Byte4 + Byte5 + Byte6 + Byte7 + message counter&0x0F + message ID low byte + message ID mid low byte + message ID mid high byte + message ID high byte)

Message Checksum = ((Checksum >> 4) + Checksum) & 0x0F

Data Length:	4 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	2816	

(R) SPN 5684 Reference Engine Gas Mass Flow Rate

Configuration of the mass flow rate of gaseous fuel expected for 100% engine fuel valve control command.

Note: The actuator will request this parameter from the ECU in order to determine what mass fuel flow to associate with a command of 100% from the ECU. This value does not change during operation.

Data Length:	2 bytes	
Resolution:	0.05 kg/h per bit, 0 offset	
Data Range:	0 to 3212.75 kg/h	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	65109	

(R) SPN 5685 Barometric Absolute Pressure (High Resolution)

Barometric Absolute Pressure (High Resolution). See SPN 108 if high resolution is not needed.

Data Length:	2 bytes	
Resolution:	0.1 kPa/bit, 0 offset	
Data Range:	0 to 6,425.5 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64992	

(R) SPN 5706 *Aftertreatment 1 Diesel Exhaust Fluid Pump Heater*

Percentage of heating applied to the aftertreatment 1 diesel exhaust fluid pump heater. A value of 0% means no heating applied, a value of 100% means full heating applied. The diesel exhaust fluid pump heater warms the diesel exhaust fluid in the diesel exhaust fluid pump. See SPN 5707 for the command for this pump heater.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64725	

(R) SPN 5707 *Aftertreatment 1 Diesel Exhaust Fluid Pump Heater Command*

Command for the Aftertreatment 1 Diesel Exhaust Fluid Pump Heater. A value of 0% means no heating commanded, a value of 100% means full heating commanded. See SPN 5706 for the measured value of the Aftertreatment 1 Diesel Exhaust Fluid Heater.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64832	

(R) SPN 5708 *Engine Coolant Pressure 2*

Gage pressure of liquid found in the engine coolant system - second instance

Data Length:	1 byte	
Resolution:	2 kPa/bit, 0 offset	
Data Range:	0 to 500 kPa	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64768	

(R) SPN 5709 *NOx Sensor ATO1 Self-diagnosis Trigger*

Signal to trigger the self-diagnosis of NOx sensor ATO1 (Aftertreatment Outlet Bank 1)

0000 Diagnostic mode disabled
 0001 NOx Sensor ATO1 Self Diagnosis Request at Lambda=1.0
 0010 NOx Sensor ATO1 Self Diagnosis Request at partial load
 0011 NOx Sensor ATO1 Self Diagnosis Request at fuel cut
 0100 NOx Sensor ATO1 Self Diagnosis Request at After Run
 0101 - 1110 Reserved
 1111 Not supported

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64719	

(R) SPN 5710 NOx Sensor AT11 Self-diagnosis Trigger

Signal to trigger the self-diagnosis of NOx sensor AT11 (Aftertreatment Intake Bank 1)

0000 Diagnostic mode disabled

0001 NOx Sensor AT11 Self Diagnosis Request at Lambda=1.0

0010 NOx Sensor AT11 Self Diagnosis Request at partial load

0011 NOx Sensor AT11 Self Diagnosis Request at fuel cut

0100 NOx Sensor AT11 Self Diagnosis Request at After Run

0101 - 1110 Reserved

1111 Not supported

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Type: Status

Operational Range: same as data range

Supporting Information:

PGN reference: 64719

(R) SPN 5711 NOx Sensor ATO2 Self-diagnosis Trigger

Signal to trigger the self-diagnosis of NOx sensor ATO2 (Aftertreatment Outlet Bank 2)

0000 Diagnostic mode disabled

0001 NOx Sensor ATO2 Self Diagnosis Request at Lambda=1.0

0010 NOx Sensor ATO2 Self Diagnosis Request at partial load

0011 NOx Sensor ATO2 Self Diagnosis Request at fuel cut

0100 NOx Sensor ATO2 Self Diagnosis Request at After Run

0101 - 1110 Reserved

1111 Not supported

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Type: Status

Operational Range: same as data range

Supporting Information:

PGN reference: 64719

(R) SPN 5712 NOx Sensor AT12 Self-diagnosis Trigger

Signal to trigger the self-diagnosis of NOx sensor AT12 (Aftertreatment Intake Bank 2)

0000 Diagnostic mode disabled

0001 NOx Sensor AT12 Self Diagnosis Request at Lambda=1.0

0010 NOx Sensor AT12 Self Diagnosis Request at partial load

0011 NOx Sensor AT12 Self Diagnosis Request at fuel cut

0100 NOx Sensor AT12 Self Diagnosis Request at After Run

0101 - 1110 Reserved

1111 Not supported

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Type: Status

Operational Range: same as data range

Supporting Information:

PGN reference: 64719

(R) SPN 5713 NOx Sensor ATO1 Self-diagnosis Status

Self-diagnosis result status for NOx sensor ATO1 (Aftertreatment Outlet Bank 1)

000 Diagnosis not active

001 NOx Sensor ATO1 Self Diagnosis active flag

010 NOx Sensor ATO1 Self Diagnosis Result Complete

011 NOx Sensor ATO1 Self Diagnosis aborted

100 NOx Sensor ATO1 Self Diagnosis not possible

101 - 110 Reserved

111 Not Supported

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61455

(R) SPN 5714 NOx Sensor ATI1 Self-diagnosis Status

Self-diagnosis result status for NOx sensor ATI1 (Aftertreatment Intake Bank 1)

000 Diagnosis not active

001 NOx Sensor ATI1 Self Diagnosis active flag

010 NOx Sensor ATI1 Self Diagnosis Result Complete

011 NOx Sensor ATI1 Self Diagnosis aborted

100 NOx Sensor ATI1 Self Diagnosis not possible

101 - 110 Reserved

111 Not Supported

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61454

(R) SPN 5715 NOx Sensor ATO2 Self-diagnosis Status

Self-diagnosis result status for NOx sensor ATO2 (Aftertreatment Outlet Bank 2)

000 Diagnosis not active

001 NOx Sensor ATO2 Self Diagnosis active flag

010 NOx Sensor ATO2 Self Diagnosis Result Complete

011 NOx Sensor ATO2 Self Diagnosis aborted

100 NOx Sensor ATO2 Self Diagnosis not possible

101 - 110 Reserved

111 Not Supported

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61457

(R) SPN 5716 NOx Sensor ATI2 Self-diagnosis Status

Self-diagnosis result status for NOx sensor ATI2 (Aftertreatment Intake Bank 2)

000 Diagnosis not active

001 NOx Sensor ATI2 Self Diagnosis active flag

010 NOx Sensor ATI2 Self Diagnosis Result Complete

011 NOx Sensor ATI2 Self Diagnosis aborted

100 NOx Sensor ATI2 Self Diagnosis not possible

101 - 110 Reserved

111 Not Supported

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61456

(R) SPN 5717 NOx Sensor ATO1 Self-diagnosis Final Result

Self-diagnosis result for NOx sensor ATO1 (Aftertreatment Outlet Bank 1) as a ratio of detected value to reference value defined by supplier.

This result is used to determine if the signal resulting from the self-diagnosis test (as represented as a ratio to a reference value) is within an acceptable range. This will be determined by the receiver of the information and may differ depending on how the sensor is used and/or sensor application. This may mean that SPN 3226 may no longer be accurate as expected.

This parameter is valid while the diagnosis feedback status of SPN 5713 = 010b (Diagnosis complete). It is broadcast as 0xFF at other times.

Data Length: 1 byte

Resolution: 1/bit, 0 offset

Data Range: 0 to 250

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64782

(R) SPN 5718 NOx Sensor ATI1 Self-diagnosis Final Result

Self-diagnosis result for NOx sensor ATI1 (Aftertreatment Intake Bank 1) as a ratio of detected value to reference value defined by supplier.

This result is used to determine if the signal resulting from the self-diagnosis test (as represented as a ratio to a reference value) is within an acceptable range. This will be determined by the receiver of the information and may differ depending on how the sensor is used and/or sensor application. This may mean that SPN 3216 may no longer be accurate as expected.

This parameter is valid while the diagnosis feedback status of SPN 5714 = 010b (Diagnosis complete). It is broadcast as 0xFF at other times.

Data Length: 1 byte

Resolution: 1/bit, 0 offset

Data Range: 0 to 250

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64784

(R) SPN 5719 NOx Sensor ATO2 Self-diagnosis Final Result

Self-diagnosis result for NOx sensor ATO2 (Aftertreatment Outlet Bank 2) as a ratio of detected value to reference value defined by supplier.

This result is used to determine if the signal resulting from the self-diagnosis test (as represented as a ratio to a reference value) is within an acceptable range. This will be determined by the receiver of the information and may differ depending on how the sensor is used and/or sensor application. This may mean that SPN 3265 may no longer be accurate as expected.

This parameter is valid while the diagnosis feedback status of SPN 5715 = 010b (Diagnosis complete). It is broadcast as 0xFF at other times.

Data Length:	1 byte	
Resolution:	1/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64778	

(R) SPN 5720 NOx Sensor ATI2 Self-diagnosis Final Result

Self-diagnosis result for NOx sensor ATI2 (Aftertreatment Intake Bank 2) as a ratio of detected value to reference value defined by supplier.

This result is used to determine if the signal resulting from the self-diagnosis test (as represented as a ratio to a reference value) is within an acceptable range. This will be determined by the receiver of the information and may differ depending on how the sensor is used and/or sensor application. This may mean that SPN 3255 may no longer be accurate as expected.

This parameter is valid while the diagnosis feedback status of SPN 5716 = 010b (Diagnosis complete). It is broadcast as 0xFF at other times.

Data Length:	1 byte	
Resolution:	1/bit, 0 offset	
Data Range:	0 to 250	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64780	

(R) SPN 5721 NOx Sensor ATO1 Operation Hours Counter

Counted hours that the NOx-sensor was operated with status "dewpoint reached"

Data Length:	2 bytes	
Resolution:	1 hr/bit, 0 offset	
Data Range:	0 to 64255 h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64783	

(R) SPN 5722 NOx Sensor ATI1 Operation Hours Counter

Counted hours that the NOx-sensor was operated with status "dewpoint reached"

Data Length:	2 bytes	
Resolution:	1 hr/bit, 0 offset	
Data Range:	0 to 64255 h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64785	

(R) SPN 5723 NOx Sensor ATO2 Operation Hours Counter

Counted hours that the NOx-sensor was operated with status "dewpoint reached"

Data Length:	2 bytes	
Resolution:	1 hr/bit, 0 offset	
Data Range:	0 to 64255 h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64779	

(R) SPN 5724 NOx Sensor ATI2 Operation Hours Counter

Counted hours that the NOx-sensor was operated with status "dewpoint reached"

Data Length:	2 bytes	
Resolution:	1 hr/bit, 0 offset	
Data Range:	0 to 64255 h	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64781	

(R) SPN 5750 Wireless Rolling Message Counter

A counter incremented with each instance of the Wireless Status message. The counter shall increment from 0 to 64255, rolling over to 0 on the next increment after 64255. The enables recipients of the Wireless Status message to detect problems with the wireless transceiver if counter fails to increment or the counter prematurely resets to 0.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 64,255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61488	

(R) SPN 5751 Transmitter Command State

The command contained in the signal received by the wireless transceiver from an off-board transmitter.

0000b - Stop
 0001b - Clear
 0010b - Field Test
 0011b - Transmitter Test
 0100b - Standby
 0101b to 1101b - Reserved
 1110b - Error
 1111b - Don't Care

0000b - Stop - Received an RF message from a transmitter requesting a machine level "Stop."
 0001b - Clear - Received an RF message from a transmitter clearing a machine level "Stop" request.
 0010b - Field Test - Used to request an acknowledgement of an RF signal from the onboard ECU, without adversely affecting the operation of the vehicle
 0011b - Transmitter Test - A transmitter test RF message was requested by a transmitter, used to diagnose transmitter behaviors
 0100b - Standby - No new Status message received at the time the message was communicated
 1110b - Error - Device Error

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61488	

(R) SPN 5752 Transmitter ID 1

The ID of the off-board transmitter that sent the incoming message received by the wireless transceiver.

Data Length:	3 bytes	
Resolution:	1 ID/bit, 0 offset	
Data Range:	0 to 16449635	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61488	

(R) SPN 5753 Wireless Signal Strength 1

The absolute received signal strength of the signal received from the off-board transmitter. The signal strength is reported as a Received Signal Strength Indicator (RSSI) value calculated in dBm.

Data Length:	1 byte	
Resolution:	0.5 dBm per bit, 0 offset	
Data Range:	-125 to 0 dBm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61488	

(R) SPN 5754 *Unique Beacon Message Identifier Number*

The number is used to identify a wireless message originating from a device on a particular machine. Within a beacon request message (see SPN 5755 [Radio Beacon Direction]), this number is included in the transmitted beacon signal. Within a beacon request acknowledge (see SPN 5755 [Radio Beacon Direction]), this number is the number from the received beacon signal.

Data Length:	2 bytes	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 64,255	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	34816	

(R) SPN 5755 *Radio Beacon Direction*

Indicates the function of a particular instance of the Radio Beacon Request message. The 'Beacon Request' state indicates the message is sent to a wireless transceiver to request a transmit of the special beacon message. The 'Beacon Received Acknowledgement' is sent from a wireless transceiver to report the reception of a special beacon message.

00b - Beacon Request - Beacon request coming from an ECU
 01b - Beacon Received Acknowledgement - Acknowledgement from wireless device
 10b - Reserved
 11b - Don't Care

00b - Beacon Request - An ECU requests that a beacon message be transmitted from a wireless device on a machine. This status will always originate from the ECU, and be sent to a wireless device. The message associated with this state will not have an associated transmitter ID, or signal strength.

01b - Beacon Received Acknowledgement - Acknowledgement of a beacon transmission detected by an onboard wireless device. This status will always originate from the wireless device, and be sent to the ECU. The message associated with this state will have an associated transmitter ID and signal strength.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	34816	

(R) SPN 5756 *Transmitter ID 2*

The ID of the off-board transmitter that sent the incoming special beacon message received by the wireless transceiver.

Data Length:	3 bytes	
Resolution:	1 ID/bit, 0 offset	
Data Range:	0 to 16449635	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	34816	

(R) SPN 5757 *Wireless Signal Strength 2*

The absolute received signal strength of the special beacon signal received from the off-board transmitter. The signal strength is reported as a Received Signal Strength Indicator (RSSI) value in dBm. This measurement method is identical to SPN 5753 [Wireless Signal Strength].

Data Length:	1 byte	
Resolution:	0.5 dBm per bit, 0 offset	
Data Range:	-125 to 0 dBm	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	34816	

(R) SPN 5758 *Aftertreatment 1 Intake Gas Sensor Power Supply*

State signal which indicates when the Aftertreatment 1 Intake Gas Sensor driver output is being driven. On means the ECU is powering the Aftertreatment 1 Intake Gas Sensor. Note that the ECU is external to the sensor.

00 – Off
 01 – On: The ECU is powering the Aftertreatment 1 Intake Gas Sensor
 10 – Error
 11 – Unavailable

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64716	

(R) SPN 5759 *Aftertreatment 1 Outlet Gas Sensor Power Supply*

State signal which indicates when the Aftertreatment 1 Outlet Gas Sensor driver output is being driven. On means the ECU is powering the Aftertreatment 1 Intake Gas Sensor. Note that the ECU is external to the sensor.

00 – Off
 01 – On: The ECU is powering the Aftertreatment 1 Outlet Gas Sensor
 10 – Error
 11 – Unavailable

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64716	

(R) SPN 5760 *Aftertreatment 2 Intake Gas Sensor Power Supply*

State signal which indicates when the Aftertreatment 2 Intake Gas Sensor driver output is being driven. On means the ECU is powering the Aftertreatment 2 Intake Gas Sensor. Note that the ECU is external to the sensor.

00 – Off

01 – On: The ECU is powering the Aftertreatment 2 Intake Gas Sensor

10 – Error

11 – Unavailable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64716

(R) SPN 5761 *Aftertreatment 2 Outlet Gas Sensor Power Supply*

State signal which indicates when the Aftertreatment 2 Outlet Gas Sensor driver output is being driven. On means the ECU is powering the Aftertreatment 2 Intake Gas Sensor. Note that the ECU is external to the sensor.

00 – Off

01 – On: The ECU is powering the Aftertreatment 2 Outlet Gas Sensor

10 – Error

11 – Unavailable

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64716

(R) SPN 5762 *Transmission Load Reduction Inhibit Request*

Request signal to the transmission to inhibit activation of load reduction functions.

Automatic transmissions may incorporate functions designed to reduce engine load during certain operating conditions (vehicle standstill at bus stop, traffic stop, etc.) for improved fuel consumption. However, other vehicle systems may have an interest in regular (higher) engine load levels for comfort features or to assist with heat generation. This signal requests that the transmission inhibit initiation of such load reduction functions or terminates their operation if they are already active. The transmission may choose to ignore this request during certain operating conditions as defined by the transmission manufacturer.

00 = Allow or resume transmission load reduction functions

01 = Inhibit or abort transmission load reduction functions

10 = Reserved

11 = Don't care/take no action

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 256

(R) SPN 5763 Engine Exhaust Gas Recirculation 1 Actuator 1 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Exhaust Gas Recirculation 1 Actuator 1 by the manufacturer's software. When there is no failure FMI 31 is transmitted. When there are multiple failures, the most severe is transmitted.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64715	

(R) SPN 5764 Engine Exhaust Gas Recirculation 1 Actuator 1 Temperature Status

Used to identify the status of the Engine Exhaust Gas Recirculation 1 Actuator 1 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High Most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64715	

(R) SPN 5765 Engine Exhaust Gas Recirculation 1 Actuator 1 Temperature

Temperature of the Engine Exhaust Gas Recirculation 1 Actuator 1 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64715	

(R) SPN 5766 Engine Exhaust Gas Recirculation 1 Actuator 1 Desired Position

The requested position of the Engine Exhaust Gas Recirculation 1 Actuator 1 by the engine ECU, where 0% represents fully closed and 100% represents fully open.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64715	

(R) SPN 5767 Engine Exhaust Gas Recirculation 1 Actuator 2 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Exhaust Gas Recirculation 1 Actuator 2 by the manufacturer's software. When there is no failure FMI 31 is transmitted. When there are multiple failures, the most severe is transmitted.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64715	

(R) SPN 5768 Engine Exhaust Gas Recirculation 1 Actuator 2 Temperature Status

Used to identify the status of the Engine Exhaust Gas Recirculation 1 Actuator 2 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High Most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64715	

(R) SPN 5769 Engine Exhaust Gas Recirculation 1 Actuator 2 Temperature

Temperature of the Engine Exhaust Gas Recirculation 1 Actuator 2 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64715	

(R) SPN 5770 Engine Exhaust Gas Recirculation 1 Actuator 2 Desired Position

The requested position of the Engine Exhaust Gas Recirculation 1 Actuator 2 by the engine ECU, where 0% represents fully closed and 100% represents fully open.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64715	

(R) SPN 5771 Engine Exhaust Gas Recirculation 1 Actuator 1 Operation Status

Used to identify the status of Exhaust Gas Recirculation 1 Actuator 1

0000 – Normal

0001 – Alarm (fully operational but needs service)

0010 – Alarm High Severity (functional but transient performance may be reduced)

0011 – Derate Active (torque output reduced due to environmental conditions)

0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)

0101 – Uncontrolled Shutdown Active (no torque is being applied from the actuator)

0110 – 1101 Reserved for future assignment

1110 – Error

1111 – Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64715

(R) SPN 5772 Engine Exhaust Gas Recirculation 1 Actuator 2 Operation Status

Used to identify the status of Exhaust Gas Recirculation 1 Actuator 2

0000 – Normal

0001 – Alarm (fully operational but needs service)

0010 – Alarm High Severity (functional but transient performance may be reduced)

0011 – Derate Active (torque output reduced due to environmental conditions)

0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)

0101 – Uncontrolled Shutdown Active (no torque is being applied from the actuator)

0110 – 1101 Reserved for future assignment

1110 – Error

1111 – Not available

Data Length: 4 bits

Resolution: 16 states/4 bit, 0 offset

Data Range: 0 to 15

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64715

(R) SPN 5773 Engine Exhaust Gas Recirculation 2 Actuator 1 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Exhaust Gas Recirculation 2 Actuator 1 by the manufacturer's software. When there is no failure FMI 31 is transmitted. When there are multiple failures, the most severe is transmitted.

Data Length: 5 bits

Resolution: Binary, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64714

(R) SPN 5774 Engine Exhaust Gas Recirculation 2 Actuator 1 Temperature Status

Used to identify the status of the Engine Exhaust Gas Recirculation 2 Actuator 1 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High Most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length:	3 bits	
Resolution:	8 states/3 bit, 0 offset	
Data Range:	0 to 7	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64714	

(R) SPN 5775 Engine Exhaust Gas Recirculation 2 Actuator 1 Temperature

Temperature of the Engine Exhaust Gas Recirculation 2 Actuator 1 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64714	

(R) SPN 5776 Engine Exhaust Gas Recirculation 2 Actuator 1 Desired Position

The requested position of the Engine Exhaust Gas Recirculation 2 Actuator 1 by the engine ECU, where 0% represents fully closed and 100% represents fully open.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64714	

(R) SPN 5777 Engine Exhaust Gas Recirculation 2 Actuator 2 Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the Engine Exhaust Gas Recirculation 2 Actuator 2 by the manufacturer's software. When there is no failure FMI 31 is transmitted. When there are multiple failures, the most severe is transmitted.

Data Length:	5 bits	
Resolution:	Binary, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64714	

(R) SPN 5778 Engine Exhaust Gas Recirculation 2 Actuator 2 Temperature Status

Used to identify the status of the Engine Exhaust Gas Recirculation 2 Actuator 2 drive circuitry temperature. Temperature excursions may affect the torque output.

000 – High Most severe
 001 – High Least severe
 010 – In Range
 011 – Low Least severe
 100 – Low Most severe
 101 – Not Defined
 110 – Error
 111 – Not available

Data Length: 3 bits
 Resolution: 8 states/3 bit, 0 offset
 Data Range: 0 to 7
 Type: Status
 Supporting Information:
 PGN reference: 64714

Operational Range: same as data range

(R) SPN 5779 Engine Exhaust Gas Recirculation 2 Actuator 2 Temperature

Temperature of the Engine Exhaust Gas Recirculation 2 Actuator 2 drive circuitry. Temperature excursions may affect the torque output.

Data Length: 1 byte
 Resolution: 1 deg C/bit, -40 deg C offset
 Data Range: -40 to 210 deg C
 Type: Measured
 Supporting Information:
 PGN reference: 64714

Operational Range: same as data range

(R) SPN 5780 Engine Exhaust Gas Recirculation 2 Actuator 2 Desired Position

The requested position of the Engine Exhaust Gas Recirculation 2 Actuator 2 by the engine ECU, where 0% represents fully closed and 100% represents fully open.

This is the position that the device is attempting to achieve.

Data Length: 1 byte
 Resolution: 0.4 %/bit, 0 offset
 Data Range: 0 to 100 %
 Type: Status
 Supporting Information:
 PGN reference: 64714

Operational Range: same as data range

(R) SPN 5781 Engine Exhaust Gas Recirculation 2 Actuator 1 Operation Status

Used to identify the status of Exhaust Gas Recirculation 2 Actuator 1

0000 – Normal
 0001 – Alarm (fully operational but needs service)
 0010 – Alarm High Severity (functional but transient performance may be reduced)
 0011 – Derate Active (torque output reduced due to environmental conditions)
 0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)
 0101 – Uncontrolled Shutdown Active (no torque is being applied from the actuator)
 0110 – 1101 Reserved for future assignment
 1110 – Error
 1111 – Not available

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 64714

Operational Range: same as data range

(R) SPN 5782 Engine Exhaust Gas Recirculation 2 Actuator 2 Operation Status

Used to identify the status of Exhaust Gas Recirculation 2 Actuator 2

0000 – Normal
 0001 – Alarm (fully operational but needs service)
 0010 – Alarm High Severity (functional but transient performance may be reduced)
 0011 – Derate Active (torque output reduced due to environmental conditions)
 0100 – Controlled Shutdown Active (driving to the default position – usually this means closed)
 0101 – Uncontrolled Shutdown Active (no torque is being applied from the actuator)
 0110 – 1101 Reserved for future assignment
 1110 – Error
 1111 – Not available

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15
 Type: Status
 Supporting Information:
 PGN reference: 64714

Operational Range: same as data range

(R) SPN 5783 Engine Throttle Valve 1 Temperature

Temperature of the engine throttle valve 1 drive circuitry (SPN 53). Temperature excursions may affect the torque output.

Data Length: 1 byte
 Resolution: 1 deg C/bit, -40 deg C offset
 Data Range: -40 to 210 deg C
 Type: Measured
 Supporting Information:
 PGN reference: 64713

Operational Range: same as data range

(R) SPN 5784 Engine Throttle Valve 2 Temperature

Temperature of the engine throttle valve 2 drive circuitry (SPN 3783). Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64713	

(R) SPN 5785 Engine Fuel Valve 1 Temperature

Temperature of the Engine Fuel Valve 1 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64713	

(R) SPN 5786 Engine Fuel Valve 2 Temperature

Temperature of the Engine Fuel Valve 2 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64713	

(R) SPN 5787 Engine Turbocharger Wastegate Actuator 2 Temperature

Temperature of the Engine Turbocharger Wastegate Actuator 2 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64713	

(R) SPN 5788 Engine Turbocharger Wastegate Actuator 1 Temperature

Temperature of the Engine Turbocharger Wastegate Actuator 1 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64753	

(R) SPN 5789 Engine Exhaust Back Pressure Actuator 1 Desired Position

The requested position of the Engine Exhaust Back Pressure Actuator 1 by the engine ECU, where 0% represents fully closed and 100% represents fully open.

This is the position that the device is attempting to achieve.

Data Length:	1 byte	
Resolution:	0.4 %/bit, 0 offset	
Data Range:	0 to 100 %	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64753	

(R) SPN 5790 Engine Exhaust Back Pressure Actuator 1 Temperature

Temperature of the Engine Exhaust Back Pressure Actuator 1 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64753	

(R) SPN 5791 Engine Turbocharger Compressor Bypass Actuator 1 Temperature

Temperature of the Engine Turbocharger Compressor Bypass Actuator 1 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64755	

(R) SPN 5792 Engine Turbocharger Compressor Bypass Actuator 2 Temperature

Temperature of the Engine Turbocharger Compressor Bypass Actuator 2 drive circuitry. Temperature excursions may affect the torque output.

Data Length:	1 byte	
Resolution:	1 deg C/bit, -40 deg C offset	
Data Range:	-40 to 210 deg C	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64755	

(R) SPN 5793 *Desired Engine Fueling State*

Devices send this request to the engine controller to:

- (a) Shut off engine fueling, but remain prepared to re-start quickly by not shutting down the control system, or
- (b) Keep the engine running.

00 Fueling not desired (shut off engine fueling)
 01 Fueling desired (keep engine running)
 10 Parameter supported, but no request
 11 Don't care / Take no action

If the engine controller receives this parameter from multiple sources, then '01-Fueling desired' shall have priority over '00-Fueling not desired'.

If this request can be honored by the receiving device as indicated by SPN 5795, then it shall be processed independently of other means to stop engine fueling (i.e., SPN 970 Engine Auxiliary Shutdown Switch or the Keyswitch). For example, if the engine is acting on SPN 5793 set to 01 (keep engine running) and the vehicle keyswitch is turned off, then the engine shall shut off.

Use examples of this parameter include, but are not limited to:

1. In applications or situations where the engine can be physically disconnected from the hybrid powertrain, a command of 00 could be used to request the engine to stop running, and as a result, stop rotating.
2. In applications or situations where engine-driven accessories (power steering, etc.) must remain active while the engine is not running, a command of 00 could result in the engine no longer running even as it continues to be spun (motored) by the hybrid powertrain.
3. In applications or situations where components want to keep the engine running, such as an aftertreatment system, a command of 01 could be used to prevent the engine from honoring requests from other devices using this parameter to shut off fueling.

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	34560	

(R) SPN 5794 *Feedback Engine Fueling State*

This parameter provides feedback to the network that SPN 5793 Desired Engine Fueling State was honored.

00 Fueling is or will be inhibited (SPN 5793 Desired Engine Fueling State = 00)
 01 Engine will be kept running (SPN 5793 Desired Engine Fueling State = 01)
 10 No active request per SPN 5793 Desired Engine Fueling State
 11 Not Supported

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64712	

(R) SPN 5795 Engine Fueling Inhibit Allowed

This parameter is broadcast by the engine control system, and indicates to other devices on the network whether or not it will respond to requests to inhibit engine fueling via SPN 5793 Desired Engine Fueling State. With this information, devices that may wish to inhibit engine fueling at some time in the future can know whether or not their request will be honored before they issue a request.

Use of this parameter is intended to be used in conjunction with SPN 5793 Desired Engine Fueling State and SPN 5794 Feedback Engine Fueling State.

- 00 Engine currently will not stop fueling in response to SPN 5793 Desired Engine Fueling State
- 01 Engine will stop fueling in response to SPN 5793 Desired Engine Fueling State
- 10 SAE Reserved
- 11 Not Supported

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64712	

(R) SPN 5821 Wand Angle

A wand sensor measures the angle of deflection of a wand from its null position. This parameter reports the measured angle of a wand sensor.

Data Length:	2 bytes	
Resolution:	0.002 deg/bit, -64 offset	
Data Range:	-64 to 64.51 deg	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61489	

(R) SPN 5822 Wand Sensor Figure of Merit

Figure of Merit sensor status for a wand sensor.

- 00 Sensor fully functional
- 01 Sensor degraded
- 10 Sensor failed
- 11 Sensor not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	61489	

(R) SPN 5823 Measured Linear Displacement

Distance to target as measured by the Linear Displacement Sensor.

Data Length:	2 bytes	
Resolution:	0.1 mm/bit, 0 offset	
Data Range:	0 to 6,425.5 mm (0 to 6.4255 m)	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	61490	

(R) SPN 5824 Linear Displacement Sensor Sensor Figure of Merit

Figure of Merit sensor status of Linear Displacement Sensor.

- 00 Sensor fully functional
- 01 Sensor degraded
- 10 Sensor failed
- 11 Sensor not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61490

(R) SPN 5825 Driver Warning System Indicator Status

The desired illumination of the Euro VI defined driver warning system indicator for relevant malfunctions and diesel exhaust fluid (reagent) tank low level. Used for Euro VI implementations. See Euro VI implementing regulation Annex XIII, Section 4 for usage requirements.

000 - Off - Used when driver warning system is non-active - which, by requirement, means the low-level and severe inducement systems are also non-active

001 - On – solid - Used when driver warning system is activated for any relevant malfunction

010 - reserved for SAE assignment

011 - reserved for SAE assignment

100 - On – fast blink (1 Hz) - Used for the second driver warning system detection threshold for diesel exhaust fluid level, where the visual alarm of the driver warning system is required to "escalate in intensity"

101 - reserved for SAE assignment

110 - reserved for SAE assignment

111 - not available

Note: SPN 5825 is similar to SPN 5245. SPN 5825 is intended to be used in implementations where the warning indicator is used to convey diesel exhaust fluid tank low level and specific emission control malfunction information, whereas SPN 5245 is intended to be used in implementations where the warning indicator is used to convey diesel exhaust fluid tank low level information only. Thus, SPN 5825 is a superset of SPN 5245, and if both are utilized, will match only under certain conditions.

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65279

(R) SPN 5826 Emission Control System Operator Inducement Severity

Severity status of the operator inducement system for anomalies with the emission control system, such as tampering, low diesel exhaust fluid (reagent) quality, diesel exhaust fluid (reagent) tank level, or EGR system errors. Higher numerical levels indicate more severe levels of inducement. Level 1 is the least severe. Used for Euro VI implementations.

000 - Driver Warning, Low-Level Inducement, and Severe Inducement Non-Active

001 - Inducement Level 1... Euro VI defined Driver Warning System Active FMI 15

010 - Inducement Level 2 ... Euro VI defined Low-Level Inducement Enabled FMI 15

011 - Inducement Level 3 ... Euro VI defined Low-Level Inducement Active FMI 16

100 - Inducement Level 4 ... Euro VI defined Severe Inducement Enabled FMI 16

101 - Inducement Level 5 ... Euro VI defined Severe Inducement Active FMI 0

110 - Temporary Override of Inducement

111 - Not Available / Not Supported

When this SPN is used in a DTC the recommended FMI usage is as shown.

Reference Euro VI implementing regulation Annex XIII, Appendix 5, section 3.1.(b), 3.1.(c), and 3.1.(d) for details.

Note: SPN 5826 is similar to SPN 5246. SPN 5826 is intended to be used to indicate the severity status of the operator inducement system for anomalies with the SCR and EGR systems, whereas SPN 5246 is intended to be used to indicate the severity status of the operator inducement system for anomalies with the SCR system only. Thus, SPN 5826 is a superset of SPN 5246, and if both are utilized, will match only under certain conditions.

Data Length: 3 bits

Resolution: 8 states/3 bit, 0 offset

Data Range: 0 to 7

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 65279

(R) SPN 5827 Aftertreatment 1 Average Distance Between Active DPF Regenerations

Indicates the average distance since last reset between active regenerations, that have not been forced to occur by manual request, for Aftertreatment device 1.

If the manufacturer allows this parameter to be reset, this distance is the average since last reset.

Data Length: 4 bytes

Resolution: 0.125 km/bit, 0 offset

Data Range: 0 to 526,385,151.9 km

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64920

(R) SPN 5828 Aftertreatment 2 Average Distance Between Active DPF Regenerations

Indicates the average distance since last reset between active regenerations, that have not been forced to occur by manual request, for Aftertreatment device 2.

If the manufacturer allows this parameter to be reset, this distance is the average since last reset.

Data Length: 4 bytes

Resolution: 0.125 km/bit, 0 offset

Data Range: 0 to 526,385,151.9 km

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64921

(R) SPN 5829 Engine Exhaust Gas Recirculation 1 Valve 1 Position Error

The position error of the Exhaust Gas Recirculation 1 valve, determined as the actual position (SPN 2791) minus the commanded position (SPN 27).

Data Length:	2 bytes	
Resolution:	0.004%/bit, -125 offset	
Data Range:	-125 to 132.02%	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64962	

(R) SPN 5830 Engine Exhaust Gas Recirculation 1 Valve 2 Position Error

The position error of the Exhaust Gas Recirculation 1 valve 2, determined as the actual position (SPN 3821) minus the commanded position (SPN 3822).

Data Length:	2 bytes	
Resolution:	0.004%/bit, -125 offset	
Data Range:	-125 to 132.02%	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64962	

(R) SPN 5831 Engine Exhaust Gas Recirculation 2 Valve 1 Position Error

The position error of the Exhaust Gas Recirculation 2 valve, determined as the actual position (SPN 5264) minus the commanded position (SPN 5262).

Data Length:	2 bytes	
Resolution:	0.004%/bit, -125 offset	
Data Range:	-125 to 132.02%	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64762	

(R) SPN 5832 Engine Exhaust Gas Recirculation 2 Valve 2 Position Error

The position error of the Exhaust Gas Recirculation 2 valve 2, determined as the actual position (SPN 5265) minus the commanded position (SPN 5263).

Data Length:	2 bytes	
Resolution:	0.004%/bit, -125 offset	
Data Range:	-125 to 132.02%	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64762	

(R) SPN 5833 Engine Fuel Mass Flow Rate

Mass of fuel consumed by engine per unit of time.

Data Length:	2 bytes	
Resolution:	0.005 g/s per bit, 0 offset	
Data Range:	0 to 321.275 g/s	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64962	

(R) SPN 5834 Aftertreatment 2 Fuel Mass Rate

Mass rate of total fuel being delivered to Aftertreatment 2 for DPF regeneration.

Data Length:	2 bytes	
Resolution:	0.05 g/m per bit, 0 offset	
Data Range:	0 to 3212.75 g/m	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64736	

(R) SPN 5835 Aftertreatment 1 Particulate Sensor

The particulate sensor measures the mass concentration of particulate matter in the exhaust downstream of the DPF in exhaust bank 1.

Data Length:	2 bytes	
Resolution:	0.0125 mg/m ³ per bit, 0 offset	
Data Range:	0 to 803.1875 mg/m ³	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64720	

(R) SPN 5836 Aftertreatment 2 Particulate Sensor

The particulate sensor measures the mass concentration of particulate matter in the exhaust downstream of the DPF in exhaust bank 2.

Data Length:	2 bytes	
Resolution:	0.0125 mg/m ³ per bit, 0 offset	
Data Range:	0 to 803.1875 mg/m ³	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64720	

(R) SPN 5837 Fuel Type

Type of fuel currently being utilized by the vehicle

Data Byte - Scaling - External Display

0x00 - Not available - NONE

0x01 - Gasoline/petrol - GAS

0x02 - Methanol - METH

0x03 - Ethanol - ETH

0x04 - Diesel - DSL

0x05 - Liquefied Petroleum Gas (LPG) - LPG

0x06 - Compressed Natural Gas (CNG) - CNG

0x07 - Propane - PROP

0x08 - Battery/electric - ELEC

0x09 - Bi-fuel vehicle using gasoline - BI_GAS

0x0A - Bi-fuel vehicle using methanol - BI_METH

0x0B - Bi-fuel vehicle using ethanol - BI_ETH

0x0C - Bi-fuel vehicle using LPG - BI_LPG

0x0D - Bi-fuel vehicle using CNG - BI_CNG

0x0E - Bi-fuel vehicle using propane - BI_PROP

0x0F - Bi-fuel vehicle using battery - BI_ELEC

0x10 - Bi-fuel vehicle using battery and combustion engine - BI_MIX

0x11 - Hybrid vehicle using gasoline engine - HYB_GAS

0x12 - Hybrid vehicle using gasoline engine on ethanol - HYB_ETH

0x13 - Hybrid vehicle using diesel engine - HYB_DSL

0x14 - Hybrid vehicle using battery - HYB_ELEC

0x15 - Hybrid vehicle using battery and combustion engine - HYB_MIX

0x16 - Hybrid vehicle in regeneration mode - HYB_REG

0x17 - 0xFD ISO/SAE reserved

0xFE - Error

0xFF - Not available (Parameter not supported)

EXAMPLE: If a Bi-fuel vehicle has less than 10% ethanol in the gasoline/petrol, then the external test equipment shall display state 0x09. In such a case, the system would be using gasoline/petrol (fuel) tables and OBD thresholds. SPN 5458 should either artificially display 0% or some number 10% or less if the system has such resolution. If the ethanol in the gasoline/petrol is above 10%, then the external test equipment shall display state 0x0B. SPN 5458 shall report the calculated ethanol/alcohol percentage.

Note: "Not available" (Data 0x00) shall be used for the following conditions where no fuel is being utilized:

- Ignition Key On/Engine Off, for example, for bi-fuel vehicles when the vehicle cannot identify which fuel is being used before engine start
- Engine stopped for vehicle using Start/Stop strategy or for hybrid vehicle with engine stopped If FUEL_TYP is utilized on a single fuel vehicle, it can continue to indicate the previously utilized fuel type while the engine is in Decel Fuel Cut Off (DFCO) mode. It is not required to indicate 0x00 while in DFCO.

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64962

(R) SPN 5847 Emergency Braking Active

Signal which indicates an emergency braking situation (ref. ECE Regulation 13 paragraph 5.2.1.31) with high deceleration values. This signal can be used to activate the hazard lights (ref ECE Regulation 48 paragraph 6.23) to indicate other road users to the rear and front of the vehicle that a high retardation force has been applied to the vehicle relative to the prevailing road conditions.

00 inactive
01 active
10 reserved
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 64964

Operational Range: same as data range

(R) SPN 5848 Aftertreatment 1 SCR Intermediate NH3

The amount of NH3 in the exhaust aftertreatment system measured by a NH3 sensor at an intermediate point in the SCR system, represented in NH3 molecule parts per million non-NH3 molecules in exhaust bank 1.

Data Length: 2 bytes
Resolution: 0.1 ppm/bit, -200 ppm offset
Data Range: -200 to 6225.5 ppm
Type: Measured
Supporting Information:
PGN reference: 61491

Operational Range: same as data range

(R) SPN 5849 Aftertreatment 1 SCR Intermediate NH3 Sensor Preliminary FMI

Used to identify the applicable J1939-73 FMI detected in the aftertreatment SCR intermediate NH3 sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 31
Type: Status
Supporting Information:
PGN reference: 61491

Operational Range: same as data range

(R) SPN 5850 Aftertreatment 1 SCR Intermediate NH3 Reading Stable

Indicates that the NH3 reading of the aftertreatment SCR intermediate NH3 sensor is stable as determined by the manufacturer's control software in exhaust bank 1.

00 - Reading is not stable
01 - Reading is stable
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3
Type: Status
Supporting Information:
PGN reference: 61491

Operational Range: same as data range

(R) SPN 5851 *Aftertreatment 1 SCR Intermediate NH3 Gas Sensor Power In Range*

Indicates that the power supplied to the aftertreatment SCR intermediate NH3 gas sensor is within the manufacturer's specification in exhaust bank 1.

00 - Power is not in range

01 - Power is in range

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61491

(R) SPN 5852 *Aftertreatment 1 SCR Intermediate NH3 Gas Sensor at Temperature*

Indicates that the heater element of the aftertreatment SCR intermediate NH3 gas sensor is within the manufacturer's specified range for accurate measurements in exhaust bank 1.

00 - Heater element is not in range

01 - Heater element is in range

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61491

(R) SPN 5853 *Aftertreatment 1 SCR Intermediate NH3 Gas Sensor Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the heater of the outlet NH3 exhaust gas sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61491

(R) SPN 5854 *Aftertreatment 1 SCR Intermediate NH3 Gas Sensor Heater Control*

Indicates the heater status in the warm-up process. Upon receiving a power-up command, the NH3 gas sensor ramps up according to a manufacturer defined profile. The Preheat 1, Preheat 2, and Automatic messages are regions within this profile in exhaust bank 1.

00 - Automatic

01 - Preheat 2

10 - Preheat 1

11 - Heater off or not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61491

(R) SPN 5855 *Aftertreatment 2 SCR Intermediate NH3*

The amount of NH3 in the exhaust aftertreatment system measured by a NH3 sensor at an intermediate point in the SCR system, represented in NH3 molecule parts per million non-NH3 molecules in exhaust bank 2.

Data Length: 2 bytes

Resolution: 0.1 ppm/bit, -200 ppm offset

Data Range: -200 to 6225.5 ppm

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 61492

(R) SPN 5856 *Aftertreatment 2 SCR Intermediate NH3 Sensor Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment SCR intermediate NH3 sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61492

(R) SPN 5857 *Aftertreatment 2 SCR Intermediate NH3 Reading Stable*

Indicates that the NH3 reading of the aftertreatment SCR intermediate NH3 sensor is stable as determined by the manufacturer's control software in exhaust bank 2.

00 - Reading is not stable

01 - Reading is stable

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61492

(R) SPN 5858 *Aftertreatment 2 SCR Intermediate NH3 Gas Sensor Power In Range*

Indicates that the power supplied to the aftertreatment SCR intermediate NH3 gas sensor is within the manufacturer's specification in exhaust bank 2.

00 - Heater element is not in range

01 - Heater element is in range

10 - Error

11 - Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61492

(R) SPN 5859 *Aftertreatment 2 SCR Intermediate NH3 Gas Sensor at Temperature*

Indicates that the heater element of the aftertreatment SCR intermediate NH3 gas sensor is within the manufacturer's specified range for accurate measurements in exhaust bank 2.

00 - Heater element is not in range

01 - Heater element is in range

10 - Error

11 - Not available

Data Length: 1 bit

Resolution: 2 states/1 bit, 0 offset

Data Range: 0 to 1

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61492

(R) SPN 5860 *Aftertreatment 2 SCR Intermediate NH3 Gas Sensor Heater Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the heater of the SCR intermediate NH3 exhaust gas sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61492

(R) SPN 5861 *Aftertreatment 2 SCR Intermediate NH3 Gas Sensor Heater Control*

Indicates the heater status in the warm-up process. Upon receiving a power-up command, the NH3 gas sensor ramps up according to a manufacturer defined profile. The Preheat 1, Preheat 2, and Automatic messages are regions within this profile in exhaust bank 1.

00 - Automatic

01 - Preheat 2

10 - Preheat 1

11 - Heater off or Not available

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 61492

(R) SPN 5862 *Aftertreatment 1 SCR Intermediate Gas Temperature*

Temperature of engine combustion byproducts at an intermediate point in the SCR component in exhaust bank 1.

Data Length: 2 bytes

Resolution: 0.03125 deg C/bit, -273 deg C offset

Data Range: -273 to 1734.96875 deg C

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64709

(R) SPN 5863 *Aftertreatment 1 SCR Intermediate Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment SCR intermediate gas temperature sensor by the manufacturer's sensor control software in exhaust bank 1. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length: 5 bits

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 31

Operational Range: same as data range

Type: Status

Supporting Information:

PGN reference: 64709

(R) SPN 5864 *Aftertreatment 2 SCR Intermediate Gas Temperature*

Temperature of engine combustion byproducts at an intermediate point in the SCR component in exhaust bank 2.

Data Length: 2 bytes

Resolution: 0.03125 deg C/bit, -273 deg C offset

Data Range: -273 to 1734.96875 deg C

Operational Range: same as data range

Type: Measured

Supporting Information:

PGN reference: 64708

(R) SPN 5865 *Aftertreatment 2 SCR Intermediate Gas Temperature Preliminary FMI*

Used to identify the applicable J1939-73 FMI detected in the aftertreatment SCR intermediate gas temperature sensor by the manufacturer's sensor control software in exhaust bank 2. When there is no failure FMI 31 is sent. In the case of multiple failures the most severe is communicated.

Data Length:	5 bits	
Resolution:	1 count/bit, 0 offset	
Data Range:	0 to 31	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64708	

(R) SPN 5866 *Engine Fueling Inhibit Prevented Reason*

If Engine Fueling Inhibit Allowed (SPN 5795) indicates that the engine will not inhibit fueling, then this parameter will indicate the reason.

If more than one reason exists at the same time, then it is up to the manufacturer to decide which one to select.

- 0 – Fueling inhibit allowed (SPN 5795 = 01)
- 1 – DPF regeneration is active or preparing to be active
- 2 – Oil Distribution in engine is incomplete
- 3 – Engine coolant temperature too low
- 4 – Service Override
- 5 to 14 – Reserved
- 15 – Not Supported

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64712	

(R) SPN 5867 *Supply Gas Methane Percentage*

The percentage of methane in the gas supplied to the engine.

Data Length:	2 bytes	
Resolution:	0.0025 %/bit, 0 offset	
Data Range:	0 to 160.6375 %	Operational Range: same as data range
Type:	Measured	
Supporting Information:		
PGN reference:	64707	

(R) SPN 5872 Hybrid System Warning Indicator

Signal from a hybrid system indicating that some aspect of its operation is not functioning correctly, and as a result, hybrid system operation may be altered or restricted. The indicator is typically a lamp. Distinctions in meaning between the continuous and flashing states are left to the hybrid system manufacturer.

- 00 - Hybrid System Warning Indicator is off
- 01 - Hybrid System Warning Indicator is on continuously
- 10 - Hybrid System Warning Indicator is flashing
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64706	

(R) SPN 5873 Hybrid System Overheat Indicator

Signal from a hybrid system indicating that at least one of its monitored temperatures is above normal acceptable limits, and as a result, hybrid system operation may be altered or restricted. The indicator is typically a lamp. Distinctions in meaning between the continuous and flashing states are left to the hybrid system manufacturer.

- 00 - Hybrid System Temperature Indicator is off
- 01 - Hybrid System Temperature Indicator is on continuously
- 10 - Hybrid System Temperature Indicator is flashing
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64706	

(R) SPN 5874 Hybrid System Stop Indicator

Signal from a hybrid system indicating that some aspect of its operation is not functioning correctly, and as a result, the vehicle must be stopped. The indicator is typically a lamp. Distinctions in meaning between the continuous and flashing states are left to the hybrid system manufacturer.

- 00 - Hybrid System Stop Indicator is off
- 01 - Hybrid System Stop Indicator is on continuously
- 10 - Hybrid System Stop Indicator is flashing
- 11 - Not available

Data Length:	2 bits	
Resolution:	4 states/2 bit, 0 offset	
Data Range:	0 to 3	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64706	

(R) SPN 5913 *Transmission Oil Temperature 2*

Second instance of transmission lubricant temperature. This parameter may reflect the temperature of a second sump or oil supply. If only one instance of transmission lubricant temperature measurement exists, SPN 177 Transmission Oil Temperature 1 should be used.

Data Length: 2 bytes
 Resolution: 0.03125 deg C/bit, -273 deg C offset
 Data Range: -273 to 1734.96875 deg C Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64917

(R) SPN 5914 *Transmission Oil Level 2 High / Low*

Second instance of a transmission oil level indicator. Conveys the current volume of transmission sump oil compared to recommended volume. Positive values indicate overfill. Zero means the transmission fluid is filled to the recommended level. If only a one instance of transmission oil level measurement exists, SPN 3027 Transmission Oil Level 1 High / Low should be used.

Parameter Specific Indicator:

A value of 0xFB indicates conditions are not acceptable for a valid fluid level measurement.

Data Length: 1 bytes
 Resolution: 0.5 L/bit, -62.5 L offset
 Data Range: -62.5 to 62.5 L Operational Range: same as data range
 Type: Measured
 Supporting Information:
 PGN reference: 64917

(R) SPN 5915 *Transmission Oil Level 2 Countdown Timer*

Countdown timer for the second instance of a transmission oil level indicator. Once all vehicle conditions (such as vehicle stopped, etc) are met, some transmissions may require a 'settling time' to allow the fluid level to normalize. This parameter indicates how much of the required settling time remains. When time reaches 0, a valid oil level measurement value will be broadcast in SPN 5914 Transmission Oil Level 2 High / Low. If only a single oil level is measured, SPN 3028 Transmission Oil Level 1 Countdown Timer should be used.

0000 less than 1 minute
 0001 One minute
 0010 Two minutes
 0011 Three minutes
 0100 Four minutes
 0101 Five minutes
 0110 Six minutes
 0111 Seven minutes
 1000 Eight minutes
 1001 Nine minutes
 1010 Ten minutes
 1011 Eleven minutes
 1100 Twelve minutes
 1101 Thirteen minutes
 1110 Error
 1111 Not Available

Data Length: 4 bits
 Resolution: 16 states/4 bit, 0 offset
 Data Range: 0 to 15 Operational Range: 0 to 13 minutes
 Type: Measured
 Supporting Information:
 PGN reference: 64917

(R) SPN 5916 *Transmission Oil Level 2 Measurement Status*

Measurement status for the second instance of a transmission oil level indicator. Indicates if conditions are acceptable to obtain a valid transmission oil level measurement as conveyed in SPN 5914 Transmission Oil Level 2 High / Low. If conditions are not acceptable, this parameter conveys to the operator what prevents conditions from being acceptable. Only one condition can be conveyed in this parameter at any given point in time. If multiple conditions exist, it is not important which condition is actually broadcast, as the driver must 'correct' each and every condition as it is presented before a valid oil level reading can be made. If multiple conditions exist that prevent a valid reading, the sender should broadcast one of those conditions until it is corrected; then the next condition can be conveyed to the operator, and so on. If only a single oil level is measured, use SPN 3026 Transmission Oil Level 1 Measurement Status.

0000 Conditions valid for transmission oil level measurement
0001 Conditions not valid – Settling timer still counting down
0010 Conditions not valid – Transmission in gear
0011 Conditions not valid – Transmission fluid temperature too low
0100 Conditions not valid – Transmission fluid temperature too high
0101 Conditions not valid – Vehicle moving; output shaft speed too high
0110 Conditions not valid – Vehicle not level
0111 Conditions not valid – Engine speed too low
1000 Conditions not valid – Engine speed too high
1001 Conditions not valid – No request for reading
1010 Not defined
1011 Not defined
1100 Not defined
1101 Conditions not valid - Other
1110 Error
1111 Not available

Data Length:	4 bits	
Resolution:	16 states/4 bit, 0 offset	
Data Range:	0 to 15	Operational Range: same as data range
Type:	Status	
Supporting Information:		
PGN reference:	64917	

APPENDIX C

PGNs

PGN 0 Torque/Speed Control 1 TSC1

NOTE - Retarder may be disabled by commanding a torque limit of 0%. Use of the limit mode allows the use of the retarder only up to the limit specified in the request. This can be used to permit retarding of up to 50%, for example, if that limit is required by some device such as an EBS, or it can disable the use of the retarder by others, as when an ABS controller detects wheel slip.

Note that the 10 ms transmission repetition rate is intended for temporary powertrain control (P32 of SPN 3350). Slower transmission rates (for control purposes P1 through P31 of SPN 3350) may be supported for longer duration control.

Transmission Repetition Rate: To engine: Control Purpose dependent or 10 ms

To retarder: 50 ms

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 0

PDU Specific: DA PGN Supporting Information:

Default Priority: 3

Parameter Group Number: 0 (0x000000)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Override Control Mode	695
1.3	2 bits	Engine Requested Speed Control Conditions	696
1.5	2 bits	Override Control Mode Priority	897
2-3	2 bytes	Engine Requested Speed/Speed Limit	898
4	1 byte	Engine Requested Torque/Torque Limit	518
5.1	3 bits	TSC1 Transmission Rate	3349
5.4	5 bits	TSC1 Control Purpose	3350
6.1	4 bits	Engine Requested Torque - High Resolution	4191
8.1	4 bits	Message Counter	4206
8.5	4 bits	Message Checksum	4207

(R) PGN 256**Transmission Control 1****TC1**

Transmission Repetition Rate: When active; 50 ms to transmission and axles
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 1
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 256 (0x000100)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission Gear Shift Inhibit Request	681
1.3	2 bits	Transmission Torque Converter Lockup Disable Request	682
1.5	2 bits	Disengage Driveline Request	683
1.7	2 bits	Transmission Reverse Gear Shift Inhibit Request	4242
2	1 byte	Requested Percent Clutch Slip	684
3	1 byte	Transmission Requested Gear	525
4.1	2 bits	Disengage Differential Lock Request - Front Axle 1	685
4.3	2 bits	Disengage Differential Lock Request - Front Axle 2	686
4.5	2 bits	Disengage Differential Lock Request - Rear Axle 1	687
4.7	2 bits	Disengage Differential Lock Request - Rear Axle 2	688
5.1	2 bits	Disengage Differential Lock Request - Central	689
5.3	2 bits	Disengage Differential Lock Request - Central Front	690
5.5	2 bits	Disengage Differential Lock Request - Central Rear	691
5.7	2 bits	Transmission Load Reduction Inhibit Request	5762
6.1	2 bits	Transmission Mode 1	1852
6.3	2 bits	Transmission Mode 2	1853
6.5	2 bits	Transmission Mode 3	1854
6.7	2 bits	Transmission Mode 4	1855
7.3	4 bits	Transmission Requested Launch Gear	4255
7.7	2 bits	Transmission Shift Selector Display Mode Switch	2985
8.1	2 bits	Transmission Mode 5	4246
8.3	2 bits	Transmission Mode 6	4247
8.5	2 bits	Transmission Mode 7	4248
8.7	2 bits	Transmission Mode 8	4249

PGN 1024**External Brake Request****XBR**

Used for brake control by an external device. The receiver is the brake system controlling the axle and/or wheel brakes. This system has to process the demanded acceleration. Note: This PGN shall not be used for external control of engine, engine brakes (engine retarders) or driveline retarders. Use TSC1 PGN instead.

Transmission Repetition Rate: When active: 20 ms; else 200 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 4
 PDU Specific: DA PGN Supporting Information: See Appendix D - PGN 1024
 Default Priority: 3
 Parameter Group Number: 1024 (0x000400)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	External Acceleration Demand	2920
3.1	2 bits	XBR EBI Mode	2914
3.3	2 bits	XBR Priority	2915
3.5	2 bits	XBR Control Mode	2916
4	1 byte	XBR urgency	4099
8.1	4 bits	XBR Message Counter	3189
8.5	4 bits	XBR Message Checksum	3188

PGN 1792**General Purpose Valve Pressure****GPV4**

The measured load sense pressure and pilot pressure of a valve. May also include the load sense and supply pressure for a valve assembly, when available.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 7
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 1792 (0x000700)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Valve Load Sense Pressure	4086
3	1 byte	Valve Pilot Pressure	4087
4-5	2 bytes	Valve Assembly Load sense Pressure	4088
6-7	2 bytes	Valve Assembly Supply Pressure	4089

PGN 2048**Auxiliary Input/Output Status 5****AUXIO5**

Notes:

Implementers are encouraged to use specific functional SPNs whenever possible.

AUXIO PGNs are intended for two categories of use in which fixed mapping to functions is not possible:

- 1) Generic I/O devices
 - 2) Applications lacking defined input and output functionality.
- Use, or request new, functionally defined parameters in all other cases.

Implementers and integrators considering using AUXIO PGNs should be cautious of conflicts that can arise from multiple users on a single system.

Transmission Repetition Rate: Manufacturer defined, not faster than 20 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 8
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 2048 (0x000800)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Auxiliary I/O Channel #6	4155
3-4	2 bytes	Auxiliary I/O Channel #5	4156
5-6	2 bytes	Auxiliary I/O Channel #4	4157
7-8	2 bytes	Auxiliary I/O Channel #3	4158

PGN 2304**Static Roll Angle Sensor Information****SRASI**

Contains Static Roll Angle Data and Status of the Static Roll Angle Sensor

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 9
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 2304 (0x000900)

Start Position	Length	Parameter Name	SPN
1	1 byte	Static Roll Angle	5582
2.1	3 bits	Static Roll Angle Status	5583

PGN 2560**Cruise Control / Vehicle Speed 2****CCVS2**

Cruise Control / Vehicle Speed 2

Transmission Repetition Rate: Every 100 ms and on change but no faster than 20 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 10
 PDU Specific: DA PGN Supporting Information: See Appendix D - PGN 2560
 Default Priority: 3
 Parameter Group Number: 2560 (0x000A00)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Cruise Control Disable Command	5603
1.3	2 bits	Cruise Control Resume Command	5604
1.5	2 bits	Cruise Control Pause Command	5605

(R) PGN 2816**Advanced Emergency Braking System 2****AEBS2**

Advanced Emergency Braking System message 2.

Transmission Repetition Rate: Every 50ms and if SPN 5681 "Driver activation demand for Advanced Emergency Braking System" has changed but no faster than every 10 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 11
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 2816 (0x000B00)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Driver activation demand for Advanced Emergency Braking System	5681
8.1	4 bits	AEBS2 message Counter	5682
8.5	4 bits	AEBS2 message checksum	5683

(R) PGN 34560 Engine State Requests**ESR**

Transmission Repetition Rate: Every 1 sec and on change but no faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 135
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 34560 (0x008700)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Desired Engine Fueling State	5793

(R) PGN 34816 Radio Beacon Request**RBR**

Message used to request the wireless transceiver to transmit a special beacon signal and to report the reception of a special beacon signal by a wireless transceiver. A unique number is included in each beacon signal to differentiate beacon signals that might be transmitted from vehicles that fall under the same radio coverage area.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 136
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 34816 (0x008800)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Unique Beacon Message Identifier Number	5754
3.7	2 bits	Radio Beacon Direction	5755
4-6	3 bytes	Transmitter ID 2	5756
7	1 byte	Wireless Signal Strength 2	5757

PGN 36608 Engine Configuration Commands**ECC**

This PGN contains parameters that are used to configure engine operation.

Transmission Repetition Rate: Every 10 seconds and on change but no faster than 1 second.
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 143
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 36608 (0x008F00)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Coolant Level Engine Protection Shutdown Override Command	5565

PGN 36864**Supplemental Fan Command****SFC**

Command message to control the speed and direction of Supplemental Fan for additional cooling beyond that of the primary cooling fan. For Example, this fan could be used to provide additional cooling to an aftertreatment system

Transmission Repetition Rate: 1 second
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 144
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 36864 (0x009000)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Supplemental Fan Enable Command	5552
1.3	2 bits	Supplemental Fan Direction Command	5553
2-3	2 bytes	Supplemental Fan Speed Command	5554
4.1	2 bits	Supplemental Fan Power Hold	5555

PGN 37120**Vehicle/Chassis Lubrication System 1****VLS1**

Used to command a vehicle/chassis lubrication system

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 145
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 37120 (0x009100)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Lubrication Cycle Mode Lock Command	5510
1.3	3 bits	Lubrication Cycle Set Command	5511
1.6	3 bits	Lubrication Operation Mode Set Command	5512
2.1	2 bits	Lubrication Pump Enable Command	5513
2.3	2 bits	Lubrication Timing Cycle Command	5514

PGN 37376**Aftertreatment 1 Hydrocarbon Doser Information 1****HCDI1**

This PGN contains information about the HC Doser and the Diesel Particulate Filter

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 146
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 37376 (0x009200)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Requested Fuel Mass Rate	5505
3.1	3 bits	HC Doser Status	5506
3.4	2 bits	HC Doser Injecting Status	5507
3.6	3 bits	Diagnostic Status of HC Doser	5508
4.1	2 bits	Hydrocarbon Doser Purging Required	5509

PGN 37888**Aftertreatment 1 Diesel Particulate Filter Soot Sensor Calibration****AT1DPFSSC**

The purpose of this PGN is to group the Aftertreatment 1 DPF soot measurement calibration parameters. These values include soot sensor signal mean and standard deviation calibration levels. These calibration levels are associated with Diesel Particulate Filter 1 Soot 2 PGN 64761.

Transmission Repetition Rate: On powerup and on request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 148
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 8
 Parameter Group Number: 37888 (0x009400)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Particulate Filter Soot Mean Calibration Offset	5495
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter Soot Standard Deviation Calibration Offset	5496

PGN 38144**Aftertreatment 2 Diesel Particulate Filter Soot Sensor Calibration****AT2DPFSSC**

The purpose of this PGN is to group the Aftertreatment 2 DPF soot measurement calibration parameters. These values include soot sensor signal mean and standard deviation calibration levels. These calibration levels are associated with Diesel Particulate Filter 2 Soot 2 PGN 64760.

Transmission Repetition Rate: On powerup and on request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 149
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 8
 Parameter Group Number: 38144 (0x009500)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Diesel Particulate Filter Soot Mean Calibration Offset	5497
3-4	2 bytes	Aftertreatment 2 Diesel Particulate Filter Soot Standard Deviation Calibration Offset	5498

PGN 38400**Low Voltage Disconnect Set Operating Mode****LVDSOM**

Low Voltage Disconnect (LVD) Set Operating Mode is sent to the LVD to either manually override the normal LVD function and force the outputs to be disconnected or connected, or to put the LVD back into normal mode.

Transmission Repetition Rate: As required but no more often than 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 150
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 38400 (0x009600)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Low Voltage Disconnect Desired Operating Mode	5149

PGN 38656**Noise Control Status****NCS**

Used to report the current state of the Noise Control System.

Transmission Repetition Rate: Every 10 seconds and on change of state, but not faster than 1 second. Every second when in tuning mode.
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 151
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 38656 (0x009700)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Cab Noise Control Status	5059
1.3	4 bits	Cab Noise Control Tuning Status	5060

PGN 38912**Noise Control 1****NC1**

Used to issue commands to the Noise Control System. This command PGN typically originates from either a Cab control panel or a diagnostic tool.

Transmission Repetition Rate: Every 10 seconds and on change of state, but not faster than every 1 second.
Data Length: 8
Extended Data Page: 0
Data Page: 0
PDU Format: 152
PDU Specific: DA PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 38912 (0x009800)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Cab Noise Control Command	5057
1.3	3 bits	Cab Noise Control Tuning Command	5058

PGN 39168**Joystick Lamp Command Message****JLCM**

Used to transfer joystick lamp command informations which are used to switch on/off/blinking joystick 1...3 lamps 1...10.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 153
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 39168 (0x009900)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 1 Lamp 1 Command	4460
1.3	2 bits	Joystick 1 Lamp 2 Command	4461
1.5	2 bits	Joystick 1 Lamp 3 Command	4462
1.7	2 bits	Joystick 1 Lamp 4 Command	4463
2.1	2 bits	Joystick 1 Lamp 5 Command	4464
2.3	2 bits	Joystick 1 Lamp 6 Command	4465
2.5	2 bits	Joystick 1 Lamp 7 Command	4466
2.7	2 bits	Joystick 1 Lamp 8 Command	4467
3.1	2 bits	Joystick 1 Lamp 9 Command	4468
3.3	2 bits	Joystick 1 Lamp 10 Command	4469
3.5	2 bits	Joystick 2 Lamp 1 Command	4470
3.7	2 bits	Joystick 2 Lamp 2 Command	4471
4.1	2 bits	Joystick 2 Lamp 3 Command	4472
4.3	2 bits	Joystick 2 Lamp 4 Command	4473
4.5	2 bits	Joystick 2 Lamp 5 Command	4474
4.7	2 bits	Joystick 2 Lamp 6 Command	4475
5.1	2 bits	Joystick 2 Lamp 7 Command	4476
5.3	2 bits	Joystick 2 Lamp 8 Command	4477
5.5	2 bits	Joystick 2 Lamp 9 Command	4478
5.7	2 bits	Joystick 2 Lamp 10 Command	4479
6.1	2 bits	Joystick 3 Lamp 1 Command	4480
6.3	2 bits	Joystick 3 Lamp 2 Command	4481
6.5	2 bits	Joystick 3 Lamp 3 Command	4482
6.7	2 bits	Joystick 3 Lamp 4 Command	4483
7.1	2 bits	Joystick 3 Lamp 5 Command	4484
7.3	2 bits	Joystick 3 Lamp 6 Command	4485
7.5	2 bits	Joystick 3 Lamp 7 Command	4486
7.7	2 bits	Joystick 3 Lamp 8 Command	4487
8.1	2 bits	Joystick 3 Lamp 9 Command	4488
8.3	2 bits	Joystick 3 Lamp 10 Command	4489

(R) PGN 39680 Proprietary Method Identification**PMI**

This is a standardized mechanism for an ECU to report a listing of the manufacturer specific (i.e. proprietary) methods and formats it supports when using the PropA, PropA2, and PropB PGNs (see J1939-21). The ability to support multiple manufacturer proprietary methods allows manufacturers to collaborate on application specific communication needs that are not of interest to the SAE J1939 committee. The process of selecting a specific method for ECUs that list multiple mutually exclusive methods is intended to be defined by the manufacturer and therefore not within the scope of this PGN.

NOTE—The placement of the Data Dictionary Manufacturer Code and Data Dictionary Method bits into the 4-byte space is illustrated in Figure PGN 39680_A (See Appendix D).

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 155
 PDU Specific: DA PGN Supporting Information: See Appendix D - PGN 39680
 Default Priority: 6
 Parameter Group Number: 39680 (0x009B00)

Start Position	Length	Parameter Name	SPN
1-2.1	11 bits	Data Dictionary Manufacturer Code	4180
2.4-4	21 bits	Data Dictionary Method	4181

PGN 39936 Auxiliary Input/Output Status 7**AUXIO7**

Notes:

Implementers are encouraged to use specific functional SPNs whenever possible.

AUXIO PGNs are intended for two categories of use in which fixed mapping to functions is not possible:

- 1) Generic I/O devices
 - 2) Applications lacking defined input and output functionality.
- Use, or request new, functionally defined parameters in all other cases.

Implementers and integrators considering using AUXIO PGNs should be cautious of conflicts that can arise from multiple users on a single system.

Transmission Repetition Rate: manufacturer defined, not faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 156
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 39936 (0x009C00)

Start Position	Length	Parameter Name	SPN
1	1 byte	Auxiliary I/O Channel #18	4167
2	1 byte	Auxiliary I/O Channel #17	4168
3	1 byte	Auxiliary I/O Channel #16	4169
4	1 byte	Auxiliary I/O Channel #15	4170
5	1 byte	Auxiliary I/O Channel #22	4171
6	1 byte	Auxiliary I/O Channel #21	4172
7	1 byte	Auxiliary I/O Channel #20	4173
8	1 byte	Auxiliary I/O Channel #19	4174

PGN 40192**Auxiliary Input/Output Status 6****AUXIO6****Notes:**

Implementers are encouraged to use specific functional SPNs whenever possible.

AUXIO PGNs are intended for two categories of use in which fixed mapping to functions is not possible:

- 1) Generic I/O devices
- 2) Applications lacking defined input and output functionality.

Use, or request new, functionally defined parameters in all other cases.

Implementers and integrators considering using AUXIO PGNs should be cautious of conflicts that can arise from multiple users on a single system.

Transmission Repetition Rate: manufacturer defined, not faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 157
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 40192 (0x009D00)

Start Position	Length	Parameter Name	SPN
1	1 byte	Auxiliary I/O Channel #10	4159
2	1 byte	Auxiliary I/O Channel #9	4160
3	1 byte	Auxiliary I/O Channel #8	4161
4	1 byte	Auxiliary I/O Channel #7	4162
5	1 byte	Auxiliary I/O Channel #14	4163
6	1 byte	Auxiliary I/O Channel #13	4164
7	1 byte	Auxiliary I/O Channel #12	4165
8	1 byte	Auxiliary I/O Channel #11	4166

PGN 42240**Auxiliary Input/Output Status 4****AUXIO4**

Notes:

Implementers are encouraged to use specific functional SPNs whenever possible.

AUXIO PGNs are intended for two categories of use in which fixed mapping to functions is not possible:

- 1) Generic I/O devices
- 2) Applications lacking defined input and output functionality.

Use, or request new, functionally defined parameters in all other cases.

Implementers and integrators considering using AUXIO PGNs should be cautious of conflicts that can arise from multiple users on a single system.

Transmission Repetition Rate: Manufacturer defined, not faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 165
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 42240 (0x00A500)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Auxiliary I/O #84	3907
1.3	2 bits	Auxiliary I/O #83	3906
1.5	2 bits	Auxiliary I/O #82	3905
1.7	2 bits	Auxiliary I/O #81	3904
2.1	2 bits	Auxiliary I/O #88	3911
2.3	2 bits	Auxiliary I/O #87	3910
2.5	2 bits	Auxiliary I/O #86	3909
2.7	2 bits	Auxiliary I/O #85	3908
3.1	2 bits	Auxiliary I/O #92	3915
3.3	2 bits	Auxiliary I/O #91	3914
3.5	2 bits	Auxiliary I/O #90	3913
3.7	2 bits	Auxiliary I/O #89	3912
4.1	2 bits	Auxiliary I/O #96	3919
4.3	2 bits	Auxiliary I/O #95	3918
4.5	2 bits	Auxiliary I/O #94	3917
4.7	2 bits	Auxiliary I/O #93	3916
5.1	2 bits	Auxiliary I/O #100	3923
5.3	2 bits	Auxiliary I/O #99	3922
5.5	2 bits	Auxiliary I/O #98	3921
5.7	2 bits	Auxiliary I/O #97	3920
6.1	2 bits	Auxiliary I/O #104	3927
6.3	2 bits	Auxiliary I/O #103	3926
6.5	2 bits	Auxiliary I/O #102	3925
6.7	2 bits	Auxiliary I/O #101	3924
7.1	2 bits	Auxiliary I/O #108	3931
7.3	2 bits	Auxiliary I/O #107	3930
7.5	2 bits	Auxiliary I/O #106	3929
7.7	2 bits	Auxiliary I/O #105	3928
8.1	2 bits	Auxiliary I/O #112	3935
8.3	2 bits	Auxiliary I/O #111	3934
8.5	2 bits	Auxiliary I/O #110	3933
8.7	2 bits	Auxiliary I/O #109	3932

PGN 42496**Auxiliary Input/Output Status 3****AUXIO3**

Notes:

Implementers are encouraged to use specific functional SPNs whenever possible.

AUXIO PGNs are intended for two categories of use in which fixed mapping to functions is not possible:

- 1) Generic I/O devices
- 2) Applications lacking defined input and output functionality.

Use, or request new, functionally defined parameters in all other cases.

Implementers and integrators considering using AUXIO PGNs should be cautious of conflicts that can arise from multiple users on a single system.

Transmission Repetition Rate: Manufacturer defined, not faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 166
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 42496 (0x00A600)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Auxiliary I/O #52	3875
1.3	2 bits	Auxiliary I/O #51	3874
1.5	2 bits	Auxiliary I/O #50	3873
1.7	2 bits	Auxiliary I/O #49	3872
2.1	2 bits	Auxiliary I/O #56	3879
2.3	2 bits	Auxiliary I/O #55	3878
2.5	2 bits	Auxiliary I/O #54	3877
2.7	2 bits	Auxiliary I/O #53	3876
3.1	2 bits	Auxiliary I/O #60	3883
3.3	2 bits	Auxiliary I/O #59	3882
3.5	2 bits	Auxiliary I/O #58	3881
3.7	2 bits	Auxiliary I/O #57	3880
4.1	2 bits	Auxiliary I/O #64	3887
4.3	2 bits	Auxiliary I/O #63	3886
4.5	2 bits	Auxiliary I/O #62	3885
4.7	2 bits	Auxiliary I/O #61	3884
5.1	2 bits	Auxiliary I/O #68	3891
5.3	2 bits	Auxiliary I/O #67	3890
5.5	2 bits	Auxiliary I/O #66	3889
5.7	2 bits	Auxiliary I/O #65	3888
6.1	2 bits	Auxiliary I/O #72	3895
6.3	2 bits	Auxiliary I/O #71	3894
6.5	2 bits	Auxiliary I/O #70	3893
6.7	2 bits	Auxiliary I/O #69	3892
7.1	2 bits	Auxiliary I/O #76	3899
7.3	2 bits	Auxiliary I/O #75	3898
7.5	2 bits	Auxiliary I/O #74	3897
7.7	2 bits	Auxiliary I/O #73	3896
8.1	2 bits	Auxiliary I/O #80	3903
8.3	2 bits	Auxiliary I/O #79	3902
8.5	2 bits	Auxiliary I/O #78	3901
8.7	2 bits	Auxiliary I/O #77	3900

PGN 42752**Auxiliary Input/Output Status 2****AUXIO2**

Notes:

Implementers are encouraged to use specific functional SPNs whenever possible.

AUXIO PGNs are intended for two categories of use in which fixed mapping to functions is not possible:

- 1) Generic I/O devices
 - 2) Applications lacking defined input and output functionality.
- Use, or request new, functionally defined parameters in all other cases.

Implementers and integrators considering using AUXIO PGNs should be cautious of conflicts that can arise from multiple users on a single system.

Transmission Repetition Rate: Manufacturer defined, not faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 167
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 42752 (0x00A700)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Auxiliary I/O #20	3843
1.3	2 bits	Auxiliary I/O #19	3842
1.5	2 bits	Auxiliary I/O #18	3841
1.7	2 bits	Auxiliary I/O #17	3840
2.1	2 bits	Auxiliary I/O #24	3847
2.3	2 bits	Auxiliary I/O #23	3846
2.5	2 bits	Auxiliary I/O #22	3845
2.7	2 bits	Auxiliary I/O #21	3844
3.1	2 bits	Auxiliary I/O #28	3851
3.3	2 bits	Auxiliary I/O #27	3850
3.5	2 bits	Auxiliary I/O #26	3849
3.7	2 bits	Auxiliary I/O #25	3848
4.1	2 bits	Auxiliary I/O #32	3855
4.3	2 bits	Auxiliary I/O #31	3854
4.5	2 bits	Auxiliary I/O #30	3853
4.7	2 bits	Auxiliary I/O #29	3852
5.1	2 bits	Auxiliary I/O #36	3859
5.3	2 bits	Auxiliary I/O #35	3858
5.5	2 bits	Auxiliary I/O #34	3857
5.7	2 bits	Auxiliary I/O #33	3856
6.1	2 bits	Auxiliary I/O #40	3863
6.3	2 bits	Auxiliary I/O #39	3862
6.5	2 bits	Auxiliary I/O #38	3861
6.7	2 bits	Auxiliary I/O #37	3860
7.1	2 bits	Auxiliary I/O #44	3867
7.3	2 bits	Auxiliary I/O #43	3866
7.5	2 bits	Auxiliary I/O #42	3865
7.7	2 bits	Auxiliary I/O #41	3864
8.1	2 bits	Auxiliary I/O #48	3871
8.3	2 bits	Auxiliary I/O #47	3870
8.5	2 bits	Auxiliary I/O #46	3869
8.7	2 bits	Auxiliary I/O #45	3868

PGN 43008 Text Display**DISP1**

This provides ASCII text information, for example to an display instrument. Broadcast rate should be on event and 1-5 seconds due to variable character length. This message is to convey information from an ecu to a display. In its most basic usage, it can be used to convey ASCII information to simple displays to show to the operator. The Text Display Characters will follow the standard J1939-71 display method. Control characters can be used but not displayed. The characters are to be terminated with a 00h or "null" character. Following bytes will be filled with FFh as usual. The null character will be used once per pgn transmission, regardless of character string length.

Byte 2 is reserved for future use, to incorporate priority.

Transmission Repetition Rate: As required
 Data Length: Variable - up to 200 characters
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 168
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 43008 (0x00A800)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Text Display Instructions	3613
3	1 byte	Text Display Index	3614
4 to n	Variable - up to 200 bytes followed by an NULL delimiter	Text Display Character	3615

PGN 43264 Forward Lane Image Command**FLIC**

Message containing commands, sent to the forward image controller

Transmission Repetition Rate: On event
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 169
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 43264 (0x00A900)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Lane Departure Warning Enable Command	3564

PGN 44544 Tire Pressure Reference Setting**TPRS**

For setting the tire pressure reference values.

This message is the setpoint for the PGN 64953 Tire Pressure reference information message.

Transmission Repetition Rate: As needed
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 174
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 44544 (0x00AE00)

Start Position	Length	Parameter Name	SPN
1	8 bits	Tire Location	3192
2	1 byte	Reference Tire Pressure Setting	3193

PGN 52992 Continuous Torque & Speed Limit Request**CTL**

Transmission Repetition Rate: 5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 207
 PDU Specific: DA PGN Supporting Information: See Appendix D - PGN 52992
 Default Priority: 6
 Parameter Group Number: 52992 (0x00CF00)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Speed Limit Request - Minimum Continuous	1784
2	1 byte	Engine Speed Limit Request - Maximum Continuous	1785
3	1 byte	Engine Torque Limit Request - Minimum Continuous	1786
4	1 byte	Engine Torque Limit Request - Maximum Continuous	1787
5	1 byte	Minimum Continuous Retarder Speed Limit Request	1788
6	1 byte	Maximum Continuous Retarder Speed Limit Request	1789
7	1 byte	Minimum Continuous Retarder Torque Limit Request	1790
8	1 byte	Maximum Continuous Retarder Torque Limit Request	1791

PGN 53248 Cab Illumination Message**CL**

This message contains information that controls illumination devices inside the vehicle's cab.

Transmission Repetition Rate: Every 5 s and on change of state but no faster than every 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 208
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 53248 (0x00D000)

Start Position	Length	Parameter Name	SPN
1	1 byte	Illumination Brightness Percent	1487
2	1 byte	Switch Backlight Illumination Brightness Percent	5532

PGN 53504 Air Suspension Control 6**ASC6**

Used for suspension control

Transmission Repetition Rate: 100 ms when active
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 209
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 53504 (0x00D100)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Level Preset Front Axle Left	1732
3-4	2 bytes	Level Preset Front Axle Right	1757
5-6	2 bytes	Level Preset Rear Axle Left	1758
7-8	2 bytes	Level Preset Rear Axle Right	1735

PGN 53760 Air Suspension Control 2**ASC2**

Used for suspension control

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 210
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 53760 (0x00D200)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Automatic traction help (load transfer)	2984
1.3	2 bits	Kneeling Request Left Side	1749
1.5	2 bits	Kneeling Request Right Side	1748
1.7	2 bits	Kneeling Control Mode Request	1747
2.1	4 bits	Nominal Level Request Front Axle	1751
2.5	4 bits	Nominal Level Request Rear Axle	1750
3.1	4 bits	Level Control Mode Request	1753
3.5	2 bits	Lift Axle 1 Position Command	1752
3.7	2 bits	Lift Axle 2 Position Command	1828
4	1 byte	Damper Stiffness Request Front Axle	1718
5	1 byte	Damper Stiffness Request Rear Axle	1719
6	1 byte	Damper Stiffness Request Lift / Tag Axle	1720
7.1	2 bits	Kneeling Command - Front Axle	1830
7.3	2 bits	Kneeling Command - Rear Axle	1829
7.5	2 bits	Prohibit air suspension control	3215
7.7	2 bits	Allow Level Control During Braking Command	5293
8.1	2 bits	Speed Dependent Level Control Request	5295
8.3	2 bits	Prohibit Automatic Air Suspension Control	5274
8.5	4 bits	Memory level request	5433

PGN 54528**Time/Date Adjust****TDA**

Transmission Repetition Rate: As needed
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 213
 PDU Specific: DA PGN Supporting Information: See Appendix D - PGN 65254
 Default Priority: 6
 Parameter Group Number: 54528 (0x00D500)

Start Position	Length	Parameter Name	SPN
1	1 byte	Adjust seconds	1603
2	1 byte	Adjust minutes	1604
3	1 byte	Adjust hours	1605
4	1 byte	Adjust month	1606
5	1 byte	Adjust day	1607
6	1 byte	Adjust year	1608
7	1 byte	Adjust local minute offset	1609
8	1 byte	Adjust local hour offset	1610

PGN 56320**Anti-theft Status****ATS**

NOTE--See Figures PGN56320_A to PGN56320_F for examples of Anti-theft message transfers. Bit 1 is the right most bit in each byte.

Transmission Repetition Rate: This message is transmitted in response to an Anti-Theft Request message. This message is also sent when the component has an abnormal power interruption. In this situation the Anti-Theft Status Report is sent without the Anti-Theft Request.
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 220
 PDU Specific: DA PGN Supporting Information: See Appendix D - PGN 56320
 Default Priority: 7
 Parameter Group Number: 56320 (0x00DC00)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Anti-theft Encryption Seed Present Indicator	1194
1.3	2 bits	Anti-theft Password Valid Indicator	1195
1.5	2 bits	Anti-theft Component Status States	1196
1.7	2 bits	Anti-theft Modify Password States	1197
2-8	7 bytes	Anti-theft Random Number	1198

PGN 56576 Anti-theft Request**ATR**

NOTE—See Figures PGN56320_A thru PGN56320_F for examples of Anti-theft message transfers. Bit 1 is the right most bit in each byte.

Transmission Repetition Rate: Transmission of this message is interrupt driven. This message is also transmitted upon power-up of the interfacing device sending this message.

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 221

PDU Specific: DA PGN Supporting Information:

Default Priority: 7

Parameter Group Number: 56576 (0x00DD00)

Start Position	Length	Parameter Name	SPN
1.2	2 bits	Anti-theft Encryption Indicator States	1199
1.4	2 bits	Anti-theft Desired Exit Mode States	1200
1.6	3 bits	Anti-theft Command States	1201
2-8	7 bytes	Anti-theft Password Representation	1202

PGN 56832 Reset**RESET**

NOTE—This message requires an Acknowledgement response (See J1939-21, PGN 59392) from the receiving node. The use of individual proprietary protocols can still be used instead of the "trip reset" PGN to maintain security.

Transmission Repetition Rate: When needed

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 222

PDU Specific: DA PGN Supporting Information:

Default Priority: 7

Parameter Group Number: 56832 (0x00DE00)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Trip Group 1	988
1.3	2 bits	Trip Group 2 - Proprietary	989
2	1 byte	Service Component Identification	1584
3.1	2 bits	Engine Build Hours Reset	1211
3.3	2 bits	Steering Straight Ahead Position Reset	3600

PGN 57344 Cab Message 1**CM1**

Message containing parameters originating from the vehicle cab.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 224
 PDU Specific: DA PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 57344 (0x00E000)

Start Position	Length	Parameter Name	SPN
1	1 byte	Requested Percent Fan Speed	986
2-3	2 bytes	Cab Interior Temperature Command	1691
4.1	2 bits	Auxiliary Heater Coolant Pump Request	1684
4.3	2 bits	Battery Main Switch Hold Request	1682
4.5	2 bits	Operator Seat Direction Switch	1714
4.7	2 bits	Seat Belt Switch	1856
5.1	2 bits	Park Brake Command	5630
5.3	2 bits	Vehicle Limiting Speed Governor Decrement Switch	1655
5.5	2 bits	Vehicle Limiting Speed Governor Increment Switch	1654
5.7	2 bits	Vehicle Limiting Speed Governor Enable Switch	1653
6.1	2 bits	Diesel Particulate Filter Regeneration Inhibit Switch	3695
6.3	2 bits	Diesel Particulate Filter Regeneration Force Switch	3696
6.5	2 bits	Automatic Gear Shifting Enable Switch	1666
6.7	2 bits	Engine Automatic Start Enable Switch	1656
7.1	4 bits	Auxiliary Heater Mode Request	1683
7.5	2 bits	Request Engine Zone Heating	1685
7.7	2 bits	Request Cab Zone Heating	1686
8	1 byte	Selected Maximum Vehicle Speed Limit	2596

PGN 61440**Electronic Retarder Controller 1****ERC1**

NOTE- This message will be transmitted by several types of retarding devices such as engine compression release brakes, exhaust system restriction brakes, and driveline retarders using hydraulic, electric, or mechanical friction to slow the vehicle. The source address of the message will indicate which one, and the type and location of the retarder are available in the Retarder Configuration Message (see PGN 65249) if that detail is important to the receiver.

Users should also be aware that the Shift Assist and Brake Assist switch status in the first byte of this message are to be used by other ECUs that might request retarding force from the retarder to know when such assistance is available. The state of the "switches" will NOT prevent the retarder from activating if requested, but should be honored by the requester (by not sending a request when the appropriate "switch" is not enabled) to prevent unwarranted noise.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 0 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61440 (0x00F000)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Retarder Torque Mode	900
1.5	2 bits	Retarder Enable - Brake Assist Switch	571
1.7	2 bits	Retarder Enable - Shift Assist Switch	572
2	1 byte	Actual Retarder - Percent Torque	520
3	1 byte	Intended Retarder Percent Torque	1085
4.1	2 bits	Engine Coolant Load Increase	1082
4.3	2 bits	Retarder Requesting Brake Light	1667
4.5	2 bits	Retarder Road Speed Limit Switch	4233
4.7	2 bits	Retarder Road Speed Exceeded Status	4234
5	1 byte	Source Address of Controlling Device for Retarder Control	1480
6	1 byte	Drivers Demand Retarder - Percent Torque	1715
7	1 byte	Retarder Selection, non-engine	1716
8	1 byte	Actual Maximum Available Retarder - Percent Torque	1717

PGN 61441 Electronic Brake Controller 1**EBC1**

Used for brake control information

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 1 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61441 (0x00F001)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	ASR Engine Control Active	561
1.3	2 bits	ASR Brake Control Active	562
1.5	2 bits	Anti-Lock Braking (ABS) Active	563
1.7	2 bits	EBS Brake Switch	1121
2	1 byte	Brake Pedal Position	521
3.1	2 bits	ABS Off-road Switch	575
3.3	2 bits	ASR Off-road Switch	576
3.5	2 bits	ASR "Hill Holder" Switch	577
3.7	2 bits	Traction Control Override Switch	1238
4.1	2 bits	Accelerator Interlock Switch	972
4.3	2 bits	Engine Derate Switch	971
4.5	2 bits	Engine Auxiliary Shutdown Switch	970
4.7	2 bits	Remote Accelerator Enable Switch	969
5	1 byte	Engine Retarder Selection	973
6.1	2 bits	ABS Fully Operational	1243
6.3	2 bits	EBS Red Warning Signal	1439
6.5	2 bits	ABS/EBS Amber Warning Signal (Powered Vehicle)	1438
6.7	2 bits	ATC/ASR Information Signal	1793
7	1 byte	Source Address of Controlling Device for Brake Control	1481
8.3	2 bits	Halt brake switch	2911
8.5	2 bits	Trailer ABS Status	1836
8.7	2 bits	Tractor-Mounted Trailer ABS Warning Signal	1792

PGN 61442 Electronic Transmission Controller 1**ETC1**

Transmission Repetition Rate: 10 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 2 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61442 (0x00F002)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission Driveline Engaged	560
1.3	2 bits	Transmission Torque Converter Lockup Engaged	573
1.5	2 bits	Transmission Shift In Process	574
1.7	2 bits	Transmission Torque Converter Lockup Transition in Process	4816
2-3	2 bytes	Transmission Output Shaft Speed	191
4	1 byte	Percent Clutch Slip	522
5.1	2 bits	Engine Momentary Overspeed Enable	606
5.3	2 bits	Progressive Shift Disable	607
5.5	2 bits	Momentary Engine Maximum Power Enable	5015
6-7	2 bytes	Transmission Input Shaft Speed	161
8	1 byte	Source Address of Controlling Device for Transmission Control	1482

PGN 61443 Electronic Engine Controller 2**EEC2**

Identifies electronic engine control related parameters.

Transmission Repetition Rate: 50 msec (preferred) or Engine Speed Dependent (if required by application)
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 3 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61443 (0x00F003)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Accelerator Pedal 1 Low Idle Switch	558
1.3	2 bits	Accelerator Pedal Kickdown Switch	559
1.5	2 bits	Road Speed Limit Status	1437
1.7	2 bits	Accelerator Pedal 2 Low Idle Switch	2970
2	1 byte	Accelerator Pedal Position 1	91
3	1 byte	Engine Percent Load At Current Speed	92
4	1 byte	Remote Accelerator Pedal Position	974
5	1 byte	Accelerator Pedal Position 2	29
6.1	2 bits	Vehicle Acceleration Rate Limit Status	2979
6.3	2 bits	Momentary Engine Maximum Power Enable Feedback	5021
6.5	2 bits	DPF Thermal Management Active	5399
6.7	2 bits	SCR Thermal Management Active	5400
7	1 byte	Actual Maximum Available Engine - Percent Torque	3357
8	1 byte	Estimated Pumping - Percent Torque	5398

PGN 61444 Electronic Engine Controller 1**EEC1**

Engine related parameters

Transmission Repetition Rate: engine speed dependent
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 4 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61444 (0x00F004)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Engine Torque Mode	899
1.5	4 bits	Actual Engine - Percent Torque High Resolution	4154
2	1 byte	Driver's Demand Engine - Percent Torque	512
3	1 byte	Actual Engine - Percent Torque	513
4-5	2 bytes	Engine Speed	190
6	1 byte	Source Address of Controlling Device for Engine Control	1483
7.1	4 bits	Engine Starter Mode	1675
8	1 byte	Engine Demand – Percent Torque	2432

PGN 61445**Electronic Transmission Controller 2****ETC2**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 5 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61445 (0x00F005)

Start Position	Length	Parameter Name	SPN
1	1 byte	Transmission Selected Gear	524
2-3	2 bytes	Transmission Actual Gear Ratio	526
4	1 byte	Transmission Current Gear	523
5-6	2 bytes	Transmission Requested Range	162
7-8	2 bytes	Transmission Current Range	163

PGN 61446**Electronic Axle Controller 1****EAC1**

NOTE - Request has to be responded to with as many messages as necessary to transmit all available information.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 6 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61446 (0x00F006)

Start Position	Length	Parameter Name	SPN
1	8 bits	Location	927
2.1	2 bits	Differential Lock State - Front Axle 1	567
2.3	2 bits	Differential Lock State - Front Axle 2	568
2.5	2 bits	Differential Lock State - Rear Axle 1	569
2.7	2 bits	Differential Lock State - Rear Axle 2	570
3.1	2 bits	Differential Lock State - Central	564
3.3	2 bits	Differential Lock State - Central Front	565
3.5	2 bits	Differential Lock State - Central Rear	566
4.1	2 bits	Front axle group engagement status	3819
4.3	2 bits	Rear axle group engagement status	3820

PGN 61447 Forward Lane Image urgent msg**FLI1**

Transmission Repetition Rate: 50 ms (only when active)
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 7 PGN Supporting Information:
 Default Priority: 4
 Parameter Group Number: 61447 (0x00F007)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Lane Departure Left	3565
1.3	2 bits	Lane Departure Right	3566
1.5	2 bits	Lane Departure Imminent, Right Side	1701
1.7	2 bits	Lane Departure Imminent, Left Side	1700

PGN 61448 Hydraulic Pressure Governor Info**HPG**

Information to be used for a hydraulic pressure governing control system

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 8 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61448 (0x00F008)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Hydraulic Pressure	1762
3.1	2 bits	Engine Hydraulic Pressure Governor Mode Indicator	1763
3.3	2 bits	Engine Hydraulic Pressure Governor Switch	1764
3.5	2 bits	Fire Apparatus Pump Engagement	2599

PGN 61449 Vehicle Dynamic Stability Control 2**VDC2**

Contains information which relates to the vehicle's movement.

Transmission Repetition Rate: 10 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 9 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61449 (0x00F009)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Steering Wheel Angle	1807
3.1	6 bits	Steering Wheel Turn Counter	1811
3.7	2 bits	Steering Wheel Angle Sensor Type	1812
4-5	2 bytes	Yaw Rate	1808
6-7	2 bytes	Lateral Acceleration	1809
8	1 byte	Longitudinal Acceleration	1810

PGN 61450 Engine Gas Flow Rate**EGF1**

Flow rates of Air and mixed gasses into the engine cylinders.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 10 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61450 (0x00F00A)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 1 (EGR1) Mass Flow Rate	2659
3-4	2 bytes	Engine Intake Air Mass Flow Rate	132
5-6	2 bytes	Engine Exhaust Gas Recirculation 2 (EGR2) Mass Flow Rate	5257

PGN 61451 Electronic Steering Control**ESC1**

PGN which indicates the actual angle and the status of a steerable axle

Transmission Repetition Rate: 20 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 11 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61451 (0x00F00B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Actual Inner wheel steering angle	2927
3	8 bits	Axle Location	2928
4.1	4 bits	Status of Steering Axle	2923
4.5	2 bits	Steerable Lift Axle Lowering Inhibit	2922
5.1	4 bits	Steering Type	2924
5.5	4 bits	Type of Steering Forces	2925
6.1	4 bits	Type of Steering Transmission	2926

PGN 61452 Electronic Transmission Controller #8**ETC8**

Electronic Transmission Controller #8

Transmission Repetition Rate: 20 ms when torque converter unlocked, 100 ms when torque converter locked
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 12 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61452 (0x00F00C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Transmission Torque Converter Ratio	3030
3-4	2 bytes	Transmission Clutch/Converter Input Speed	5052

PGN 61453 Land Leveling System Operational Information**LOI**

Group of operational parameters associated with the Land Leveling System, such as switch states. This is provided to the device controlling the blade, and is usually directed at the primary land leveling controller.

Notes:

1. The parameter group is filled with SPNs sent to the Land Leveling System controller. Similar PGNs exist, 65138 for example, but PGN 65138 is sent out by the Land Leveling System primary controller to reflect the mode the land leveling system has been put into (auto, manual). This logical decision to put the system into auto/manual mode is based in part on the input from this PGN, along with other various inputs. It makes more sense to create this PGN filled with parameters sourced from the non-primary controller, rather than use the PGN sourced by the primary controller itself. In the future, other SPNs coming from the non-primary controller can be added to the PGN. There are plans to add more switch values in the future.

2. Other systems with automated blade controls should be able to use this parameter group, since it contains measured switch values.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 13 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61453 (0x00F00D)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Blade Control Mode Switch	3156
1.5	4 bits	Desired Grade Offset Switch	3157
2.1	4 bits	Blade Auto Mode Command	3158
2.5	4 bits	Left Blade Control Mode Operator Control	3334
3.1	4 bits	Right Blade Control Mode Operator Control	3335
3.5	4 bits	Left Desired Blade Offset Operator Control	3336
4.1	4 bits	Right Desired Blade Offset Operator Control	3337
4.5	4 bits	Side-shift Blade Control Mode Operator Control	3338
5.1	4 bits	Side-shift Desired Blade Offset Operator Control	3339
5.5	2 bits	Set Elevation Sensor #1 Reference Elevation	5405
5.7	2 bits	Set Elevation Sensor #2 Reference Elevation	5406

(R) PGN 61454 Aftertreatment 1 Intake Gas 1**AT1IG1**

The purpose of this PGN is to group the aftertreatment intake sensor data for bank 1. These values include the NOx, %O2, Status's of the sensors with respect to the power being supplied and the heating element, errors and stability of the readings.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 14 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61454 (0x00F00E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Intake NOx	3216
3-4	2 bytes	Aftertreatment 1 Intake O2	3217
5.1	2 bits	Aftertreatment 1 Intake Gas Sensor Power Status	3218
5.3	2 bits	Aftertreatment 1 Intake Gas Sensor at Temperature	3219
5.5	2 bits	Aftertreatment 1 Intake NOx Reading Stable	3220
5.7	2 bits	Aftertreatment 1 Intake Wide-Range % O2 Reading Stable	3221
6.1	5 bits	Aftertreatment 1 Intake Gas Sensor Heater Preliminary FMI	3222
6.6	2 bits	Aftertreatment 1 Intake Gas Sensor Heater Control	3223
7.1	5 bits	Aftertreatment 1 Intake NOx Sensor Preliminary FMI	3224
7.6	3 bits	NOx Sensor AT11 Self-diagnosis Status	5714
8.1	5 bits	Aftertreatment 1 Intake Oxygen Sensor Preliminary FMI	3225

(R) PGN 61455 Aftertreatment 1 Outlet Gas 1**AT1OG1**

The purpose of this PGN is to group the aftertreatment outlet sensor data for bank 1. These values include the NOx, %O2, Status' of the sensors with respect to the power being supplied and the heating element, errors and stability of the readings.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 15 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61455 (0x00F00F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Outlet NOx	3226
3-4	2 bytes	Aftertreatment 1 Outlet O2	3227
5.1	2 bits	Aftertreatment 1 Outlet Gas Sensor Power Status	3228
5.3	2 bits	Aftertreatment 1 Outlet Gas Sensor at Temperature	3229
5.5	2 bits	Aftertreatment 1 Outlet NOx Reading Stable	3230
5.7	2 bits	Aftertreatment 1 Outlet Wide-Range %O2 Reading Stable	3231
6.1	5 bits	Aftertreatment 1 Outlet Gas Sensor Heater Preliminary FMI	3232
6.6	2 bits	Aftertreatment 1 Outlet Gas Sensor Heater Control	3233
7.1	5 bits	Aftertreatment 1 Outlet NOx Sensor Preliminary FMI	3234
7.6	3 bits	NOx Sensor ATO1 Self-diagnosis Status	5713
8.1	5 bits	Aftertreatment 1 Outlet Oxygen Sensor Preliminary FMI	3235

(R) PGN 61456 Aftertreatment 2 Intake Gas 1**AT2IG1**

The purpose of this PGN is to group the aftertreatment intake sensor data for bank 2. These values include the NOx, %O2, status of the sensors with respect to the power being supplied and the heating element, errors and stability of the readings.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 16 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61456 (0x00F010)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Intake NOx	3255
3-4	2 bytes	Aftertreatment 2 Intake O2	3256
5.1	2 bits	Aftertreatment 2 Intake Gas Sensor Power Status	3257
5.3	2 bits	Aftertreatment 2 Intake Gas Sensor at Temperature	3258
5.5	2 bits	Aftertreatment 2 Intake NOx Reading Stable	3259
5.7	2 bits	Aftertreatment 2 Intake Wide-Range % O2 Reading Stable	3260
6.1	5 bits	Aftertreatment 2 Intake Gas Sensor Heater Preliminary FMI	3261
6.6	2 bits	Aftertreatment 2 Intake Gas Sensor Heater Control	3262
7.1	5 bits	Aftertreatment 2 Intake NOx Sensor Preliminary FMI	3263
7.6	3 bits	NOx Sensor AT12 Self-diagnosis Status	5716
8.1	5 bits	Aftertreatment 2 Intake Oxygen Sensor Preliminary FMI	3264

(R) PGN 61457 Aftertreatment 2 Outlet Gas 1**AT2OG1**

The purpose of this PGN is to group the aftertreatment outlet sensor data for bank 2. These values include the NOx, %O2, status of the sensors with respect to the power being supplied and the heating element, errors and stability of the readings.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 17 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61457 (0x00F011)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Outlet NOx	3265
3-4	2 bytes	Aftertreatment 2 Outlet O2	3266
5.1	2 bits	Aftertreatment 2 Outlet Gas Sensor Power Status	3267
5.3	2 bits	Aftertreatment 2 Outlet Gas Sensor at Temperature	3268
5.5	2 bits	Aftertreatment 2 Outlet NOx Reading Stable	3269
5.7	2 bits	Aftertreatment 2 Outlet Wide-Range % O2 Reading Stable	3270
6.1	5 bits	Aftertreatment 2 Outlet Gas Sensor Heater Preliminary FMI	3271
6.6	2 bits	Aftertreatment 2 Outlet Gas Sensor Heater Control	3272
7.1	5 bits	Aftertreatment 2 Outlet NOx Sensor Preliminary FMI	3273
7.6	3 bits	NOx Sensor ATO2 Self-diagnosis Status	5715
8.1	5 bits	Aftertreatment 2 Outlet Oxygen Sensor Preliminary FMI	3274

PGN 61458**Fifth Wheel Smart Systems 1****FWSS1**

Fifth wheel smart system information. Parameters used to determine the status of the tractor to trailer coupling system integrity.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 18 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61458 (0x00F012)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Fifth Wheel Vertical Force	3308
3-4	2 bytes	Fifth Wheel Drawbar Force	3309
5-6	2 bytes	Fifth Wheel Roll Moment	3310
7.1	2 bits	Fifth Wheel Roll Warning Indicator	3317

PGN 61459**Slope Sensor Information****SSI**

The Slope Sensor Information message shall provide a measurement of the vehicles pitch angle, a measurement of the vehicles roll angle, and a measurement of the vehicles pitch rate. The vehicle dynamics measurements in this message shall be according to a Z-Down axis system as referenced in SAE J670.

Note 1) When this PGN is used to transmit information from a device not attached to the vehicle, the components local frame of reference shall be used.

Note 2) The NAME of the source of the PGN shall to used to associate to the frame of reference. (e.g, Machine control will report vehicle pitch and roll, blade control will report blade pitch and roll).

The data within the message shall contain the measured pitch, roll, and pitch rate, figure of merits for the three measurements, a compensated measurement indicator, and measurement latency for the sensor measurements.

Note 1) When this PGN is used to transmit information from a device not attached to the vehicle, the components local frame of reference shall be used.

Note 2) The NAME of the source of the PGN shall to used to associate to the frame of reference. (e.g, Machine control will report vehicle pitch and roll, blade control will report blade pitch and roll).

Transmission Repetition Rate: 10 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 19 PGN Supporting Information: See Appendix D - PGN 61459
 Default Priority: 3
 Parameter Group Number: 61459 (0x00F013)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Pitch Angle	3318
3-4	2 bytes	Roll Angle	3319
5-6	2 bytes	Pitch Rate	3322
7.1	2 bits	Pitch Angle Figure of Merit	3323
7.3	2 bits	Roll Angle Figure of Merit	3324
7.5	2 bits	Pitch Rate Figure of Merit	3325
7.7	2 bits	Pitch and Roll Compensated	3326
8	1 byte	Roll and Pitch Measurement Latency	3327

PGN 61460**Blade Information****BI**

A measurement of the machine's relative blade height and a rotational angle measurement of the machine blade yaw angle around the machine z-axis. The vehicle dynamics measurements in this message shall be according to a Z-Down axis system as referenced in SAE J670.

The data in the message is intended to be accurate enough for real-time control.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 20 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61460 (0x00F014)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Relative Blade Height	3365
3-4	2 bytes	Blade Rotation Angle	3331
5	1 byte	Relative Blade Height and Blade Rotation Angle Measurement Latency	3366
6.1	2 bits	Relative Blade Height Figure of Merit	3367
6.3	2 bits	Blade Rotation Angle Figure of Merit	3332

PGN 61462**Cylinder Combustion Status****CCS**

Used to send the SPNs containing information relating to the state of combustion for 24 cylinders. When there is no combustion detected on any one cylinder, this PGN needs to be sent every crank revolution (engine speed dependant). If combustion is good on all cylinders, 5 seconds would be satisfactory for a transmission rate. This will allow communication between a separate module monitoring combustion inside the engine cylinders and the control module that needs this information to make engine related decisions.

Transmission Repetition Rate: Engine speed dependent when there is no combustion, once every 5 seconds otherwise
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 22 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61462 (0x00F016)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Cylinder 1 Combustion Status	3387
1.3	2 bits	Engine Cylinder 2 Combustion Status	3388
1.5	2 bits	Engine Cylinder 3 Combustion Status	3389
1.7	2 bits	Engine Cylinder 4 Combustion Status	3390
2.1	2 bits	Engine Cylinder 5 Combustion Status	3391
2.3	2 bits	Engine Cylinder 6 Combustion Status	3392
2.5	2 bits	Engine Cylinder 7 Combustion Status	3393
2.7	2 bits	Engine Cylinder 8 Combustion Status	3394
3.1	2 bits	Engine Cylinder 9 Combustion Status	3395
3.3	2 bits	Engine Cylinder 10 Combustion Status	3396
3.5	2 bits	Engine Cylinder 11 Combustion Status	3397
3.7	2 bits	Engine Cylinder 12 Combustion Status	3398
4.1	2 bits	Engine Cylinder 13 Combustion Status	3399
4.3	2 bits	Engine Cylinder 14 Combustion Status	3400
4.5	2 bits	Engine Cylinder 15 Combustion Status	3401
4.7	2 bits	Engine Cylinder 16 Combustion Status	3402
5.1	2 bits	Engine Cylinder 17 Combustion Status	3403
5.3	2 bits	Engine Cylinder 18 Combustion Status	3404
5.5	2 bits	Engine Cylinder 19 Combustion Status	3405
5.7	2 bits	Engine Cylinder 20 Combustion Status	3406
6.1	2 bits	Engine Cylinder 21 Combustion Status	3407
6.3	2 bits	Engine Cylinder 22 Combustion Status	3408
6.5	2 bits	Engine Cylinder 23 Combustion Status	3409
6.7	2 bits	Engine Cylinder 24 Combustion Status	3410

PGN 61463**Engine Knock Level #1****KL1**

Used to send the SPNs containing information relating to the level of knock for 8 cylinders. When knock is detected on any one cylinder, this PGN needs to be sent every crank revolution (engine speed dependant). If there is no knock detected on any cylinder, 5 seconds would be satisfactory for a transmission rate. This will allow communication between a separate module monitoring combustion inside the engine cylinders and the control module that needs this information to make engine related decisions.

Transmission Repetition Rate: Engine speed dependent when knock present, once every 5 seconds otherwise
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 23 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61463 (0x00F017)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Cylinder 1 Knock Level	1352
2	1 byte	Engine Cylinder 2 Knock Level	1353
3	1 byte	Engine Cylinder 3 Knock Level	1354
4	1 byte	Engine Cylinder 4 Knock Level	1355
5	1 byte	Engine Cylinder 5 Knock Level	1356
6	1 byte	Engine Cylinder 6 Knock Level	1357
7	1 byte	Engine Cylinder 7 Knock Level	1358
8	1 byte	Engine Cylinder 8 Knock Level	1359

PGN 61464**Engine Knock Level #2****KL2**

Used to send the SPNs containing information relating to the level of knock for 8 cylinders. When knock is detected on any one cylinder, this PGN needs to be sent every crank revolution (engine speed dependant). If there is no knock detected on any cylinder, 5 seconds would be satisfactory for a transmission rate. This will allow communication between a separate module monitoring combustion inside the engine cylinders and the control module that needs this information to make engine related decisions.

Transmission Repetition Rate: Engine speed dependent when knock present, once every 5 seconds otherwise
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 24 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61464 (0x00F018)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Cylinder 9 Knock Level	1360
2	1 byte	Engine Cylinder 10 Knock Level	1361
3	1 byte	Engine Cylinder 11 Knock Level	1362
4	1 byte	Engine Cylinder 12 Knock Level	1363
5	1 byte	Engine Cylinder 13 Knock Level	1364
6	1 byte	Engine Cylinder 14 Knock Level	1365
7	1 byte	Engine Cylinder 15 Knock Level	1366
8	1 byte	Engine Cylinder 16 Knock Level	1367

PGN 61465**Engine Knock Level #3****KL3**

Used to send the SPNs containing information relating to the level of knock for 8 cylinders. When knock is detected on any one cylinder, this PGN needs to be sent every crank revolution (engine speed dependant). If there is no knock detected on any cylinder, 5 seconds would be satisfactory for a transmission rate. This will allow communication between a separate module monitoring combustion inside the engine cylinders and the control module that needs this information to make engine related decisions.

Transmission Repetition Rate: Engine speed dependent when knock present, once every 5 seconds otherwise
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 25 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61465 (0x00F019)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Cylinder 17 Knock Level	1368
2	1 byte	Engine Cylinder 18 Knock Level	1369
3	1 byte	Engine Cylinder 19 Knock Level	1370
4	1 byte	Engine Cylinder 20 Knock Level	1371
5	1 byte	Engine Cylinder 21 Knock Level	1372
6	1 byte	Engine Cylinder 22 Knock Level	1373
7	1 byte	Engine Cylinder 23 Knock Level	1374
8	1 byte	Engine Cylinder 24 Knock Level	1375

PGN 61466**Engine Throttle / Fuel Actuator Control Command****TFAC**

Used to control networked electronic throttle control actuator and/or fuel control actuator valves. Otherwise, this PGN can be used to monitor commanded % positioning to electronic throttle control actuator and/or fuel control actuator valves.

Transmission Repetition Rate: 50 msec (preferred) or Engine Speed Dependent (if required by application)
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 26 PGN Supporting Information: See Appendix D - PGN 61466
 Default Priority: 4
 Parameter Group Number: 61466 (0x00F01A)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Throttle Actuator 1 Control Command	3464
3-4	2 bytes	Engine Throttle Actuator 2 Control Command	3465
5-6	2 bytes	Engine Fuel Actuator 1 Control Command	633
7-8	2 bytes	Engine Fuel Actuator 2 Control Command	1244

PGN 61469 Steering Angle Sensor Information**SAS**

Contains information which relates to a steering angle sensor.

Transmission Repetition Rate: 10 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 29 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61469 (0x00F01D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Steering Wheel Angle	3683
3.1	6 bits	Steering Wheel Angle Range Counter	3684
3.7	2 bits	Steering Wheel Angle Range Counter Type	3685
5-6	2 bytes	Steering Wheel Angle Range	3686
7.1	2 bits	Steering Angle Sensor Active Mode	3687
7.3	2 bits	Steering Angle Sensor Calibrated	3688
8.1	4 bits	Message Counter	3689
8.5	4 bits	Message Checksum	3690

PGN 61473 Engine Speed Sensor Information**ESSI**

This PGN contains the speed information and status signal of each engine speed sensor. This message is used for service to troubleshoot no-start or hard start problems. This message is not needed except for servicing.

Transmission Repetition Rate: Transmitted only after requested. After request, broadcast rate is engine speed dependent. Update stopped after key switch cycle.
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 33 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61473 (0x00F021)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Speed 1	4201
3-4	2 bytes	Engine Speed 2	723
5-6	2 bytes	Engine Speed 3	4202
7.3	2 bits	Engine Speed Sensor 3 Timing Pattern Status	4205
7.5	2 bits	Engine Speed Sensor 2 Timing Pattern Status	4204
7.7	2 bits	Engine Speed Sensor 1 Timing Pattern Status	4203

PGN 61475 Aftertreatment 1 SCR Dosing System Information 1**A1SCRDSI1**

This message contains SCR dosing system information for aftertreatment system 1 (or bank 1). See PGN 64833 for more information.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 35 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61475 (0x00F023)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Exhaust Fluid Actual Dosing Quantity	4331
3.1	4 bits	Aftertreatment 1 SCR System State	4332
4-5	2 bytes	Aftertreatment 1 Diesel Exhaust Fluid Actual Quantity of Integrator	4333
6	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	4334

PGN 61476 Aftertreatment 1 SCR Dosing System Requests 1**A1SCRDSR1**

This message contains SCR dosing system request information for aftertreatment system 1 (or bank 1). See PGN 64832 for more information.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 36 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61476 (0x00F024)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Exhaust Fluid Dosing Requested Quantity	4348
3.1	4 bits	Aftertreatment 1 SCR System Requested State	4349
4-5	2 bytes	Aftertreatment 1 Diesel Exhaust Fluid Requested Quantity of Integrator	4350

PGN 61477 Aftertreatment 1 SCR Ammonia Information**A1SCRAI**

This message contains aftertreatment outlet ammonia information for aftertreatment system 1 (or bank 1).

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 37 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61477 (0x00F025)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Outlet NH3	4377
3.1	5 bits	Aftertreatment 1 Outlet NH3 Sensor Preliminary FMI	4378
4.1	2 bits	Aftertreatment 1 Outlet NH3 Reading Stable	4379
4.3	2 bits	Aftertreatment 1 Outlet NH3 Gas Sensor Power In Range	4380
4.5	2 bits	Aftertreatment 1 Outlet NH3 Gas Sensor at Temperature	4381
5.1	5 bits	Aftertreatment 1 Outlet NH3 Gas Sensor Heater Preliminary FMI	4382
6.1	2 bits	Aftertreatment 1 Outlet NH3 Gas Sensor Heater Control	4383

PGN 61478 Aftertreatment 2 SCR Dosing System Information 1**A2SCRDSI1**

This message contains SCR dosing system information for aftertreatment system 2 (or bank 2). See PGN 64827 for more information.

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 38 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61478 (0x00F026)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Diesel Exhaust Fluid Actual Dosing Quantity	4384
3.1	4 bits	Aftertreatment 2 SCR System State	4385
4-5	2 bytes	Aftertreatment 2 Diesel Exhaust Fluid Actual Quantity of Integrator	4386
6	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Dosing Absolute Pressure	4387

PGN 61479 Aftertreatment 2 SCR Dosing System Requests 1**A2SCRDSR1**

This message contains SCR dosing system request information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 39 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61479 (0x00F027)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Diesel Exhaust Fluid Dosing Requested Quantity	4401
3.1	4 bits	Aftertreatment 2 SCR System Requested State	4402
4-5	2 bytes	Aftertreatment 2 Diesel Exhaust Fluid Requested Quantity of Integrator	4403

PGN 61480 Aftertreatment 2 SCR Ammonia Information**A2SCRAI**

This message contains outlet ammonia information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 40 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61480 (0x00F028)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Outlet NH3	4443
3.1	5 bits	Aftertreatment 2 Outlet NH3 Sensor Preliminary FMI	4444
4.1	2 bits	Aftertreatment 2 Outlet NH3 Reading Stable	4445
4.3	2 bits	Aftertreatment 2 Outlet NH3 Gas Sensor Power In Range	4446
4.5	2 bits	Aftertreatment 2 Outlet NH3 Gas Sensor at Temperature	4447
5.1	5 bits	Aftertreatment 2 Outlet NH3 Gas Sensor Heater Preliminary FMI	4448
6.1	2 bits	Aftertreatment 2 Outlet NH3 Gas Sensor Heater Control	4449

PGN 61481 Slope Sensor Information 2**SSI/2**

The Slope Sensor Information 2 message shall provide a measurement of the vehicle's extended pitch angle and a measurement of the vehicle's extended roll angle. The vehicle dynamics measurements in this message shall be according to a Z-Down axis system as referenced in SAE J670.

Note 1) When this PGN is used to transmit information from a device not attached to the vehicle, the components local frame of reference shall be used.

Note 2) The NAME of the source of the PGN shall to used to associate to the frame of reference. (e.g, Machine control will report vehicle pitch and roll, blade control will report blade pitch and roll).

Transmission Repetition Rate: 10 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 41 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61481 (0x00F029)

Start Position	Length	Parameter Name	SPN
1-3	3 bytes	Pitch Angle Extended Range	4976
4-6	3 bytes	Roll Angle Extended Range	4977
7.1	2 bits	Pitch Angle Extended Range Compensation	4978
7.3	2 bits	Pitch Angle Extended Range Figure of Merit	4979
7.5	2 bits	Roll Angle Extended Range Compensation	4980
7.7	2 bits	Roll Angle Extended Range Figure of Merit	4981
8	1 byte	Roll and Pitch Extended Range Measurement Latency	4982

PGN 61482 Angular Rate Information**ARI**

The Angular Rate Information message shall provide a measurement of the vehicle's pitch rate, roll rate, and yaw rate measurements. The vehicle dynamics measurements in this message shall be according to a Z-Down axis system as referenced in SAE J670.

Note 1) When this PGN is used to transmit information from a device not attached to the vehicle, the components local frame of reference shall be used.

Note 2) The NAME of the source of the PGN shall to used to associate to the frame of reference. (e.g, Machine control will report vehicle pitch rate, roll rate, and yaw rate. Blade control will report blade pitch rate, roll rate, and yaw rate).

Transmission Repetition Rate: 10 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 42 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 61482 (0x00F02A)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Pitch Rate Extended Range	4983
3-4	2 bytes	Roll Rate Extended Range	4984
5-6	2 bytes	Yaw Rate Extended Range	4985
7.1	2 bits	Pitch Rate Extended Range Figure of Merit	4986
7.3	2 bits	Roll Rate Extended Range Figure of Merit	4987
7.5	2 bits	Yaw Rate Extended Range Figure of Merit	4988
8	1 byte	Angular Rate Measurement Latency	4989

PGN 61483 Crash Notification**CN**

This message is transmitted in case of a crash event.

The message contains information about the Crash Type, a Crash Counter and a Checksum. The function of the Crash Counter is to prevent other ECU's from reacting to a faulty transmission of the Crash Information message.

Therefore the Crash Counter becomes incremented by 1 for every sent message, beginning with "0" for the first message.

Other ECUs should react on a state change in order to distinguish between a faulty transmission and a real crash event.

The Crash Checksum provides an additional verification of the signal path.

Transmission Repetition Rate: Transmitted every 20 msec for the first 100 msec and then broadcast every 1 sec for 10 sec in case of a crash event

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 240

PDU Specific: 43 PGN Supporting Information:

Default Priority: 0

Parameter Group Number: 61483 (0x00F02B)

Start Position	Length	Parameter Name	SPN
1.1	5 bits	Crash Type	4973
8.1	4 bits	Crash Counter	4974
8.5	4 bits	Crash Checksum	4975

PGN 61484 Magnet Status Information 2**MSI2**

This message carries data related to the status of the magnetic material handling system, possibly including the generator that provides power to the magnet.

Transmission Repetition Rate: 50 ms

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 240

PDU Specific: 44 PGN Supporting Information:

Default Priority: 2

Parameter Group Number: 61484 (0x00F02C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Magnet Forward Current	5008
3	1 byte	Magnet Reverse Current	5009
4.1	2 bits	Material Lift Switch	5010
4.3	2 bits	Material Drop Switch	5011
4.5	2 bits	Generator Current Boost Active Status	5012
4.7	2 bits	Material Lift Active Status	5013
5.1	2 bits	Material Drop Active Status	5014
5.3	2 bits	Lift Relay Control	5402
5.5	2 bits	Drop Relay Control	5403
5.7	2 bits	Magnet Generator Control	5551

PGN 61485 Acceleration Sensor**ACCS**

The acceleration sensor message shall provide a measurement of the vehicle's acceleration in the lateral, longitudinal, and vertical axes. The vehicle dynamics measurements in this message shall be according to a Z-Up axis system as referenced in SAE J670.

Transmission Repetition Rate: 10 ms (default) or 20 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 45 PGN Supporting Information:
 Default Priority: 2
 Parameter Group Number: 61485 (0x00F02D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Lateral Acceleration Extended Range	5347
3-4	2 bytes	Longitudinal Acceleration Extended Range	5348
5-6	2 bytes	Vertical Acceleration Extended Range	5349
7.1	2 bits	Lateral Acceleration Extended Range Figure of Merit	5350
7.3	2 bits	Longitudinal Acceleration Extended Range Figure of Merit	5351
7.5	2 bits	Vertical Acceleration Extended Range Figure of Merit	5352
7.7	2 bits	Support Variable Transmission Repetition Rate for Acceleration Sensor	5353

PGN 61486 Engine Turbocharger Wastegate Actuator and Exhaust Back Pressure Regulator Command ETWAC

This PGN will contain the Engine Turbocharger Wastegate Actuator 1 & 2 control and Exhaust Back Pressure Regulator commands.

Transmission Repetition Rate: Engine speed dependent
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 46 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 61486 (0x00F02E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger Wastegate Actuator 1 Command	5386
3-4	2 bytes	Engine Turbocharger Wastegate Actuator 2 Command	5387
5-6	2 bytes	Engine Exhaust Back Pressure Regulator Control Command	649

(R) PGN 61487 Advanced Emergency Braking System 1**AEBS1**

Advanced Emergency Braking System message 1.

Transmission Repetition Rate: Every 50ms and on change of "AEBS system state" or change of "Collision warning status" but no faster than every 10 ms

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 240

PDU Specific: 47 PGN Supporting Information:

Default Priority: 3

Parameter Group Number: 61487 (0x00F02F)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Advanced emergency braking system state	5676
1.5	4 bits	Collision warning level	5677
2.1	3 bits	Relevant object detected for advanced emergency braking system	5678
2.4	3 bits	Bend off probability of relevant object	5679
3	1 byte	Time to collision with relevant object	5680

(R) PGN 61488 Wireless Status**WS**

Carries commands received by the wireless transceiver from an off-board transmitter and conveys the status of the on-board wireless transceiver. The message originates from the on-board wireless transceiver and is directed to an Electronic Control Unit (ECU) assigned to managing the wireless transceivers.

Transmission Repetition Rate: 50 ms

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 240

PDU Specific: 48 PGN Supporting Information:

Default Priority: 3

Parameter Group Number: 61488 (0x00F030)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Wireless Rolling Message Counter	5750
3.5	4 bits	Transmitter Command State	5751
4-6	3 bytes	Transmitter ID 1	5752
7	1 byte	Wireless Signal Strength 1	5753

(R) PGN 61489 Wand Sensor**WAND**

The wand sensor is an electromechanical sensor that detects the angle of deflection of a wand.

Transmission Repetition Rate: 20 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 49 PGN Supporting Information:
 Default Priority: 1
 Parameter Group Number: 61489 (0x00F031)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Wand Angle	5821
3.1	2 bits	Wand Sensor Figure of Merit	5822

(R) PGN 61490 Linear Displacement Sensor**LDISP**

The Linear Displacement Sensor is an electromechanical sensor that detects the distance of an object from the body of the sensor.

Transmission Repetition Rate: 20 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 50 PGN Supporting Information:
 Default Priority: 1
 Parameter Group Number: 61490 (0x00F032)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Measured Linear Displacement	5823
3.1	2 bits	Linear Displacement Sensor Sensor Figure of Merit	5824

(R) PGN 61491 Aftertreatment 1 SCR Ammonia Information 2**A1SCRAI2**

This message contains aftertreatment intermediate ammonia information for aftertreatment system 1 (or bank 1).

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 51 PGN Supporting Information:
 Default Priority: 4
 Parameter Group Number: 61491 (0x00F033)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 SCR Intermediate NH3	5848
3.1	5 bits	Aftertreatment 1 SCR Intermediate NH3 Sensor Preliminary FMI	5849
4.1	2 bits	Aftertreatment 1 SCR Intermediate NH3 Reading Stable	5850
4.3	2 bits	Aftertreatment 1 SCR Intermediate NH3 Gas Sensor Power In Range	5851
4.5	2 bits	Aftertreatment 1 SCR Intermediate NH3 Gas Sensor at Temperature	5852
5.1	5 bits	Aftertreatment 1 SCR Intermediate NH3 Gas Sensor Heater Preliminary FMI	5853
6.1	2 bits	Aftertreatment 1 SCR Intermediate NH3 Gas Sensor Heater Control	5854

(R) PGN 61492 Aftertreatment 2 SCR Ammonia Information 2**A2SCRAI2**

This message contains aftertreatment intermediate ammonia information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 240
 PDU Specific: 52 PGN Supporting Information:
 Default Priority: 4
 Parameter Group Number: 61492 (0x00F034)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 SCR Intermediate NH3	5855
3.1	5 bits	Aftertreatment 2 SCR Intermediate NH3 Sensor Preliminary FMI	5856
4.1	2 bits	Aftertreatment 2 SCR Intermediate NH3 Reading Stable	5857
4.3	2 bits	Aftertreatment 2 SCR Intermediate NH3 Gas Sensor Power In Range	5858
4.5	1 bit	Aftertreatment 2 SCR Intermediate NH3 Gas Sensor at Temperature	5859
5.1	5 bits	Aftertreatment 2 SCR Intermediate NH3 Gas Sensor Heater Preliminary FMI	5860
6.1	2 bits	Aftertreatment 2 SCR Intermediate NH3 Gas Sensor Heater Control	5861

(R) PGN 64706 Hybrid System Status**HSS**

Status information of a hybrid system.

Transmission Repetition Rate: Every 1 sec and on change but no faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 194 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64706 (0x00FCC2)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Hybrid System Warning Indicator	5872
1.3	2 bits	Hybrid System Overheat Indicator	5873
1.5	2 bits	Hybrid System Stop Indicator	5874

(R) PGN 64707 Fuel Information 4 (Gaseous)**GFI4**

Gaseous fuel information 4

Transmission Repetition Rate: 200 ms
 Data Length: 8 bytes
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 195 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64707 (0x00FCC3)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Supply Gas Methane Percentage	5867

(R) PGN 64708 Aftertreatment 2 SCR Exhaust Gas Temperature 2**A2SCREGT2**

This message contains SCR catalyst gas temperature information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 196 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64708 (0x00FCC4)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 SCR Intermediate Gas Temperature	5864
3.1	5 bits	Aftertreatment 2 SCR Intermediate Gas Temperature Preliminary FMI	5865

(R) PGN 64709 Aftertreatment 1 SCR Exhaust Gas Temperature 2**A1SCREGT2**

This message contains SCR catalyst gas temperature information for aftertreatment system 1 (or bank 1).

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 197 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64709 (0x00FCC5)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 SCR Intermediate Gas Temperature	5862
3.1	5 bits	Aftertreatment 1 SCR Intermediate Gas Temperature Preliminary FMI	5863

(R) PGN 64712 Electronic Engine Controller 13**EEC13**

Transmission Repetition Rate: Every 1 sec and on change but no faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 200 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64712 (0x00FCC8)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Feedback Engine Fueling State	5794
1.3	2 bits	Engine Fueling Inhibit Allowed	5795
1.5	4 bits	Engine Fueling Inhibit Prevented Reason	5866

(R) PGN 64713 Engine Fuel/Throttle Valve Information 2**EF/TVI2**

This PGN will be used to transmit the Feedback information from the Engine Throttle and Fuel Actuator.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 201 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64713 (0x00FCC9)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Throttle Valve 1 Temperature	5783
2	1 byte	Engine Throttle Valve 2 Temperature	5784
3	1 byte	Engine Fuel Valve 1 Temperature	5785
4	1 byte	Engine Fuel Valve 2 Temperature	5786
5	1 byte	Engine Turbocharger Wastegate Actuator 2 Temperature	5787

(R) PGN 64714 Engine Exhaust Gas Recirculation 2 Actuator**EEGR1A**

Engine Exhaust Gas Recirculation 2 Actuator related parameters

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 202 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64714 (0x00FCCA)

Start Position	Length	Parameter Name	SPN
1.1	5 bits	Engine Exhaust Gas Recirculation 2 Actuator 1 Preliminary FMI	5773
1.6	3 bits	Engine Exhaust Gas Recirculation 2 Actuator 1 Temperature Status	5774
2	1 byte	Engine Exhaust Gas Recirculation 2 Actuator 1 Temperature	5775
3	1 byte	Engine Exhaust Gas Recirculation 2 Actuator 1 Desired Position	5776
4.1	5 bits	Engine Exhaust Gas Recirculation 2 Actuator 2 Preliminary FMI	5777
4.6	3 bits	Engine Exhaust Gas Recirculation 2 Actuator 2 Temperature Status	5778
5	1 byte	Engine Exhaust Gas Recirculation 2 Actuator 2 Temperature	5779
6	1 byte	Engine Exhaust Gas Recirculation 2 Actuator 2 Desired Position	5780
7.1	4 bits	Engine Exhaust Gas Recirculation 2 Actuator 1 Operation Status	5781
7.5	4 bits	Engine Exhaust Gas Recirculation 2 Actuator 2 Operation Status	5782

(R) PGN 64715 Engine Exhaust Gas Recirculation 1 Actuator**EEGR1A**

Engine Exhaust Gas Recirculation 1 Actuator related parameters

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 203 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64715 (0x00FCCB)

Start Position	Length	Parameter Name	SPN
1.1	5 bits	Engine Exhaust Gas Recirculation 1 Actuator 1 Preliminary FMI	5763
1.6	3 bits	Engine Exhaust Gas Recirculation 1 Actuator 1 Temperature Status	5764
2	1 byte	Engine Exhaust Gas Recirculation 1 Actuator 1 Temperature	5765
3	1 byte	Engine Exhaust Gas Recirculation 1 Actuator 1 Desired Position	5766
4.1	5 bits	Engine Exhaust Gas Recirculation 1 Actuator 2 Preliminary FMI	5767
4.6	3 bits	Engine Exhaust Gas Recirculation 1 Actuator 2 Temperature Status	5768
5	1 byte	Engine Exhaust Gas Recirculation 1 Actuator 2 Temperature	5769
6	1 byte	Engine Exhaust Gas Recirculation 1 Actuator 2 Desired Position	5770
7.1	4 bits	Engine Exhaust Gas Recirculation 1 Actuator 1 Operation Status	5771
7.5	4 bits	Engine Exhaust Gas Recirculation 1 Actuator 2 Operation Status	5772

(R) PGN 64716 Electronic Engine Controller 12**EEC12**

Engine Related Parameters

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 204 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64716 (0x00FCCC)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Aftertreatment 1 Intake Gas Sensor Power Supply	5758
1.3	2 bits	Aftertreatment 1 Outlet Gas Sensor Power Supply	5759
1.5	2 bits	Aftertreatment 2 Intake Gas Sensor Power Supply	5760
1.7	2 bits	Aftertreatment 2 Outlet Gas Sensor Power Supply	5761

(R) PGN 64719 NOx Sensor Self-Diagnosis Request**NSSR**

Request to initiate the self-diagnosis of the NOx sensors implemented in the system.

This request may be sent at any time, but should not be sent if the status parameter indicates the self-diagnosis is not possible (state = 100 in SPNs 5709, 5710, 5711, and 5712) due to conditions.

It does not need to be sent cyclically.

A diagnosis request should only be sent when the status is "000 – Diagnosis is not active" in SPNs 5709, 5710, 5711 and 5712, except to abort a current test.

Note that while a requested test is in process, a different test should not be initiated.

Transmission Repetition Rate: As required
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 207 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64719 (0x00FCCF)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	NOx Sensor ATO1 Self-diagnosis Trigger	5709
1.5	4 bits	NOx Sensor ATI1 Self-diagnosis Trigger	5710
2.1	4 bits	NOx Sensor ATO2 Self-diagnosis Trigger	5711
2.5	4 bits	NOx Sensor ATI2 Self-diagnosis Trigger	5712

(R) PGN 64720 Engine Particulate Sensor Information**EPSI**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 208 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64720 (0x00FCD0)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Particulate Sensor	5835
3-4	2 bytes	Aftertreatment 2 Particulate Sensor	5836

(R) PGN 64725 Aftertreatment 1 Diesel Exhaust Fluid Pump 1 Information**AT1P1I**

Contains information on Diesel Exhaust Fluid Pumps

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 213 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64725 (0x00FCD5)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Pump Heater	5706

(R) PGN 64726 Aftertreatment 1 Diesel Particulate Filter 2 Soot 5**AT1DPF2S5**

Diesel particulate filter soot parameters for the aftertreatment 1 diesel particulate filter 2.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 214 PGN Supporting Information: See Appendix D - PGN 64730
 Default Priority: 6
 Parameter Group Number: 64726 (0x00FCD6)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor	5652
		Analysis Frequency 3	
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor	5653
		Frequency 3 Soot Signal	
5-6	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor	5654
		Analysis Frequency 4	
7-8	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor	5655
		Frequency 4 Soot Signal	

(R) PGN 64727 Aftertreatment 1 Diesel Particulate Filter 2 Soot 4**AT1DPF2S4**

This message is used report the analysis frequency and associated soot sensor signal data for two of the requested analysis frequencies for aftertreatment 1 diesel particulate filter 2.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 215 PGN Supporting Information: See Appendix D - PGN 64730
 Default Priority: 6
 Parameter Group Number: 64727 (0x00FCD7)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Frequency 1	5648
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Frequency 1 Soot Signal	5649
5-6	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Frequency 2	5650
7-8	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Frequency 2 Soot Signal	5651

(R) PGN 64728 Aftertreatment 1 Diesel Particulate Filter 2 Soot 3**AT1DPF2S3**

This message is used to specify up to 4 soot sensor analysis frequencies to request the soot sensor signal data associated with those analysis frequencies for aftertreatment 1 diesel particulate filter 2.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 216 PGN Supporting Information: See Appendix D - PGN 64730
 Default Priority: 6
 Parameter Group Number: 64728 (0x00FCD8)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Request Frequency 1	5644
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Request Frequency 2	5645
5-6	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Request Frequency 3	5646
7-8	2 bytes	Aftertreatment 1 Diesel Particulate Filter 2 Soot Sensor Analysis Request Frequency 4	5647

(R) PGN 64729 Aftertreatment 1 Diesel Particulate Filter 1 Soot 5**AT1DPF1S5**

This message is used report the analysis frequency and associated soot sensor signal data for two of the requested analysis frequencies for the aftertreatment 1 diesel particulate filter 1.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 217 PGN Supporting Information: See Appendix D - PGN 64730
 Default Priority: 6
 Parameter Group Number: 64729 (0x00FCD9)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Frequency 3	5640
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Frequency 3 Soot Signal	5641
5-6	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Frequency 4	5642
7-8	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Frequency 4 Soot Signal	5643

(R) PGN 64730 Aftertreatment 1 Diesel Particulate Filter 1 Soot 4**AT1DPF1S4**

This message is used report the analysis frequency and associated soot sensor signal data for two of the requested analysis frequencies for the aftertreatment 1 diesel particulate filter 1.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 218 PGN Supporting Information: See Appendix D - PGN 64730
 Default Priority: 6
 Parameter Group Number: 64730 (0x00FCDA)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Frequency 1	5636
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Frequency 1 Soot Signal	5637
5-6	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Frequency 2	5638
7-8	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Frequency 2 Soot Signal	5639

(R) PGN 64731 Aftertreatment 1 Diesel Particulate Filter 1 Soot 3**AT1DPF1S3**

This message is used to specify up to 4 soot sensor analysis frequencies to request the soot sensor signal data associated with those analysis frequencies for aftertreatment 1 diesel particulate filter 1.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 219 PGN Supporting Information: See Appendix D - PGN 64730
 Default Priority: 6
 Parameter Group Number: 64731 (0x00FCDB)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Request Frequency 1	5632
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Request Frequency 2	5633
5-6	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Request Frequency 3	5634
7-8	2 bytes	Aftertreatment 1 Diesel Particulate Filter 1 Soot Sensor Analysis Request Frequency 4	5635

PGN 64732 Cruise Control 3**CCVS3**

Cruise Control / Vehicle Speed 3

Transmission Repetition Rate: Every 1 sec and on change but no faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 220 PGN Supporting Information: See Appendix D - PGN 2560
 Default Priority: 6
 Parameter Group Number: 64732 (0x00FCDC)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Adaptive Cruise Control Readiness Status	5606
1.3	3 bits	Cruise Control System Command State	5607
2	1 byte	Source Address of Controlling Device for Disabling Cruise Control	5608
3	1 byte	Source Address of Controlling Device for Pausing Cruise Control	5609

PGN 64733**Aftertreatment 2 Air Control 3****AT2AC3**

This PGN contains information about the Aftertreatment 2 Air Control.

NOTE: This message will be transmitted by the engine or aftertreatment controller. Other aftertreatment air control information could be added in the future.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 221 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64733 (0x00FCDD)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Secondary Air Absolute Pressure	5590

PGN 64734**Aftertreatment 1 Air Control 3****AT1AC3**

This PGN contains information about the Aftertreatment 1 Air Control.

NOTE: This message will be transmitted by the engine or aftertreatment controller. Other aftertreatment air control information could be added in the future.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 222 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64734 (0x00FCDE)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Secondary Air Absolute Pressure	5589

PGN 64735**Engine Fluid Level/Pressure 12****EFL/P12**

12th PGN which identifies parameters that are either measuring various pressures within the engine or identifying engine fluid levels

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 223 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64735 (0x00FCDF)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Fuel Delivery Absolute Pressure	5578
2	1 byte	Engine Filtered Fuel Delivery Pressure	5579
3	1 byte	Engine Filtered Fuel Delivery Absolute Pressure	5580
4	1 byte	Engine Fuel Filter Degradation	5584

(R) PGN 64736 Diesel Particulate Filter Control 2**DPFC2**

The purpose of this PGN is to group parameters about the diesel particulate filter regeneration control.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 224 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64736 (0x00FCE0)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Particulate Filter Intake Temperature Set Point	5501
3-4	2 bytes	Relative Unburned Fuel Mass from Engine	5502
5-6	2 bytes	Aftertreatment 1 Fuel Mass Rate	5503
7-8	2 bytes	Aftertreatment 2 Fuel Mass Rate	5834

PGN 64737 Fuel Economy 2 (Liquid)**LFE2**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 225 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64737 (0x00FCE1)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	High Resolution Engine Fuel Rate	1600

PGN 64738 Supplemental Fan Status**SFS**

The status of Supplemental Fan. This is a supplemental fan used for additional cooling beyond that of the primary cooling fan system. For example, this fan could be used to provide additional cooling to an aftertreatment system

Transmission Repetition Rate: 1 second
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 226 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64738 (0x00FCE2)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Supplemental Fan Enable Status	5556
1.3	2 bits	Supplemental Fan Direction Status	5557
1.5	4 bits	Supplemental Fan Velocity Status	5558
2.1	3 bits	Supplemental Fan Controller Temperature Status	5559
2.4	4 bits	Supplemental Fan Drive Status	5560
3	1 byte	Supplemental Fan Controller ECU Temperature	5561
4-5	2 bytes	Supplemental Fan Speed	5562
6	1 byte	Supplemental Fan Current	5563
7-8	2 bytes	Supplemental Fan Power	5564

PGN 64739 Engine Exhaust Brake Control**EBCC**

Contains information about the engine exhaust brake system control.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 227 PGN Supporting Information: See Appendix D - PGN 64739
 Default Priority: 4
 Parameter Group Number: 64739 (0x00FCE3)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Turbocharger 1 Turbine Outlet Pressure	5541
2	1 byte	Desired Engine Turbocharger 1 Turbine Outlet Pressure	5542
3	1 byte	Engine Exhaust Brake Actuator Command	5543
4	1 byte	Engine Turbocharger 2 Turbine Outlet Pressure	5544
5	1 byte	Desired Engine Turbocharger 2 Turbine Outlet Pressure	5545

PGN 64740 Engine Fuel Properties**EFP**

Engine Fuel Properties

Transmission Repetition Rate: 30 seconds
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 228 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64740 (0x00FCE4)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Fuel Dynamic Viscosity	5537
3-4	2 bytes	Engine Fuel Density	5538
5-6	2 bytes	Engine Fuel Dielectricity (high resolution)	5539
7-8	2 bytes	Engine Fuel Temperature (High Resolution)	5540

PGN 64741 Hydraulic Oil Properties**HOP**

Hydraulic Oil Properties. This hydraulic fluid is for the entire hydraulics system of a piece of equipment.

Transmission Repetition Rate: 30 seconds
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 229 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64741 (0x00FCE5)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Hydraulic Oil Dynamic Viscosity	5533
3-4	2 bytes	Hydraulic Oil Density	5534
5-6	2 bytes	Hydraulic Oil Relative Dielectricity (high resolution)	5535
7-8	2 bytes	Hydraulic Oil Temperature (High Resolution)	5536

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PGN 64742 Vehicle/Chassis Lubrication System 2**VLS2**

Reports vehicle/chassis lubrication systems status

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 230 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64742 (0x00FCE6)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Lubrication Cycle Mode Lock Status	5515
1.3	3 bits	Lubrication Cycle Mode Status	5516
1.6	3 bits	Lubrication Operation Mode Status	5517
2.1	2 bits	Lubrication Pump Enable Status	5518
2.3	2 bits	Lubrication Reservoir Level	5519
2.5	2 bits	Lubrication Timing Cycle Status	5520

(R) PGN 64743 Engine Configuration 3**EC3**

The EC3 message contains a static engine friction torque map consisting of torque points that correspond to the speed points in the EC1 message. A net brake torque map for the engine can be calculated by subtracting the static engine friction torque from the engine's corresponding indicated torque at each speed point. The static friction torque map is expected to change as engine temperature changes. It will also change when an engine speed derate is active.

For engine configuration map modes 1 and 2, points 1 through 6 correspond to the speed points in the torque map in the engine configuration message. For engine configuration map mode 3, points 1 through 5 correspond to the speed points, but point 6 corresponds to a speed point that is determined using Engine Gain (Kp) Of The Endspped Governor (SPN 545). Refer to Appendix D - PGN 65251 for a description of the modes.

Estimated Engine Parasitic Losses – Percent Torque (SPN 2978) are not accounted for in the EC3 static friction torque map. If the EC3 message is supported and parasitic losses are known, the parasitic losses must be included in Estimated Engine Parasitic Losses - Percent Torque (SPN 2978); the parasitic losses must NOT be included in Nominal Friction - Percent Torque (SPN 514).

Even though Estimated Pumping - Percent Torque (SPN 5398) is included in Nominal Friction - Percent Torque (SPN 514), Estimated Pumping - Percent Torque is not included in the computation of the static friction torque map. For a given engine speed, the relationship between the static friction torque map and Nominal Friction - Percent Torque can be determined by subtracting Estimated Pumping - Percent Torque from Nominal Friction - Percent Torque. The static friction torque map cannot include the effects of Estimated Pumping - Percent Torque because of the dynamic nature of the pumping losses.

The static friction torque at a given engine speed equals Nominal Friction - Percent Torque (SPN 514) minus Estimated Pumping - Percent Torque (SPN 5398).

Note: Refer to section 5.2.1.

Transmission Repetition Rate:	Every 5 s and on change of torque/speed points of more than 10% since last transmission but no faster than every 500 ms
Data Length:	8
Extended Data Page:	0
Data Page:	0
PDU Format:	252
PDU Specific:	231 PGN Supporting Information:
Default Priority:	6
Parameter Group Number:	64743 (0x00FCE7)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Friction Percent Torque At Idle, Point 1	5471
2	1 byte	Engine Friction Percent Torque, Point 2	5472
3	1 byte	Engine Friction Percent Torque, Point 3	5473
4	1 byte	Engine Friction Percent Torque, Point 4	5474
5	1 byte	Engine Friction Percent Torque, Point 5	5475
6	1 byte	Engine Friction Percent Torque, Point 6	5476
7	1 byte	Engine Friction Percent Torque, Point 7	5477

PGN 64744 Intake Valve Actuation Control**IVAC**

Contains information about the intake valve actuation system control.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 232 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64744 (0x00FCE8)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Intake Valve Actuation System Oil Pressure 1 Solenoid Control	5499
1.3	2 bits	Intake Valve Actuation System Oil Pressure 2 Solenoid Control	5500

PGN 64745 Armrest Switch Matrix Commands**ARMSWIMC**

Operator commands sent via the Armrest Switch Matrices.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 233 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64745 (0x00FCE9)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Armrest 1 Switch 1	1503
1.3	2 bits	Armrest 1 Switch 2	5492
1.5	2 bits	Armrest 2 Switch 1	5493
1.7	2 bits	Armrest 2 Switch 2	5494

PGN 64746 Vehicle Electrical Power #4**VEP4**

Hybrid system voltage information.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 234 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64746 (0x00FCEA)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Hybrid Battery Pack Remaining Charge	5464

PGN 64747 Aftertreatment 2 NOx Adsorber Information**AFT2NAI**

This message contains NOx adsorber information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 235 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64747 (0x00FCEB)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Aftertreatment 2 NOx Adsorber deNOx Regeneration Status	5460
1.3	2 bits	Aftertreatment 2 NOx Adsorber deSOx Regeneration Status	5462

PGN 64748 Aftertreatment 1 NOx Adsorber Information**AFT1NAI**

This message contains NOx adsorber information for aftertreatment system 1 (or bank 1).

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 236 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64748 (0x00FCEC)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Aftertreatment 1 NOx Adsorber deNOx Regeneration Status	5459
1.3	2 bits	Aftertreatment 1 NOx Adsorber deSOx Regeneration Status	5461

PGN 64749 Aftertreatment 2 Warm Up Diesel Oxidation Catalyst Information**AT2WUDOC**

This PGN contains information for the warm up oxidation catalytic converter in exhaust bank 2.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 237 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64749 (0x00FCED)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Warm Up Diesel Oxidation Catalyst Intake Temperature	5315
3-4	2 bytes	Aftertreatment 2 Warm Up Diesel Oxidation Catalyst Outlet Temperature	5316

PGN 64750 Land Leveling System Reference Elevation Data**LLRE**

This PGN will be used to communicate the reference elvation information for the land leveling system. It will communicate the left and right blade offset data and left and right elevation deviation data.

Transmission Repetition Rate: 200 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 238 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64750 (0x00FCEE)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Blade Elevation Deviation - Left	5410
3-4	2 bytes	Blade Elevation Deviation - Right	5411
5-6	2 bytes	Blade Reference Elevation Offset - Left	5412
7-8	2 bytes	Blade Reference Elevation Offset - Right	5413

PGN 64751 Engine Fluid Level/Pressure 11**EFL/P11**

Engine related parameters.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 239 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64751 (0x00FCEF)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 1 Intake Absolute Pressure	5430
3-4	2 bytes	Engine Exhaust Gas Recirculation 1 Outlet Absolute Pressure (High Resolution)	5431

PGN 64752 Engine Fuel/lube systems 2**EFS2**

Contains information on the engine fuel and lube system

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 240 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64752 (0x00FCF0)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Fuel Filter (Suction Side) Intake Absolute Pressure	5417

**(R) PGN 64753 Engine Turbocharger Wastegate Actuator and Exhaust Back Pressure Regulator Information
ETWAI**

This PGN will be used to transmit the Engine Turbocharger Wastegate and Exhaust Back Pressure Regulator Information.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 241 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64753 (0x00FCF1)

Start Position	Length	Parameter Name	SPN
1.1	5 bits	Engine Turbocharger Wastegate Actuator 2 Preliminary FMI	5384
1.6	3 bits	Engine Turbocharger Wastegate Actuator 2 Temperature Status	5385
2.1	4 bits	Engine Turbocharger Wastegate Actuator 1 Operation Status	5451
2.5	4 bits	Engine Turbocharger Wastegate Actuator 2 Operation Status	5452
3	1 byte	Engine Exhaust Back Pressure Regulator Position	5625
4.1	5 bits	Engine Exhaust Back Pressure Regulator Preliminary FMI	5626
4.6	3 bits	Engine Exhaust Back Pressure Regulator Temperature Status	5627
5.1	4 bits	Engine Exhaust Back Pressure Regulator Control Operation Status	5628
6	1 byte	Engine Turbocharger Wastegate Actuator 1 Temperature	5788
7	1 byte	Engine Exhaust Back Pressure Actuator 1 Desired Position	5789
8	1 byte	Engine Exhaust Back Pressure Actuator 1 Temperature	5790

(R) PGN 64754 Engine Fuel/Throttle Valve Information 1**EFTVI1**

This PGN will be used to transmit the Feedback information from the Engine Throttle and Fuel Actuator.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 242 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64754 (0x00FCF2)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Desired Throttle Valve 1 Position	5374
2.1	5 bits	Engine Throttle Valve 1 Preliminary FMI	5375
2.6	3 bits	Engine Throttle Valve 1 Temperature Status	5376
3	1 byte	Engine Desired Throttle Valve 2 Position	5377
4.1	5 bits	Engine Throttle Valve 2 Preliminary FMI	5378
4.6	3 bits	Engine Throttle Valve 2 Temperature status	5379
5.1	5 bits	Engine Fuel Valve 1 Preliminary FMI	5380
5.6	3 bits	Engine Fuel Valve 1 Temperature Status	5381
6.1	5 bits	Engine Fuel Valve 2 Preliminary FMI	5382
6.6	3 bits	Engine Fuel Valve 2 Temperature Status	5383
7.1	4 bits	Engine Throttle Valve 1 Operation Status	5445
7.5	4 bits	Engine Throttle Valve 2 Operation Status	5446
8.1	4 bits	Engine Fuel Valve 1 Operation Status	5447
8.5	4 bits	Engine Fuel Valve 2 Operation Status	5448

(R) PGN 64755 Engine Turbocharger Compressor Bypass Information**ETCBI**

This PGN will contain the Engine Turbocharger Compressor Bypass information

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 243 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64755 (0x00FCF3)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Turbocharger Compressor Bypass Actuator 2 Position	5388
2	1 byte	Engine Desired Turbocharger Compressor Bypass Actuator 2 Position	5389
3.1	5 bits	Engine Turbocharger compressor Bypass Actuator 2 Preliminary FMI	5390
3.6	3 bits	Engine Turbocharger Compressor Bypass Actuator 2 Temperature Status	5391
4.1	4 bits	Engine Turbocharger Compressor Bypass Actuator 1 Operation Status	5449
4.5	4 bits	Engine Turbocharger Compressor Bypass Actuator 2 Operation Status	5450
5	1 byte	Engine Turbocharger Compressor Bypass Actuator 1 Temperature	5791
6	1 byte	Engine Turbocharger Compressor Bypass Actuator 2 Temperature	5792

PGN 64756 Charge Air Cooler 2**CAC2**

Engine bank 2 Charge Air Cooler parameters

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 244 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64756 (0x00FCF4)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Charge Air Cooler 2 Intake Temperature	5289
3-4	2 bytes	Engine Charge Air Cooler 2 Outlet Temperature	5290
5-6	2 bytes	Engine Charge Air Cooler 2 Ambient Air Temperature	5291
7	1 byte	Engine Charge Air Cooler 2 Efficiency	5292

PGN 64757 Charge Air Cooler 2 Precooler**CAC2P**

Engine bank 2 CAC precooler parameters

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 245 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64757 (0x00FCF5)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Charge Air Cooler 2 Precooler Intake Temperature	5286
3-4	2 bytes	Engine Charge Air Cooler 2 Precooler Outlet Temperature	5287
5	1 byte	Engine Charge Air Cooler 2 Precooler Efficiency	5288

PGN 64758 Charge Air Cooler 1**CAC1**

Engine bank 1 Charge Air Cooler parameters

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 246 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64758 (0x00FCF6)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Charge Air Cooler 1 Intake Temperature	5283
3-4	2 bytes	Engine Charge Air Cooler 1 Ambient Air Temperature	5284
5	1 byte	Engine Charge Air Cooler 1 Efficiency	5285

PGN 64759 Charge Air Cooler 1 Precooler**CAC1P**

Engine bank 1 CAC precooler parameters

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 247 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64759 (0x00FCF7)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Charge Air Cooler 1 Precooler Intake Temperature	5280
3-4	2 bytes	Engine Charge Air Cooler 1 Precooler Outlet Temperature	5281
5	1 byte	Engine Charge Air Cooler 1 Precooler Efficiency	5282

PGN 64760 Diesel Particulate Filter 2 Soot 2**DPF2S2**

Additional diesel particulate filter soot parameters for diesel particulate filter 2.

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 248 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64760 (0x00FCF8)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Diesel Particulate Filter 2 Soot Signal Standard Deviation	5269
3-4	2 bytes	Diesel Particulate Filter 2 Soot Signal Maximum	5270
5-6	2 bytes	Diesel Particulate Filter 2 Soot Signal Minimum	5271

PGN 64761 Diesel Particulate Filter 1 Soot 2**DPF1S2**

Additional diesel particulate filter soot parameters for diesel particulate filter 1.

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 249 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64761 (0x00FCF9)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Diesel Particulate Filter 1 Soot Signal Standard Deviation	5266
3-4	2 bytes	Diesel Particulate Filter 1 Soot Signal Maximum	5267
5-6	2 bytes	Diesel Particulate Filter 1 Soot Signal Minimum	5268

(R) PGN 64762 Electronic Engine Controller 11**EEC11**

Engine related parameters

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 250 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 64762 (0x00FCFA)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 2 (EGR2) Valve Control	5264
3-4	2 bytes	Engine Exhaust Gas Recirculation 2 (EGR2) Valve 2 Control	5265
5-6	2 bytes	Engine Exhaust Gas Recirculation 2 Valve 1 Position Error	5831
7-8	2 bytes	Engine Exhaust Gas Recirculation 2 Valve 2 Position Error	5832

PGN 64763 Engine Manifold Actuator Position**EMAP**

Engine manifold actuator position parameters

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 251 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64763 (0x00FCFB)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Manifold Bank 1 Flow Balance Valve Actuator Position	5277
3-4	2 bytes	Engine Exhaust Manifold Bank 2 Flow Balance Valve Actuator Position	5279

PGN 64764 Engine Manifold Actuator Control**EMAC**

Engine manifold actuator control parameters.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 252 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 64764 (0x00FCFC)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Manifold Bank 1 Flow Balance Valve Actuator Control	5276
3-4	2 bytes	Engine Exhaust Manifold Bank 2 Flow Balance Valve Actuator Control	5278

PGN 64765 Electronic Engine Controller 9**EEC9**

Engine related parameters

Transmission Repetition Rate: 100 msec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 253 PGN Supporting Information:
 Default Priority: 4
 Parameter Group Number: 64765 (0x00FCFD)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 2 Valve Position	5262
3-4	2 bytes	Engine Exhaust Gas Recirculation 2 Valve 2 Position	5263
5-6	2 bytes	Commanded Engine Fuel Rail Pressure	5313
7-8	2 bytes	Commanded Engine Fuel Injection Control Pressure	5314

PGN 64766 Electronic Engine Controller 10**EEC10**

Engine related parameters

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 254 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 64766 (0x00FCFE)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 2 (EGR2) Cooler Intake Temperature	5258
3-4	2 bytes	Engine Exhaust Gas Recirculation 2 (EGR2) Cooler Intake Gas Absolute Pressure	5259
5	1 byte	Engine Exhaust Gas Recirculation 2 (EGR2) Cooler Efficiency	5260
6	1 byte	EGR 2 Cooler Bypass Actuator Position	5261

PGN 64767 Engine Temperature 5**ET5**

Engine related parameters

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 252
 PDU Specific: 255 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64767 (0x00FCFF)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 2 Temperature	5255
3-4	2 bytes	Engine Exhaust Gas Recirculation 2 Mixer Intake Temperature	5256

(R) PGN 64768 Engine Fluid Level/Pressure 10**EFL/P10**

Engine related parameters

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 00 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64768 (0x00FD00)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 2 Differential Pressure	5252
3	1 byte	Engine Exhaust Gas Recirculation 2 Intake Pressure	5253
4-5	2 bytes	Engine Exhaust Gas Recirculation 2 Outlet Absolute Pressure	5254
6-7	2 bytes	Engine Exhaust Gas Recirculation 2 Intake Absolute Pressure	5429
8	1 byte	Engine Coolant Pressure 2	5708

PGN 64769 Low Voltage Disconnect Status**LVDS**

Status of the Low-Voltage Disconnect (LVD) device.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 01 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64769 (0x00FD01)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Low Voltage Disconnect Manual Disconnect State	5141
1.3	2 bits	Low Voltage Disconnect Manual Connect State	5142
1.5	4 bits	Low Voltage Disconnect Current Operating Mode	5143
2.1	4 bits	Low Voltage Disconnect Output #3 State	5144
2.5	4 bits	Low Voltage Disconnect Output #2 State	5145
3.1	4 bits	Low Voltage Disconnect Output #1 State	5146
3.5	4 bits	Low Voltage Disconnect Vout Output State	5147
4	1 byte	Low Voltage Disconnect Temperature	5148

PGN 64772 Direct Lamp Control Data 2**DLCD2**

This message will be transmitted by the controller that is illuminating the lamps.

It is not required to be used with PGN 64774.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 04 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64772 (0x00FD04)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Vehicle Battery Voltage Low Lamp Data	5104
1.3	2 bits	Vehicle Fuel Level Low Lamp Data	5105
1.5	2 bits	Vehicle Air Pressure Low Lamp Data	5106
1.7	2 bits	Vehicle HVAC Recirculation Lamp Data	5107
2.1	2 bits	Vehicle Battery Charging Lamp Data	5108

PGN 64773 Direct Lamp Control Data 1**DLCD1**

This message will be transmitted by the controller that is illuminating the lamps.

It is not required to be used with PGN 64775.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 05 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64773 (0x00FD05)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Protect Lamp Data	5093
1.3	2 bits	Engine Amber Warning Lamp Data	5094
1.5	2 bits	Engine Red Stop Lamp Data	5095
1.7	2 bits	OBD Malfunction Indicator Lamp Data	5096
2.1	2 bits	Engine Brake Active Lamp Data	5097
2.3	2 bits	Compression Brake Enable Switch Indicator Lamp Data	5098
2.5	2 bits	Engine Oil Pressure Low Lamp Data	5099
2.7	2 bits	Engine Coolant Temperature High Lamp Data	5100
3.1	2 bits	Engine Coolant Level Low Lamp Data	5101
3.3	2 bits	Engine Idle Management Active Lamp Data	5102
3.5	2 bits	Engine Air Filter Restriction Lamp Data	5103
3.7	2 bits	Engine Fuel Filter Restricted Lamp Data	5470
8.7	2 bits	Engine Wait To Start Lamp Data	5416

PGN 64774 Direct Lamp Control Command 2**DLCC2**

Message that directly controls the driver indicator lamps. See also PGN 64775 for additional lamps and PGN 64772 for the feedback information about these lamps.

Note: Since this message is direct lamp control, it is required that only one device have direct control of any individual lamp. It is understood that there may be applications in which not all lamps will be directly controlled by a single ECU.

Transmission Repetition Rate: Every 1 s and on change of state but no faster than every 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 06 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64774 (0x00FD06)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Vehicle Battery Voltage Low Lamp Command	5087
1.3	2 bits	Vehicle Fuel Level Low Lamp Command	5088
1.5	2 bits	Vehicle Air Pressure Low Lamp Command	5089
1.7	2 bits	Vehicle HVAC Recirculation Lamp Command	5090
2.1	2 bits	Vehicle Battery Charging Lamp Command	5091

PGN 64775 Direct Lamp Control Command 1**DLCC1**

Message that directly controls the driver indicator lamps. See also PGN 64774 for additional lamps and PGN 64773 for the feedback information about these lamps.

Note: Since this message is direct lamp control, it is required that only one device have direct control of any individual lamp. It is understood that there may be applications in which not all lamps will be directly controlled by a single ECU.

Transmission Repetition Rate: Every 1 s and on change of state but no faster than every 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 07 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64775 (0x00FD07)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Protect Lamp Command	5077
1.3	2 bits	Engine Amber Warning Lamp Command	5078
1.5	2 bits	Engine Red Stop Lamp Command	5079
1.7	2 bits	OBD Malfunction Indicator Lamp Command	5080
2.1	2 bits	Engine Brake Active Lamp Command	5081
2.3	2 bits	Compression Brake Enable Switch Indicator Lamp Command	3987
2.5	2 bits	Engine Oil Pressure Low Lamp Command	5082
2.7	2 bits	Engine Coolant Temperature High Lamp Command	5083
3.1	2 bits	Engine Coolant Level Low Lamp Command	5084
3.3	2 bits	Engine Idle Management Active Lamp Command	5085
3.5	2 bits	Engine Air Filter Restriction Lamp Command	5086
3.7	2 bits	Engine Fuel Filter Restricted Lamp Command	5469

PGN 64776 Engine oil message**EOM**

Engine oil related parameters

Transmission Repetition Rate: 30 seconds
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 08 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 64776 (0x00FD08)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Oil Viscosity	5055
3-4	2 bytes	Engine Oil Density	5056
5-6	2 bytes	Engine Oil Relative Dielectricity (high resolution)	5468

PGN 64777 High Resolution Fuel Consumption (Liquid)**HRLFC**

Engine fuel consumption accumulators. See PGN 65257 for alternate resolution.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 09 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64777 (0x00FD09)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	High Resolution Engine Trip Fuel	5053
5-8	4 bytes	High Resolution Engine Total Fuel Used	5054

(R) PGN 64778 Aftertreatment 2 Outlet Gas NOx Sensor correction data 2**AT2OGC2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 10 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64778 (0x00FD0A)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 2 Outlet Gas NOx Sensor Correction of pressure Lambda	5048
2	1 byte	Aftertreatment 2 Outlet Gas NOx Sensor Correction of pressure Nox	5049
3	1 byte	Aftertreatment 2 Outlet Gas NOx Sensor NO2 Correction	5050
4	1 byte	Aftertreatment 2 Outlet Gas NOx Sensor NH3 Correction	5051
5	1 byte	NOx Sensor ATO2 Self-diagnosis Final Result	5719

(R) PGN 64779 Aftertreatment 2 Outlet Gas NOx Sensor correction data 1**AT2OGC1**

Transmission Repetition Rate: On start-up, and every second until the dewpoint signal state = 1 (SPN 3240) has been received by the transmitter
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 11 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64779 (0x00FD0B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Outlet Gas NOx Sensor Heater Ratio	5045
3-4	2 bytes	Aftertreatment 2 Outlet Gas NOx Sensor New part deviation NOx Gain	5046
5	1 byte	Aftertreatment 2 Outlet Gas NOx Sensor New part deviation NOx Offset	5047
6-7	2 bytes	NOx Sensor ATO2 Operation Hours Counter	5723

(R) PGN 64780 Aftertreatment 2 Intake Gas NOx Sensor correction data 2**AT2IGC2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 12 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64780 (0x00FD0C)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 2 Intake Gas NOx Sensor Correction of pressure Lambda	5041
2	1 byte	Aftertreatment 2 Intake Gas NOx Sensor Correction of pressure Nox	5042
3	1 byte	Aftertreatment 2 Intake Gas NOx Sensor NO2 Correction	5043
4	1 byte	Aftertreatment 2 Intake Gas NOx Sensor NH3 Correction	5044
5	1 byte	NOx Sensor AT12 Self-diagnosis Final Result	5720

(R) PGN 64781 Aftertreatment 2 Intake Gas NOx Sensor correction data 1**AT2IGC1**

Transmission Repetition Rate: On start-up, and every second until the dewpoint signal state = 1 (SPN 3239) has
 been received by the transmitter
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 13 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64781 (0x00FD0D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Intake Gas NOx Sensor Heater Ratio	5038
3-4	2 bytes	Aftertreatment 2 Intake Gas NOx Sensor New part deviation NOx Gain	5039
5	1 byte	Aftertreatment 2 Intake Gas NOx Sensor New part deviation NOx Offset	5040
6-7	2 bytes	NOx Sensor AT12 Operation Hours Counter	5724

(R) PGN 64782 Aftertreatment 1 Outlet Gas NOx Sensor correction data 2**AT10GC2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 14 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64782 (0x00FD0E)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 1 Outlet Gas NOx Sensor Correction of Pressure Lambda	5034
2	1 byte	Aftertreatment 1 Outlet Gas NOx Sensor Correction of Pressure NOx	5035
3	1 byte	Aftertreatment 1 Outlet Gas NOx Sensor NO2 Correction	5036
4	1 byte	Aftertreatment 1 Outlet Gas NOx Sensor NH3 Correction	5037
5	1 byte	NOx Sensor ATO1 Self-diagnosis Final Result	5717

(R) PGN 64783 Aftertreatment 1 Outlet Gas NOx Sensor correction data 1**AT10GC1**

Transmission Repetition Rate: On start-up, and every second until the dewpoint signal state = 1 (SPN 3238) has been received by the transmitter
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 15 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64783 (0x00FD0F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Outlet Gas NOx Sensor Heater Ratio	5031
3-4	2 bytes	Aftertreatment 1 Outlet Gas NOx Sensor New Part Deviation NOx Gain	5032
5	1 byte	Aftertreatment 1 Outlet Gas NOx Sensor New Part Deviation NOx Offset	5033
6-7	2 bytes	NOx Sensor ATO1 Operation Hours Counter	5721

(R) PGN 64784 Aftertreatment 1 Intake Gas NOx Sensor correction data 2**AT1IGC2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 16 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64784 (0x00FD10)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 1 Intake Gas NOx Sensor Correction of Pressure Lambda	5027
2	1 byte	Aftertreatment 1 Intake Gas NOx Sensor Correction of Pressure NOx	5028
3	1 byte	Aftertreatment 1 Intake Gas NOx Sensor NO2 Correction	5029
4	1 byte	Aftertreatment 1 Intake Gas NOx Sensor NH3 Correction	5030
5	1 byte	NOx Sensor AT11 Self-diagnosis Final Result	5718

(R) PGN 64785 Aftertreatment 1 Intake Gas NOx Sensor correction data 1**AT1IGC1**

Transmission Repetition Rate: On start-up, and every second until the dewpoint signal state = 1 (SPN 3237) has been received by the transmitter
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 17 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64785 (0x00FD11)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Intake Gas NOx Sensor Heater Ratio	5024
3-4	2 bytes	Aftertreatment 1 Intake Gas NOx Sensor New part deviation NOx Gain	5025
5	1 byte	Aftertreatment 1 Intake Gas NOx Sensor New part deviation NOx Offset	5026
6-7	2 bytes	NOx Sensor AT11 Operation Hours Counter	5722

PGN 64786 Magnet Status Information 1**MSI1**

This message carries data related to the status of the magnetic material handling system, possibly including the generator that provides power to the magnet.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 18 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64786 (0x00FD12)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Generator Overheat Status	5000
1.3	2 bits	Genset System Output Voltage Range Status	5001
1.5	2 bits	Grapple/Magnet Selection Switch	5003
1.7	2 bits	Genset Softstart Active Status	5004
2.1	5 bits	Reverse Current Range Setting	5002
3.1	2 bits	Genset Enable Active Status	5005
3.3	2 bits	Voltage Monitor Active Status	5006
3.5	2 bits	Generator Duty Cycle Exceeded Status	5007

PGN 64787 Magnet System Configuration Information**MSCI**

This message carries data related to the configuration of the magnetic material handling system, possibly including the generator that provides power to the magnet.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 19 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64787 (0x00FD13)

Start Position	Length	Parameter Name	SPN
1	1 byte	Magnet Boost Time	4998
2-3	2 bytes	Magnet Rated Power	4999

PGN 64788 Battery Charger 2**BCH2**

Parameters for the battery charger connected to the auxiliary battery.

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 20 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64788 (0x00FD14)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Battery Charger 2 State	4994
1.5	2 bits	Battery Charger 2 Power Line State	4995
2-3	2 bytes	Battery Charger 2 Output Voltage	4996
4-5	2 bytes	Battery Charger 2 Output Current	4997

PGN 64789 Battery Charger 1**BCH1**

Parameters for the battery charger connected to the main battery.

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 21 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64789 (0x00FD15)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Battery Charger 1 State	4990
1.5	2 bits	Battery Charger 1 Power Line State	4991
2-3	2 bytes	Battery Charger 1 Output Voltage	4992
4-5	2 bytes	Battery Charger 1 Output Current	4993

PGN 64790 Occupant Classification System Information**OCSI**

Message containing status of Occupant Classification System for driver, passenger and rear seating positions. The PGN becomes updated every time a Beltlock Status changes in the Beltlock and Airbag Deactivation PGN.

Transmission Repetition Rate: Transmitted every 5 sec and on change of PGN 64791 but no faster than every 250 msec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 22 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64790 (0x00FD16)

Start Position	Length	Parameter Name	SPN
1.1	3 bits	Driver Occupant Classification System Status	4963
1.4	3 bits	Passenger Occupant Classification System Status	4964
2.1	2 bits	Occupant Classification System 3 Status	4965
2.3	2 bits	Occupant Classification System 4 Status	4966
2.5	2 bits	Occupant Classification System 5 Status	4967
2.7	2 bits	Occupant Classification System 6 Status	4968
3.1	2 bits	Occupant Classification System 7 Status	4969
3.3	2 bits	Occupant Classification System 8 Status	4970
3.5	2 bits	Occupant Classification System 9 Status	4971
3.7	2 bits	Occupant Classification System 10 Status	4972

PGN 64791 Beltlock and Airbag Deactivation Switch Information**BDS**

Message containing Beltlock States and the Passenger Airbag Deactivation Switch State.

Transmission Repetition Rate: 250 msec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 23 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64791 (0x00FD17)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Driver Beltlock Status	4952
1.3	2 bits	Passenger Beltlock Status	4953
1.5	2 bits	Beltlock 3 Status	4954
1.7	2 bits	Beltlock 4 Status	4955
2.1	2 bits	Beltlock 5 Status	4956
2.3	2 bits	Beltlock 6 Status	4957
2.5	2 bits	Beltlock 7 Status	4958
2.7	2 bits	Beltlock 8 Status	4959
3.1	2 bits	Beltlock 9 Status	4960
3.3	2 bits	Beltlock 10 Status	4961
3.5	2 bits	Passenger Airbag Deactivation Switch Status	4962

PGN 64792**Collision Sensor Information****CSI**

Message containing type and serial number for every sensor of the restraint-system. The Collision Sensor Type is required for all possible sensors, but only the serial numbers of sensors with a type that is different from "unavailable" are included in the message. The serial numbers are delimited by an ASCII "***". Since there can be different sensor configurations, depending on the vehicle, the message has a variable length.

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 24 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 64792 (0x00FD18)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Frontal Collision Sensor 1 - Type	4918
1.5	4 bits	Frontal Collision Sensor 2 - Type	4919
2.1	4 bits	Frontal Collision Sensor 3 - Type	4920
2.5	4 bits	Frontal Collision Sensor 4 - Type	4921
3.1	4 bits	Side Collision Sensor Front Left - Type	4922
3.5	4 bits	Side Collision Sensor Mid Front Left - Type	4923
4.1	4 bits	Side Collision Sensor Mid Rear Left - Type	4924
4.5	4 bits	Side Collision Sensor Rear Left - Type	4925
5.1	4 bits	Side Collision Sensor Front Right - Type	4926
5.5	4 bits	Side Collision Sensor Mid Front Right - Type	4927
6.1	4 bits	Side Collision Sensor Mid Rear Right - Type	4928
6.5	4 bits	Side Collision Sensor Rear Right - Type	4929
7.1	4 bits	Rear Collision Sensor 1 - Type	4930
7.5	4 bits	Rear Collision Sensor 2 - Type	4931
8.1	4 bits	Rear Collision Sensor 3 - Type	4932
8.5	4 bits	Rear Collision Sensor 4 - Type	4933
9.1	4 bits	Rollover Sensor - Type	4934
a (starts at byte 10)	Variable - up to 32 bytes followed by an "***" delimiter	Frontal Collision Sensor 1 - Serial Number	4935
b	Variable - up to 32 bytes followed by an "***" delimiter	Frontal Collision Sensor 2 - Serial Number	4936
c	Variable - up to 32 bytes followed by an "***" delimiter	Frontal Collision Sensor 3 - Serial Number	4937
d	Variable - up to 32 bytes followed by an "***" delimiter	Frontal Collision Sensor 4 - Serial Number	4938
e	Variable - up to 32 bytes followed by an "***" delimiter	Side Collision Sensor Front Left - Serial Number	4939
f	Variable - up to 32 bytes followed by an "***" delimiter	Side Collision Sensor Mid Front Left - Serial Number	4940
g	Variable - up to 32 bytes followed by an "***" delimiter	Side Collision Sensor Mid Rear Left - Serial Number	4941

h	Variable - up to 32 bytes followed by an "*" delimiter	Side Collision Sensor Rear Left - Serial Number	4942
i	Variable - up to 32 bytes followed by an "*" delimiter	Side Collision Sensor Front Right - Serial Number	4943
j	Variable - up to 32 bytes followed by an "*" delimiter	Side Collision Sensor Mid Front Right - Serial Number	4944
k	Variable - up to 32 bytes followed by an "*" delimiter	Side Collision Sensor Mid Rear Right - Serial Number	4945
l	Variable - up to 32 bytes followed by an "*" delimiter	Side Collision Sensor Rear Right - Serial Number	4946
m	Variable - up to 32 bytes followed by an "*" delimiter	Rear Collision Sensor 1 - Serial Number	4947
n	Variable - up to 32 bytes followed by an "*" delimiter	Rear Collision Sensor 2 - Serial Number	4948
o	Variable - up to 32 bytes followed by an "*" delimiter	Rear Collision Sensor 3 - Serial Number	4949
p	Variable - up to 32 bytes followed by an "*" delimiter	Rear Collision Sensor 4 - Serial Number	4950
q	Variable - up to 32 bytes followed by an "*" delimiter	Rollover Sensor - Serial Number	4951

PGN 64793**Ignitor Loop Information****ILI**

Message containing resistance values for every equipped ignitor loop of the restraint-system. (Maximum of 100 Ignitor Loops.)

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Byte 21-22 Special Ignitor Loop [1], if installed

Byte 23-24 Special Ignitor Loop [2], if installed

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Up to Special Ignitor Loop [90], if installed

This entry can cover 100 ignition loops in total, where the last 90 are special ignitor loop SPNs. The SPN-names are numbered from 1 to 90.

Since there can be different ignitor loop configurations, depending on the vehicle, the message has a variable length. The first 10 standard ignitor loop parameters with exact names (SPN 4818 up to SPN 4827) are always listed in this message. The special ignitor loop parameters are listed only if equipped.

(A list with the positions of all equipped special ignitor loops is required for proper diagnostics in garage, in order to find the position of defective devices. This list has to be provided to service by the restraint system manufacturer.)

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 25 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 64793 (0x00FD19)

Start Position	Length	Parameter Name	SPN
001-002	2 bytes	Driver Airbag Ignitor Loop 1st Stage - Resistance	4818
003-004	2 bytes	Passenger Airbag Ignitor Loop 1st Stage - Resistance	4819
005-006	2 bytes	Driver Airbag Ignitor Loop 2nd Stage - Resistance	4820
007-008	2 bytes	Passenger Airbag Ignitor Loop 2nd Stage - Resistance	4821
009-010	2 bytes	Driver Belt Tensioner Ignitor Loop - Resistance	4822
011-012	2 bytes	Passenger Belt Tensioner Ignitor Loop - Resistance	4823
013-014	2 bytes	Side Bag Ignitor Loop 1 - Left - Resistance	4824
015-016	2 bytes	Side Bag Ignitor Loop 2 - Left - Resistance	4825
017-018	2 bytes	Side Bag Ignitor Loop 1 - Right - Resistance	4826
019-020	2 bytes	Side Bag Ignitor Loop 2 - Right - Resistance	4827
021-022	2 bytes	Special Ignitor Loop 1 - Resistance	4828
023-024	2 bytes	Special Ignitor Loop 2 - Resistance	4829
025-026	2 bytes	Special Ignitor Loop 3 - Resistance	4830
027-028	2 bytes	Special Ignitor Loop 4 - Resistance	4831
029-030	2 bytes	Special Ignitor Loop 5 - Resistance	4832
031-032	2 bytes	Special Ignitor Loop 6 - Resistance	4833
033-034	2 bytes	Special Ignitor Loop 7 - Resistance	4834
035-036	2 bytes	Special Ignitor Loop 8 - Resistance	4835
037-038	2 bytes	Special Ignitor Loop 9 - Resistance	4836
039-040	2 bytes	Special Ignitor Loop 10 - Resistance	4837
041-042	2 bytes	Special Ignitor Loop 11 - Resistance	4838
043-044	2 bytes	Special Ignitor Loop 12 - Resistance	4839
045-046	2 bytes	Special Ignitor Loop 13 - Resistance	4840
047-048	2 bytes	Special Ignitor Loop 14 - Resistance	4841
049-050	2 bytes	Special Ignitor Loop 15 - Resistance	4842
051-052	2 bytes	Special Ignitor Loop 16 - Resistance	4843
053-054	2 bytes	Special Ignitor Loop 17 - Resistance	4844
055-056	2 bytes	Special Ignitor Loop 18 - Resistance	4845
057-058	2 bytes	Special Ignitor Loop 19 - Resistance	4846
059-060	2 bytes	Special Ignitor Loop 20 - Resistance	4847
061-062	2 bytes	Special Ignitor Loop 21 - Resistance	4848
063-064	2 bytes	Special Ignitor Loop 22 - Resistance	4849
065-066	2 bytes	Special Ignitor Loop 23 - Resistance	4850

067-068	2 bytes	Special Ignitor Loop 24 - Resistance	4851
069-070	2 bytes	Special Ignitor Loop 25 - Resistance	4852
071-072	2 bytes	Special Ignitor Loop 26 - Resistance	4853
073-074	2 bytes	Special Ignitor Loop 27 - Resistance	4854
075-076	2 bytes	Special Ignitor Loop 28 - Resistance	4855
077-078	2 bytes	Special Ignitor Loop 29 - Resistance	4856
079-080	2 bytes	Special Ignitor Loop 30 - Resistance	4857
081-082	2 bytes	Special Ignitor Loop 31 - Resistance	4858
083-084	2 bytes	Special Ignitor Loop 32 - Resistance	4859
085-086	2 bytes	Special Ignitor Loop 33 - Resistance	4860
087-088	2 bytes	Special Ignitor Loop 34 - Resistance	4861
089-090	2 bytes	Special Ignitor Loop 35 - Resistance	4862
091-092	2 bytes	Special Ignitor Loop 36 - Resistance	4863
093-094	2 bytes	Special Ignitor Loop 37 - Resistance	4864
095-096	2 bytes	Special Ignitor Loop 38 - Resistance	4865
097-098	2 bytes	Special Ignitor Loop 39 - Resistance	4866
099-100	2 bytes	Special Ignitor Loop 40 - Resistance	4867
101-102	2 bytes	Special Ignitor Loop 41 - Resistance	4868
103-104	2 bytes	Special Ignitor Loop 42 - Resistance	4869
105-106	2 bytes	Special Ignitor Loop 43 - Resistance	4870
107-108	2 bytes	Special Ignitor Loop 44 - Resistance	4871
109-110	2 bytes	Special Ignitor Loop 45 - Resistance	4872
111-112	2 bytes	Special Ignitor Loop 46 - Resistance	4873
113-114	2 bytes	Special Ignitor Loop 47 - Resistance	4874
115-116	2 bytes	Special Ignitor Loop 48 - Resistance	4875
117-118	2 bytes	Special Ignitor Loop 49 - Resistance	4876
119-120	2 bytes	Special Ignitor Loop 50 - Resistance	4877
121-122	2 bytes	Special Ignitor Loop 51 - Resistance	4878
123-124	2 bytes	Special Ignitor Loop 52 - Resistance	4879
125-126	2 bytes	Special Ignitor Loop 53 - Resistance	4880
127-128	2 bytes	Special Ignitor Loop 54 - Resistance	4881
129-130	2 bytes	Special Ignitor Loop 55 - Resistance	4882
131-132	2 bytes	Special Ignitor Loop 56 - Resistance	4883
133-134	2 bytes	Special Ignitor Loop 57 - Resistance	4884
135-136	2 bytes	Special Ignitor Loop 58 - Resistance	4885
137-138	2 bytes	Special Ignitor Loop 59 - Resistance	4886
139-140	2 bytes	Special Ignitor Loop 60 - Resistance	4887
141-142	2 bytes	Special Ignitor Loop 61 - Resistance	4888
143-144	2 bytes	Special Ignitor Loop 62 - Resistance	4889
145-146	2 bytes	Special Ignitor Loop 63 - Resistance	4890
147-148	2 bytes	Special Ignitor Loop 64 - Resistance	4891
149-150	2 bytes	Special Ignitor Loop 65 - Resistance	4892
151-152	2 bytes	Special Ignitor Loop 66 - Resistance	4893
153-154	2 bytes	Special Ignitor Loop 67 - Resistance	4894
155-156	2 bytes	Special Ignitor Loop 68 - Resistance	4895
157-158	2 bytes	Special Ignitor Loop 69 - Resistance	4896
159-160	2 bytes	Special Ignitor Loop 70 - Resistance	4897
161-162	2 bytes	Special Ignitor Loop 71 - Resistance	4898
163-164	2 bytes	Special Ignitor Loop 72 - Resistance	4899
165-166	2 bytes	Special Ignitor Loop 73 - Resistance	4900
167-168	2 bytes	Special Ignitor Loop 74 - Resistance	4901
169-170	2 bytes	Special Ignitor Loop 75 - Resistance	4902
171-172	2 bytes	Special Ignitor Loop 76 - Resistance	4903
173-174	2 bytes	Special Ignitor Loop 77 - Resistance	4904
175-176	2 bytes	Special Ignitor Loop 78 - Resistance	4905
177-178	2 bytes	Special Ignitor Loop 79 - Resistance	4906
179-180	2 bytes	Special Ignitor Loop 80 - Resistance	4907
181-182	2 bytes	Special Ignitor Loop 81 - Resistance	4908
183-184	2 bytes	Special Ignitor Loop 82 - Resistance	4909
185-186	2 bytes	Special Ignitor Loop 83 - Resistance	4910
187-188	2 bytes	Special Ignitor Loop 84 - Resistance	4911
189-190	2 bytes	Special Ignitor Loop 85 - Resistance	4912
191-192	2 bytes	Special Ignitor Loop 86 - Resistance	4913
193-194	2 bytes	Special Ignitor Loop 87 - Resistance	4914
195-196	2 bytes	Special Ignitor Loop 88 - Resistance	4915
197-198	2 bytes	Special Ignitor Loop 89 - Resistance	4916

199-200 2 bytes Special Ignitor Loop 90 - Resistance 4917

PGN 64794 Aftertreatment 1 Warm Up Diesel Oxidation Catalyst Information

AT1WUDOC

This PGN contains information for the warm up oxidation catalytic converter in exhaust bank 1.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 26 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64794 (0x00FD1A)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Warm Up Diesel Oxidation Catalyst Intake Temperature	4809
3-4	2 bytes	Aftertreatment 1 Warm Up Diesel Oxidation Catalyst Outlet Temperature	4810

PGN 64795 Diesel Particulate Filter 2 Soot

DPF2S

Diesel particulate filter soot parameters for diesel particulate filter 2.

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 27 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64795 (0x00FD1B)

Start Position	Length	Parameter Name	SPN
1	1 byte	Diesel Particulate Filter 2 Soot Mass	4786
2	1 byte	Diesel Particulate Filter 2 Soot Density	4787
3-4	2 bytes	Diesel Particulate Filter 2 Mean Soot Signal	4788
5-6	2 bytes	Diesel Particulate Filter 2 Median Soot Signal	4789
7.1	5 bits	Diesel Particulate Filter 2 Soot Sensor Preliminary FMI	4790
8	1 byte	Diesel Particulate Filter 2 Soot Sensor ECU Internal Temperature	5570

PGN 64796 Diesel Particulate Filter 1 Soot**DPF1S**

Diesel particulate filter soot parameters for diesel particulate filter 1.

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 28 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64796 (0x00FD1C)

Start Position	Length	Parameter Name	SPN
1	1 byte	Diesel Particulate Filter 1 Soot Mass	4781
2	1 byte	Diesel Particulate Filter 1 Soot Density	4782
3-4	2 bytes	Diesel Particulate Filter 1 Mean Soot Signal	4783
5-6	2 bytes	Diesel Particulate Filter 1 Median Soot Signal	4784
7.1	5 bits	Diesel Particulate Filter 1 Soot Sensor Preliminary FMI	4785
8	1 byte	Diesel Particulate Filter 1 Soot Sensor ECU Internal Temperature	5569

PGN 64797 Aftertreatment Differential Temperature 2**ATDT2**

The purpose of this PGN is to group the aftertreatment differential temperature data. These values include the differential temperature measure between the intake and outlet of aftertreatment components.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 29 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64797 (0x00FD1D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Three Way Catalyst Differential Gas Temperature	4779
3-4	2 bytes	Aftertreatment 2 Three Way Catalyst Differential Gas Temperature	4780

PGN 64798 Aftertreatment Differential Temperature 1**ATDT1**

The purpose of this PGN is to group the aftertreatment differential temperature data. These values include the differential temperature measure between the intake and outlet of aftertreatment components.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 30 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64798 (0x00FD1E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Gas Oxidation Catalyst Differential Gas Temperature	4777
3-4	2 bytes	Aftertreatment 2 Gas Oxidation Catalyst Differential Gas Temperature	4778

PGN 64799 Aftertreatment 2 Diesel Oxidation Catalyst**A2DOC**

The purpose of this PGN is to group the aftertreatment diesel oxidation catalyst data for bank 2. These values include the intake temperature, outlet temperature and differential pressure as well as the associated preliminary FMIs. The diesel parameters should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). Separate parameters have been defined for gas fueled engines.

Note: The 5 bits of SPN 4775 are positioned into the data field in the following manner. The 2 most significant bits are placed in bits 2-1 of byte 8 such that the most significant bit of SPN 4775 located at byte 8 bit 2, and the 3 least significant bits are placed in bits 8-6 of byte 7 such that the least significant bit of SPN 4775 located at byte 7 bit 6.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 31 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64799 (0x00FD1F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Diesel Oxidation Catalyst Intake Gas Temperature	4771
3-4	2 bytes	Aftertreatment 2 Diesel Oxidation Catalyst Outlet Gas Temperature	4772
5-6	2 bytes	Aftertreatment 2 Diesel Oxidation Catalyst Differential Pressure	4773
7.1	5 bits	Aftertreatment 2 Diesel Oxidation Catalyst Intake Gas Temperature Preliminary FMI	4774
7.6-8.1	5 bits	Aftertreatment 2 Diesel Oxidation Catalyst Outlet Gas Temperature Preliminary FMI	4775
8.3	5 bits	Aftertreatment 2 Diesel Oxidation Catalyst Differential Pressure Preliminary FMI	4776

PGN 64800**Aftertreatment 1 Diesel Oxidation Catalyst****A1DOC**

The purpose of this PGN is to group the aftertreatment diesel oxidation catalyst data for bank 1. These values include the intake temperature, outlet temperature and differential pressure as well as the associated preliminary FMIs. The diesel parameters should be used with engines fueled by diesel fuel (not gaseous fuel like natural gas or propane). Separate parameters have been defined for gas fueled engines.

Note: The 5 bits of SPN 4769 are positioned into the data field in the following manner. The 2 most significant bits are placed in bits 2-1 of byte 8 such that the most significant bit of SPN 4769 located at byte 8 bit 2, and the 3 least significant bits are placed in bits 8-6 of byte 7 such that the least significant bit of SPN 4769 located at byte 7 bit 6.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 32 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64800 (0x00FD20)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Oxidation Catalyst Intake Gas Temperature	4765
3-4	2 bytes	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature	4766
5-6	2 bytes	Aftertreatment 1 Diesel Oxidation Catalyst Differential Pressure	4767
7.1	5 bits	Aftertreatment 1 Diesel Oxidation Catalyst Intake Gas Temperature Preliminary FMI	4768
7.6-8.1	5 bits	Aftertreatment 1 Diesel Oxidation Catalyst Outlet Gas Temperature Preliminary FMI	4769
8.3	5 bits	Aftertreatment 1 Diesel Oxidation Catalyst Differential Pressure Preliminary FMI	4770

PGN 64801**Aftertreatment 2 Gas Oxidation Catalyst****A2GOC**

The purpose of this PGN is to group the aftertreatment gas oxidation catalyst data for bank 2. These values include the intake temperature, outlet temperature and differential pressure as well as the associated preliminary FMIs. The gas parameters should be used with engines fueled by gaseous fuel like natural gas or propane. Separate parameters have been defined for diesel fueled engines.

Note: The 5 bits of SPN 4763 are positioned into the data field in the following manner. The 2 most significant bits are placed in bits 2-1 of byte 8 such that the most significant bit of SPN 4763 located at byte 8 bit 2, and the 3 least significant bits are placed in bits 8-6 of byte 7 such that the least significant bit of SPN 4763 located at byte 7 bit 6.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 33 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64801 (0x00FD21)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Gas Oxidation Catalyst Intake Gas Temperature	4759
3-4	2 bytes	Aftertreatment 2 Gas Oxidation Catalyst Outlet Gas Temperature	4760
5-6	2 bytes	Aftertreatment 2 Gas Oxidation Catalyst Differential Pressure	4761
7.1	5 bits	Aftertreatment 2 Gas Oxidation Catalyst Intake Gas Temperature Preliminary FMI	4762
7.6-8.1	5 bits	Aftertreatment 2 Gas Oxidation Catalyst Outlet Gas Temperature Preliminary FMI	4763
8.3	5 bits	Aftertreatment 2 Gas Oxidation Catalyst Differential Pressure Preliminary FMI	4764

PGN 64802**Aftertreatment 1 Gas Oxidation Catalyst****A1GOC**

The purpose of this PGN is to group the aftertreatment gas oxidation catalyst data for bank 1. These values include the intake temperature, outlet temperature and differential pressure as well as the associated preliminary FMIs. The gas parameters should be used with engines fueled by gaseous fuel like natural gas or propane. Separate parameters have been defined for diesel fueled engines.

Note: The 5 bits of SPN 4757 are positioned into the data field in the following manner. The 2 most significant bits are placed in bits 2-1 of byte 8 such that the most significant bit of SPN 4757 located at byte 8 bit 2, and the 3 least significant bits are placed in bits 8-6 of byte 7 such that the least significant bit of SPN 4757 located at byte 7 bit 6.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 34 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64802 (0x00FD22)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Gas Oxidation Catalyst Intake Gas Temperature	4753
3-4	2 bytes	Aftertreatment 1 Gas Oxidation Catalyst Outlet Gas Temperature	4754
5-6	2 bytes	Aftertreatment 1 Gas Oxidation Catalyst Differential Pressure	4755
7.1	5 bits	Aftertreatment 1 Gas Oxidation Catalyst Intake Gas Temperature Preliminary FMI	4756
7.6-8.1	5 bits	Aftertreatment 1 Gas Oxidation Catalyst Outlet Gas Temperature Preliminary FMI	4757
8.3	5 bits	Aftertreatment 1 Gas Oxidation Catalyst Differential Pressure Preliminary FMI	4758

PGN 64803**Extended Joystick Message 10****EJM10**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms	
Data Length:	8	
Extended Data Page:	0	
Data Page:	0	
PDU Format:	253	
PDU Specific:	35	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64803 (0x00FD23)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 10 Grip X-Axis Neutral Position Status	4735
1.3	2 bits	Joystick 10 Grip X-Axis Lever Left Negative Position Status	4736
1.5	2 bits	Joystick 10 Grip X-Axis Lever Right Positive Position Status	4737
1.7-2	10 bits	Joystick 10 Grip X-Axis Position	4738
3.1	2 bits	Joystick 10 Grip Y-Axis Neutral Position Status	4739
3.3	2 bits	Joystick 10 Grip Y-Axis Lever Back Negative Position Status	4740
3.5	2 bits	Joystick 10 Grip Y-Axis Lever Forward Positive Position Status	4741
3.7-4	10 bits	Joystick 10 Grip Y-Axis Position	4742
5.1	2 bits	Joystick 10 Theta-Axis Neutral Position Status	4743
5.3	2 bits	Joystick 10 Theta-Axis Counter Clockwise Negative Position Status	4744
5.5	2 bits	Joystick 10 Theta-Axis Clockwise Positive Position Status	4745
5.7-6	10 bits	Joystick 10 Theta-Axis Position	4746
7.3	2 bits	Joystick 10 Theta-Axis Detent Position Status	4747
7.5	2 bits	Joystick 10 Grip Y-Axis Detent Position Status	4748
7.7	2 bits	Joystick 10 Grip X-Axis Detent Position Status	4749

PGN 64804**Basic Joystick Message 10****BJM10**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Transmission Repetition Rate: Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms

Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 36 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64804 (0x00FD24)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 10 X-Axis Neutral Position Status	4713
1.3	2 bits	Joystick 10 X-Axis Lever Left Negative Position Status	4714
1.5	2 bits	Joystick 10 X-Axis Lever Right Positive Position Status	4715
1.7-2	10 bits	Joystick 10 X-Axis Position	4716
3.1	2 bits	Joystick 10 Y-Axis Neutral Position Status	4717
3.3	2 bits	Joystick 10 Y-Axis Lever Back Negative Position Status	4718
3.5	2 bits	Joystick 10 Y-Axis Lever Forward Positive Position Status	4719
3.7-4	10 bits	Joystick 10 Y-Axis Position	4720
5.5	2 bits	Joystick 10 Y-Axis Detent Position Status	4721
5.7	2 bits	Joystick 10 X-Axis Detent Position Status	4722
6.1	2 bits	Joystick 10 Button 4 Pressed Status	4723
6.3	2 bits	Joystick 10 Button 3 Pressed Status	4724
6.5	2 bits	Joystick 10 Button 2 Pressed Status	4725
6.7	2 bits	Joystick 10 Button 1 Pressed Status	4726
7.1	2 bits	Joystick 10 Button 8 Pressed Status	4727
7.3	2 bits	Joystick 10 Button 7 Pressed Status	4728
7.5	2 bits	Joystick 10 Button 6 Pressed Status	4729
7.7	2 bits	Joystick 10 Button 5 Pressed Status	4730
8.1	2 bits	Joystick 10 Button 12 Pressed Status	4731
8.3	2 bits	Joystick 10 Button 11 Pressed Status	4732
8.5	2 bits	Joystick 10 Button 10 Pressed Status	4733
8.7	2 bits	Joystick 10 Button 9 Pressed Status	4734

PGN 64805**Extended Joystick Message 9****EJM9**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms	
Data Length:	8	
Extended Data Page:	0	
Data Page:	0	
PDU Format:	253	
PDU Specific:	37	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64805 (0x00FD25)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 9 Grip X-Axis Neutral Position Status	4698
1.3	2 bits	Joystick 9 Grip X-Axis Lever Left Negative Position Status	4699
1.5	2 bits	Joystick 9 Grip X-Axis Lever Right Positive Position Status	4700
1.7-2	10 bits	Joystick 9 Grip X-Axis Position	4701
3.1	2 bits	Joystick 9 Grip Y-Axis Neutral Position Status	4702
3.3	2 bits	Joystick 9 Grip Y-Axis Lever Back Negative Position Status	4703
3.5	2 bits	Joystick 9 Grip Y-Axis Lever Forward Positive Position Status	4704
3.7-4	10 bits	Joystick 9 Grip Y-Axis Position	4705
5.1	2 bits	Joystick 9 Theta-Axis Neutral Position Status	4706
5.3	2 bits	Joystick 9 Theta-Axis Counter Clockwise Negative Position Status	4707
5.5	2 bits	Joystick 9 Theta-Axis Clockwise Positive Position Status	4708
5.7-6	10 bits	Joystick 9 Theta-Axis Position	4709
7.3	2 bits	Joystick 9 Theta-Axis Detent Position Status	4710
7.5	2 bits	Joystick 9 Grip Y-Axis Detent Position Status	4711
7.7	2 bits	Joystick 9 Grip X-Axis Detent Position Status	4712

PGN 64806**Basic Joystick Message 9****BJM9**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN
Bit 10	Byte n Bit 8
Bit 9	Bit 7
Bit 8	Bit 6
Bit 7	Bit 5
Bit 6	Bit 4
Bit 5	Bit 3
Bit 4	Bit 2
Bit 3	Bit 1
Bit 2	Byte (n-1) Bit 8
Bit 1	Bit 7

Transmission Repetition Rate: Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms

Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 38 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64806 (0x00FD26)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 9 X-Axis Neutral Position Status	4676
1.3	2 bits	Joystick 9 X-Axis Lever Left Negative Position Status	4677
1.5	2 bits	Joystick 9 X-Axis Lever Right Positive Position Status	4678
1.7-2	10 bits	Joystick 9 X-Axis Position	4679
3.1	2 bits	Joystick 9 Y-Axis Neutral Position Status	4680
3.3	2 bits	Joystick 9 Y-Axis Lever Back Negative Position Status	4681
3.5	2 bits	Joystick 9 Y-Axis Lever Forward Positive Position Status	4682
3.7-4	10 bits	Joystick 9 Y-Axis Position	4683
5.5	2 bits	Joystick 9 Y-Axis Detent Position Status	4684
5.7	2 bits	Joystick 9 X-Axis Detent Position Status	4685
6.1	2 bits	Joystick 9 Button 4 Pressed Status	4686
6.3	2 bits	Joystick 9 Button 3 Pressed Status	4687
6.5	2 bits	Joystick 9 Button 2 Pressed Status	4688
6.7	2 bits	Joystick 9 Button 1 Pressed Status	4689
7.1	2 bits	Joystick 9 Button 8 Pressed Status	4690
7.3	2 bits	Joystick 9 Button 7 Pressed Status	4691
7.5	2 bits	Joystick 9 Button 6 Pressed Status	4692
7.7	2 bits	Joystick 9 Button 5 Pressed Status	4693
8.1	2 bits	Joystick 9 Button 12 Pressed Status	4694
8.3	2 bits	Joystick 9 Button 11 Pressed Status	4695
8.5	2 bits	Joystick 9 Button 10 Pressed Status	4696
8.7	2 bits	Joystick 9 Button 9 Pressed Status	4697

PGN 64807**Extended Joystick Message 8****EJM8**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms		
Data Length:	8		
Extended Data Page:	0		
Data Page:	0		
PDU Format:	253		
PDU Specific:	39	PGN Supporting Information:	
Default Priority:	3		
Parameter Group Number:	64807 (0x00FD27)		

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 8 Grip X-Axis Neutral Position Status	4661
1.3	2 bits	Joystick 8 Grip X-Axis Lever Left Negative Position Status	4662
1.5	2 bits	Joystick 8 Grip X-Axis Lever Right Positive Position Status	4663
1.7-2	10 bits	Joystick 8 Grip X-Axis Position	4664
3.1	2 bits	Joystick 8 Grip Y-Axis Neutral Position Status	4665
3.3	2 bits	Joystick 8 Grip Y-Axis Lever Back Negative Position Status	4666
3.5	2 bits	Joystick 8 Grip Y-Axis Lever Forward Positive Position Status	4667
3.7-4	10 bits	Joystick 8 Grip Y-Axis Position	4668
5.1	2 bits	Joystick 8 Theta-Axis Neutral Position Status	4669
5.3	2 bits	Joystick 8 Theta-Axis Counter Clockwise Negative Position Status	4670
5.5	2 bits	Joystick 8 Theta-Axis Clockwise Positive Position Status	4671
5.7-6	10 bits	Joystick 8 Theta-Axis Position	4672
7.3	2 bits	Joystick 8 Theta-Axis Detent Position Status	4673
7.5	2 bits	Joystick 8 Grip Y-Axis Detent Position Status	4674
7.7	2 bits	Joystick 8 Grip X-Axis Detent Position Status	4675

PGN 64808**Basic Joystick Message 8****BJM8**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Transmission Repetition Rate:	Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms	
Data Length:	8	
Extended Data Page:	0	
Data Page:	0	
PDU Format:	253	
PDU Specific:	40	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64808 (0x00FD28)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 8 X-Axis Neutral Position Status	4639
1.3	2 bits	Joystick 8 X-Axis Lever Left Negative Position Status	4640
1.5	2 bits	Joystick 8 X-Axis Lever Right Positive Position Status	4641
1.7-2	10 bits	Joystick 8 X-Axis Position	4642
3.1	2 bits	Joystick 8 Y-Axis Neutral Position Status	4643
3.3	2 bits	Joystick 8 Y-Axis Lever Back Negative Position Status	4644
3.5	2 bits	Joystick 8 Y-Axis Lever Forward Positive Position Status	4645
3.7-4	10 bits	Joystick 8 Y-Axis Position	4646
5.5	2 bits	Joystick 8 Y-Axis Detent Position Status	4647
5.7	2 bits	Joystick 8 X-Axis Detent Position Status	4648
6.1	2 bits	Joystick 8 Button 4 Pressed Status	4649
6.3	2 bits	Joystick 8 Button 3 Pressed Status	4650
6.5	2 bits	Joystick 8 Button 2 Pressed Status	4651
6.7	2 bits	Joystick 8 Button 1 Pressed Status	4652
7.1	2 bits	Joystick 8 Button 8 Pressed Status	4653
7.3	2 bits	Joystick 8 Button 7 Pressed Status	4654
7.5	2 bits	Joystick 8 Button 6 Pressed Status	4655
7.7	2 bits	Joystick 8 Button 5 Pressed Status	4656
8.1	2 bits	Joystick 8 Button 12 Pressed Status	4657
8.3	2 bits	Joystick 8 Button 11 Pressed Status	4658
8.5	2 bits	Joystick 8 Button 10 Pressed Status	4659
8.7	2 bits	Joystick 8 Button 9 Pressed Status	4660

PGN 64809**Extended Joystick Message 7****EJM7**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms			
Data Length:	8			
Extended Data Page:	0			
Data Page:	0			
PDU Format:	253			
PDU Specific:	41	PGN Supporting Information:		
Default Priority:	3			
Parameter Group Number:	64809 (0x00FD29)			

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 7 Grip X-Axis Neutral Position Status	4624
1.3	2 bits	Joystick 7 Grip X-Axis Lever Left Negative Position Status	4625
1.5	2 bits	Joystick 7 Grip X-Axis Lever Right Positive Position Status	4626
1.7-2	10 bits	Joystick 7 Grip X-Axis Position	4627
3.1	2 bits	Joystick 7 Grip Y-Axis Neutral Position Status	4628
3.3	2 bits	Joystick 7 Grip Y-Axis Lever Back Negative Position Status	4629
3.5	2 bits	Joystick 7 Grip Y-Axis Lever Forward Positive Position Status	4630
3.7-4	10 bits	Joystick 7 Grip Y-Axis Position	4631
5.1	2 bits	Joystick 7 Theta-Axis Neutral Position Status	4632
5.3	2 bits	Joystick 7 Theta-Axis Counter Clockwise Negative Position Status	4633
5.5	2 bits	Joystick 7 Theta-Axis Clockwise Positive Position Status	4634
5.7-6	10 bits	Joystick 7 Theta-Axis Position	4635
7.3	2 bits	Joystick 7 Theta-Axis Detent Position Status	4636
7.5	2 bits	Joystick 7 Grip Y-Axis Detent Position Status	4637
7.7	2 bits	Joystick 7 Grip X-Axis Detent Position Status	4638

PGN 64810**Basic Joystick Message 7****BJM7**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN
Bit 10	Byte n Bit 8
Bit 9	Bit 7
Bit 8	Bit 6
Bit 7	Bit 5
Bit 6	Bit 4
Bit 5	Bit 3
Bit 4	Bit 2
Bit 3	Bit 1
Bit 2	Byte (n-1) Bit 8
Bit 1	Bit 7

Transmission Repetition Rate: Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms

Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 42 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64810 (0x00FD2A)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 7 X-Axis Neutral Position Status	4602
1.3	2 bits	Joystick 7 X-Axis Lever Left Negative Position Status	4603
1.5	2 bits	Joystick 7 X-Axis Lever Right Positive Position Status	4604
1.7-2	10 bits	Joystick 7 X-Axis Position	4605
3.1	2 bits	Joystick 7 Y-Axis Neutral Position Status	4606
3.3	2 bits	Joystick 7 Y-Axis Lever Back Negative Position Status	4607
3.5	2 bits	Joystick 7 Y-Axis Lever Forward Positive Position Status	4608
3.7-4	10 bits	Joystick 7 Y-Axis Position	4609
5.5	2 bits	Joystick 7 Y-Axis Detent Position Status	4610
5.7	2 bits	Joystick 7 X-Axis Detent Position Status	4611
6.1	2 bits	Joystick 7 Button 4 Pressed Status	4612
6.3	2 bits	Joystick 7 Button 3 Pressed Status	4613
6.5	2 bits	Joystick 7 Button 2 Pressed Status	4614
6.7	2 bits	Joystick 7 Button 1 Pressed Status	4615
7.1	2 bits	Joystick 7 Button 8 Pressed Status	4616
7.3	2 bits	Joystick 7 Button 7 Pressed Status	4617
7.5	2 bits	Joystick 7 Button 6 Pressed Status	4618
7.7	2 bits	Joystick 7 Button 5 Pressed Status	4619
8.1	2 bits	Joystick 7 Button 12 Pressed Status	4620
8.3	2 bits	Joystick 7 Button 11 Pressed Status	4621
8.5	2 bits	Joystick 7 Button 10 Pressed Status	4622
8.7	2 bits	Joystick 7 Button 9 Pressed Status	4623

PGN 64811**Extended Joystick Message 6****EJM6**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms	
Data Length:	8	
Extended Data Page:	0	
Data Page:	0	
PDU Format:	253	
PDU Specific:	43	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64811 (0x00FD2B)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 6 Grip X-Axis Neutral Position Status	4587
1.3	2 bits	Joystick 6 Grip X-Axis Lever Left Negative Position Status	4588
1.5	2 bits	Joystick 6 Grip X-Axis Lever Right Positive Position Status	4589
1.7-2	10 bits	Joystick 6 Grip X-Axis Position	4590
3.1	2 bits	Joystick 6 Grip Y-Axis Neutral Position Status	4591
3.3	2 bits	Joystick 6 Grip Y-Axis Lever Back Negative Position Status	4592
3.5	2 bits	Joystick 6 Grip Y-Axis Lever Forward Positive Position Status	4593
3.7-4	10 bits	Joystick 6 Grip Y-Axis Position	4594
5.1	2 bits	Joystick 6 Theta-Axis Neutral Position Status	4595
5.3	2 bits	Joystick 6 Theta-Axis Counter Clockwise Negative Position Status	4596
5.5	2 bits	Joystick 6 Theta-Axis Clockwise Positive Position Status	4597
5.7-6	10 bits	Joystick 6 Theta-Axis Position	4598
7.3	2 bits	Joystick 6 Theta-Axis Detent Position Status	4599
7.5	2 bits	Joystick 6 Grip Y-Axis Detent Position Status	4600
7.7	2 bits	Joystick 6 Grip X-Axis Detent Position Status	4601

PGN 64812**Basic Joystick Message 6****BJM6**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Transmission Repetition Rate: Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms

Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 44 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64812 (0x00FD2C)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 6 X-Axis Neutral Position Status	4565
1.3	2 bits	Joystick 6 X-Axis Lever Left Negative Position Status	4566
1.5	2 bits	Joystick 6 X-Axis Lever Right Positive Position Status	4567
1.7-2	10 bits	Joystick 6 X-Axis Position	4568
3.1	2 bits	Joystick 6 Y-Axis Neutral Position Status	4569
3.3	2 bits	Joystick 6 Y-Axis Lever Back Negative Position Status	4570
3.5	2 bits	Joystick 6 Y-Axis Lever Forward Positive Position Status	4571
3.7-4	10 bits	Joystick 6 Y-Axis Position	4572
5.5	2 bits	Joystick 6 Y-Axis Detent Position Status	4573
5.7	2 bits	Joystick 6 X-Axis Detent Position Status	4574
6.1	2 bits	Joystick 6 Button 4 Pressed Status	4575
6.3	2 bits	Joystick 6 Button 3 Pressed Status	4576
6.5	2 bits	Joystick 6 Button 2 Pressed Status	4577
6.7	2 bits	Joystick 6 Button 1 Pressed Status	4578
7.1	2 bits	Joystick 6 Button 8 Pressed Status	4579
7.3	2 bits	Joystick 6 Button 7 Pressed Status	4580
7.5	2 bits	Joystick 6 Button 6 Pressed Status	4581
7.7	2 bits	Joystick 6 Button 5 Pressed Status	4582
8.1	2 bits	Joystick 6 Button 12 Pressed Status	4583
8.3	2 bits	Joystick 6 Button 11 Pressed Status	4584
8.5	2 bits	Joystick 6 Button 10 Pressed Status	4585
8.7	2 bits	Joystick 6 Button 9 Pressed Status	4586

PGN 64813**Extended Joystick Message 5****EJM5**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms		
Data Length:	8		
Extended Data Page:	0		
Data Page:	0		
PDU Format:	253		
PDU Specific:	45	PGN Supporting Information:	
Default Priority:	3		
Parameter Group Number:	64813 (0x00FD2D)		

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 5 Grip X-Axis Neutral Position Status	4550
1.3	2 bits	Joystick 5 Grip X-Axis Lever Left Negative Position Status	4551
1.5	2 bits	Joystick 5 Grip X-Axis Lever Right Positive Position Status	4552
1.7-2	10 bits	Joystick 5 Grip X-Axis Position	4553
3.1	2 bits	Joystick 5 Grip Y-Axis Neutral Position Status	4554
3.3	2 bits	Joystick 5 Grip Y-Axis Lever Back Negative Position Status	4555
3.5	2 bits	Joystick 5 Grip Y-Axis Lever Forward Positive Position Status	4556
3.7-4	10 bits	Joystick 5 Grip Y-Axis Position	4557
5.1	2 bits	Joystick 5 Theta-Axis Neutral Position Status	4558
5.3	2 bits	Joystick 5 Theta-Axis Counter Clockwise Negative Position Status	4559
5.5	2 bits	Joystick 5 Theta-Axis Clockwise Positive Position Status	4560
5.7-6	10 bits	Joystick 5 Theta-Axis Position	4561
7.3	2 bits	Joystick 5 Theta-Axis Detent Position Status	4562
7.5	2 bits	Joystick 5 Grip Y-Axis Detent Position Status	4563
7.7	2 bits	Joystick 5 Grip X-Axis Detent Position Status	4564

PGN 64814**Basic Joystick Message 5****BJM5**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Transmission Repetition Rate: Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms

Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 46 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64814 (0x00FD2E)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 5 X-Axis Neutral Position Status	4528
1.3	2 bits	Joystick 5 X-Axis Lever Left Negative Position Status	4529
1.5	2 bits	Joystick 5 X-Axis Lever Right Positive Position Status	4530
1.7-2	10 bits	Joystick 5 X-Axis Position	4531
3.1	2 bits	Joystick 5 Y-Axis Neutral Position Status	4532
3.3	2 bits	Joystick 5 Y-Axis Lever Back Negative Position Status	4533
3.5	2 bits	Joystick 5 Y-Axis Lever Forward Positive Position Status	4534
3.7-4	10 bits	Joystick 5 Y-Axis Position	4535
5.5	2 bits	Joystick 5 Y-Axis Detent Position Status	4536
5.7	2 bits	Joystick 5 X-Axis Detent Position Status	4537
6.1	2 bits	Joystick 5 Button 4 Pressed Status	4538
6.3	2 bits	Joystick 5 Button 3 Pressed Status	4539
6.5	2 bits	Joystick 5 Button 2 Pressed Status	4540
6.7	2 bits	Joystick 5 Button 1 Pressed Status	4541
7.1	2 bits	Joystick 5 Button 8 Pressed Status	4542
7.3	2 bits	Joystick 5 Button 7 Pressed Status	4543
7.5	2 bits	Joystick 5 Button 6 Pressed Status	4544
7.7	2 bits	Joystick 5 Button 5 Pressed Status	4545
8.1	2 bits	Joystick 5 Button 12 Pressed Status	4546
8.3	2 bits	Joystick 5 Button 11 Pressed Status	4547
8.5	2 bits	Joystick 5 Button 10 Pressed Status	4548
8.7	2 bits	Joystick 5 Button 9 Pressed Status	4549

PGN 64815 Extended Joystick Message 4**EJM4**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms	
Data Length:	8	
Extended Data Page:	0	
Data Page:	0	
PDU Format:	253	
PDU Specific:	47	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64815 (0x00FD2F)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 4 Grip X-Axis Neutral Position Status	4513
1.3	2 bits	Joystick 4 Grip X-Axis Lever Left Negative Position Status	4514
1.5	2 bits	Joystick 4 Grip X-Axis Lever Right Positive Position Status	4515
1.7-2	10 bits	Joystick 4 Grip X-Axis Position	4516
3.1	2 bits	Joystick 4 Grip Y-Axis Neutral Position Status	4517
3.3	2 bits	Joystick 4 Grip Y-Axis Lever Back Negative Position Status	4518
3.5	2 bits	Joystick 4 Grip Y-Axis Lever Forward Positive Position Status	4519
3.7-4	10 bits	Joystick 4 Grip Y-Axis Position	4520
5.1	2 bits	Joystick 4 Theta-Axis Neutral Position Status	4521
5.3	2 bits	Joystick 4 Theta-Axis Counter Clockwise Negative Position Status	4522
5.5	2 bits	Joystick 4 Theta-Axis Clockwise Positive Position Status	4523
5.7-6	10 bits	Joystick 4 Theta-Axis Position	4524
7.3	2 bits	Joystick 4 Theta-Axis Detent Position Status	4525
7.5	2 bits	Joystick 4 Grip Y-Axis Detent Position Status	4526
7.7	2 bits	Joystick 4 Grip X-Axis Detent Position Status	4527

PGN 64816**Basic Joystick Message 4****BJM4**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Transmission Repetition Rate: Every 100 ms and on change of state, but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: Every 100 ms or on change of state, but no faster than every 20 ms

Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 48 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64816 (0x00FD30)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 4 X-Axis Neutral Position Status	4491
1.3	2 bits	Joystick 4 X-Axis Lever Left Negative Position Status	4492
1.5	2 bits	Joystick 4 X-Axis Lever Right Positive Position Status	4493
1.7-2	10 bits	Joystick 4 X-Axis Position	4494
3.1	2 bits	Joystick 4 Y-Axis Neutral Position Status	4495
3.3	2 bits	Joystick 4 Y-Axis Lever Back Negative Position Status	4496
3.5	2 bits	Joystick 4 Y-Axis Lever Forward Positive Position Status	4497
3.7-4	10 bits	Joystick 4 Y-Axis Position	4498
5.5	2 bits	Joystick 4 Y-Axis Detent Position Status	4499
5.7	2 bits	Joystick 4 X-Axis Detent Position Status	4500
6.1	2 bits	Joystick 4 Button 4 Pressed Status	4501
6.3	2 bits	Joystick 4 Button 3 Pressed Status	4502
6.5	2 bits	Joystick 4 Button 2 Pressed Status	4503
6.7	2 bits	Joystick 4 Button 1 Pressed Status	4504
7.1	2 bits	Joystick 4 Button 8 Pressed Status	4505
7.3	2 bits	Joystick 4 Button 7 Pressed Status	4506
7.5	2 bits	Joystick 4 Button 6 Pressed Status	4507
7.7	2 bits	Joystick 4 Button 5 Pressed Status	4508
8.1	2 bits	Joystick 4 Button 12 Pressed Status	4509
8.3	2 bits	Joystick 4 Button 11 Pressed Status	4510
8.5	2 bits	Joystick 4 Button 10 Pressed Status	4511
8.7	2 bits	Joystick 4 Button 9 Pressed Status	4512

PGN 64817**Fan Drive #2****FD2**

This parameter group transfers status and measured information for a second engine coolant fan. For systems with a single or the primary fan, see PGN 65213.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 49 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64817 (0x00FD31)

Start Position	Length	Parameter Name	SPN
1	1 byte	Estimated Percent Fan 2 Speed	1550
2.1	4 bits	Fan 2 Drive State	1557
3-4	2 bytes	Fan 2 Speed	1598
5-6	2 bytes	Hydraulic Fan 2 Motor Pressure	1707
7	1 byte	Fan 2 Drive Bypass Command Status	1708

PGN 64819**Aftertreatment 2 Diesel Exhaust Fluid Supply Information****A2DEFSI**

This message contains diesel exhaust fluid supply information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 51 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64819 (0x00FD33)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Diesel Exhaust Fluid Pump Motor Speed	4440
3	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Pump Drive Percentage	4441
4	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Return Valve	4442
5	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Tank Fill Valve Command	5437
6.1	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Pump State	5438
7	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Tank Drain Valve Command	5439

PGN 64820 Aftertreatment 2 SCR Reagent Tank 2 Information**A2SCRRT2I**

This message contains SCR reagent tank 2 information for aftertreatment system 2 (or bank 2). The second tank for the aftertreatment system is usually a smaller quick-thaw reagent tank located in series with tank 1.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 52 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64820 (0x00FD34)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Level	4433
2	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Temperature	4434
3-4	2 bytes	Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Level 2	4435
5.1	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Level Preliminary FMI	4436
6.1	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Temperature Preliminary FMI	4437
7	4 bits	Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Heater	4438
8.1	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Heater Preliminary FMI	4439

PGN 64821 Aftertreatment 2 SCR Reagent Tank 1 Information**A2SCRRT1I**

This message contains SCR reagent tank 1 information for aftertreatment system 2 (or bank 2). The first tank for the aftertreatment system is primary reagent storage tank.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 53 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64821 (0x00FD35)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Tank Level	4426
2	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Tank Temperature	4427
3-4	2 bytes	Aftertreatment 2 Diesel Exhaust Fluid Tank Level 2	4428
5.1	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Tank Level Preliminary FMI	4429
6.1	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Tank 1 Temperature Preliminary FMI	4430
7	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Tank Heater	4431
8.1	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Tank 1 Heater Preliminary FMI	4432

PGN 64822 Aftertreatment 2 Diesel Exhaust Fluid Information**A2DEFI**

Sensor Information which measures temperature, concentration, and conductivity of the diesel exhaust fluid of the aftertreatment 2 system.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 54 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64822 (0x00FD36)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Temperature 2	4420
2	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Concentration	4421
3	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Conductivity	4422
4.1	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Temperature 2 Preliminary FMI	4423
5.1	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Properties Preliminary FMI	4424
6.1	4 bits	Aftertreatment 2 Diesel Exhaust Fluid Type	4425

PGN 64823 Aftertreatment 2 SCR Service Information**A2SCRSI**

This message contains SCR service information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 55 PGN Supporting Information:
 Default Priority: 8
 Parameter Group Number: 64823 (0x00FD37)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Diesel Exhaust Fluid Average Consumption	4417
3-4	2 bytes	Aftertreatment 2 SCR Commanded Catalyst Diesel Exhaust Fluid Consumption	4418
5	1 byte	Aftertreatment 2 SCR Conversion Efficiency	4419

(R) PGN 64824 Aftertreatment 2 SCR Exhaust Gas Temperature 1**A2SCREGT1**

This message contains SCR catalyst intake and outlet exhaust gas temperature information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 56 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64824 (0x00FD38)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 SCR Catalyst Intake Gas Temperature	4413
3.1	5 bits	Aftertreatment 2 SCR Catalyst Intake Gas Temperature Preliminary FMI	4414
4-5	2 bytes	Aftertreatment 2 SCR Catalyst Outlet Gas Temperature	4415
6.1	5 bits	Aftertreatment 2 SCR Catalyst Outlet Gas Temperature Preliminary FMI	4416

PGN 64825 Aftertreatment 2 SCR Exhaust Gas Pressures**A2SCREGP**

This message contains SCR catalyst exhaust gas pressure information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 57 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64825 (0x00FD39)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 SCR Exhaust Gas Differential Pressure	4411
3.1	5 bits	Aftertreatment 2 SCR Exhaust Gas Differential Pressure Preliminary FMI	4412

PGN 64826**Aftertreatment 2 SCR Dosing System Requests 2****A2SCRDSR2**

This message contains SCR dosing system request information for aftertreatment system 2 (or bank 2).

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 58 PGN Supporting Information:
 Default Priority:
 Parameter Group Number: 64826 (0x00FD3A)

Start Position	Length	Parameter Name	SPN
1.3	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Doser Fault Suppression Request	4405
1.5	3 bits	Aftertreatment 2 Diesel Exhaust Fluid Doser Heating Mode Request	4406
2.1	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 1	4407
2.3	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 2	4408
2.5	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 3	4409
2.7	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 4	4410
3	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Tank Heater Command	5138
4	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Tank 2 Heater Command	5415

PGN 64827**Aftertreatment 2 SCR Dosing System Information 2****A2SCRDSI2**

This message contains SCR dosing system information for aftertreatment system 2 (or bank 2). See PGN 61478 for more information.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 59 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64827 (0x00FD3B)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 2 SCR Dosing Air Assist Absolute Pressure	4388
2	1 byte	Aftertreatment 2 SCR Dosing Air Assist Valve	4389
3	1 byte	Aftertreatment 2 Diesel Exhaust Fluid Dosing Temperature	4390
4.1	3 bits	Aftertreatment 2 SCR Dosing Valve Exhaust Temp. Reduction Request	4391
4.4	3 bits	Aftertreatment 2 SCR Feedback Control Status	4392
5.1	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 1 State	4393
5.3	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 1 Preliminary FMI	4394
6.1	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 2 State	4395
6.3	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 2 Preliminary FMI	4396
7.1	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 3 State	4397
7.3	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 3 Preliminary FMI	4398
8.1	2 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 4 State	4399
8.3	5 bits	Aftertreatment 2 Diesel Exhaust Fluid Line Heater 4 Preliminary FMI	4400

PGN 64828 Aftertreatment 1 Diesel Exhaust Fluid Supply Information**A1DEFSI**

This message contains diesel exhaust fluid supply information for aftertreatment system 1 (or bank 1).

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 60 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64828 (0x00FD3C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Exhaust Fluid Pump Motor Speed	4374
3	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Pump Drive Percentage	4375
4	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Return Valve	4376
5	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank Fill Valve	5434
		Command	
6.1	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Pump State	5435
7	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank Drain Valve	5436
		Command	

PGN 64829 Aftertreatment 1 SCR Reagent Tank 2 Information**A1SCRRT2I**

This message contains SCR reagent tank 2 information for aftertreatment system 1 (or bank 1). The second tank for the aftertreatment system is usually a smaller quick-thaw reagent tank located in series with tank 1.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 61 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64829 (0x00FD3D)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Level	4367
2	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Temperature	4368
3-4	2 bytes	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Level 2	4369
5.1	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Level Preliminary FMI	4370
6.1	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Temperature Preliminary FMI	4371
7	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Heater	4372
8.1	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Heater Preliminary FMI	4373

(R) PGN 64830 Aftertreatment 1 SCR Exhaust Gas Temperature 1**A1SCREGT1**

This message contains SCR catalyst intake and outlet exhaust gas temperature information for aftertreatment system 1 (or bank 1).

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 62 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64830 (0x00FD3E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 SCR Catalyst Intake Gas Temperature	4360
3.1	5 bits	Aftertreatment 1 SCR Catalyst Intake Gas Temperature Preliminary FMI	4361
4-5	2 bytes	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature	4363
6.1	5 bits	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature Preliminary FMI	4362

PGN 64831 Aftertreatment 1 SCR Exhaust Gas Pressures**A1SCREGP**

This message contains SCR catalyst exhaust gas pressure information for aftertreatment system 1 (or bank 1).

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 63 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64831 (0x00FD3F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 SCR Exhaust Gas Differential Pressure	4358
3.1	5 bits	Aftertreatment 1 SCR Exhaust Gas Differential Pressure Preliminary FMI	4359

(R) PGN 64832 Aftertreatment 1 SCR Dosing System Requests 2**A1SCRDSR2**

This message contains SCR dosing system request information for aftertreatment system 1 (or bank 1). See PGN 61476 for more information.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 64 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64832 (0x00FD40)

Start Position	Length	Parameter Name	SPN
1.3	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Doser Fault Suppression Request	4352
1.5	3 bits	Aftertreatment 1 Diesel Exhaust Fluid Doser Heating Mode Request	4353
2.1	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1	4354
2.3	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2	4355
2.5	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3	4356
2.7	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 4	4357
3	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater Command	5137
4	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Heater Command	5414
5	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Pump Heater Command	5707

PGN 64833 Aftertreatment 1 SCR Dosing System Information 2**A1SCRDSI2**

This message contains SCR dosing system information for aftertreatment system 1 (or bank 1). See PGN 61475 for more information.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 65 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64833 (0x00FD41)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 1 SCR Dosing Air Assist Absolute Pressure	4335
2	1 byte	Aftertreatment 1 SCR Dosing Air Assist Valve	4336
3	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature	4337
4.1	3 bits	Aftertreatment 1 SCR Dosing Valve Exhaust Temperature Reduction Request	4338
4.4	3 bits	Aftertreatment 1 SCR Feedback Control Status	4339
5.1	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	4340
5.3	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Preliminary FMI	4341
6.1	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State	4342
6.3	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Preliminary FMI	4343
7.1	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State	4344
7.3	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 Preliminary FMI	4345
8.1	2 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 4 State	4346
8.3	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 4 Preliminary FMI	4347

PGN 64836 Aftertreatment 2 Fuel Control 2**AT2FC2**

Contains information about the aftertreatment 2 fuel system. See also PGN 64928.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 68 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64836 (0x00FD44)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Fuel Pressure 2	4303
3.1	2 bits	Aftertreatment 2 Fuel Pump Relay Control	5426
3.3	2 bits	Aftertreatment 2 Fuel Flow Diverter Valve Control	5427
4-5	2 bytes	Aftertreatment 2 Fuel Pressure 2 Control	5428

PGN 64837 Aftertreatment 2 Three Way Catalytic Converter**AT2TWCC**

The purpose of this PGN is to group the aftertreatment Three Way Catalytic Converter data for bank 2. These values include the intake temperature, outlet temperature and differential pressure as well as the associated preliminary FMIs.

Note: The 5 bits of SPN 4299 are positioned into the data field in the following manner. The 2 most significant bits are placed in bits 2-1 of byte 8 such that the most significant bit of SPN 4299 located at byte 8 bit 2, and the 3 least significant bits are placed in bits 8-6 of byte 7 such that the least significant bit of SPN 4299 located at byte 7 bit 6.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 69 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64837 (0x00FD45)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Three Way Catalytic Converter Intake Gas Temperature	4295
3-4	2 bytes	Aftertreatment 2 Three Way Catalytic Converter Outlet Gas Temperature	4296
5-6	2 bytes	Aftertreatment 2 Three Way Catalytic Converter Differential Pressure	4297
7.1	5 bits	Aftertreatment 2 Three Way Catalytic Converter Intake Gas Temperature Preliminary FMI	4298
7.6-8.1	5 bits	Aftertreatment 2 Three Way Catalytic Converter Outlet Gas Temperature Preliminary FMI	4299
8.3	5 bits	Aftertreatment 2 Three Way Catalytic Converter Differential Pressure Preliminary FMI	4300

PGN 64838 Aftertreatment 1 Three Way Catalytic Converter**AT1TWCC**

The purpose of this PGN is to group the aftertreatment Three Way Catalytic Converter data for bank 1. These values include the intake temperature, outlet temperature and differential pressure as well as the associated preliminary FMIs.

Note: The 5 bits of SPN 4293 are positioned into the data field in the following manner. The 2 most significant bits are placed in bits 2-1 of byte 8 such that the most significant bit of SPN 4293 located at byte 8 bit 2, and the 3 least significant bits are placed in bits 8-6 of byte 7 such that the least significant bit of SPN 4293 located at byte 7 bit 6.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 70 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64838 (0x00FD46)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Three Way Catalytic Converter Intake Gas Temperature	4289
3-4	2 bytes	Aftertreatment 1 Three Way Catalytic Converter Outlet Gas Temperature	4290
5-6	2 bytes	Aftertreatment 1 Three Way Catalytic Converter Differential Pressure	4291
7.1	5 bits	Aftertreatment 1 Three Way Catalytic Converter Intake Gas Temperature Preliminary FMI	4292
7.6-8.1	5 bits	Aftertreatment 1 Three Way Catalytic Converter Outlet Gas Temperature Preliminary FMI	4293
8.3	5 bits	Aftertreatment 1 Three Way Catalytic Converter Differential Pressure Preliminary FMI	4294

PGN 64839 Transmission Mode Labels**TML**

ASCII text string describing a manufacturer-specific Transmission Mode. This PGN may contain up to 8 instances of the Transmission Mode Label field (for Transmission Mode 1 through Transmission Mode 8) with each separated by the asterisk (*) delimiter character. The Mode Labels are placed in increasing order of the mode number (i.e. Mode 1 label is first, followed by Mode 2 label, etc). It is not necessary to include text for each mode; however, the delimiter is always required for each, i.e. the data field must include all 8 asterisk delimiters even if the application does not provide label data for each of the modes.

NOTE – The ASCII character “*” is reserved as the delimiter

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 71 PGN Supporting Information: See Appendix D - PGN 64839
 Default Priority: 7
 Parameter Group Number: 64839 (0x00FD47)

Start Position	Length	Parameter Name	SPN
A	Variable - up to 25 bytes followed by an "*" delimiter	Transmission Mode Label	4254

PGN 64840 Engine Exhaust Bank 2 O2 Fuel Trim**O2FT2**

Provides bank 2 short-term and long-term fuel trim values

Transmission Repetition Rate: On Request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 72 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64840 (0x00FD48)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Long-term Fuel Trim - Bank 2	4239
3-4	2 bytes	Short-term Fuel Trim - Bank 2	4238
5.1	4 bits	Engine Exhaust Gas Oxygen Sensor Closed Loop Operation, Bank 2	4241

PGN 64841 Engine Exhaust Bank 1 O2 Fuel Trim**O2FT1**

Provides bank 1 short-term and long-term fuel trim values

Transmission Repetition Rate: On Request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 73 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64841 (0x00FD49)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Long-term Fuel Trim - Bank 1	4237
3-4	2 bytes	Short-term Fuel Trim - Bank 1	4236
5.1	4 bits	Engine Exhaust Gas Oxygen Sensor Closed Loop Operation, Bank 1	4240

PGN 64849 Aftercooler Coolant Control Valve Command**ACCVC**

Transmit status information from the Master ECU to an electronic thermostat

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 81 PGN Supporting Information:
 Default Priority: 4
 Parameter Group Number: 64849 (0x00FD51)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Aftercooler Coolant Thermostat Mode	4198
2	1 byte	Desired Aftercooler Coolant Intake Temperature	4199
3	1 byte	Desired Aftercooler Coolant Thermostat Opening	4200

PGN 64850 Engine Coolant Control Valve Command**ECCVC**

Transmit status information from the Master ECU to an electronic thermostat

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 82 PGN Supporting Information:
 Default Priority: 4
 Parameter Group Number: 64850 (0x00FD52)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Coolant Thermostat Mode	4195
2	1 byte	Desired Engine Coolant Pump Outlet Temperature	4196
3	1 byte	Desired Engine Coolant Thermostat Opening	4197
4	1 byte	Engine Auxiliary Cooler Supply Valve 1 Actuator Command	5546
5	1 byte	Engine Auxiliary Cooler Supply Valve 2 Actuator Command	5547

PGN 64851 Engine Average Information**EAI**

Reports averaged engine information

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 83 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64851 (0x00FD53)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Temperature Average	4151
3-4	2 bytes	Engine Exhaust Gas Temperature Average - Bank 1	4153
5-6	2 bytes	Engine Exhaust Gas Temperature Average - Bank 2	4152

PGN 64869 Aftertreatment 1 Fuel Control 2**AT1FC2**

Contains information about the aftertreatment 1 fuel system. See also PGN 64929.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 101 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64869 (0x00FD65)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Fuel Pressure 2	4077
3.1	2 bits	Aftertreatment 1 Fuel Pump Relay Control	5423
3.3	2 bits	Aftertreatment 1 Fuel Flow Diverter Valve Control	5424
4-5	2 bytes	Aftertreatment 1 Fuel Pressure 2 Actuator Control	5425
6	1 byte	Aftertreatment 1 Hydrocarbon Doser Intake Fuel Temperature	5456

PGN 64870 Engine Temperature 4**ET4**

Engine temperatures

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 102 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64870 (0x00FD66)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Coolant Temperature 2	4076
2	1 byte	Engine Coolant Pump Outlet Temperature	4193
3	1 byte	Engine Coolant Thermostat Opening	4194
4-5	2 bytes	Engine Exhaust Valve Actuation System Oil Temperature	4288
6-7	2 bytes	Engine Exhaust Gas Recirculation 1 Mixer Intake Temperature	5020

PGN 64871 Zero Net Vehicle Weight Change**ZNWV**

Zero Net Vehicle Weight Change

Transmission Repetition Rate: As needed
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 103 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64871 (0x00FD67)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Zero Net Vehicle Weight Change	4075

PGN 64872 Gross Combination Vehicle Weight**GCVW**

Gross Combination Vehicle Weight

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 104 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64872 (0x00FD68)

Start Position	Length	Parameter Name	SPN
1-3	3 bytes	Gross Combination Weight	417
4-6	3 bytes	Net Vehicle Weight Change	413

PGN 64873 Axle Group Calibration Weights**AGCW**

Indicates axle group calibration weights

Transmission Repetition Rate: On request. Upon request, will be broadcast as many times as required to transmit all available axle groups.

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 253

PDU Specific: 105 PGN Supporting Information:

Default Priority: 7

Parameter Group Number: 64873 (0x00FD69)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Axle Group Location	4074
2-3	2 bytes	Axle Group Empty Weight Calibration	408
4-5	2 bytes	Axle Group Full Weight Calibration	407

PGN 64874 Axle Group Weight**AGW**

Combination of specific axle group and the weight imposed on that axle group

Transmission Repetition Rate: On request. Upon request, will be broadcast as many times as required to transmit all available axle groups.

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 253

PDU Specific: 106 PGN Supporting Information:

Default Priority: 5

Parameter Group Number: 64874 (0x00FD6A)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Axle Group Location	4073
2-3	2 bytes	Axle Group Weight	409

PGN 64875**Available Axle Group Weights****AAGW**

Indicates which axle groups are included in the current weight calculation

Transmission Repetition Rate: As needed. Broadcast whenever an axle group equipped with an on-board scale joined or left the on-board scale subset.

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 253

PDU Specific: 107 PGN Supporting Information:

Default Priority: 6

Parameter Group Number: 64875 (0x00FD6B)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Steer Axle Group Weight Available	4059
1.3	2 bits	Lift Axle Group Weight Available	4060
1.5	2 bits	Drive Axle Group Weight Available	4061
1.7	2 bits	Tag Axle Group Weight Available	4062
2.1	2 bits	Additional Tractor Axle Group Weight Available	4063
2.3	2 bits	Trailer A Axle Group Weight Available	4064
2.5	2 bits	Trailer B Axle Group Weight Available	4065
2.7	2 bits	Trailer C Axle Group Weight Available	4066
3.1	2 bits	Trailer D Axle Group Weight Available	4067
3.3	2 bits	Trailer E Axle Group Weight Available	4068
3.5	2 bits	Trailer F Axle Group Weight Available	4069
3.7	2 bits	Trailer G Axle Group Weight Available	4070
4.1	2 bits	Trailer H Axle Group Weight Available	4071
4.3	2 bits	Additional Trailer Axle Group Weight Available	4072

PGN 64876**Aftertreatment 2 Air Control 2****AT2AC2**

This PGN contains information about the Aftertreatment 2 Air Control.

NOTE: This message will be transmitted by the engine or aftertreatment controller. Other aftertreatment air control information could be added in the future.

Transmission Repetition Rate: 500 msec

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 253

PDU Specific: 108 PGN Supporting Information:

Default Priority: 6

Parameter Group Number: 64876 (0x00FD6C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Secondary Air Differential Pressure	3833
3-4	2 bytes	Aftertreatment 2 Secondary Air Temperature	3834
5-6	2 bytes	Aftertreatment 2 Secondary Air Mass Flow	3835
7-8	2 bytes	Aftertreatment 2 Secondary Air Pressure	3838

PGN 64877 Aftertreatment 1 Air Control 2**AT1AC2**

This PGN contains information about the Aftertreatment 1 Air Control.

NOTE: This message will be transmitted by the engine or aftertreatment controller. Other aftertreatment air control information could be added in the future.

Transmission Repetition Rate: 500 msec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 109 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64877 (0x00FD6D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Secondary Air Differential Pressure	3830
3-4	2 bytes	Aftertreatment 1 Secondary Air Temperature	3831
5-6	2 bytes	Aftertreatment 1 Secondary Air Mass Flow	3832
7-8	2 bytes	Aftertreatment 1 Secondary Air Pressure	3837

PGN 64878 Aftertreatment 1 SCR Service Information**SCR1**

Used to provide information to an inspection tool regarding the proper use of reagent in SCR type emissions control systems.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 110 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64878 (0x00FD6E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Diesel Exhaust Fluid Average Consumption	3826
3-4	2 bytes	Aftertreatment 1 Commanded Diesel Exhaust Fluid Consumption	3828
5	1 byte	Aftertreatment 1 SCR Conversion Efficiency	4364
6-7	2 bytes	Aftertreatment 1 SCR Operator Inducement Active Traveled Distance	5463

PGN 64879 Electronic Engine Controller 8**EEC8**

Engine related parameters

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 111 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64879 (0x00FD6F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 1 (EGR1) Valve 2 Control	3821
3-4	2 bytes	Engine Exhaust Gas Recirculation 1 (EGR1) Cooler Intake Temperature	4750
5-6	2 bytes	Engine Exhaust Gas Recirculation 1 (EGR1) Cooler Intake Gas Absolute Pressure	4751
7	1 byte	Engine Exhaust Gas Recirculation 1 (EGR1) Cooler Efficiency	4752

PGN 64880 Door ramp control**DRC**

This message reports the current status of door ramps

Transmission Repetition Rate: Every 1 s while active and on change of state but no faster than every 100 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 1 s when active and on change of state
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 112 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64880 (0x00FD70)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Retract Status of ramp 1	3810
1.3	2 bits	Enable status of ramp 1	3811
1.5	2 bits	Movement status of ramp 1	3812
2.1	2 bits	Retract Status of ramp 2	3813
2.3	2 bits	Enable status of ramp 2	3814
2.5	2 bits	Movement status of ramp 2	3815
3.1	2 bits	Retract Status of ramp 3	3816
3.3	2 bits	Enable status of ramp 3	3817
3.5	2 bits	Movement status of ramp 3	3818
4.1	2 bits	Retract Status of ramp 4	4454
4.3	2 bits	Enable status of ramp 4	4455
4.5	2 bits	Movement status of ramp 4	4456
5.1	2 bits	Retract Status of ramp 5	4457
5.3	2 bits	Enable status of ramp 5	4458
5.5	2 bits	Movement status of ramp 5	4459

PGN 64881 Brake actuator stroke status**BSA**

The Brake Stroke Alert (BSA) message will provide the brake actuator stroke status for up to 20 wheel ends.

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 113 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64881 (0x00FD71)

Start Position	Length	Parameter Name	SPN
1.1	3 bits	Tractor Brake Stroke Axle 1 Left	3785
1.4	3 bits	Tractor Brake Stroke Axle 1 Right	3786
1.7-2.1	3 bits	Tractor Brake Stroke Axle 2 Left	3787
2.2	3 bits	Tractor Brake Stroke Axle 2 Right	3788
2.5	3 bits	Tractor Brake Stroke Axle 3 Left	3789
2.8-3.1	3 bits	Tractor Brake Stroke Axle 3 Right	3790
3.3	3 bits	Tractor Brake Stroke Axle 4 Left	3791
3.6	3 bits	Tractor Brake Stroke Axle 4 Right	3792
4.1	3 bits	Tractor Brake Stroke Axle 5 Left	3793
4.4	3 bits	Tractor Brake Stroke Axle 5 Right	3794
4.7-5.1	3 bits	Trailer Brake Stroke Axle 1 Left	3795
5.2	3 bits	Trailer Brake Stroke Axle 1 Right	3796
5.5	3 bits	Trailer Brake Stroke Axle 2 Left	3797
5.8-6.1	3 bits	Trailer Brake Stroke Axle 2 Right	3798
6.3	3 bits	Trailer Brake Stroke Axle 3 Left	3799
6.6	3 bits	Trailer Brake Stroke Axle 3 Right	3800
7.1	3 bits	Trailer Brake Stroke Axle 4 Left	3801
7.4	3 bits	Trailer Brake Stroke Axle 4 Right	3802
7.7-8.1	3 bits	Trailer Brake Stroke Axle 5 Left	3803
8.2	3 bits	Trailer Brake Stroke Axle 5 Right	3804

PGN 64882 Engine Spark Voltage 6**ESV6**

The PGN contains information about spark voltage values for cylinders 21 through 24. This is the secondary voltage of the combustion event.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 114 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64882 (0x00FD72)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Spark Plug 21	1314
3-4	2 bytes	Engine Spark Plug 22	1315
5-6	2 bytes	Engine Spark Plug 23	1316
7-8	2 bytes	Engine Spark Plug 24	1317

PGN 64883**Engine Spark Voltage 5****ESV5**

The PGN contains information about spark voltage values for cylinders 17 through 20. This is the secondary voltage of the combustion event.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 115 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64883 (0x00FD73)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Spark Plug 17	1310
3-4	2 bytes	Engine Spark Plug 18	1311
5-6	2 bytes	Engine Spark Plug 19	1312
7-8	2 bytes	Engine Spark Plug 20	1313

PGN 64884**Engine Spark Voltage 4****ESV4**

The PGN contains information about spark voltage values for cylinders 13 through 16. This is the secondary voltage of the combustion event.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 116 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64884 (0x00FD74)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Spark Plug 13	1306
3-4	2 bytes	Engine Spark Plug 14	1307
5-6	2 bytes	Engine Spark Plug 15	1308
7-8	2 bytes	Engine Spark Plug 16	1309

PGN 64885**Engine Spark Voltage 3****ESV3**

The PGN contains information about spark voltage values for cylinders 9 through 12. This is the secondary voltage of the combustion event.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 117 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64885 (0x00FD75)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Spark Plug 9	1302
3-4	2 bytes	Engine Spark Plug 10	1303
5-6	2 bytes	Engine Spark Plug 11	1304
7-8	2 bytes	Engine Spark Plug 12	1305

PGN 64886**Engine Spark Voltage 2****ESV2**

The PGN contains information about spark voltage values for cylinders 5 through 8. This is the secondary voltage of the combustion event.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 118 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64886 (0x00FD76)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Spark Plug 5	1298
3-4	2 bytes	Engine Spark Plug 6	1299
5-6	2 bytes	Engine Spark Plug 7	1300
7-8	2 bytes	Engine Spark Plug 8	1301

PGN 64887**Engine Spark Voltage 1****ESV1**

The PGN contains information about spark voltage values for cylinders 1 through 4. This is the secondary voltage of the combustion event.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 119 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64887 (0x00FD77)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Spark Plug 1	1294
3-4	2 bytes	Engine Spark Plug 2	1295
5-6	2 bytes	Engine Spark Plug 3	1296
7-8	2 bytes	Engine Spark Plug 4	1297

PGN 64888**Aftertreatment 2 Trip Information****AT2TI**

This PGN contains trip total information about the aftertreatment 2.

NOTE: The SPNs in this PGN need to be reset by the reset PGN 56832.

Transmission Repetition Rate: On request
 Data Length: 32
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 120 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64888 (0x00FD78)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Aftertreatment 2 Diesel Particulate Filter Trip Fuel Used	3741
05-08	4 bytes	Aftertreatment 2 Diesel Particulate Filter Trip Active Regeneration Time	3742
09-12	4 bytes	Aftertreatment 2 Diesel Particulate Filter Trip Disabled Time	3743
13-16	4 bytes	Aftertreatment 2 Diesel Particulate Filter Trip Number of Active Regenerations	3744
17-20	4 bytes	Aftertreatment 2 Diesel Particulate Filter Trip Passive Regeneration Time	3745
21-24	4 bytes	Aftertreatment 2 Diesel Particulate Filter Trip Number of Passive Regenerations	3746
25-28	4 bytes	Aftertreatment 2 Diesel Particulate Filter Trip Number of Active Regeneration Inhibit Requests	3747
29-32	4 bytes	Aftertreatment 2 Diesel Particulate Filter Trip Number of Active Regeneration Manual Requests	3748

PGN 64889 Aftertreatment 1 Trip Information**AT1TI**

This PGN contains trip total information about the aftertreatment 1.

NOTE: The SPNs in this PGN need to be reset by the reset PGN 56832.

Transmission Repetition Rate: On request
 Data Length: 32
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 121 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64889 (0x00FD79)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Aftertreatment 1 Diesel Particulate Filter Trip Fuel Used	3733
05-08	4 bytes	Aftertreatment 1 Diesel Particulate Filter Trip Active Regeneration Time	3734
09-12	4 bytes	Aftertreatment 1 Diesel Particulate Filter Trip Disabled Time	3735
13-16	4 bytes	Aftertreatment 1 Diesel Particulate Filter Trip Number of Active Regenerations	3736
17-20	4 bytes	Aftertreatment 1 Diesel Particulate Filter Trip Passive Regeneration Time	3737
21-24	4 bytes	Aftertreatment 1 Diesel Particulate Filter Trip Number of Passive Regenerations	3738
25-28	4 bytes	Aftertreatment 1 Diesel Particulate Filter Trip Number of Active Regeneration Inhibit Requests	3739
29-32	4 bytes	Aftertreatment 1 Diesel Particulate Filter Trip Number of Active Regeneration Manual Requests	3740

PGN 64890 Aftertreatment 2 Service**AT2S**

This PGN contains information about the aftertreatment 2 (diesel particulate filter 2 soot and ash load).

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 122 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64890 (0x00FD7A)

Start Position	Length	Parameter Name	SPN
1	1 byte	Diesel Particulate Filter 2 Soot Load Percent	3722
2	1 byte	Diesel Particulate Filter 2 Ash Load Percent	3723
3-6	4 bytes	Diesel Particulate Filter 2 Time Since Last Active Regeneration	3724
7	2 bytes	Aftertreatment 2 Diesel Particulate Filter Soot Load Regeneration Threshold	5467

PGN 64891**Aftertreatment 1 Service****AT1S**

This PGN contains information about the aftertreatment 1 (diesel particulate filter 1 soot and ash load).

Transmission Repetition Rate: On request
Data Length: 8
Extended Data Page: 0
Data Page: 0
PDU Format: 253
PDU Specific: 123 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64891 (0x00FD7B)

Start Position	Length	Parameter Name	SPN
1	1 byte	Diesel Particulate Filter 1 Soot Load Percent	3719
2	1 byte	Diesel Particulate Filter 1 Ash Load Percent	3720
3-6	4 bytes	Diesel Particulate Filter 1 Time Since Last Active Regeneration	3721
7	2 bytes	Aftertreatment 1 Diesel Particulate Filter Soot Load Regeneration Threshold	5466

PGN 64892**Diesel Particulate Filter Control 1****DPFC1**

This PGN contains information about the diesel particulate filter regeneration control.

If there are aftertreatment systems on two banks, this PGN represents the composite information from both banks.

NOTE: This message will be transmitted by the engine or aftertreatment system controller.

Transmission Repetition Rate: Every 1 s and on change of state but no faster than every 100 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 1 s and on change

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 253

PDU Specific: 124 PGN Supporting Information:

Default Priority: 6

Parameter Group Number: 64892 (0x00FD7C)

Start Position	Length	Parameter Name	SPN
1.1	3 bits	Diesel Particulate Filter Lamp Command	3697
2.1	2 bits	Diesel Particulate Filter Passive Regeneration Status	3699
2.3	2 bits	Diesel Particulate Filter Active Regeneration Status	3700
2.5	3 bits	Diesel Particulate Filter Status	3701
3.1	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Status	3702
3.3	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Inhibit Switch	3703
3.5	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Clutch Disengaged	3704
3.7	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Service Brake Active	3705
4.1	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to PTO Active	3706
4.3	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Accelerator Pedal Off Idle	3707
4.5	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Out of Neutral	3708
4.7	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Vehicle Speed Above Allowed Speed	3709
5.1	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Parking Brake Not Set	3710
5.3	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Low Exhaust Gas Temperature	3711
5.5	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to System Fault Active	3712
5.7	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to System Timeout	3713
6.1	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Temporary System Lockout	3714
6.3	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Permanent System Lockout	3715
6.5	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Engine Not Warmed Up	3716
6.7	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Vehicle Speed Below Allowed Speed	3717
7.1	2 bits	Diesel Particulate Filter Automatic Active Regeneration Initiation Configuration	3718
7.3	3 bits	Exhaust System High Temperature Lamp Command	3698
7.6	3 bits	Diesel Particulate Filter Active Regeneration Forced Status	4175
8.1	2 bits	Hydrocarbon Doser Purging Enable	5504
8.3	2 bits	Diesel Particulate Filter Active Regeneration Inhibited Due to Low Exhaust Gas Pressure	5629
8.5	2 bits	Diesel Particulate Filter 1 Conditions Not Met for Active Regeneration	3750

PGN 64894 Adaptive Front-Lighting System Status**AFSS**

This message reports information about the current operation mode of the Adaptive Front-Lighting System (AFS). The Message may include information about dynamic bending light and light distribution. The message provides feedback to the light controller and may be used to ensure a fail safe state in case of malfunction.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 126 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64894 (0x00FD7E)

Start Position	Length	Parameter Name	SPN
1.1	3 bits	Left Headlamp Dynamic Bending Light	3691
1.4	3 bits	Right Headlamp Dynamic Bending Light	3692
2.1	4 bits	Left Headlamp Light Distribution	3693
2.5	4 bits	Right Headlamp Light Distribution	3694

PGN 64895 Engine Configuration 2**EC2**

Contains static information about the engine. To be used with data that will not change during vehicle operation.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 127 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64895 (0x00FD7F)

Start Position	Length	Parameter Name	SPN
1	1 byte	Maximum Crank Attempts per Start Attempt	3670

PGN 64897 EGR Cooler Bypass**EGRBV**

Contains information about the EGR Cooler Bypass

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 129 PGN Supporting Information:
 Default Priority: 5
 Parameter Group Number: 64897 (0x00FD81)

Start Position	Length	Parameter Name	SPN
1	1 byte	EGR1 Cooler Bypass Actuator Position	3672

PGN 64899 Transfer Case Information**TCI**

Transfer Case Information

Transmission Repetition Rate: Every 1 s and on change of state but no faster than every 100 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 1 s or on change

Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 131 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64899 (0x00FD83)

Start Position	Length	Parameter Name	SPN
1.1	3 bits	Transfer case status	3645

PGN 64900 Engine Fluid Level/Pressure 9**EFL/P9**

This message contains Engine Intake Valve Actuation Oil Pressure information.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 132 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64900 (0x00FD84)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #17	3640
3-4	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #18	3641
5-6	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #19	3642
7-8	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #20	3643

PGN 64901 Engine Fluid Level/Pressure 8**EFL/P8**

This message contains Engine Intake Valve Actuation Oil Pressure information.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 133 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64901 (0x00FD85)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #13	3636
3-4	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #14	3637
5-6	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #15	3638
7-8	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #16	3639

PGN 64902 Engine Fluid Level/Pressure 7**EFL/P7**

This message contains Engine Intake Valve Actuation Oil Pressure information.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 134 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64902 (0x00FD86)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #9	3632
3-4	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #10	3633
5-6	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #11	3634
7-8	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #12	3635

PGN 64903 Engine Fluid Level/Pressure 6**EFL/P6**

This message contains Engine Intake Valve Actuation Oil Pressure information.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 135 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64903 (0x00FD87)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #5	3628
3-4	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #6	3629
5-6	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #7	3630
7-8	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #8	3631

PGN 64904 Engine Fluid Level/Pressure 5**EFL/P5**

This message contains Engine Intake Valve Actuation Oil Pressure information.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 136 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64904 (0x00FD88)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #1	3624
3-4	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #2	3625
5-6	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #3	3626
7-8	2 bytes	Engine Intake Valve Actuation Oil Pressure for Cylinder #4	3627

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PGN 64905 Vehicle Direction/Speed 2**VDS2**

Vehicle Direction/Speed 2 PGN contains the vehicle roll data.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 137 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64905 (0x00FD89)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Vehicle Roll	3623

PGN 64906 SAE J2012 DTC Display**J2012**

Conveys basic SAE J2012 DTC information for on-board or service tool displays.

If PGN 64906 is requested and a supporting device has no active or inactive J2012 DTCs, PGN 64906 shall be sent with the first data byte (Number of J2012 DTCs) set to zero. Any unused bytes in the PGN shall be set to 255. When two or more J2012 DTCs are indicated PGN 64906 must be sent via Transport Protocol (See J1939-21).

See supporting information for data byte arrangement and example.

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 138 PGN Supporting Information: See Appendix D - PGN 64906
 Default Priority: 7
 Parameter Group Number: 64906 (0x00FD8A)

Start Position	Length	Parameter Name	SPN
1	1 byte	Number of J2012 DTCs	3619
2-6	5 bytes	J2012 DTC	3620
7.1	1 bit	J2012 DTC Status	3621
7.2	7 bits	J2012 DTC Occurrence Count	3622

PGN 64907 Aftertreatment 2 Gas Parameters**AT2GP**

Diesel particulate filter gas parameters for system or bank 2

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 139 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64907 (0x00FD8B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Diesel Particulate Filter Intake Pressure 2	3611
3-4	2 bytes	Diesel Particulate Filter Outlet Pressure 2	3612

PGN 64908**Aftertreatment 1 Gas Parameters****AT1GP**

Diesel particulate filter gas parameters for system or bank 1

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 140 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64908 (0x00FD8C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Diesel Particulate Filter Intake Pressure 1	3609
3-4	2 bytes	Diesel Particulate Filter Outlet Pressure 1	3610

PGN 64912**Advertised Engine Torque Curve****AETC**

This message conveys the advertised torque curve for the engine, as typically seen on specification sheets available from most engine manufacturers. The collection conditions for the data conveyed are indicated by SPN 3558 – AETC Data Collection Standard.

This map does not contain dynamic elements, and does not change during engine operation. For engines capable of dynamically switching between torque curves or ratings during operation, this map contains values for the highest (most powerful) rating. This map is not intended for use in real time engine control, but merely to indicate what engine rating is installed in the vehicle.

Data points on the curve are in order from left to right, and, at a minimum, must span from the lowest rpm where peak torque can be produced to the high speed governor breakpoint. SPN 3559 – Number of AETC Data Points indicates the number of data point pairs being sent. A minimum of 5 points must be supported, with up to 15 available as needed to properly convey the shape of the torque curve. Speed values need not be evenly incremented.

The pair of data points (a and b) are repeated in the PGN for the number of data points identified in byte 1.

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 144 PGN Supporting Information: See Appendix D - PGN 64912
 Default Priority: 6
 Parameter Group Number: 64912 (0x00FD90)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	AETC Data Collection Standard	3558
1.5	4 bits	Number of AETC data points	3559
a	2 bytes	AETC Speed Value	3560
b	2 bytes	AETC Torque value	3561

PGN 64914 Engine Operating Information**EOI**

Contains engine parameters related to operation.

Transmission Repetition Rate: 250 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 148 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64914 (0x00FD92)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Engine Operating State	3543
1.5	2 bits	Fuel Pump Primer Control	4082
2-3	2 bytes	Time Remaining in Engine Operating State	3544
4.1	2 bits	Engine Fuel Shutoff Vent Control	3608
4.3	2 bits	Engine Fuel Shutoff 1 Control	632
4.5	2 bits	Engine Fuel Shutoff 2 Control	2807
4.7	2 bits	Engine Fuel Shutoff Valve Leak Test Control	3601
5.1	2 bits	Engine Oil Priming Pump Control	3589
5.3	2 bits	Engine Oil Pre-heater Control	3602
5.5	2 bits	Engine Electrical System Power Conservation Control	3603
5.7	2 bits	Engine Block / Coolant Pre-heater Control	3604
6.1	2 bits	Engine Coolant Circulating Pump Control	3605
6.3	2 bits	Engine Controlled Shutdown Request	3606
6.5	2 bits	Engine Emergency (Immediate) Shutdown Indication	3607
8	1 byte	Engine Derate Request	3644

PGN 64916 Electronic Engine Controller 7**EEC7**

Engine related parameters

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 148 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64916 (0x00FD94)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 1 Valve Position	27
3-4	2 bytes	Engine Exhaust Gas Recirculation 1 Valve 2 Position	3822
5-6	2 bytes	Engine Crankcase Breather Oil Separator Speed	5444
7-8	2 bytes	Commanded Engine Intake Manifold Pressure	5312

(R) PGN 64917 Transmission Fluids 2**TRF2**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 149 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64917 (0x00FD95)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission Oil Filter Restriction Switch	3359
1.3	2 bits	Transmission Oil Level Switch	3533
1.5	2 bits	Transmission Overheat Indicator	5345
2-3	2 bytes	Transmission Torque Converter Oil Outlet Temperature	3823
4	1 byte	Transmission Oil Life Remaining	4177
5-6	2 bytes	Transmission Oil Temperature 2	5913
7	1 bytes	Transmission Oil Level 2 High / Low	5914
8.1	4 bits	Transmission Oil Level 2 Countdown Timer	5915
8.5	4 bits	Transmission Oil Level 2 Measurement Status	5916

(R) PGN 64920 Aftertreatment 1 Historical Information**AT1HI**

Contains information about the history of the aftertreatment 1 system

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 152 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64920 (0x00FD98)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Aftertreatment 1 Total Fuel Used	3522
05-08	4 bytes	Aftertreatment 1 Total Regeneration Time	3523
09-12	4 bytes	Aftertreatment 1 Total Disabled Time	3524
13-16	4 bytes	Aftertreatment 1 Total Number of Active Regenerations	3525
17-20	4 bytes	Aftertreatment 1 Diesel Particulate Filter Total Passive Regeneration Time	3725
21-24	4 bytes	Aftertreatment 1 Diesel Particulate Filter Total Number of Passive Regenerations	3726
25-28	4 bytes	Aftertreatment 1 Diesel Particulate Filter Total Number of Active Regeneration Inhibit Requests	3727
29-32	4 bytes	Aftertreatment 1 Diesel Particulate Filter Total Number of Active Regeneration Manual Requests	3728
33-36	4 bytes	Aftertreatment 1 Average Time Between Active Regenerations	5454
37-40	4 bytes	Aftertreatment 1 Average Distance Between Active DPF Regenerations	5827

(R) PGN 64921 Aftertreatment 2 Historical information**AT2HI**

Contains information about the history of the aftertreatment 2 system

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 153 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64921 (0x00FD99)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Aftertreatment 2 Total Fuel Used	3526
05-08	4 bytes	Aftertreatment 2 Total Regeneration Time	3527
09-12	4 bytes	Aftertreatment 2 Total Disabled Time	3528
13-16	4 bytes	Aftertreatment 2 Total Number of Active Regenerations	3529
17-20	4 bytes	Aftertreatment 2 Diesel Particulate Filter Total Passive Regeneration Time	3729
21-24	4 bytes	Aftertreatment 2 Diesel Particulate Filter Total Number of Passive Regenerations	3730
25-28	4 bytes	Aftertreatment 2 Diesel Particulate Filter Total Number of Active Regeneration Inhibit Requests	3731
29-32	4 bytes	Aftertreatment 2 Diesel Particulate Filter Total Number of Active Regeneration Manual Requests	3732
33-36	4 bytes	Aftertreatment 2 Average Time Between Active Regenerations	5455
37-40	4 bytes	Aftertreatment 2 Average Distance Between Active DPF Regenerations	5828

PGN 64923 Aftertreatment 1 Diesel Exhaust Fluid Information**A1DEFI**

Sensor Information which measures temperature, concentration, and conductivity of the diesel exhaust fluid of the aftertreatment 1 system.

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 155 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64923 (0x00FD9B)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	3515
2	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Concentration	3516
3	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Conductivity	3518
4.1	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2 Preliminary FMI	3519
5.1	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Properties Preliminary FMI	3520
6.1	4 bits	Aftertreatment 1 Diesel Exhaust Fluid Property	3521

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PGN 64924 Sensor Electrical Power #2**SEP2**

Voltage supplies for sensors #2

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 156 PGN Supporting Information: See Appendix D - PGN 65104
 Default Priority: 6
 Parameter Group Number: 64924 (0x00FD9C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Sensor supply voltage 5	3513
3-4	2 bytes	Sensor supply voltage 6	3514
5-6	2 bytes	Sensor supply voltage 7	5125
7-8	2 bytes	Sensor supply voltage 8	5126

PGN 64925 Sensor Electrical Power #1**SEP1**

Voltage supplies for sensors #1

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 157 PGN Supporting Information: See Appendix D - PGN 65104
 Default Priority: 6
 Parameter Group Number: 64925 (0x00FD9D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Sensor supply voltage 1	3509
3-4	2 bytes	Sensor supply voltage 2	3510
5-6	2 bytes	Sensor supply voltage 3	3511
7-8	2 bytes	Sensor supply voltage 4	3512

PGN 64926 Aftertreatment 2 Air Control 1**AT2AC1**

Contains information about the aftertreatment 2 air system

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 159 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64926 (0x00FD9E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Supply Air Pressure	3499
3-4	2 bytes	Aftertreatment 2 Purge Air Pressure	3500
5-6	2 bytes	Aftertreatment 2 Air Pressure Control	3501
7.1	1 byte	Aftertreatment 2 Air Pressure Actuator Position	3502
8.1	2 bits	Aftertreatment 2 Air System Relay	3506
8.3	2 bits	Aftertreatment 2 Atomization Air Actuator	3505
8.5	2 bits	Aftertreatment 2 Purge Air Actuator	3504
8.7	2 bits	Aftertreatment 2 Air Enable Actuator	3503

PGN 64927 Aftertreatment 1 Air Control 1**AT1AC1**

Contains information about the aftertreatment 1 air system

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 159 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64927 (0x00FD9F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Supply Air Pressure	3485
3-4	2 bytes	Aftertreatment 1 Purge Air Pressure	3486
5-6	2 bytes	Aftertreatment 1 Air Pressure Control	3487
7.1	1 byte	Aftertreatment 1 Air Pressure Actuator Position	3488
8.1	2 bits	Aftertreatment 1 Air System Relay	3492
8.3	2 bits	Aftertreatment 1 Atomization Air Actuator	3491
8.5	2 bits	Aftertreatment 1 Purge Air Actuator	3490
8.7	2 bits	Aftertreatment 1 Air Enable Actuator	3489

PGN 64928 Aftertreatment 2 Fuel Control 1**AT2FC1**

Contains information about the aftertreatment 2 fuel system

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 160 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64928 (0x00FDA0)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Fuel Pressure 1	3494
3-4	2 bytes	Aftertreatment 2 Fuel Rate	3495
5-6	2 bytes	Aftertreatment 2 Fuel Pressure 1 Control	3493
7.1	2 bits	Aftertreatment 2 Fuel Drain Actuator	4098
7.3	2 bits	Aftertreatment 2 Ignition	3498
7.5	2 bits	Aftertreatment 2 Regeneration Status	3497
7.7	2 bits	Aftertreatment 2 Fuel Enable Actuator	3496
8	1 byte	Aftertreatment 2 Fuel Injector 1 Heater Control	4302

PGN 64929 Aftertreatment 1 Fuel Control 1**AT1FC1**

Contains information about the aftertreatment 1 fuel system

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 161 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64929 (0x00FDA1)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Fuel Pressure 1	3480
3-4	2 bytes	Aftertreatment 1 Fuel Rate	3481
5-6	2 bytes	Aftertreatment 1 Fuel Pressure 1 Control	3479
7.1	2 bits	Aftertreatment 1 Fuel Drain Actuator	4097
7.3	2 bits	Aftertreatment 1 Ignition	3484
7.5	2 bits	Aftertreatment 1 Regeneration Status	3483
7.7	2 bits	Aftertreatment 1 Fuel Enable Actuator	3482
8	1 byte	Aftertreatment 1 Fuel Injector 1 Heater Control	4301

PGN 64930 Fuel Information 3 (Gaseous)**GFI**

Gaseous fuel information 3

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 162 PGN Supporting Information:
 Default Priority: 4
 Parameter Group Number: 64930 (0x00FDA2)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Fuel Valve 2 Intake Absolute Pressure	3466
3-4	2 bytes	Engine Gas 2 Mass Flow Rate	3467
5	1 byte	Engine Fuel Temperature 2	3468
7-8	2 bytes	Engine Fuel Valve 2 Outlet Absolute Pressure	3469

PGN 64931 Electronic Engine Controller 6**EEC6**

Engine related parameters

Transmission Repetition Rate: 100 msec (preferred) or Engine Speed Dependent (if required by application)
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 163 PGN Supporting Information:
 Default Priority: 4
 Parameter Group Number: 64931 (0x00FDA3)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger Compressor Bypass Actuator 1 Command	3470
3	1 byte	Engine Variable Geometry Turbocharger Actuator #1	641
4	1 byte	Engine Turbocharger Compressor Bypass Actuator 1 Position	3675
5-6	2 bytes	Engine Turbocharger Compressor Bypass Actuator 2 command	5369
7	1 byte	Engine Desired Turbocharger Compressor Bypass Actuator 1 Position	5366
8.1	5 bits	Engine Turbocharger Compressor Bypass Actuator 1 Preliminary FMI	5367
8.6	3 bits	Engine Turbocharger Compressor Bypass Actuator 1 Temperature Status	5368

PGN 64932**PTO Drive Engagement****PTODE**

Information relating to the request for engagement, consent for engagement, and status of engagement of various specific physical PTO drives. This message may be broadcast by one or all controllers involved in the enabling of a given PTO drive.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 164 PGN Supporting Information: See Appendix D - PGN 64932
 Default Priority: 6
 Parameter Group Number: 64932 (0x00FDA4)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Enable Switch – Transfer case output shaft PTO	3455
1.3	2 bits	Enable Switch – Transmission output shaft PTO	3454
1.5	2 bits	Enable Switch – Transmission input shaft PTO 2	3453
1.7	2 bits	Enable Switch – Transmission input shaft PTO 1	3452
2.1	2 bits	Enable Switch - PTO Engine Flywheel	3939
2.3	2 bits	Enable Switch - PTO Engine Accessory Drive 1	3942
2.5	2 bits	Enable Switch - PTO Engine Accessory Drive 2	3945
3.1	2 bits	Engagement Consent – Transfer case output shaft PTO	3459
3.3	2 bits	Engagement Consent – Transmission output shaft PTO	3458
3.5	2 bits	Engagement Consent – Transmission input shaft PTO 2	3457
3.7	2 bits	Engagement Consent – Transmission input shaft PTO 1	3456
4.1	2 bits	Engagement Consent - PTO Engine Flywheel	3940
4.3	2 bits	Engagement Consent - PTO Engine Accessory Drive 1	3943
4.5	2 bits	Engagement Consent - PTO Engine Accessory Drive 2	3946
5.1	2 bits	Engagement Status – Transfer case output shaft PTO	3463
5.3	2 bits	Engagement Status – Transmission output shaft PTO	3462
5.5	2 bits	Engagement Status – Transmission input shaft PTO 2	3461
5.7	2 bits	Engagement Status – Transmission input shaft PTO 1	3460
6.1	2 bits	Engagement Status - PTO Engine Flywheel	3941
6.3	2 bits	Engagement Status - PTO Engine Accessory Drive 1	3944
6.5	2 bits	Engagement Status - PTO Engine Accessory Drive 2	3947
7.1	2 bits	At least one PTO engaged	3948

PGN 64933**Door Control 2****DC2**

Used for door information.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 165 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64933 (0x00FDA5)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Lock Status of Door 1	3412
1.3	2 bits	Open Status of Door 1	3413
1.5	2 bits	Enable Status of Door 1	3414
1.7	2 bits	Lock Status of Door 2	3415
2.1	2 bits	Open Status of Door 2	3416
2.3	2 bits	Enable Status of Door 2	3417
2.5	2 bits	Lock Status of Door 3	3418
2.7	2 bits	Open Status of Door 3	3419
3.1	2 bits	Enable Status of Door 3	3420
3.3	2 bits	Lock Status of Door 4	3421
3.5	2 bits	Open Status of Door 4	3422
3.7	2 bits	Enable Status of Door 4	3423
4.1	2 bits	Lock Status of Door 5	3424
4.3	2 bits	Open Status of Door 5	3425
4.5	2 bits	Enable Status of Door 5	3426
4.7	2 bits	Lock Status of Door 6	3427
5.1	2 bits	Open Status of Door 6	3428
5.3	2 bits	Enable Status of Door 6	3429
5.5	2 bits	Lock Status of Door 7	3430
5.7	2 bits	Open Status of Door 7	3431
6.1	2 bits	Enable Status of Door 7	3432
6.3	2 bits	Lock Status of Door 8	3433
6.5	2 bits	Open Status of Door 8	3434
6.7	2 bits	Enable Status of Door 8	3435
7.1	2 bits	Lock Status of Door 9	3436
7.3	2 bits	Open Status of Door 9	3437
7.5	2 bits	Enable Status of Door 9	3438
7.7	2 bits	Lock Status of Door 10	3439
8.1	2 bits	Open Status of Door 10	3440
8.3	2 bits	Enable Status of Door 10	3441

PGN 64936 Wireless Communications Message 2**WCM2**

Message for reporting status information regarding the second instance of a wireless communications network on a device or system.

See PGN 64937 for the first wireless network.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 168 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64936 (0x00FDA8)

Start Position	Length	Parameter Name	SPN
1	8 bits	Network Transceiver Status 2	3442
2	8 bits	Network Service Status 2	3443
3	8 bits	Network Antenna Status 2	3444
4	1 byte	Network Signal Strength 2	3445
5	8 bits	Wireless Communication Network Type 2	3446

PGN 64937 Wireless Communications Message 1**WCM1**

Message for reporting status information regarding the first instance of a wireless communications network on a device or system.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 169 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64937 (0x00FDA9)

Start Position	Length	Parameter Name	SPN
1	8 bits	Network Transceiver Status 1	3368
2	8 bits	Network Service Status 1	3369
3	8 bits	Network Antenna Status 1	3370
4	1 byte	Network Signal Strength 1	3371
5	8 bits	Wireless Communication Network Type 1	3372

PGN 64938**Engine Fluid Level/Pressure 4****EFL/P4**

4th PGN which identifies parameters that are either measuring various pressures within the engine or identifying engine fluid levels

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 170 PGN Supporting Information: See Appendix D - PGN 64938
 Default Priority: 6
 Parameter Group Number: 64938 (0x00FDAA)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Charge Air Cooler 1 Intake Pressure	3340
2	1 byte	Engine Charge Air Cooler 2 Intake Pressure	3341
3	1 byte	Engine Coolant Pump Differential Pressure	3342
4-5	2 bytes	Engine Centrifugal Oil Filter speed	3343
6	1 byte	Engine Intercooler Coolant Level	3668
7	1 byte	Engine Aftercooler Coolant Level	3676
8	1 byte	Engine Charge Air Cooler Outlet Pressure	2631

PGN 64942**Fifth Wheel Smart Systems 2****FWSS2**

Fifth wheel smart system information #2. Message to convey operator parameters associated with the tractor to trailer coupling control and error state.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 174 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64942 (0x00FDAE)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Fifth Wheel Error Status	3307
1.5	2 bits	Fifth Wheel Lock Ready to Couple Indicator	3312
1.7	2 bits	Fifth Wheel Lock Couple Status Indicator	3313
2	1 byte	Fifth Wheel Slider Position	3311
3.1	2 bits	Fifth Wheel Slider Lock Indicator	3316

PGN 64943**Aftertreatment 2 Intermediate Gas****AT2IMG**

The purpose of this PGN is to group the aftertreatment intermediate gas temperature and pressure messages for bank 2.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 175 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64943 (0x00FDAF)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Exhaust Gas Temperature 2	3283
3-4	2 bytes	Aftertreatment 2 Diesel Particulate Filter Intermediate Gas Temperature	3284
5-6	2 bytes	Aftertreatment 2 Diesel Particulate Filter Differential Pressure	3285
7.1	5 bits	Aftertreatment 2 Exhaust Gas Temperature 2 Preliminary FMI	3286
7.6-8.1	5 bits	Aftertreatment 2 Diesel Particulate Filter Delta Pressure Preliminary FMI	3287
8.3	5 bits	Aftertreatment 2 Diesel Particulate Filter Intermediate Gas Temperature Preliminary FMI	3288

PGN 64944**Aftertreatment 2 Outlet Gas 2****AT2OG2**

The purpose of this PGN is to group the aftertreatment outlet gas temperature messages for bank 2.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 176 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64944 (0x00FDB0)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Exhaust Gas Temperature 3	3279
3-4	2 bytes	Aftertreatment 2 Diesel Particulate Filter Outlet Gas Temperature	3280
5.1	5 bits	Aftertreatment 2 Exhaust Gas Temperature 3 Preliminary FMI	3281
6.1	5 bits	Aftertreatment 2 Diesel Particulate Filter Exhaust Gas Temperature Preliminary FMI	3282

PGN 64945 Aftertreatment 2 Intake Gas 2**AT2IG2**

The purpose of this PGN is to group the aftertreatment intake gas temperature messages for bank 2.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 177 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64945 (0x00FDB1)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 2 Exhaust Gas Temperature 1	3275
3-4	2 bytes	Aftertreatment 2 Diesel Particulate Filter Intake Gas Temperature	3276
5.1	5 bits	Aftertreatment 2 Exhaust Gas Temperature 1 Preliminary FMI	3277
6.1	5 bits	Aftertreatment 2 Diesel Particulate Filter Intake Gas Temperature Preliminary FMI	3278

PGN 64946 Aftertreatment 1 Intermediate Gas**AT1IMG**

The purpose of this PGN is to group the aftertreatment intermediate gas temperature and pressure messages.

Note: The 5 bits of SPN 3253 are positioned into the data field in the following manner. The 2 most significant bits are placed in bits 2-1 of byte 8 such that the most significant bit of SPN 3253 located at byte 8 bit 2, and the 3 least significant bits are placed in bits 8-6 of byte 7 such that the least significant bit of SPN 3253 located at byte 7 bit 6.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 178 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64946 (0x00FDB2)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Exhaust Gas Temperature 2	3249
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter Intermediate Gas Temperature	3250
5-6	2 bytes	Aftertreatment 1 Diesel Particulate Filter Differential Pressure	3251
7.1	5 bits	Aftertreatment 1 Exhaust Gas Temperature 2 Preliminary FMI	3252
7.6-8.1	5 bits	Aftertreatment 1 Diesel Particulate Filter Delta Pressure Preliminary FMI	3253
8.3	5 bits	Aftertreatment 1 Diesel Particulate Filter Intermediate Gas Temperature Preliminary FMI	3254

PGN 64947 Aftertreatment 1 Outlet Gas 2**AT1OG2**

The purpose of this PGN is to group the aftertreatment outlet gas temperature messages.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 179 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64947 (0x00FDB3)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Exhaust Gas Temperature 3	3245
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter Outlet Gas Temperature	3246
5.1	5 bits	Aftertreatment 1 Exhaust Gas Temperature 3 Preliminary FMI	3247
6.1	5 bits	Aftertreatment 1 Diesel Particulate Filter Outlet Exhaust Gas Temperature Preliminary FMI	3248

PGN 64948 Aftertreatment 1 Intake Gas 2**AT1IG2**

The purpose of this PGN is to group the aftertreatment intake gas temperature messages for bank 1.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 180 PGN Supporting Information: See Appendix D - PGN 64948
 Default Priority: 6
 Parameter Group Number: 64948 (0x00FDB4)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Aftertreatment 1 Exhaust Gas Temperature 1	3241
3-4	2 bytes	Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature	3242
5.1	5 bits	Aftertreatment 1 Exhaust Gas Temperature 1 Preliminary FMI	3243
6.1	5 bits	Aftertreatment 1 Diesel Particulate Filter Intake Gas Temperature Preliminary FMI	3244

PGN 64953 Tire Pressure Reference Information**TPRI**

Information on actual tire pressure reference value for monitoring.

NOTE—Message has to be repeated as necessary to transmit all available information. This method of location identification requires individual SPNs to be assigned to report failures specific to each individual component (i.e. each tire, each axle, etc.).

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 185 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64953 (0x00FDB9)

Start Position	Length	Parameter Name	SPN
1	8 bits	Tire Location	3190
2	1 byte	Reference Tire Pressure	3191

PGN 64954 Farebox Status**TR6**

Used to report alarms of the fare collection unit.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 186 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64954 (0x00FDBA)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Farebox Emergency Status	3179
2.1	7 bits	Farebox Alarm Identifier	3181

PGN 64955 Farebox Point of Sale**TR5**

Used to report stop level point of sale detail.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 187 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64955 (0x00FDBB)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Transaction Type	3170
1.5	4 bits	Passenger Type	3171
2.1	4 bits	Type of Fare	3176
2.5	4 bits	Payment Details	3177
3.1	4 bits	Fare Validity	3165
3.5	4 bits	Pass Category	3166
4.1	5 bits	Initial Fare Agency	3167
5.1	3 bits	Type of Service	3172
5.4	5 bits	Transfer Type	3173
6, 7.1	12 bits	Route Number	3169
8	1 byte	Transfer Sold	3168

PGN 64956 Farebox Service Detail**TR4**

Used to identify service, assignments, and fare preset detail of the fare collection unit.

Transmission Repetition Rate: On request
 Data Length: 15
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 188 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64956 (0x00FDBC)

Start Position	Length	Parameter Name	SPN
01.1	2 bits	Farebox Service Status	3178
01.3	3 bits	Trip Status	3180
02.1	4 bits	Trip Direction	3174
03	8 bits	Fare Presets	3175
04-05	2 bytes	Trip Number	3159
06-07	2 bytes	Pattern Number	3161
08-09	2 bytes	Assigned Route	3160
10-11	2 bytes	Assigned Run	3162
12-13	2 bytes	Assigned Block	3163
14-15	2 bytes	Driver's farebox security code	3164

PGN 64957 Signal Preemption**TR3**

Status and configuration of the device used for intersection preemption.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 189 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64957 (0x00FDBD)

Start Position	Length	Parameter Name	SPN
1.3	2 bits	Range Code Enable	3081
1.5	2 bits	Transit Route ID Usage	3080
1.7	2 bits	Intersection Preemption Request/Response	3079
2.1	4 bits	Priority of Response Sent by Emitter	3084
2.5	2 bits	Transit Door Enable	3083
2.7	2 bits	Strobe Activation Control Status	3082
3.4	2 bytes	Vehicle ID	3085

PGN 64958 Transit Route**TR1**

The current route assigned to this transit vehicle. The transit route information may be entered into different devices by different authorities (fare collection, radio log, unit control panel, etc.).

Transmission Repetition Rate: On request
 Data Length: variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 190 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64958 (0x00FDBE)

Start Position	Length	Parameter Name	SPN
1	1 byte	Agency	3078
2	1 byte	Number of bytes in the Transit Assigned Route Identity	3071
3	1 byte	Number of bytes in the Transit Assigned Run Identity	3072
4	1 byte	Number of bytes in the Transit Assigned Block Identity	3073
5 to A	Variable - up to 100 bytes	Transit Assigned Route Identity	3074
A+1 to B	Variable - up to 100 bytes	Transit Assigned Run Identity	3075
B+1 to C	Variable - up to 100 bytes	Transit Assigned Block Identity	3076

PGN 64959 Transit Milepost**TR2**

Identification of a transit route milepost

Transmission Repetition Rate: On request
 Data Length: variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 191 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64959 (0x00FDBF)

Start Position	Length	Parameter Name	SPN
1	1 byte	Number of bytes in the Milepost Identification	3070
2 to n	Variable - up to 100 bytes	Milepost Identification	509

PGN 64960 Passenger Counter**TR7**

Used to notify the transit link devices of real-time boarding and exiting passengers or to indicate the total number of passengers on vehicle referenced to the last transit stop.

Also transmits information on the use status of the vehicle.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 192 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64960 (0x00FDC0)

Start Position	Length	Parameter Name	SPN
1	8 bits	Type of Passenger Count	3043
2	1 byte	Patron Count	3047
3.1	2 bits	Silent Alarm Status	3044
3.3	2 bits	Vehicle Use Status	3045
3.5	2 bits	Transit Run Status	3046

PGN 64961**Engine Fluid Level/Pressure 3****EFL/P3**

3rd PGN which identifies parameters that are either measuring various pressures within the engine or identifying engine fluid levels

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 193 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64961 (0x00FDC1)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Intake Valve Actuation System Oil Pressure	2948
3	1 byte	Engine Exhaust Gas Recirculation 1 Intake Pressure	3358
4-5	2 bytes	Engine Exhaust Valve Actuation System Oil Pressure	4287
6	1 byte	Engine Exhaust Gas Recirculation 1 Outlet Pressure	5019
7-8	2 bytes	Engine Throttle Valve 1 Differential Pressure	5631

(R) PGN 64962**Electronic Engine Controller 14****EEC14**

Transmission Repetition Rate: On Request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 194 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64962 (0x00FDC2)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation 1 Valve 1 Position Error	5829
3-4	2 bytes	Engine Exhaust Gas Recirculation 1 Valve 2 Position Error	5830
5-6	2 bytes	Engine Fuel Mass Flow Rate	5833
7	8 bits	Fuel Type	5837

(R) PGN 64963**Electronic Engine Controller 15****EEC15**

Transmission Repetition Rate: On Request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 195 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64963 (0x00FDC3)

Start Position	Length	Parameter Name	SPN
1	1 byte	Accelerator Pedal #1 Channel 2	2623
2	1 byte	Accelerator Pedal #1 Channel 3	2624
3	1 byte	Accelerator Pedal #2 Channel 2	2625
4	1 byte	Accelerator Pedal #2 Channel 3	2626

(R) PGN 64964 Electronic Brake Controller 5**EBC5**

Used for information on brake control.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 196 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64964 (0x00FDC4)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Brake Temperature Warning	3839
1.3	3 bits	Halt brake mode	2913
1.6	3 bits	Hill holder mode	2912
2.1	2 bits	Foundation Brake Use	2919
2.3	2 bits	XBR System State	2917
2.5	4 bits	XBR Active Control Mode	2918
3	1 byte	XBR Acceleration Limit	2921
4.1	2 bits	Parking Brake Actuator Fully Activated	5275
4.3	2 bits	Emergency Braking Active	5847

PGN 64965**ECU Identification Information****ECUID**

Message for reporting identification and information about the physical ECU and its hardware, such as the ECU's part number, serial number, build date, etc. Information about the software within the ECU should be reported using the Software Identification PGN 65242 and/or DM19.

NOTE - The fields in this message are optional and separated by an ASCII "**". It is not necessary to include parametric data for all fields; however, the delimiter ("**") is always required. An ASCII "**" is required at the end of the last included field, even if there is only one ECU identification designator. Any additional ECU identification fields defined in the future will be appended at the end, each separated by an ASCII "**" as a delimiter.

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 197 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64965 (0x00FDC5)

Start Position	Length	Parameter Name	SPN
a	Variable - up to 200 bytes followed by an "**" delimiter	ECU Part Number	2901
b	Variable - up to 200 bytes followed by an "**" delimiter	ECU Serial Number	2902
c	Variable - up to 200 bytes followed by an "**" delimiter	ECU Location	2903
d	Variable - up to 200 bytes followed by an "**" delimiter	ECU Type	2904
e	Variable - up to 200 bytes followed by an "**" delimiter	ECU Manufacturer Name	4304

PGN 64966 Cold Start Aids**CSA**

Cold start aid information and settings.

Transmission Repetition Rate: As required
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 198 PGN Supporting Information: See Addendix D - PGN 64966
 Default Priority: 6
 Parameter Group Number: 64966 (0x00FDC6)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Start Enable Device 1	626
1.3	2 bits	Engine Start Enable Device 2	1804
2.1	4 bits	Engine Start Enable Device 1 Configuration	2899
2.5	4 bits	Engine Start Enable Device 2 Configuration	2898
3	1 byte	Engine Cold Start Fuel Igniter Command	5548
4.1	2 bits	Engine Cold Start Fuel Igniter Relay	5549
4.3	2 bits	Engine Cold Start Fuel Igniter Relay Feedback	5550

PGN 64967 Off-Highway Engine Control Selection States**OHCSS**

Reports the states of off-highway engine control modes, as they apply to different modes of engine operation which may be used to aid particular working environments. These states provide the controls feedback for PGN 64971 which provides the operator inputs to the controller.

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 199 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64967 (0x00FDC7)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Auxiliary Governor State	2896
1.3	2 bits	Engine Multi-Unit Sync State	2890
1.5	2 bits	Engine Alternate Low Idle Select State	2891
2	8 bits	Engine Alternate Rating Select State	2888
3.1	4 bits	Engine Alternate Droop Accelerator 1 Select State	2889
3.5	4 bits	Engine Alternate Droop Accelerator 2 Select State	2893
4.1	4 bits	Engine Alternate Droop Remote Accelerator Select State	2894
4.5	4 bits	Engine Alternate Droop Auxiliary Input Select State	2895

PGN 64968 Operator Primary Intermediate Speed Control state**ISCS**

The Operator Primary Intermediate Speed Control State is used to provide the controller feedback to indicate the controls state achieved.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 200 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64968 (0x00FDC8)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Engine Operator Primary Intermediate Speed Select State	2892

PGN 64969 Electronic Control Module Information**CMI**

Information relating to electronic control modules

Transmission Repetition Rate: As required
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 201 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 64969 (0x00FDC9)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Total Count of Configuration Changes Made	2887

PGN 64970 Intermediate Speed Control**ISC**

The Intermediate Speed Control is widely used in the Industrial application to control the engine to an intermediate speed setting which can bypass the accelerator position control. An example of this operation would be in an agricultural application where an external device is connected to an output shaft from the engine which must then be controlled to a constant speed. This is accomplished by activating a switch setting, thus eliminating the need for the operator to attempt to control this speed with the accelerator position.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 202 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64970 (0x00FDCA)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Engine Operator Primary Intermediate Speed Select	2880

PGN 64971 Off-Highway Engine Control Selection**OHECS**

Allows for the selection of off-highway engine control modes, as they apply to different modes of engine operation which may be used to aid particular working environments. By offering characteristics suitable for the work in hand, the operator may select the desired mode (e.g. economy fuel ratings, droop settings, alternate idle points, multiple engine synchronization, etc.) to maximize performance under given conditions. The operator selects these inputs via hardwire switch operation, whereby an overall system control communicates the information to the engine controller.

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 203 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64971 (0x00FDCB)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Auxiliary Governor Switch	2884
1.3	2 bits	Engine Synchronization Switch	1377
1.5	2 bits	Engine Alternate Low Idle Switch	2883
2	1 byte	Engine Alternate Rating Select	2882
3.1	4 bits	Engine Alternate Droop Accelerator 1 Select	2881
3.5	4 bits	Engine Alternate Droop Accelerator 2 Select	2879
4.1	4 bits	Engine Alternate Droop Remote Accelerator Select	2886
4.5	4 bits	Engine Alternate Droop Auxiliary Input Select	2885

PGN 64972 Operators External Light Controls Message**OEL**

The message containing the information about the position of the operator's external light control switch(s). Including switches for the Headlights, turn signals, hazard light, clearance lights, marker lights, etc.

Transmission Repetition Rate: Every 1 s and on change of switch state but no faster than every 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 204 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64972 (0x00FDCC)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Work Light Switch	2873
1.5	4 bits	Main Light Switch	2872
2.1	4 bits	Turn Signal Switch	2876
2.5	2 bits	Hazard Light Switch	2875
2.7	2 bits	High-Low Beam Switch	2874
3	1 byte	Operators Desired Back-light	2878
4-5	2 bytes	Operators Desired - Delayed Lamp Off Time	2877

PGN 64973 Operator Wiper and Washer Controls Message**OWW**

Message for items related to the operators controls for the window wipers and washers on the front and rear cab windows

Transmission Repetition Rate: 200 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 205 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64973 (0x00FDCD)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Front Non-operator Wiper Switch	2864
1.5	4 bits	Front Operator Wiper Switch	2863
2.5	4 bits	Rear Wiper Switch	2865
3	1 byte	Front Operator Wiper Delay Control	2869
4	1 byte	Front Non-operator Wiper Delay Control	2870
5	1 byte	Rear Wiper Delay Control	2871
6.3	3 bits	Front Non-operator Washer Switch	2867
6.6	3 bits	Front Operator Washer Switch	2866
7.6	3 bits	Rear Washer Function	2868

PGN 64976 Intake/Exhaust Conditions 2**IC2**

Intake/Exhaust Conditions 2 is a second PGN conveying this type of engine information. Also see PGN 65270.

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 208 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64976 (0x00FDD0)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Air Filter 2 Differential Pressure	2809
2	1 byte	Engine Air Filter 3 Differential Pressure	2810
3	1 byte	Engine Air Filter 4 Differential Pressure	2811
4	1 byte	Engine Intake Manifold #2 Pressure	3562
5	1 byte	Engine Intake Manifold #1 Absolute Pressure	3563
6-7	2 bytes	Engine Intake Manifold #1 Absolute Pressure (High Resolution)	4817
8	1 byte	Engine Intake Manifold 2 Absolute Pressure	5422

PGN 64977 FMS-standard Interface Identity/Capabilities**FMS**

Information which specifies the capabilities of the Fleet Management System (FMS) - standard interface device. This PGN typically is sourced from the network interconnect FMS - standard interface device.

Transmission Repetition Rate: 10 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 209 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 64977 (0x00FDD1)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	FMS-standard Diagnostics Supported	2804
1.3	2 bits	FMS-standard Requests Supported	2805
2-5	4 bytes	FMS-standard SW-version supported.	2806

PGN 64978 ECU Performance**EP**

Message used to transfer ECU performance parameters.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 210 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64978 (0x00FDD2)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Keep-Alive Battery Consumption	2803
3	1 byte	Data Memory Usage	2802

PGN 64979 Turbocharger Information 6**TCI6**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 211 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64979 (0x00FDD3)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Compressor Outlet Temperature	2629
3-4	2 bytes	Engine Turbocharger 2 Compressor Outlet Temperature	2799
5-6	2 bytes	Engine Turbocharger 3 Compressor Outlet Temperature	2800
7-8	2 bytes	Engine Turbocharger 4 Compressor Outlet Temperature	2801

PGN 64980**Cab Message 3****CM3**

Provides information from Cab mounted operator inputs.

Transmission Repetition Rate: Every 10 s and on change of state but no faster than every 100 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: On change or every 10 s

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 253

PDU Specific: 212 PGN Supporting Information:

Default Priority: 6

Parameter Group Number: 64980 (0x00FDD4)

Start Position	Length	Parameter Name	SPN
1.1	3 bits	Transfer Case Selector Switch	2796
2.1	2 bits	Fifth Wheel Release Control	3314
2.3	2 bits	Fifth Wheel Release Control Security Lockout	3315
3.1	2 bits	Transmission Oil Level Request	3809

PGN 64981**Electronic Engine Controller 5****EEC5**

Engine related parameters

Transmission Repetition Rate: On request

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 253

PDU Specific: 213 PGN Supporting Information:

Default Priority: 6

Parameter Group Number: 64981 (0x00FDD5)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Calculated Turbine Intake Temperature	2789
3-4	2 bytes	Engine Turbocharger 1 Calculated Turbine Outlet Temperature	2790
5-6	2 bytes	Engine Exhaust Gas Recirculation 1 (EGR1) Valve Control	2791
7.1	2 bits	Engine Variable Geometry Turbocharger (VGT) Air Control Shutoff Valve	2792
7.3	2 bits	Engine Fuel Control Control Mode	5323
7.5	2 bits	Engine Variable Geometry Turbocharger 1 Control Mode	5457
8	1 byte	Engine Variable Geometry Turbocharger (VGT) 1 Actuator Position	2795

PGN 64982**Basic Joystick Message 1****BJM1**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN
Bit 10	Byte n Bit 8
Bit 9	Bit 7
Bit 8	Bit 6
Bit 7	Bit 5
Bit 6	Bit 4
Bit 5	Bit 3
Bit 4	Bit 2
Bit 3	Bit 1
Bit 2	Byte (n-1) Bit 8
Bit 1	Bit 7

Transmission Repetition Rate:	Every 100 ms and on change of state but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 100 ms or on change, not to exceed 20 ms	
Data Length:	8	
Extended Data Page:	0	
Data Page:	0	
PDU Format:	253	
PDU Specific:	214	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64982 (0x00FDD6)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 1 X-Axis Neutral Position Status	2675
1.3	2 bits	Joystick 1 X-Axis Lever Left Negative Position Status	2670
1.5	2 bits	Joystick 1 X-Axis Lever Right Positive Position Status	2665
1.7-2	10 bits	Joystick 1 X-Axis Position	2660
3.1	2 bits	Joystick 1 Y-Axis Neutral Position Status	2676
3.3	2 bits	Joystick 1 Y-Axis Lever Back Negative Position Status	2671
3.5	2 bits	Joystick 1 Y-Axis Lever Forward Positive Position Status	2666
3.7-4	10 bits	Joystick 1 Y-Axis Position	2661
5.5	2 bits	Joystick 1 Y-Axis Detent Position Status	2681
5.7	2 bits	Joystick 1 X-Axis Detent Position Status	2680
6.1	2 bits	Joystick 1 Button 4 Pressed Status	2688
6.3	2 bits	Joystick 1 Button 3 Pressed Status	2687
6.5	2 bits	Joystick 1 Button 2 Pressed Status	2686
6.7	2 bits	Joystick 1 Button 1 Pressed Status	2685
7.1	2 bits	Joystick 1 Button 8 Pressed Status	2692
7.3	2 bits	Joystick 1 Button 7 Pressed Status	2691
7.5	2 bits	Joystick 1 Button 6 Pressed Status	2690
7.7	2 bits	Joystick 1 Button 5 Pressed Status	2689
8.1	2 bits	Joystick 1 Button 12 Pressed Status	2696
8.3	2 bits	Joystick 1 Button 11 Pressed Status	2695
8.5	2 bits	Joystick 1 Button 10 Pressed Status	2694
8.7	2 bits	Joystick 1 Button 9 Pressed Status	2693

PGN 64983**Extended Joystick Message 1****EJM1**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 100 ms or on change, not to exceed 20 ms		
Data Length:	8		
Extended Data Page:	0		
Data Page:	0		
PDU Format:	253		
PDU Specific:	215	PGN Supporting Information:	
Default Priority:	3		
Parameter Group Number:	64983 (0x00FDD7)		

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 1 Grip X-Axis Neutral Position Status	2677
1.3	2 bits	Joystick 1 Grip X-Axis Lever Left Negative Position Status	2672
1.5	2 bits	Joystick 1 Grip X-Axis Lever Right Positive Position Status	2667
1.7-2	10 bits	Joystick 1 Grip X-Axis Position	2662
3.1	2 bits	Joystick 1 Grip Y-Axis Neutral Position Status	2678
3.3	2 bits	Joystick 1 Grip Y-Axis Lever Back Negative Position Status	2673
3.5	2 bits	Joystick 1 Grip Y-Axis Lever Forward Positive Position Status	2668
3.7-4	10 bits	Joystick 1 Grip Y-Axis Position	2663
5.1	2 bits	Joystick 1 Theta-Axis Neutral Position Status	2679
5.3	2 bits	Joystick 1 Theta-Axis Counter Clockwise Negative Position Status	2674
5.5	2 bits	Joystick 1 Theta-Axis Clockwise Positive Position Status	2669
5.7-6	10 bits	Joystick 1 Theta-Axis Position	2664
7.3	2 bits	Joystick 1 Theta-Axis Detent Position Status	2684
7.5	2 bits	Joystick 1 Grip Y-Axis Detent Position Status	2683
7.7	2 bits	Joystick 1 Grip X-Axis Detent Position Status	2682

PGN 64984**Basic Joystick Message 2****BJM2**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Transmission Repetition Rate: Every 100 ms and on change of state but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 100 ms or on change, not to exceed 20 ms

Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 216 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64984 (0x00FDD8)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 2 X-Axis Neutral Position Status	2712
1.3	2 bits	Joystick 2 X-Axis Lever Left Negative Position Status	2707
1.5	2 bits	Joystick 2 X-Axis Lever Right Positive Position Status	2702
1.7-2	10 bits	Joystick 2 X-Axis Position	2697
3.1	2 bits	Joystick 2 Y-Axis Neutral Position Status	2713
3.3	2 bits	Joystick 2 Y-Axis Lever Back Negative Position Status	2708
3.5	2 bits	Joystick 2 Y-Axis Lever Forward Positive Position Status	2703
3.7-4	10 bits	Joystick 2 Y-Axis Position	2698
5.5	2 bits	Joystick 2 Y-Axis Detent Position Status	2718
5.7	2 bits	Joystick 2 X-Axis Detent Position Status	2717
6.1	2 bits	Joystick 2 Button 4 Pressed Status	2725
6.3	2 bits	Joystick 2 Button 3 Pressed Status	2724
6.5	2 bits	Joystick 2 Button 2 Pressed Status	2723
6.7	2 bits	Joystick 2 Button 1 Pressed Status	2722
7.1	2 bits	Joystick 2 Button 8 Pressed Status	2729
7.3	2 bits	Joystick 2 Button 7 Pressed Status	2728
7.5	2 bits	Joystick 2 Button 6 Pressed Status	2727
7.7	2 bits	Joystick 2 Button 5 Pressed Status	2726
8.1	2 bits	Joystick 2 Button 12 Pressed Status	2733
8.3	2 bits	Joystick 2 Button 11 Pressed Status	2732
8.5	2 bits	Joystick 2 Button 10 Pressed Status	2731
8.7	2 bits	Joystick 2 Button 9 Pressed Status	2730

PGN 64985**Extended Joystick Message 2****EJM2**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 100 ms or on change, not to exceed 20 ms		
Data Length:	8		
Extended Data Page:	0		
Data Page:	0		
PDU Format:	253		
PDU Specific:	217	PGN Supporting Information:	
Default Priority:	3		
Parameter Group Number:	64985 (0x00FDD9)		

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 2 Grip X-Axis Neutral Position Status	2714
1.3	2 bits	Joystick 2 Grip X-Axis Lever Left Negative Position Status	2709
1.5	2 bits	Joystick 2 Grip X-Axis Lever Right Positive Position Status	2704
1.7-2	10 bits	Joystick 2 Grip X-Axis Position	2699
3.1	2 bits	Joystick 2 Grip Y-Axis Neutral Position Status	2715
3.3	2 bits	Joystick 2 Grip Y-Axis Lever Back Negative Position Status	2710
3.5	2 bits	Joystick 2 Grip Y-Axis Lever Forward Positive Position Status	2705
3.7-4	10 bits	Joystick 2 Grip Y-Axis Position	2700
5.1	2 bits	Joystick 2 Theta-Axis Neutral Position Status	2716
5.3	2 bits	Joystick 2 Theta-Axis Counter Clockwise Negative Position Status	2711
5.5	2 bits	Joystick 2 Theta-Axis Clockwise Positive Position Status	2706
5.7-6	10 bits	Joystick 2 Theta-Axis Position	2701
7.3	2 bits	Joystick 2 Theta-Axis Detent Position Status	2721
7.5	2 bits	Joystick 2 Grip Y-Axis Detent Position Status	2720
7.7	2 bits	Joystick 2 Grip X-Axis Detent Position Status	2719

PGN 64986**Basic Joystick Message 3****BJM3**

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN
Bit 10	Byte n Bit 8
Bit 9	Bit 7
Bit 8	Bit 6
Bit 7	Bit 5
Bit 6	Bit 4
Bit 5	Bit 3
Bit 4	Bit 2
Bit 3	Bit 1
Bit 2	Byte (n-1) Bit 8
Bit 1	Bit 7

Transmission Repetition Rate:	Every 100 ms and on change of state but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 100 ms or on change, not to exceed 20 ms	
Data Length:	8	
Extended Data Page:	0	
Data Page:	0	
PDU Format:	253	
PDU Specific:	218	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64986 (0x00FDDA)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 3 X-Axis Neutral Position Status	2749
1.3	2 bits	Joystick 3 X-Axis Lever Left Negative Position Status	2744
1.5	2 bits	Joystick 3 X-Axis Lever Right Positive Position Status	2739
1.7-2	10 bits	Joystick 3 X-Axis Position	2734
3.1	2 bits	Joystick 3 Y-Axis Neutral Position Status	2750
3.3	2 bits	Joystick 3 Y-Axis Lever Back Negative Position Status	2745
3.5	2 bits	Joystick 3 Y-Axis Lever Forward Positive Position Status	2740
3.7-4	10 bits	Joystick 3 Y-Axis Position	2735
5.5	2 bits	Joystick 3 Y-Axis Detent Position Status	2755
5.7	2 bits	Joystick 3 X-Axis Detent Position Status	2754
6.1	2 bits	Joystick 3 Button 4 Pressed Status	2762
6.3	2 bits	Joystick 3 Button 3 Pressed Status	2761
6.5	2 bits	Joystick 3 Button 2 Pressed Status	2760
6.7	2 bits	Joystick 3 Button 1 Pressed Status	2759
7.1	2 bits	Joystick 3 Button 8 Pressed Status	2766
7.3	2 bits	Joystick 3 Button 7 Pressed Status	2765
7.5	2 bits	Joystick 3 Button 6 Pressed Status	2764
7.7	2 bits	Joystick 3 Button 5 Pressed Status	2763
8.1	2 bits	Joystick 3 Button 12 Pressed Status	2770
8.3	2 bits	Joystick 3 Button 11 Pressed Status	2769
8.5	2 bits	Joystick 3 Button 10 Pressed Status	2768
8.7	2 bits	Joystick 3 Button 9 Pressed Status	2767

PGN 64987**Extended Joystick Message 3****EJM3**

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis. This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition Rate:	Every 100 ms and on change of state but no faster than every 20 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 100 ms or on change, not to exceed 20 ms	
Data Length:	8	
Extended Data Page:	0	
Data Page:	0	
PDU Format:	253	
PDU Specific:	219	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64987 (0x00FDDb)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 3 Grip X-Axis Neutral Position Status	2751
1.3	2 bits	Joystick 3 Grip X-Axis Lever Left Negative Position Status	2746
1.5	2 bits	Joystick 3 Grip X-Axis Lever Right Positive Position Status	2741
1.7-2	10 bits	Joystick 3 Grip X-Axis Position	2736
3.1	2 bits	Joystick 3 Grip Y-Axis Neutral Position Status	2752
3.3	2 bits	Joystick 3 Grip Y-Axis Lever Back Negative Position Status	2747
3.5	2 bits	Joystick 3 Grip Y-Axis Lever Forward Positive Position Status	2742
3.7-4	10 bits	Joystick 3 Grip Y-Axis Position	2737
5.1	2 bits	Joystick 3 Theta-Axis Neutral Position Status	2753
5.3	2 bits	Joystick 3 Theta-Axis Counter Clockwise Negative Position Status	2748
5.5	2 bits	Joystick 3 Theta-Axis Clockwise Positive Position Status	2743
5.7-6	10 bits	Joystick 3 Theta-Axis Position	2738
7.3	2 bits	Joystick 3 Theta-Axis Detent Position Status	2758
7.5	2 bits	Joystick 3 Grip Y-Axis Detent Position Status	2757
7.7	2 bits	Joystick 3 Grip X-Axis Detent Position Status	2756

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PGN 64988 Marine Control Information**MCI**

This messages contains marine vessel control information for the engine

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 220 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64988 (0x00FDDC)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Engine Throttle Synchronization Mode Status	2615
1.5	2 bits	Trolling Mode Status	2616
1.7	2 bits	Slow Vessel Mode Status	2617

PGN 64991 Front Wheel Drive Status**FWD**

Front wheel drive ECU information

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 223 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 64991 (0x00FDDE)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Front Wheel Drive Actuator Status	2612

(R) PGN 64992 Ambient Conditions 2**AMB2**

This message contains measurement and configuration information about the vehicle ambient conditions.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 224 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64992 (0x00FDE0)

Start Position	Length	Parameter Name	SPN
1	1 byte	Solar Intensity Percent	2610
2	1 byte	Solar Sensor Maximum	2611
3-4	2 bytes	Specific Humidity	4490
5-6	2 bytes	Calculated Ambient Air Temperature	5581
7-8	2 bytes	Barometric Absolute Pressure (High Resolution)	5685

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PGN 64993 Cab A/C Climate System Information**CACI**

This message contains measurement and condition information from cab air conditioning components.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 225 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64993 (0x00FDE1)

Start Position	Length	Parameter Name	SPN
1	1 byte	Cab A/C Refrigerant Compressor Outlet Pressure	2609

PGN 64994 Supply Pressure Demand**SPR**

Used for controlling the supply pressure. Often used to raise the pressure of a supply pressure circuit in situations where more pneumatic energy is needed.

This message is the setpoint for the PGN 65198 message.

Transmission Repetition Rate: 1 s, when active
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 226 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64994 (0x00FDE2)

Start Position	Length	Parameter Name	SPN
1	1 byte	Pneumatic Supply Pressure Request	2603
2	1 byte	Parking and/or Trailer Air Pressure Request	2604
3	1 byte	Service Brake Air Pressure Request, Circuit #1	2605
4	1 byte	Service Brake Air Pressure Request, Circuit #2	2606
5	1 byte	Auxiliary Equipment Supply Pressure Request	2607
6	1 byte	Air Suspension Supply Pressure Request	2608

PGN 64995 Equipment Operation and Control**EOAC**

Parameters related to the operation and controls for equipment

Transmission Repetition Rate: 250 mS
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 227 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64995 (0x00FDE3)

Start Position	Length	Parameter Name	SPN
1	1 byte	Travel Velocity Control Position	2601

PGN 64996**Equipment Performance Data****EPD**

Parameters related to the performance characteristics of equipment

Transmission Repetition Rate: 500 mS
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 228 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64996 (0x00FDE4)

Start Position	Length	Parameter Name	SPN
1	1 byte	Payload Percentage	2600

PGN 64997**Maximum Vehicle Speed Limit Status****MVS**

Reports the possible maximum vehicle speed limits, one through seven, and the applied maximum vehicle speed limit.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 229 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 64997 (0x00FDE5)

Start Position	Length	Parameter Name	SPN
1	1 byte	Maximum Vehicle Speed Limit 1	2588
2	1 byte	Maximum Vehicle Speed Limit 2	2589
3	1 byte	Maximum Vehicle Speed Limit 3	2590
4	1 byte	Maximum Vehicle Speed Limit 4	2591
5	1 byte	Maximum Vehicle Speed Limit 5	2592
6	1 byte	Maximum Vehicle Speed Limit 6	2593
7	1 byte	Maximum Vehicle Speed Limit 7	2594
8	1 byte	Applied Vehicle Speed Limit	2595

PGN 64998 Hydraulic Braking System**HBS**

Used for information on a hydraulic brake system

As an example: this PGN may be used for a two circuit hydraulic brake system with separate circuits for front and rear axle. The hydraulic energy is supplied via two independent electrically driven pumps. The energy is stored in gas filled hydraulic accumulators also separated for each circuit.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 253
 PDU Specific: 230 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 64998 (0x00FDE6)

Start Position	Length	Parameter Name	SPN
1	1 byte	Hydraulic Brake Pressure Circuit 1	2580
2	1 byte	Hydraulic Brake Pressure Circuit 2	2581
3.1	2 bits	Hydraulic Brake Pressure Warning State Circuit 1	2584
3.3	2 bits	Hydraulic Brake Pressure Warning State Circuit 2	2585
3.5	2 bits	Hydraulic Brake Pressure Supply State Circuit 1	2582
3.7	2 bits	Hydraulic Brake Pressure Supply State Circuit 2	2583
4.1	2 bits	Hydraulic Brake System Audible Warning Command	2930
4.3	2 bits	Hydraulic Brake Fluid Level Switch	2931

PGN 65031 Exhaust Temperature**ET**

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 7 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65031 (0x00FE07)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Temperature - Right Manifold	2433
3-4	2 bytes	Engine Exhaust Gas Temperature - Left Manifold	2434

PGN 65088**Lighting Data****LD**

This lighting message is a response to the request for lighting data in the lighting command message. Each lighting controller on the tractor and attached implements must transmit this message to the Tractor ECU when requested. The tractor will use this information to determine which lighting systems are functioning. Lighting controllers that have lamp sensing capability will also report failed light bulbs. This is a legal requirement in many areas.

See PGN 65089 for the lighting command message.

Transmission Repetition Rate: As requested.
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 64 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65088 (0x00FE40)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Running Light	2404
1.3	2 bits	Alternate Beam Head Light Data	2352
1.5	2 bits	Low Beam Head Light Data	2350
1.7	2 bits	High Beam Head Light Data	2348
2.1	2 bits	Tractor Front Fog Lights	2388
2.3	2 bits	Rotating Beacon Light	2386
2.5	2 bits	Right Turn Signal Lights	2370
2.7	2 bits	Left Turn Signal Lights	2368
3.1	2 bits	Back Up Light and Alarm Horn	2392
3.3	2 bits	Center Stop Light	2376
3.5	2 bits	Right Stop Light	2374
3.7	2 bits	Left Stop Light	2372
4.1	2 bits	Implement Clearance Light	2384
4.3	2 bits	Tractor Clearance Light	2382
4.5	2 bits	Implement Marker Light	2380
4.7	2 bits	Tractor Marker Light	2378
5.1	2 bits	Rear Fog Lights	2390
5.3	2 bits	Tractor Underside Mounted Work Lights	2358
5.5	2 bits	Tractor Rear Low Mounted Work Lights	2360
5.7	2 bits	Tractor Rear High Mounted Work Lights	2362
6.1	2 bits	Tractor Side Low Mounted Work Lights	2364
6.3	2 bits	Tractor Side High Mounted Work Lights	2366
6.5	2 bits	Tractor Front Low Mounted Work Lights	2354
6.7	2 bits	Tractor Front High Mounted Work Lights	2356
7.1	2 bits	Implement OEM Option 2 Light	2398
7.3	2 bits	Implement OEM Option 1 Light	2396
7.5	2 bits	Implement Right Facing Work Light	2407
7.7	2 bits	Implement Left Forward Work Light	2598
8.3	2 bits	Implement Right Forward Work Light	2402
8.5	2 bits	Implement Left Facing Work Light	2400
8.7	2 bits	Implement Rear Work Light	2394

PGN 65089**Lighting Command****LCMD**

The lighting command message has been defined as a global message from the tractor to all lighting controllers on the tractor and attached implements. Separate messages are provided for tractor and implement work and driving lights. Additional commands have been provided for 3 optional lights on implements to meet the needs of specialty equipment. Common marking and signaling messages are provided.

This message is used to control the state of all lighting functions. The lighting command message shall be sent on each change of state of a lamp. The state values indicate the lights is to be turned ON or OFF. Flashing is accomplished by sending the lighting message with the state alternately ON or OFF. A lighting command message must be sent at least once per second. It is the responsibility of the tractor designer to provide the correct combination of lamp commands to meet local legislative directives.

See PGN 65088 for the message to provide feedback for this command message.

Transmission Repetition Rate:	Every 1 s and on change of state but no faster than every 100 ms
Data Length:	8
Extended Data Page:	0
Data Page:	0
PDU Format:	254
PDU Specific:	65
Default Priority:	3
Parameter Group Number:	65089 (0x00FE41)

PGN Supporting Information:

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Running Light Command	2403
1.3	2 bits	Alternate Beam Head Light Command	2351
1.5	2 bits	Low Beam Head Light Command	2349
1.7	2 bits	High Beam Head Light Command	2347
2.1	2 bits	Tractor Front Fog Lights Command	2387
2.3	2 bits	Rotating Beacon Light Command	2385
2.5	2 bits	Right Turn Signal Lights Command	2369
2.7	2 bits	Left Turn Signal Lights Command	2367
3.1	2 bits	Back Up Light and Alarm Horn Command	2391
3.3	2 bits	Center Stop Light Command	2375
3.5	2 bits	Right Stop Light Command	2373
3.7	2 bits	Left Stop Light Command	2371
4.1	2 bits	Implement Clearance Light Command	2383
4.3	2 bits	Tractor Clearance Light Command	2381
4.5	2 bits	Implement Marker Light Command	2379
4.7	2 bits	Tractor Marker Light Command	2377
5.1	2 bits	Rear Fog Light Command	2389
5.3	2 bits	Tractor Underside Mounted Work Lights Command	2357
5.5	2 bits	Tractor Rear Low Mounted Work Lights Command	2359
5.7	2 bits	Tractor Rear High Mounted Work Lights Command	2361
6.1	2 bits	Tractor Side Low Mounted Work Lights Command	2363
6.3	2 bits	Tractor Side High Mounted Work Lights Command	2365
6.5	2 bits	Tractor Front Low Mounted Work Lights Command	2353
6.7	2 bits	Tractor Front High Mounted Work Lights Command	2355
7.1	2 bits	Implement OEM Option 2 Light Command	2397
7.3	2 bits	Implement OEM Option 1 Light Command	2395
7.5	2 bits	Implement Right Facing Work Light Command	2406
7.7	2 bits	Implement Left Forward Work Light Command	2597
8.1	2 bits	Lighting Data Request Command	2393
8.3	2 bits	Implement Right Forward Work Light Command	2401
8.5	2 bits	Implement Left Facing Work Light Command	2399
8.7	2 bits	Implement Rear Work Light Command	2405

PGN 65098**Electronic Transmission Controller 7****ETC7**

Transmission status information from the transmission controller to network.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 74 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65098 (0x00FE4A)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission Current Range Display Blank State	4176
1.3	2 bits	Transmission Service Indicator	4178
1.5	2 bits	Transmission Requested Range Display Blank State	1850
1.7	2 bits	Transmission Requested Range Display Flash State	1849
2.1	2 bits	Transmission Ready for Brake Release	3086
2.3	2 bits	Active Shift Console Indicator	2945
2.5	2 bits	Transmission Engine Crank Enable	2900
2.7	2 bits	Transmission Shift Inhibit Indicator	1851
3.1	2 bits	Transmission Mode 4 Indicator	2539
3.3	2 bits	Transmission Mode 3 Indicator	2538
3.5	2 bits	Transmission Mode 2 Indicator	2537
3.7	2 bits	Transmission Mode 1 Indicator	2536
4	1 byte	Transmission Requested Gear Feedback	3289
5.1	2 bits	Transmission Mode 5 Indicator	4250
5.3	2 bits	Transmission Mode 6 Indicator	4251
5.5	2 bits	Transmission Mode 7 Indicator	4252
5.7	2 bits	Transmission Mode 8 Indicator	4253
6.1	2 bits	Transmission Reverse Gear Shift Inhibit Status	4261
6.3	2 bits	Transmission Warning Indicator	5344

PGN 65099**Transmission Configuration 2****TCFG2**

Contains transmission configuration information.

Transmission Repetition Rate: On request or sender may transmit every 5 seconds until acknowledged by reception of the engine configuration message PGN 65251 SPN 1846.
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 75 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65099 (0x00FE4B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Transmission Torque Limit	1845

PGN 65100 Military Lighting Command**ML**

The message contains parameters that control military specific lights.

Transmission Repetition Rate: 500ms or upon state change, but not faster than 100 ms.
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 76 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65100 (0x00FE4C)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Rear Black Out Marker Select	1840
1.3	2 bits	Front Black Out Marker Lamp Select	1839
1.5	2 bits	Convoy Lamp Select	1838
1.7	2 bits	Convoy Driving Lamp Select	1837
3.7	2 bits	Black Out Brake/Stop Lamp Select	1841
4.1	2 bits	Night Vision Illuminator Select	1843
4.7	2 bits	Black Out Work Lamp Select	1842
8	1 byte	Operators Black Out Intensity Selection	1844

PGN 65101 Total Averaged Information**TAVG**

Averages of information accumulated over the life of the engine

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 77 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65101 (0x00FE4D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Total Average Fuel Rate	1834
3-4	2 bytes	Engine Total Average Fuel Economy	1835

PGN 65102 Door Control 1**DC1**

Used for door information.

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 78 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65102 (0x00FE4E)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Position of doors	1821
1.5	2 bits	Ramp / Wheel Chair Lift Position	1820
1.7	2 bits	Status 2 of doors	3411

PGN 65103 Vehicle Dynamic Stability Control 1**VDC1**

Contains information which relates to the VDC system status.

Transmission Repetition Rate: 100ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 79 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65103 (0x00FE4F)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	VDC Information Signal	1813
1.3	2 bits	VDC Fully Operational	1814
1.5	2 bits	VDC brake light request	1815
2.1	2 bits	ROP Engine Control active	1816
2.3	2 bits	ROP Brake Control active	1818
2.5	2 bits	YC Engine Control active	1817
2.7	2 bits	YC Brake Control active	1819
3.1	2 bits	Trailer-VDC Active	5624

PGN 65104 Battery Temperature**BT1**

Contains battery temperature information.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 80 PGN Supporting Information: See Appendix D - PGN 65104
 Default Priority: 6
 Parameter Group Number: 65104 (0x00FE50)

Start Position	Length	Parameter Name	SPN
1	1 byte	Battery 1 Temperature	1800
2	1 byte	Battery 2 Temperature	1801

PGN 65105 Adaptive Cruise Control, Operator Input**ACC2**

The operator requested characteristics for the ACC systems operation.

Transmission Repetition Rate: 250 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 81 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65105 (0x00FE51)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	ACC usage demand	5023
1.6	3 bits	Requested ACC Distance Mode	1799

PGN 65106**Vehicle Electrical Power #3****VEP3**

This contains high resolution/range parameters reported from the alternator or power generation components.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 82 PGN Supporting Information: See Appendix D - PGN 65104
 Default Priority: 6
 Parameter Group Number: 65106 (0x00FE52)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Alternator Current (High Range/Resolution)	1795
3-4	2 bytes	Net Battery Current (High Range/Resolution)	2579

PGN 65107**Retarder Continuous Torque & Speed Limit****RTC1**

Transmission Repetition Rate: 5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 83 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65107 (0x00FE53)

Start Position	Length	Parameter Name	SPN
1	1 byte	Low Limit Threshold for Maximum RPM from Retarder	1776
2	1 byte	High Limit Threshold for Minimum Continuous RPM from Retarder	1777
3	1 byte	Low Limit Threshold for Maximum Torque from Retarder	1778
4	1 byte	High Limit Threshold for Minimum Continuous Torque from Retarder	1779
5	1 byte	Maximum Continuous Retarder Speed	1780
6	1 byte	Minimum Continuous Retarder Speed	1781
7	1 byte	Maximum Continuous Retarder Torque	1782
8	1 byte	Minimum Continuous Retarder Torque	1783

PGN 65108**Engine Continuous Torque & Speed Limit****ECT1**

Transmission Repetition Rate: 5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 84 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65108 (0x00FE54)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Low Limit Threshold for Maximum RPM from Engine	1768
2	1 byte	Engine High Limit Threshold for Minimum Continuous Engine RPM	1769
3	1 byte	Engine Low Limit Threshold for Maximum Torque from Engine	1770
4	1 byte	Engine High Limit Threshold for Minimum Continuous Torque from Engine	1771
5	1 byte	Engine Maximum Continuous RPM	1772
6	1 byte	Engine Minimum Continuous RPM	1773
7	1 byte	Engine Maximum Continuous Torque	1774
8	1 byte	Engine Minimum Continuous Torque	1775

(R) PGN 65109**Gaseous Fuel Properties****GFD**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 85 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65109 (0x00FE55)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Specific Heat Ratio	1767
3-4	2 bytes	Reference Engine Gas Mass Flow Rate	5684
5-6	2 bytes	Fuel energy content	4245

PGN 65110 Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Information**AT1T1I**

Contains information on various tank levels

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 86 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65110 (0x00FE56)

Start Position	Length	Parameter Name	SPN
1	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank Level	1761
2	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature	3031
3-4	2 bytes	Aftertreatment 1 Diesel Exhaust Fluid Tank Level 2	3517
5.1	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Tank Level Preliminary FMI	3532
5.6	3 bits	Aftertreatment Selective Catalytic Reduction Operator Inducement Active	5245
6.1	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Temperature Preliminary FMI	4365
6.6	3 bits	Aftertreatment SCR Operator Inducement Severity	5246
7	1 byte	Aftertreatment 1 Diesel Exhaust Fluid Tank Heater	3363
8.1	5 bits	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater Preliminary FMI	4366

PGN 65111 Air Suspension Control 5**ASC5**

Used for damper stiffness information

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 87 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 65111 (0x00FE57)

Start Position	Length	Parameter Name	SPN
1	1 byte	Damper Stiffness Front Axle	1729
2	1 byte	Damper Stiffness Rear Axle	1730
3	1 byte	Damper Stiffness Lift / Tag Axle	1731
4.1	2 bits	Electronic Shock Absorber Control Mode - Front Axle	1833
4.3	2 bits	Electronic Shock Absorber Control Mode - Rear Axle	1832
4.5	2 bits	Electronic Shock Absorber Control Mode - Lift/Tag Axle	1831

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PGN 65112 Air Suspension Control 4**ASC4**

Used for bellow pressure information

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 88 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65112 (0x00FE58)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Bellow Pressure Front Axle Left	1725
3-4	2 bytes	Bellow Pressure Front Axle Right	1726
5-6	2 bytes	Bellow Pressure Rear Axle Left	1727
7-8	2 bytes	Bellow Pressure Rear Axle Right	1728

PGN 65113 Air Suspension Control 3**ASC3**

Used for height information

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 89 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65113 (0x00FE59)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Relative Level Front Axle Left	1721
3-4	2 bytes	Relative Level Front Axle Right	1722
5-6	2 bytes	Relative Level Rear Axle Left	1724
7-8	2 bytes	Relative Level Rear Axle Right	1723

PGN 65114 Air Suspension Control 1**ASC1**

Used for suspension control information

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 90 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 65114 (0x00FE5A)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Nominal Level Front Axle	1734
1.5	4 bits	Nominal Level Rear Axle	1733
2.1	2 bits	Below Nominal Level Front Axle	1738
2.3	2 bits	Below Nominal Level Rear Axle	1754
2.5	2 bits	Above Nominal Level Front Axle	1737
2.7	2 bits	Above Nominal Level Rear Axle	1736
3.1	2 bits	Lowering Control Mode Front Axle	1740
3.3	2 bits	Lowering Control Mode Rear Axle	1755
3.5	2 bits	Lifting Control Mode Front Axle	1739
3.7	2 bits	Lifting Control Mode Rear Axle	1756
4.1	4 bits	Kneeling Information	1742
4.5	4 bits	Level Control Mode	1741
5.1	2 bits	Security Device	1746
5.3	2 bits	Vehicle Motion Inhibit	1745
5.5	2 bits	Door Release	1744
5.7	2 bits	Lift Axle 1 Position	1743
6.1	2 bits	Front Axle in Bumper Range	1824
6.3	2 bits	Rear Axle in Bumper Range	1823
6.7	2 bits	Lift Axle 2 Position	1822
7.1	2 bits	Suspension Remote Control 1	1826
7.3	2 bits	Suspension Remote control 2	1825
7.5	2 bits	Allow Level Control During Braking Status	5294
7.7	2 bits	Speed Dependant Level Control Status	5296
8.1	4 bits	Suspension Control Refusal Information	1827
8.5	4 bits	Memory level	5432

PGN 65115 Forward Lane Image**FLI2**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 91 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65115 (0x00FE5B)

Start Position	Length	Parameter Name	SPN
1.3	2 bits	Lane Tracking Status Right Side	1711
1.5	2 bits	Lane Tracking Status Left Side	1710
1.7	2 bits	Lane Departure Indication Enable Status	1702

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PGN 65126**Battery Main Switch Information****BM**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 102 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65126 (0x00FE66)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Battery Main Switch Hold State	1681

PGN 65127**Climate Control Configuration****CCC**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 103 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65127 (0x00FE67)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Auxiliary Heater Maximum Output Power	1690

PGN 65128**Vehicle Fluids****VF**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 104 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65128 (0x00FE68)

Start Position	Length	Parameter Name	SPN
1	1 byte	Hydraulic Temperature	1638
2.1	2 bits	Hydraulic Oil Filter Restriction Switch	1713
2.3	2 bits	Winch Oil Pressure Switch	1857
3	1 byte	Hydraulic Oil Level	2602

PGN 65129 Engine Temperature 3**ET3**

This parameter group is used to transmit high resolution engine temperatures for control purposes.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 105 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65129 (0x00FE69)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Intake Manifold 1 Air Temperature (High Resolution)	1636
3-4	2 bytes	Engine Coolant Temperature (High Resolution)	1637
5-6	2 bytes	Engine Intake Valve Actuation System Oil Temperature	2986
7-8	2 bytes	Engine Charge Air Cooler 1 Outlet Temperature	2630

PGN 65130 Engine Fuel/lube systems**EFS**

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 106 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65130 (0x00FE6A)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Oil Level Remote Reservoir	1380
2	1 byte	Engine Fuel Supply Pump Intake Pressure	1381
3	1 byte	Engine Fuel Filter (suction side) Differential Pressure	1382
4	1 byte	Engine Waste Oil Reservoir Level	3548
5	1 byte	Engine Oil-Filter Outlet Pressure	3549
6.1	2 bits	Engine Oil Priming Pump Switch	3550
6.3	2 bits	Engine Oil Priming State	3551
6.5	2 bits	Engine Oil Pre-Heated State	3552
6.7	2 bits	Engine Coolant Pre-heated State	3553
7.1	3 bits	Engine Ventilation Status	3554
7.4	2 bits	Fuel Pump Primer Status	4083

PGN 65131 Driver's Identification**DI**

Field:

a Driver 1 Identification

Delimiter (ASCII "**")

b Driver 2 Identification

Delimiter (ASCII "**")

NOTE - If only driver card 1 is present, only the parameter driver 1 identification and two delimiters shall be transmitted. If only driver card 2 is present, a delimiter followed by parameter driver 2 identification and the second delimiter shall be transmitted. If no driver cards are present, only the two delimiters shall be sent.

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 107 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65131 (0x00FE6B)

Start Position	Length	Parameter Name	SPN
a	Variable - up to 1728 bytes followed by an "**" delimiter	Driver 1 identification	1625
b	Variable - up to 1728 bytes followed by an "**" delimiter	Driver 2 identification	1626

PGN 65132 Tachograph**TCO1**

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 108 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 65132 (0x00FE6C)

Start Position	Length	Parameter Name	SPN
1.1	3 bits	Driver 1 working state	1612
1.4	3 bits	Driver 2 working state	1613
1.7	2 bits	Vehicle motion	1611
2.1	4 bits	Driver 1 Time Related States	1617
2.5	2 bits	Driver card, driver 1	1615
2.7	2 bits	Vehicle Overspeed	1614
3.1	4 bits	Driver 2 Time Related States	1618
3.5	2 bits	Driver card, driver 2	1616
4.1	2 bits	System event	1622
4.3	2 bits	Handling information	1621
4.5	2 bits	Tachograph performance	1620
4.7	2 bits	Direction indicator	1619
5-6	2 bytes	Tachograph output shaft speed	1623
7-8	2 bytes	Tachograph vehicle speed	1624

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PGN 65133**Heater Information****HTR**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 109 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65133 (0x00FE6D)

Start Position	Length	Parameter Name	SPN
1	1 byte	Auxiliary Heater Output Coolant Temperature	1687
2	1 byte	Auxiliary Heater Input Air Temperature	1688
3	1 byte	Auxiliary Heater Output Power Percent	1689
4.1	4 bits	Auxiliary Heater Mode	1677
5.1	2 bits	Auxiliary Heater Water Pump Status	1676
5.3	2 bits	Cab Ventilation	1678
5.5	2 bits	Engine Heating Zone	1679
5.7	2 bits	Cab Heating Zone	1680

PGN 65134**High Resolution Wheel Speed****HRW**

Transmission Repetition Rate: 20 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 110 PGN Supporting Information:
 Default Priority: 2
 Parameter Group Number: 65134 (0x00FE6E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Front Axle, Left Wheel Speed	1592
3-4	2 bytes	Front axle, right wheel speed	1593
5-6	2 bytes	Rear axle, left wheel speed	1594
7-8	2 bytes	Rear axle, right wheel speed	1595

PGN 65135 Adaptive Cruise Control 1**ACC1**

NOTE—The ACC1 message is required whenever the engine is running and ACC is powered on and not faulted. The timeout for ACC1 message will be between 2.5 times to 5 times the update rate.

The ACC1 message is intended primarily for engines and driver display units. The receiving device should identify the ACC device based on ACC function value of 32 (headway controller) or source address of 42 (headway controller).

In the event that the engine is running, the ACC is installed and the ACC1 message is not present, the engine will disable cruise control and return to non-cruise mode; also, the driver display unit will notify the driver that ACC operation is no longer available. In addition to the ACC1 timeout, engine cruise control will also be disabled if parameter "Adaptive Cruise Control State" in ACC1 is 110b (ACC disabled or in error). In some cases, it may be possible for the driver to restart cruise control (without ACC capability) during ACC/J1939 fault by performing a reset function. See Figure PGN65135_A.

It is possible that engines and driver display units may require calibration settings in order to know if the present vehicle configuration includes an ACC system or not. A calibration setting may also be needed for defining the driver reset function.

Transmission Repetition Rate: 100ms or upon state change, but not faster than 20 ms.
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 111 PGN Supporting Information: See Appendix D - PGN 65135
 Default Priority: 4
 Parameter Group Number: 65135 (0x00FE6F)

Start Position	Length	Parameter Name	SPN
1	1 byte	Speed of forward vehicle	1586
2	1 byte	Distance to forward vehicle	1587
3	1 byte	Adaptive Cruise Control Set Speed	1588
4.1	3 bits	Adaptive Cruise Control Mode	1590
4.4	3 bits	Adaptive cruise control set distance mode	1589
5-6	2 bytes	Road curvature	1591
7.1	2 bits	ACC Target Detected	1798
7.3	2 bits	ACC System Shutoff Warning	1797
7.5	2 bits	ACC Distance Alert Signal	1796
7.7	2 bits	Forward Collision Warning	5022

PGN 65136 Combination Vehicle Weight**CVW**

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 112 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65136 (0x00FE70)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Powered Vehicle Weight	1585
3-4	2 bytes	Gross Combination Vehicle Weight	1760

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PGN 65137**Laser Tracer Position****LTP**

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 113 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 65137 (0x00FE71)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Laser Tracer Target Deviation	1579
3-4	2 bytes	Laser Tracer Vertical Distance	1580
5	1 byte	Laser Tracer Horizontal Deviation	1581
6	8 bits	LED Display Data #2	1582
7	8 bits	Laser Tracer Information	1583

PGN 65138**Laser Leveling System Blade Control****LBC**

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 114 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 65138 (0x00FE72)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Blade Duration and Direction	1577
3	8 bits	Blade Control Mode	1578
4.1	4 bits	Blade Control Mode - Left	5407
4.5	4 bits	Blade Control Mode - Right	5408
5.1	2 bits	Land Leveling System Enable Status	5409

PGN 65139**Laser Receiver Mast Position****LMP**

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 115 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 65139 (0x00FE73)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Mast Position	1576

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PGN 65140 Modify Leveling System Control Set Point**LSP**

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 116 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 65140 (0x00FE74)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Modify Leveling System Set Point	1575
3-6	4 bytes	Blade Height Set Point - High Resolution	1759

PGN 65141 Laser Leveling System Vertical Deviation**LVD**

Transmission Repetition Rate: 50 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 117 PGN Supporting Information:
 Default Priority: 3
 Parameter Group Number: 65141 (0x00FE75)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Laser Strike Vertical Deviation	1574
3	1 byte	Laser Receiver Type	2576
4-5	2 bytes	Laser Strike Data Latency	2793
6-7	2 bytes	Absolute Laser Strike Position	2794

PGN 65142 Laser Leveling System Vertical Position Display Data**LVDD**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 118 PGN Supporting Information:
 Default Priority: 4
 Parameter Group Number: 65142 (0x00FE76)

Start Position	Length	Parameter Name	SPN
1	8 bits	LED Display Data #1	1573
2.1	4 bits	LED Display Mode Control	1805
2.5	4 bits	LED Display Deadband Control	1806
3.1	4 bits	LED Pattern Control	2578
3.5	4 bits	Display Deadbands	2577

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PGN 65143**Auxiliary Pressures****AP**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 119 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65143 (0x00FE77)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Auxiliary Vacuum Pressure Reading	136
3-4	2 bytes	Auxiliary Gage Pressure Reading 1	137
5-6	2 bytes	Auxiliary Absolute Pressure Reading	138

PGN 65144**Tire Pressure Control Unit Mode and Status****TP1**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 120 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65144 (0x00FE78)

Start Position	Length	Parameter Name	SPN
1	1 byte	Tire Pressure Check Interval	39
2.1	4 bits	Steer Channel Mode	1466
3.1	4 bits	Trailer/tag Channel Mode	1467
3.5	4 bits	Drive Channel Mode	1468
4.1	2 bits	PCU Drive Solenoid Status	1469
4.3	2 bits	PCU Steer Solenoid Status	1470
4.5	2 bits	Tire Pressure Supply Switch Status	1471
5.1	2 bits	PCU Deflate Solenoid Status	1472
5.3	2 bits	PCU Control Solenoid Status	1473
5.5	2 bits	PCU Supply Solenoid Status	1474
5.7	2 bits	PCU Trailer, Tag or Push Solenoid Status	1475

PGN 65145**Tire Pressure Control Unit Target Pressures****TP2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 121 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65145 (0x00FE79)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trailer, Tag Or Push Channel Tire Pressure Target	141
3-4	2 bytes	Drive Channel Tire Pressure Target	142
5-6	2 bytes	Steer Channel Tire Pressure Target	143

PGN 65146 Tire Pressure Control Unit Current Pressures**TP3**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 122 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65146 (0x00FE7A)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trailer, Tag Or Push Channel Tire Pressure	144
3-4	2 bytes	Drive Channel Tire Pressure	145
5-6	2 bytes	Steer Channel Tire Pressure	146

PGN 65147 Combustion Time 1**CT1**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 123 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65147 (0x00FE7B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #1 Combustion Time	1444
3-4	2 bytes	Engine Cylinder #2 Combustion Time	1445
5-6	2 bytes	Engine Cylinder #3 Combustion Time	1446
7-8	2 bytes	Engine Cylinder #4 Combustion Time	1447

PGN 65148 Combustion Time 2**CT2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 124 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65148 (0x00FE7C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #5 Combustion Time	1448
3-4	2 bytes	Engine Cylinder #6 Combustion Time	1449
5-6	2 bytes	Engine Cylinder #7 Combustion Time	1450
7-8	2 bytes	Engine Cylinder #8 Combustion Time	1451

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PGN 65149**Combustion Time 3****CT3**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 125 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65149 (0x00FE7D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #9 Combustion Time	1452
3-4	2 bytes	Engine Cylinder #10 Combustion Time	1453
5-6	2 bytes	Engine Cylinder #11 Combustion Time	1454
7-8	2 bytes	Engine Cylinder #12 Combustion Time	1455

PGN 65150**Combustion Time 4****CT4**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 126 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65150 (0x00FE7E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #13 Combustion Time	1456
3-4	2 bytes	Engine Cylinder #14 Combustion Time	1457
5-6	2 bytes	Engine Cylinder #15 Combustion Time	1458
7-8	2 bytes	Engine Cylinder #16 Combustion Time	1459

PGN 65151**Combustion Time 5****CT5**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 127 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65151 (0x00FE7F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #17 Combustion Time	1460
3-4	2 bytes	Engine Cylinder #18 Combustion Time	1461
5-6	2 bytes	Engine Cylinder #19 Combustion Time	1462
7-8	2 bytes	Engine Cylinder #20 Combustion Time	1463

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PGN 65152**Combustion Time 6****CT6**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 128 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65152 (0x00FE80)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Desired Combustion Time	1464
3-4	2 bytes	Engine Average Combustion Time	1465

PGN 65153**Fuel Information 2 (Gaseous)****GFI2**

Gaseous fuel information 2

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 129 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65153 (0x00FE81)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Fuel Flow Rate 1	1440
3-4	2 bytes	Engine Fuel Flow Rate 2	1441
5	1 byte	Engine Fuel Valve 1 Position	1442
6	1 byte	Engine Fuel Valve 2 Position	1443
7	1 byte	Engine Requested Fuel Valve 1 Position	1765
8	1 byte	Engine Requested Fuel Valve 2 Position	1766

PGN 65154**Ignition Timing 1****IT1**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 130 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65154 (0x00FE82)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #1 Ignition Timing	1413
3-4	2 bytes	Engine Cylinder #2 Ignition Timing	1414
5-6	2 bytes	Engine Cylinder #3 Ignition Timing	1415
7-8	2 bytes	Engine Cylinder #4 Ignition Timing	1416

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PGN 65155**Ignition Timing 2****IT2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 131 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65155 (0x00FE83)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #5 Ignition Timing	1417
3-4	2 bytes	Engine Cylinder #6 Ignition Timing	1418
5-6	2 bytes	Engine Cylinder #7 Ignition Timing	1419
7-8	2 bytes	Engine Cylinder #8 Ignition Timing	1420

PGN 65156**Ignition Timing 3****IT3**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 132 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65156 (0x00FE84)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #9 Ignition Timing	1421
3-4	2 bytes	Engine Cylinder #10 Ignition Timing	1422
5-6	2 bytes	Engine Cylinder #11 Ignition Timing	1423
7-8	2 bytes	Engine Cylinder #12 Ignition Timing	1424

PGN 65157**Ignition Timing 4****IT4**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 133 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65157 (0x00FE85)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #13 Ignition Timing	1425
3-4	2 bytes	Engine Cylinder #14 Ignition Timing	1426
5-6	2 bytes	Engine Cylinder #15 Ignition Timing	1427
7-8	2 bytes	Engine Cylinder #16 Ignition Timing	1428

PGN 65158**Ignition Timing 5****IT5**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 134 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65158 (0x00FE86)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #17 Ignition Timing	1429
3-4	2 bytes	Engine Cylinder #18 Ignition Timing	1430
5-6	2 bytes	Engine Cylinder #19 Ignition Timing	1431
7-8	2 bytes	Engine Cylinder #20 Ignition Timing	1432

PGN 65159**Ignition Timing 6****IT6**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 135 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65159 (0x00FE87)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Desired Ignition Timing #1	1433
3-4	2 bytes	Engine Desired Ignition Timing #2	1434
5-6	2 bytes	Engine Desired Ignition Timing #3	1435
7-8	2 bytes	Engine Actual Ignition Timing	1436

PGN 65160**Ignition Transformer Secondary Output 1****ISO1**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 136 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65160 (0x00FE88)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Cylinder #1 Ignition Transformer Secondary Output	1393
2	1 byte	Engine Cylinder #2 Ignition Transformer Secondary Output	1394
3	1 byte	Engine Cylinder #3 Ignition Transformer Secondary Output	1395
4	1 byte	Engine Cylinder #4 Ignition Transformer Secondary Output	1396
5	1 byte	Engine Cylinder #5 Ignition Transformer Secondary Output	1397
6	1 byte	Engine Cylinder #6 Ignition Transformer Secondary Output	1398
7	1 byte	Engine Cylinder #7 Ignition Transformer Secondary Output	1399
8	1 byte	Engine Cylinder #8 Ignition Transformer Secondary Output	1400

PGN 65161 Ignition Transformer Secondary Output 2**ISO2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 137 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65161 (0x00FE89)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Cylinder #9 Ignition Transformer Secondary Output	1401
2	1 byte	Engine Cylinder #10 Ignition Transformer Secondary Output	1402
3	1 byte	Engine Cylinder #11 Ignition Transformer Secondary Output	1403
4	1 byte	Engine Cylinder #12 Ignition Transformer Secondary Output	1404
5	1 byte	Engine Cylinder #13 Ignition Transformer Secondary Output	1405
6	1 byte	Engine Cylinder #14 Ignition Transformer Secondary Output	1406
7	1 byte	Engine Cylinder #15 Ignition Transformer Secondary Output	1407
8	1 byte	Engine Cylinder #16 Ignition Transformer Secondary Output	1408

PGN 65162 Ignition Transformer Secondary Output 3**ISO3**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 138 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65162 (0x00FE8A)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Cylinder #17 Ignition Transformer Secondary Output	1409
2	1 byte	Engine Cylinder #18 Ignition Transformer Secondary Output	1410
3	1 byte	Engine Cylinder #19 Ignition Transformer Secondary Output	1411
4	1 byte	Engine Cylinder #20 Ignition Transformer Secondary Output	1412

PGN 65163 Gaseous Fuel Pressure**GFP**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 139 PGN Supporting Information: See Appendix D - PGN 65163
 Default Priority: 7
 Parameter Group Number: 65163 (0x00FE8B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Fuel Valve 1 Intake Absolute Pressure	1390
3-4	2 bytes	Engine Fuel Valve Differential Pressure	1391
5-6	2 bytes	Engine Air to Fuel Differential Pressure	1392
7-8	2 bytes	Engine Fuel Valve 1 Outlet Absolute Pressure	2980

PGN 65164 Auxiliary Analog Information**AAI**

Auxiliary Analog Information

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 140 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65164 (0x00FE8C)

Start Position	Length	Parameter Name	SPN
1	1 byte	Auxiliary Temperature 1	441
2	1 byte	Auxiliary Temperature 2	442
3	1 byte	Auxiliary Pressure #1	1387
4	1 byte	Auxiliary Pressure #2	1388
5-6	2 bytes	Auxiliary Level	3087
7	1 byte	Relative Humidity	354

PGN 65165 Vehicle Electrical Power #2**VEP2**

Voltage data for the main vehicle Power Distribution system.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 141 PGN Supporting Information: See Appendix D - PGN 65104
 Default Priority: 6
 Parameter Group Number: 65165 (0x00FE8D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Battery Potential / Power Input 2	444
3-4	2 bytes	ECU Power Output Supply Voltage #1	3597
5-6	2 bytes	ECU Power Output Supply Voltage #2	3598
7-8	2 bytes	ECU Power Output Supply Voltage #3	3599

PGN 65166**Service 2****S2**

NOTE - There are two acceptable formats for the Service PGN. Format 1 has only 8 bytes of data and reports the component most in need of service for each of the three categories. Format 2, however, uses the transport protocol as necessary (See J1939-21) in order to repeat these 8 bytes of service component information until all supported service components in each category have been transmitted.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 142 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65166 (0x00FE8E)

Start Position	Length	Parameter Name	SPN
1	1 byte	Service Component Identification	1379
2-3	2 bytes	Time Since Last Service	1350

PGN 65167**Supply Pressure 2****SP2**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 143 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65167 (0x00FE8F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine External Shutdown Air Supply Pressure	1320

PGN 65168 Engine Torque History**ETH**

NOTE - The torque history PGN is variable in length and may contain up to 125 torque history records. Each torque history record MUST BE 38 bytes in length. Any unused bytes must be 0xFF.

The last six bytes of each record are not currently defined and shall be transmitted as "not available" (0xff). In the first record, these are byte positions 34-39.

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 144 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65168 (0x00FE90)

Start Position	Length	Parameter Name	SPN
01	1 byte	Number of Engine Torque History Records	1246
02-03	2 bytes	Engine Power	1247
04-05	2 bytes	Engine Peak Torque 1	1248
06-07	2 bytes	Engine Peak Torque 2	1249
08	1 byte	Calibration Record Start Month	1250
09	1 byte	Calibration Record Start Day	1251
10	1 byte	Calibration Record Start Year	1252
11-14	4 bytes	Calibration Record Duration Time	1253
15.1	2 bits	Torque Limiting Feature Status	1254
15.3	3 bits	Engine Torque Limit Feature	1632
16-17	2 bytes	Transmission Gear Ratio 1	1255
18-19	2 bytes	Engine Torque Limit 1, Transmission	1256
20-21	2 bytes	Transmission Gear Ratio 2	1257
22-23	2 bytes	Engine Torque Limit 2, Transmission	1258
24-25	2 bytes	Transmission Gear Ratio 3	1259
26-27	2 bytes	Engine Torque Limit 3, Transmission	1260
28-29	2 bytes	Engine Torque Limit 4, Transmission	1261
30-31	2 bytes	Engine Torque Limit 5, Switch	1262
32-33	2 bytes	Engine Torque Limit 6, Axle Input	1263

PGN 65169 Fuel Leakage**FL**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 145 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65169 (0x00FE91)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Fuel Leakage 1	1239
1.3	2 bits	Engine Fuel Leakage 2	1240

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PGN 65170**Engine Information****EI**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 146 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65170 (0x00FE92)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Pre-filter Oil Pressure	1208
2-3	2 bytes	Engine Exhaust Gas Pressure 1	1209
4	1 byte	Engine Fuel Rack Position	1210
5-6	2 bytes	Engine Gas Mass Flow Rate 1	1241
7-8	2 bytes	Instantaneous Estimated Brake Power	1242

PGN 65171**Engine Electrical System/Module Information****EES**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 147 PGN Supporting Information: See Appendix D - PGN 65104
 Default Priority: 7
 Parameter Group Number: 65171 (0x00FE93)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Electrical Load	1204
3.1	2 bits	Safety Wire Status	1205

(R) PGN 65172**Engine Auxiliary Coolant****EAC**

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 148 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65172 (0x00FE94)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Auxiliary Coolant Pressure	1203
2	1 byte	Engine Auxiliary Coolant Temperature	1212
3	1 byte	Sea Water Pump Outlet Pressure	2435
4	1 byte	Engine Extended Range Coolant Pressure	20

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PGN 65173**Rebuild Information****RBI**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 149 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65173 (0x00FE95)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Engine Operation Time Since Rebuild	1193

PGN 65174**Turbocharger Wastegate****TCW**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 150 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65174 (0x00FE96)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Turbocharger Wastegate Actuator 1 Position	1188
2	1 byte	Engine Turbocharger Wastegate Actuator 2 Position	1189
3	1 byte	Engine Turbocharger Wastegate Actuator 3 Position	1190
4	1 byte	Engine Turbocharger Wastegate Actuator 4 Position	1191
5	1 byte	Engine Turbocharger Wastegate Actuator Control Air Pressure	1192
6	1 byte	Engine Desired Turbocharger Wastegate Actuator 1 Position	5370
7.1	5 bits	Engine Turbocharger Wastegate Actuator 1 Preliminary FMI	5371
7.6	3 bits	Engine Turbocharger Wastegate Actuator 1 Temperature Status	5372
8	1 byte	Engine Desired Turbocharger Wastegate Actuator 2 Position	5373

PGN 65175**Turbocharger Information 5****TCI5**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 151 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65175 (0x00FE97)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Turbine Outlet Temperature	1184
3-4	2 bytes	Engine Turbocharger 2 Turbine Outlet Temperature	1185
5-6	2 bytes	Engine Turbocharger 3 Turbine Outlet Temperature	1186
7-8	2 bytes	Engine Turbocharger 4 Turbine Outlet Temperature	1187

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PGN 65176 Turbocharger Information 4**TCI4**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 152 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65176 (0x00FE98)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Turbine Intake Temperature	1180
3-4	2 bytes	Engine Turbocharger 2 Turbine Intake Temperature	1181
5-6	2 bytes	Engine Turbocharger 3 Turbine Intake Temperature	1182
7-8	2 bytes	Engine Turbocharger 4 Turbine Intake Temperature	1183

PGN 65177 Turbocharger Information 3**TCI3**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 153 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65177 (0x00FE99)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Compressor Intake Pressure	1176
3-4	2 bytes	Engine Turbocharger 2 Compressor Intake Pressure	1177
5-6	2 bytes	Engine Turbocharger 3 Compressor Intake Pressure	1178
7-8	2 bytes	Engine Turbocharger 4 Compressor Intake Pressure	1179

PGN 65178 Turbocharger Information 2**TCI2**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 154 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65178 (0x00FE9A)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Compressor Intake Temperature	1172
3-4	2 bytes	Engine Turbocharger 2 Compressor Intake Temperature	1173
5-6	2 bytes	Engine Turbocharger 3 Compressor Intake Temperature	1174
7-8	2 bytes	Engine Turbocharger 4 Compressor Intake Temperature	1175

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PGN 65179 Turbocharger Information 1**TCI1**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 155 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65179 (0x00FE9B)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Turbocharger Lube Oil Pressure 2	1168
2-3	2 bytes	Engine Turbocharger 2 Speed	1169
4-5	2 bytes	Engine Turbocharger 3 Speed	1170
6-7	2 bytes	Engine Turbocharger 4 Speed	1171

PGN 65180 Main Bearing Temperature 3**MBT3**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 156 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65180 (0x00FE9C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Main Bearing 9 Temperature	1165
3-4	2 bytes	Engine Main Bearing 10 Temperature	1166
5-6	2 bytes	Engine Main Bearing 11 Temperature	1167

PGN 65181 Main Bearing Temperature 2**MBT2**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 157 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65181 (0x00FE9D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Main Bearing 5 Temperature	1161
3-4	2 bytes	Engine Main Bearing 6 Temperature	1162
5-6	2 bytes	Engine Main Bearing 7 Temperature	1163
7-8	2 bytes	Engine Main Bearing 8 Temperature	1164

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PGN 65182 Main Bearing Temperature 1**MBT1**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 158 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65182 (0x00FE9E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Main Bearing 1 Temperature	1157
3-4	2 bytes	Engine Main Bearing 2 Temperature	1158
5-6	2 bytes	Engine Main Bearing 3 Temperature	1159
7-8	2 bytes	Engine Main Bearing 4 Temperature	1160

PGN 65183 Exhaust Port Temperature 5**EPT5**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 159 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65183 (0x00FE9F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 17 Temperature	1153
3-4	2 bytes	Engine Exhaust Gas Port 18 Temperature	1154
5-6	2 bytes	Engine Exhaust Gas Port 19 Temperature	1155
7-8	2 bytes	Engine Exhaust Gas Port 20 Temperature	1156

PGN 65184 Exhaust Port Temperature 4**EPT4**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 160 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65184 (0x00FEA0)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 13 Temperature	1149
3-4	2 bytes	Engine Exhaust Gas Port 14 Temperature	1150
5-6	2 bytes	Engine Exhaust Gas Port 15 Temperature	1151
7-8	2 bytes	Engine Exhaust Gas Port 16 Temperature	1152

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PGN 65185 Exhaust Port Temperature 3**EPT3**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 161 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65185 (0x00FEA1)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 9 Temperature	1145
3-4	2 bytes	Engine Exhaust Gas Port 10 Temperature	1146
5-6	2 bytes	Engine Exhaust Gas Port 11 Temperature	1147
7-8	2 bytes	Engine Exhaust Gas Port 12 Temperature	1148

PGN 65186 Exhaust Port Temperature 2**EPT2**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 162 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65186 (0x00FEA2)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 5 Temperature	1141
3-4	2 bytes	Engine Exhaust Gas Port 6 Temperature	1142
5-6	2 bytes	Engine Exhaust Gas Port 7 Temperature	1143
7-8	2 bytes	Engine Exhaust Gas Port 8 Temperature	1144

PGN 65187 Exhaust Port Temperature 1**EPT1**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 163 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65187 (0x00FEA3)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 1 Temperature	1137
3-4	2 bytes	Engine Exhaust Gas Port 2 Temperature	1138
5-6	2 bytes	Engine Exhaust Gas Port 3 Temperature	1139
7-8	2 bytes	Engine Exhaust Gas Port 4 Temperature	1140

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PGN 65188**Engine Temperature 2****ET2**

Transmission Repetition Rate: 1s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 164 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65188 (0x00FEA4)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Oil Temperature 2	1135
3-4	2 bytes	Engine ECU Temperature	1136
5-6	2 bytes	Engine Exhaust Gas Recirculation 1 Differential Pressure	411
7-8	2 bytes	Engine Exhaust Gas Recirculation 1 Temperature	412

PGN 65189**Intake Manifold Information 2****IMT2**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 165 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65189 (0x00FEA5)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Intake Manifold 2 Temperature	1131
2	1 byte	Engine Intake Manifold 3 Temperature	1132
3	1 byte	Engine Intake Manifold 4 Temperature	1133
4	1 byte	Engine Intake Manifold 5 Temperature	1802
5	1 byte	Engine Intake Manifold 6 Temperature	1803

PGN 65190**Intake Manifold Information 1****IMT1**

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 166 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65190 (0x00FEA6)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Boost Pressure	1127
3-4	2 bytes	Engine Turbocharger 2 Boost Pressure	1128
5-6	2 bytes	Engine Turbocharger 3 Boost Pressure	1129
7-8	2 bytes	Engine Turbocharger 4 Boost Pressure	1130

PGN 65191**Alternator Temperature****AT**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 167 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65191 (0x00FEA7)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Alternator Bearing 1 Temperature	1122
2	1 byte	Engine Alternator Bearing 2 Temperature	1123
3	1 byte	Engine Alternator Winding 1 Temperature	1124
4	1 byte	Engine Alternator Winding 2 Temperature	1125
5	1 byte	Engine Alternator Winding 3 Temperature	1126

PGN 65192**Articulation Control****ACTL**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 168 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65192 (0x00FEA8)

Start Position	Length	Parameter Name	SPN
1	1 byte	Articulation Angle	1120

PGN 65193**Exhaust Oxygen 1****EO1**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 169 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65193 (0x00FEA9)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Desired Rated Exhaust Oxygen	1117
3-4	2 bytes	Engine Desired Exhaust Oxygen	1118
5-6	2 bytes	Engine Actual Exhaust Oxygen	1119
7	1 byte	Engine Exhaust Gas Oxygen Sensor Fueling Correction	1695
8.7	2 bits	Engine Exhaust Gas Oxygen Sensor Closed Loop Operation	1696

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PGN 65194**Alternate Fuel 2****AF2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 170 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65194 (0x00FEAA)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Gaseous Fuel Correction Factor	1116
2-3	2 bytes	Engine Desired Absolute Intake Manifold Pressure (Turbo Boost Limit)	1692
4	1 byte	Engine Turbocharger Wastegate Valve Position	1693
5	1 byte	Engine Gas Mass Flow Sensor Fueling Correction	1694

PGN 65195**Electronic Transmission Controller 6****ETC6**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 171 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65195 (0x00FEAB)

Start Position	Length	Parameter Name	SPN
1	1 byte	Recommended Gear	1113
2	1 byte	Highest Possible Gear	1115
3	1 byte	Lowest Possible Gear	1114
4	1 byte	Clutch Life Remaining	2983

PGN 65196**Wheel Brake Lining Remaining Information****EBC4**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 172 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65196 (0x00FEAC)

Start Position	Length	Parameter Name	SPN
1	1 byte	Brake Lining Remaining, Front Axle, Left Wheel	1099
2	1 byte	Brake Lining Remaining, Front Axle, Right Wheel	1100
3	1 byte	Brake Lining Remaining, Rear Axle #1, Left Wheel	1101
4	1 byte	Brake Lining Remaining, Rear Axle #1, Right Wheel	1102
5	1 byte	Brake Lining Remaining, Rear Axle #2, Left Wheel	1103
6	1 byte	Brake Lining Remaining, Rear Axle #2, Right Wheel	1104
7	1 byte	Brake Lining Remaining, Rear Axle #3, Left Wheel	1105
8	1 byte	Brake Lining Remaining, Rear Axle #3, Right Wheel	1106

PGN 65197**Wheel Application Pressure High Range Information****EBC3**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 173 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65197 (0x00FEAD)

Start Position	Length	Parameter Name	SPN
1	1 byte	Brake Application Pressure High Range, Front Axle, Left Wheel	1091
2	1 byte	Brake Application Pressure High Range, Front Axle, Right Wheel	1092
3	1 byte	Brake Application Pressure High Range, Rear Axle #1, Left Wheel	1093
4	1 byte	Brake Application Pressure High Range, Rear Axle #1, Right Wheel	1094
5	1 byte	Brake Application Pressure High Range, Rear Axle #2, Left Wheel	1095
6	1 byte	Brake Application Pressure High Range, Rear Axle #2, Right Wheel	1096
7	1 byte	Brake Application Pressure High Range, Rear Axle #3, Left Wheel	1097
8	1 byte	Brake Application Pressure High Range, Rear Axle #3, Right Wheel	1098

PGN 65198**Air Supply Pressure****AIR1**

Air Supply Pressure

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 174 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65198 (0x00FEAE)

Start Position	Length	Parameter Name	SPN
1	1 byte	Pneumatic Supply Pressure	46
2	1 byte	Parking and/or Trailer Air Pressure	1086
3	1 byte	Service Brake Circuit 1 Air Pressure	1087
4	1 byte	Service Brake Circuit 2 Air Pressure	1088
5	1 byte	Auxiliary Equipment Supply Pressure	1089
6	1 byte	Air Suspension Supply Pressure	1090
7.1	2 bits	Air Compressor Status	1351

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PGN 65199**Fuel Consumption (Gaseous)****GFC**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 175 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65199 (0x00FEAF)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Trip Fuel (Gaseous)	1039
5-8	4 bytes	Total Fuel Used (Gaseous)	1040

PGN 65200**Trip Time Information 2****TTI2**

Transmission Repetition Rate: On request
 Data Length: 20
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 176 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65200 (0x00FEB0)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Cruise Time	1034
05-08	4 bytes	Trip PTO Governor Time	1035
09-12	4 bytes	Trip Engine Running Time	1036
13-16	4 bytes	Trip Idle Time	1037
17-20	4 bytes	Trip Air Compressor On Time	1038

PGN 65201**ECU History****EH**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 177 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65201 (0x00FEB1)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Total ECU Distance	1032
5-8	4 bytes	Total ECU Run Time	1033

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PGN 65202**Fuel Information 1 (Gaseous)****GFI1**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 178 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65202 (0x00FEB2)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Total Engine PTO Governor Fuel Used (Gaseous)	1030
5-6	2 bytes	Trip Average Fuel Rate (Gaseous)	1031
7-8	2 bytes	Engine Fuel Specific Gravity	1389

PGN 65203**Fuel Information (Liquid)****LFI**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 179 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65203 (0x00FEB3)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Total Engine PTO Governor Fuel Used	1028
5-6	2 bytes	Trip Average Fuel Rate	1029
7-8	2 bytes	Flexible Fuel Percentage	5458

PGN 65204**Trip Time Information 1****TTI1**

Transmission Repetition Rate: On request
 Data Length: 16
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 180 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65204 (0x00FEB4)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Time in VSL	1024
05-08	4 bytes	Trip Time in Top Gear	1025
09-12	4 bytes	Trip Time in Gear Down	1026
13-16	4 bytes	Trip Time in Derate by Engine	1027

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PGN 65205***Trip Shutdown Information******TSI***

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 181 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65205 (0x00FEB5)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trip Number of Hot Shutdowns	1020
3-4	2 bytes	Trip Number of Idle Shutdowns	1021
5-6	2 bytes	Trip Number of Idle Shutdown Overrides	1022
7-8	2 bytes	Trip Sudden Decelerations	1023

PGN 65206***Trip Vehicle Speed/Cruise Distance Information******TVI***

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 182 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65206 (0x00FEB6)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trip Maximum Vehicle Speed	1018
3-6	4 bytes	Trip Cruise Distance	1019

PGN 65207***Engine Speed/Load Factor Information******LF***

Transmission Repetition Rate: On request
 Data Length: 10
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 183 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65207 (0x00FEB7)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trip Maximum Engine Speed	1013
3-4	2 bytes	Trip Average Engine Speed	1014
5	1 byte	Trip Drive Average Load Factor	1015
6	1 byte	Total Drive Average Load Factor	1016
7-10	4 bytes	Total Engine Cruise Time	1017

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PGN 65208***Trip Fuel Information (Gaseous)******GTFI***

Transmission Repetition Rate: On request
 Data Length: 22
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 184 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65208 (0x00FEB8)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Drive Fuel Used (Gaseous)	1007
05-08	4 bytes	Trip PTO Governor Moving Fuel Used (Gaseous)	1008
09-12	4 bytes	Trip PTO Governor Non-moving Fuel Used (Gaseous)	1009
13-16	4 bytes	Trip Vehicle Idle Fuel Used (Gaseous)	1010
17-20	4 bytes	Trip Cruise Fuel Used (Gaseous)	1011
21-22	2 bytes	Trip Drive Fuel Economy (Gaseous)	1012

PGN 65209***Trip Fuel Information (Liquid)******LTFI***

Transmission Repetition Rate: On request
 Data Length: 22
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 185 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65209 (0x00FEB9)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Drive Fuel Used	1001
05-08	4 bytes	Trip PTO Governor Moving Fuel Used	1002
09-12	4 bytes	Trip PTO Governor Non-moving Fuel Used	1003
13-16	4 bytes	Trip Vehicle Idle Fuel Used	1004
17-20	4 bytes	Trip Cruise Fuel Used	1005
21-22	2 bytes	Trip Drive Fuel Economy	1006

PGN 65210***Trip Distance Information******TDI***

Transmission Repetition Rate: On request
 Data Length: 12
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 186 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65210 (0x00FEBA)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Trip Distance on VSL	998
5-8	4 bytes	Trip Gear Down Distance	999
9-12	4 bytes	Trip Distance in Top Gear	1000

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PGN 65211**Trip Fan Information****TFI**

Transmission Repetition Rate: On request
 Data Length: 16
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 187 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65211 (0x00FEBB)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Fan On Time	994
05-08	4 bytes	Trip Fan On Time Due to the Engine System	995
09-12	4 bytes	Trip Fan On Time Due to a Manual Switch	996
13-16	4 bytes	Trip Fan On Time Due to the A/C System	997

PGN 65212**Compression/Service Brake Information****CBI**

Transmission Repetition Rate: On request
 Data Length: 16
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 188 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65212 (0x00FEBB)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Total Compression Brake Distance	990
05-08	4 bytes	Trip Compression Brake Distance	991
09-12	4 bytes	Trip Service Brake Distance	992
13-16	4 bytes	Trip Service Brake Applications	993

PGN 65213**Fan Drive #1****FD1**

This parameter group transfers status and measured information for an engine coolant fan. This PGN is used for the primary fan if there are more than one fan in the system. PGN 64817 may be used for a second fan.

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 189 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65213 (0x00FEBD)

Start Position	Length	Parameter Name	SPN
1	1 byte	Estimated Percent Fan Speed	975
2.1	4 bits	Fan Drive State	977
3-4	2 bytes	Fan Speed	1639
5-6	2 bytes	Hydraulic Fan Motor Pressure	4211
7	1 byte	Fan Drive Bypass Command Status	4212

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PGN 65214**Electronic Engine Controller 4****EEC4**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 190 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65214 (0x00FEBE)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Rated Power	166
3-4	2 bytes	Engine Rated Speed	189
5.1	2 bits	Engine Rotation Direction	3669
5.3	2 bits	Engine Intake Manifold Pressure Control Mode	5465
6	1 byte	Crank Attempt Count on Present Start Attempt	3671

PGN 65215**Wheel Speed Information****EBC2**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 191 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65215 (0x00FEBF)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Front Axle Speed	904
3	1 byte	Relative Speed; Front Axle, Left Wheel	905
4	1 byte	Relative Speed; Front Axle, Right Wheel	906
5	1 byte	Relative Speed; Rear Axle #1, Left Wheel	907
6	1 byte	Relative Speed; Rear Axle #1, Right Wheel	908
7	1 byte	Relative Speed; Rear Axle #2, Left Wheel	909
8	1 byte	Relative Speed; Rear Axle #2, Right Wheel	910

PGN 65216**Service Information****SERV**

Transmitted with the service component identification that has the shortest distance or nearest time until the next service inspection.

NOTE - There are two acceptable formats for the Service PGN. Format 1 has only 8 bytes of data and reports the component most in need of service for each of the three categories. Format 2, however, uses the transport layer as necessary in order to repeat these 8 bytes of service component information until all supported service components in each category have been transmitted.

Transmission Repetition Rate: On request
 Data Length: 8 bytes or variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 192 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65216 (0x00FEC0)

Start Position	Length	Parameter Name	SPN
1	1 byte	Service Component Identification	911
2-3	2 bytes	Service Distance	914
4	1 byte	Service Component Identification	912
5	1 byte	Service Delay/Calendar Time Based	915
6	1 byte	Service Component Identification	913
7-8	2 bytes	Service Delay/Operational Time Based	916

PGN 65217**High Resolution Vehicle Distance****VDHR**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 193 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65217 (0x00FEC1)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	High Resolution Total Vehicle Distance	917
5-8	4 bytes	High Resolution Trip Distance	918

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PGN 65218**Electronic Retarder Controller 2****ERC2**

Transmission Repetition Rate: Every 1 s and on change of state but no faster than every 100 ms. Grandfathered definition for systems that implemented this message prior to July, 2010: 1 s when active; or on change of state

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 254

PDU Specific: 194 PGN Supporting Information:

Default Priority: 7

Parameter Group Number: 65218 (0x00FEC2)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission Output Retarder	748

PGN 65219**Electronic Transmission Controller 5****ETC5**

Transmission Repetition Rate: On request

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 254

PDU Specific: 195 PGN Supporting Information:

Default Priority: 7

Parameter Group Number: 65219 (0x00FEC3)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission High Range Sense Switch	778
1.3	2 bits	Transmission Low Range Sense Switch	779
2.1	2 bits	Transmission Reverse Direction Switch	767
2.3	2 bits	Transmission Neutral Switch	604
2.5	2 bits	Transmission Forward Direction Switch	903

PGN 65221**Electronic Transmission Controller 4****ETC4**

Transmission Repetition Rate: On request

Data Length: 8

Extended Data Page: 0

Data Page: 0

PDU Format: 254

PDU Specific: 197 PGN Supporting Information:

Default Priority: 7

Parameter Group Number: 65221 (0x00FEC5)

Start Position	Length	Parameter Name	SPN
1	1 byte	Transmission Synchronizer Clutch Value	53
2	1 byte	Transmission Synchronizer Brake Value	54

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PGN 65223**Electronic Transmission Controller 3****ETC3**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 199 PGN Supporting Information:
 Default Priority: 7
 Parameter Group Number: 65223 (0x00FEC7)

Start Position	Length	Parameter Name	SPN
1	1 byte	Transmission Shift Finger Gear Position	59
2	1 byte	Transmission Shift Finger Rail Position	60
3.1	2 bits	Transmission Shift Finger Neutral Indicator	780
3.3	2 bits	Transmission Shift Finger Engagement Indicator	781
3.5	2 bits	Transmission Shift Finger Center Rail Indicator	782
4.1	2 bits	Transmission Shift Finger Rail Actuator 1	772
4.3	2 bits	Transmission Shift Finger Gear Actuator 1	773
4.5	2 bits	Transmission Shift Finger Rail Actuator 2	783
4.7	2 bits	Transmission Shift Finger Gear Actuator 2	784
5.1	2 bits	Transmission Range High Actuator	768
5.3	2 bits	Transmission Range Low Actuator	769
5.5	2 bits	Transmission Splitter Direct Actuator	770
5.7	2 bits	Transmission Splitter Indirect Actuator	771
6.1	2 bits	Transmission Clutch Actuator	788
6.3	2 bits	Transmission Lockup Clutch Actuator	740
6.5	2 bits	Transmission Defuel Actuator	786
6.7	2 bits	Transmission Inertia Brake Actuator	787

PGN 65237**Alternator Information****AS**

Transmission Repetition Rate: 1 sec
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 213 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65237 (0x00FED5)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Alternator Speed	589
3.1	2 bits	Alternator 1 Status	3353
3.3	2 bits	Alternator 2 Status	3354
3.5	2 bits	Alternator 3 Status	3355
3.7	2 bits	Alternator 4 Status	3356

PGN 65241**Auxiliary Input/Output Status 1****AUXIO1**

Notes:

Implementers are encouraged to use specific functional SPNs whenever possible.

AUXIO PGNs are intended for two categories of use in which fixed mapping to functions is not possible:

- 1) Generic I/O devices
- 2) Applications lacking defined input and output functionality.

Use, or request new, functionally defined parameters in all other cases.

Implementers and integrators considering using AUXIO PGNs should be cautious of conflicts that can arise from multiple users on a single system.

Transmission Repetition Rate: manufacturer defined, not faster than 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 217 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65241 (0x00FED9)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Auxiliary I/O #04	704
1.3	2 bits	Auxiliary I/O #03	703
1.5	2 bits	Auxiliary I/O #02	702
1.7	2 bits	Auxiliary I/O #01	701
2.1	2 bits	Auxiliary I/O #08	708
2.3	2 bits	Auxiliary I/O #07	707
2.5	2 bits	Auxiliary I/O #06	706
2.7	2 bits	Auxiliary I/O #05	705
3.1	2 bits	Auxiliary I/O #12	712
3.3	2 bits	Auxiliary I/O #11	711
3.5	2 bits	Auxiliary I/O #10	710
3.7	2 bits	Auxiliary I/O #09	709
4.1	2 bits	Auxiliary I/O #16	716
4.3	2 bits	Auxiliary I/O #15	715
4.5	2 bits	Auxiliary I/O #14	714
4.7	2 bits	Auxiliary I/O #13	713
5-6	2 bytes	Auxiliary I/O Channel #1	1083
7-8	2 bytes	Auxiliary I/O Channel #2	1084

PGN 65242 Software Identification**SOFT**

Byte: 1 Number of software identification fields
 2-n Software identification(s)
 Delimiter (ASCII "**")

NOTE- The software identification field is variable in length and may contain up to 125 software identification designators. An ASCII "**" is used as a delimiter to separate multiple software identifications. Additional software identification fields may be added at the end, each separated by an ASCII "**" as a delimiter. An ASCII "**" is required at the end of the last software identification field, even if there is only one software identification designator.

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 218 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65242 (0x00FEDA)

Start Position	Length	Parameter Name	SPN
1	1 byte	Number of Software Identification Fields	965
2-N	Variable - up to 200 bytes followed by an "**" delimiter	Software Identification	234

PGN 65243 Engine Fluid Level/Pressure 2**EFL/P2**

2nd PGN which identifies parameters that are either measuring various pressures within the engine or identifying engine fluid levels

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 219 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65243 (0x00FEDB)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Injection Control Pressure	164
3-4	2 bytes	Engine Injector Metering Rail 1 Pressure	157
5-6	2 bytes	Engine Injector Timing Rail 1 Pressure	156
7-8	2 bytes	Engine Injector Metering Rail 2 Pressure	1349

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PGN 65244**Idle Operation****IO**

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 220 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65244 (0x00FEDC)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Engine Total Idle Fuel Used	236
5-8	4 bytes	Engine Total Idle Hours	235

PGN 65245**Turbocharger****TC**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 221 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65245 (0x00FEDD)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Turbocharger Lube Oil Pressure 1	104
2-3	2 bytes	Engine Turbocharger 1 Speed	103
4.7	2 bits	Engine Turbocharger Oil Level Switch	1665

PGN 65246**Air Start Pressure****AIR2**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 222 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65246 (0x00FEDE)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Air Start Pressure	82

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PGN 65247**Electronic Engine Controller 3****EEC3**

Transmission Repetition Rate: 250 msec (preferred) or Engine Speed Dependent (if required by application)
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 223 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65247 (0x00FEDF)

Start Position	Length	Parameter Name	SPN
1	1 byte	Nominal Friction - Percent Torque	514
2-3	2 bytes	Engine's Desired Operating Speed	515
4	1 byte	Engine's Desired Operating Speed Asymmetry Adjustment	519
5	1 byte	Estimated Engine Parasitic Losses - Percent Torque	2978
6-7	2 bytes	Aftertreatment 1 Exhaust Gas Mass Flow	3236
8.1	2 bits	Aftertreatment 1 Intake Dew Point	3237
8.3	2 bits	Aftertreatment 1 Exhaust Dew Point	3238
8.5	2 bits	Aftertreatment 2 Intake Dew Point	3239
8.7	2 bits	Aftertreatment 2 Exhaust Dew Point	3240

PGN 65248**Vehicle Distance****VD**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 224 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65248 (0x00FEE0)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Trip Distance	244
5-8	4 bytes	Total Vehicle Distance	245

PGN 65249 Retarder Configuration**RC**

This map describes the stationary behavior of the retarder.

Note: Grandfathered definition for systems that implemented this message prior to July, 2010: On change of torque/speed points of more than 10% since last transmission, or every 5 s.

Transmission Repetition Rate: Every 5 s and on change of torque/speed points of more than 10% since last transmission but no faster than every 500 ms

Data Length: 19

Extended Data Page: 0

Data Page: 0

PDU Format: 254

PDU Specific: 225 PGN Supporting Information: See Appendix D - PGN 65249

Default Priority: 6

Parameter Group Number: 65249 (0x00FEE1)

Start Position	Length	Parameter Name	SPN
01.1	4 bits	Retarder Type	901
01.5	4 bits	Retarder Location	902
02	1 byte	Retarder Control Method (Retarder Configuration)	557
03-04	2 bytes	Retarder Speed At Idle, Point 1 (Retarder Configuration)	546
05	1 byte	Percent Torque At Idle, Point 1 (Retarder Configuration)	551
06-07	2 bytes	Maximum Retarder Speed, Point 2 (Retarder Configuration)	548
08	1 byte	Percent Torque At Maximum Speed, Point 2 (Retarder Configuration)	552
09-10	2 bytes	Retarder Speed At Point 3 (Retarder Configuration)	549
11	1 byte	Percent Torque At Point 3 (Retarder Configuration)	553
12-13	2 bytes	Retarder Speed At Point 4 (Retarder Configuration)	550
14	1 byte	Percent Torque At Point 4 (Retarder Configuration)	554
15-16	2 bytes	Retarder Speed At Peak Torque, Point 5 (Retarder Configuration)	547
17-18	2 bytes	Reference Retarder Torque (Retarder Configuration)	556
19	1 byte	Percent Torque At Peak Torque, Point 5 (Retarder Configuration)	555

PGN 65250 Transmission Configuration**TCFG**

Total message length depends on total number of forward and reverse gear ratios.

NOTE: The first gear ratio transmitted in bytes 3,4 will be the highest reverse gear ratio. Additional 2-byte gear ratios will follow:

3,4 Highest reverse gear ratio

.

.

a,b Lowest reverse gear ratio

c,d Lowest forward gear ratio

.

.

e,f Highest forward gear ratio

Transmission Repetition Rate: On request

Data Length: Variable

Extended Data Page: 0

Data Page: 0

PDU Format: 254

PDU Specific: 226 PGN Supporting Information:

Default Priority: 6

Parameter Group Number: 65250 (0x00FEE2)

Start Position	Length	Parameter Name	SPN
1	1 byte	Number of Reverse Gear Ratios	958
2	1 byte	Number of Forward Gear Ratios	957
3-4	2 bytes	Transmission Gear Ratio	581

PGN 65251**Engine Configuration 1****EC1**

This map describes the stationary behavior of the engine and the speed dependent available indicated torque. This map should reflect the effect of changes due to barometric pressure, engine temperature, and any other stationary changes (sensor failures, etc.) which influence the engine torque curve more than 10%. This map is only valid for maximum boost pressure. At low boost pressures the torque limit may be much lower.

The engine configuration message must be sent at any time that the engine configuration map has changed by more than 10% of speed or torque (due to events other than boost pressure) since that last time the message was transmitted. As an alternative, it may be sent periodically, once every 5 s. It shall also be sent on response to a configuration request message.

The engine characteristic can be described in one of three modes. Mode 1 provides a complete curve of speed and torque points (see PGN65251_A). Modes 2 and 3 provide a partial curve of speed and torque points and a separate endspeed governor characteristic. In modes 2 and 3, the receiver of the engine configuration message has to calculate the minimum of the engine torque curve and the endspeed governor characteristic to get the final available engine torque.

Mode 2 provides a high idle point where torque equals zero (point 6) and the endspeed governor gain Kp (see Figure PGN65251_B). Mode 3 provides the kick-in point of the endspeed governor (point 2) and the governor gain Kp (see Figure PGN65251_C).

The selection of the three modes can be done by setting the parameters as shown in 'Table PGN65251_A.

Grandfathered definition for systems that implemented this message prior to July, 2010: On change of torque/speed points of more than 10% since last transmission. Alternative: Every 5 s.

Transmission Repetition Rate:	Every 5 s and on change of torque/speed points of more than 10% since last transmission but no faster than every 500 ms
Data Length:	39
Extended Data Page:	0
Data Page:	0
PDU Format:	254
PDU Specific:	227
Default Priority:	6
Parameter Group Number:	65251 (0x00FEE3)

PGN Supporting Information: See Appendix D - PGN 65251

Start Position	Length	Parameter Name	SPN
01-02	2 bytes	Engine Speed At Idle, Point 1 (Engine Configuration)	188
03	1 byte	Engine Percent Torque At Idle, Point 1 (Engine Configuration)	539
04-05	2 bytes	Engine Speed At Point 2 (Engine Configuration)	528
06	1 byte	Engine Percent Torque At Point 2 (Engine Configuration)	540
07-08	2 bytes	Engine Speed At Point 3 (Engine Configuration)	529
09	1 byte	Engine Percent Torque At Point 3 (Engine Configuration)	541
10-11	2 bytes	Engine Speed At Point 4 (Engine Configuration)	530
12	1 byte	Engine Percent Torque At Point 4 (Engine Configuration)	542
13-14	2 bytes	Engine Speed At Point 5 (Engine Configuration)	531
15	1 byte	Engine Percent Torque At Point 5 (Engine Configuration)	543
16-17	2 bytes	Engine Speed At High Idle, Point 6 (Engine Configuration)	532
18-19	2 bytes	Engine Gain (Kp) Of The Endspped Governor (Engine Configuration)	545
20-21	2 bytes	Engine Reference Torque (Engine Configuration)	544
22-23	2 bytes	Engine Maximum Momentary Override Speed, Point 7 (Engine Configuration)	533
24	1 byte	Engine Maximum Momentary Override Time Limit (Engine Configuration)	534
25	1 byte	Engine Requested Speed Control Range Lower Limit (Engine Configuration)	535
26	1 byte	Engine Requested Speed Control Range Upper Limit (Engine Configuration)	536
27	1 byte	Engine Requested Torque Control Range Lower Limit (Engine Configuration)	537

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28	1 byte	Engine Requested Torque Control Range Upper Limit (Engine Configuration)	538
29-30	2 bytes	Engine Extended Range Requested Speed Control Range Upper Limit (Engine configuration)	1712
31-32	2 bytes	Engine Moment of Inertia	1794
33-34	2 bytes	Engine Default Torque Limit	1846
35	8 bits	Support Variable Rate TSC1 Message	3344
36	8 bits	Support TSC1 Control Purpose Group 1	3345
37	8 bits	Support TSC1 Control Purpose Group 2	3346
38	8 bits	Support TSC1 Control Purpose Group 3	3347
39	8 bits	Support TSC1 Control Purpose Group 4	3348

PGN 65252 Shutdown**SHUTDN**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 228 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65252 (0x00FEE4)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Idle Shutdown has Shutdown Engine	593
1.3	2 bits	Engine Idle Shutdown Driver Alert Mode	594
1.5	2 bits	Engine Idle Shutdown Timer Override	592
1.7	2 bits	Engine Idle Shutdown Timer State	590
2.7	2 bits	Engine Idle Shutdown Timer Function	591
3.1	2 bits	A/C High Pressure Fan Switch	985
3.3	2 bits	Refrigerant Low Pressure Switch	875
3.5	2 bits	Refrigerant High Pressure Switch	605
4.1	2 bits	Engine Wait to Start Lamp	1081
5.1	2 bits	Engine Protection System has Shutdown Engine	1110
5.3	2 bits	Engine Protection System Approaching Shutdown	1109
5.5	2 bits	Engine Protection System Timer Override	1108
5.7	2 bits	Engine Protection System Timer State	1107
6.7	2 bits	Engine Protection System Configuration	1111
7.1	2 bits	Engine Alarm Acknowledge	2815
7.3	2 bits	Engine Alarm Output Command Status	2814
7.5	2 bits	Engine Air Shutoff Command Status	2813
7.7	2 bits	Engine Overspeed Test	2812
8.1	2 bits	Engine Air Shutoff Status	3667
8.3	2 bits	PTO Shutdown has Shutdown Engine	5404
8.5	2 bits	Coolant Level Engine Protection Shutdown Status	5566

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PGN 65253**Engine Hours, Revolutions****HOURS**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 229 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65253 (0x00FEE5)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Engine Total Hours of Operation	247
5-8	4 bytes	Engine Total Revolutions	249

PGN 65254**Time/Date****TD**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 230 PGN Supporting Information: See Appendix D - PGN 65254
 Default Priority: 6
 Parameter Group Number: 65254 (0x00FEE6)

Start Position	Length	Parameter Name	SPN
1	1 byte	Seconds	959
2	1 byte	Minutes	960
3	1 byte	Hours	961
4	1 byte	Month	963
5	1 byte	Day	962
6	1 byte	Year	964
7	1 byte	Local minute offset	1601
8	1 byte	Local hour offset	1602

PGN 65255**Vehicle Hours****VH**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 231 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65255 (0x00FEE7)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Total Vehicle Hours	246
5-8	4 bytes	Total Power Takeoff Hours	248

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PGN 65256**Vehicle Direction/Speed****VDS**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 232 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65256 (0x00FEE8)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Compass Bearing	165
3-4	2 bytes	Navigation-Based Vehicle Speed	517
5-6	2 bytes	Pitch	583
7-8	2 bytes	Altitude	580

PGN 65257**Fuel Consumption (Liquid)****LFC**

Engine fuel consumption accumulators. See PGN 64777 for alternate resolution.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 233 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65257 (0x00FEE9)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Engine Trip Fuel	182
5-8	4 bytes	Engine Total Fuel Used	250

PGN 65258**Vehicle Weight****VW**

NOTE—Request has to be responded to with as many messages as necessary to transmit all available information.

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 234 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65258 (0x00FEEA)

Start Position	Length	Parameter Name	SPN
1	8 bits	Axle Location	928
2-3	2 bytes	Axle Weight	582
4-5	2 bytes	Trailer Weight	180
6-7	2 bytes	Cargo Weight	181

PGN 65259**Component Identification****CI**

NOTE - The make, model, serial number and unit number fields in this message are optional and separated by an ASCII "**". It is not necessary to include all fields; however, the delimiter ("**") is always required.

Field:

a Make

Delimiter (ASCII "**")

b Model

Delimiter (ASCII "**")

c Serial number

Delimiter (ASCII "**")

d Unit number (Power unit)

Delimiter (ASCII "**")

These examples are permitted uses:

aaaaa*b...b*c...c*d...d*

*b...b***

*b...b**d...d*

Transmission Repetition Rate:	On request	
Data Length:	Variable	
Extended Data Page:	0	
Data Page:	0	
PDU Format:	254	
PDU Specific:	235	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65259 (0x00FEEB)	

Start Position	Length	Parameter Name	SPN
a	Variable - up to 5 bytes followed by an "**" delimiter	Make	586
b	Variable - up to 200 bytes followed by an "**" delimiter	Model	587
c	Variable - up to 200 bytes followed by an "**" delimiter	Serial Number	588
d	Variable - up to 200 bytes followed by an "**" delimiter	Unit Number (Power Unit)	233

PGN 65260 Vehicle Identification**VI**

Byte: 1-n Vehicle Identification Number
 Delimiter (ASCII "**")

Transmission Repetition Rate: On request
 Data Length: Variable
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 236 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65260 (0x00FEEC)

Start Position	Length	Parameter Name	SPN
1	Variable - up to 200 bytes followed by an "**" delimiter	Vehicle Identification Number	237

PGN 65261 Cruise Control/Vehicle Speed Setup**CCSS**

Transmission Repetition Rate: On request
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 237 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65261 (0x00FEED)

Start Position	Length	Parameter Name	SPN
1	1 byte	Maximum Vehicle Speed Limit	74
2	1 byte	Cruise Control High Set Limit Speed	87
3	1 byte	Cruise Control Low Set Limit Speed	88

PGN 65262 Engine Temperature 1**ET1**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 238 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65262 (0x00FEEE)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Coolant Temperature	110
2	1 byte	Engine Fuel Temperature 1	174
3-4	2 bytes	Engine Oil Temperature 1	175
5-6	2 bytes	Engine Turbocharger Oil Temperature	176
7	1 byte	Engine Intercooler Temperature	52
8	1 byte	Engine Intercooler Thermostat Opening	1134

PGN 65263**Engine Fluid Level/Pressure 1****EFL/P1**

PGN which identifies parameters that are either measuring various pressures within the engine or identifying engine fluid levels

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 239 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65263 (0x00FEEF)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Fuel Delivery Pressure	94
2	1 byte	Engine Extended Crankcase Blow-by Pressure	22
3	1 byte	Engine Oil Level	98
4	1 byte	Engine Oil Pressure	100
5-6	2 bytes	Engine Crankcase Pressure	101
7	1 byte	Engine Coolant Pressure	109
8	1 byte	Engine Coolant Level	111

PGN 65264**Power Takeoff Information****PTO**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 240 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65264 (0x00FEF0)

Start Position	Length	Parameter Name	SPN
1	1 byte	Power Takeoff Oil Temperature	90
2-3	2 bytes	Power Takeoff Speed	186
4-5	2 bytes	Power Takeoff Set Speed	187
6.1	2 bits	Engine PTO Governor Enable Switch	980
6.3	2 bits	Engine Remote PTO Governor Preprogrammed Speed Control Switch	979
6.5	2 bits	Engine Remote PTO Governor Variable Speed Control Switch	978
7.1	2 bits	Engine PTO Governor Set Switch	984
7.3	2 bits	Engine PTO Governor Coast/Decelerate Switch	983
7.5	2 bits	Engine PTO Governor Resume Switch	982
7.7	2 bits	Engine PTO Governor Accelerate Switch	981
8.1	2 bits	Operator Engine PTO Governor Memory Select Switch	2897
8.3	2 bits	Remote PTO Governor Preprogrammed Speed Control Switch #2	3447
8.5	2 bits	Auxiliary Input Ignore Switch	3448

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PGN 65265 Cruise Control/Vehicle Speed 1**CCVS1**

Cruise Control/Vehicle Speed 1

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 241 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65265 (0x00FEF1)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Two Speed Axle Switch	69
1.3	2 bits	Parking Brake Switch	70
1.5	2 bits	Cruise Control Pause Switch	1633
1.7	2 bits	Park Brake Release Inhibit Request	3807
2-3	2 bytes	Wheel-Based Vehicle Speed	84
4.1	2 bits	Cruise Control Active	595
4.3	2 bits	Cruise Control Enable Switch	596
4.5	2 bits	Brake Switch	597
4.7	2 bits	Clutch Switch	598
5.1	2 bits	Cruise Control Set Switch	599
5.3	2 bits	Cruise Control Coast (Decelerate) Switch	600
5.5	2 bits	Cruise Control Resume Switch	601
5.7	2 bits	Cruise Control Accelerate Switch	602
6	1 byte	Cruise Control Set Speed	86
7.1	5 bits	PTO Governor State	976
7.6	3 bits	Cruise Control States	527
8.1	2 bits	Engine Idle Increment Switch	968
8.3	2 bits	Engine Idle Decrement Switch	967
8.5	2 bits	Engine Test Mode Switch	966
8.7	2 bits	Engine Shutdown Override Switch	1237

PGN 65266 Fuel Economy (Liquid)**LFE1**

Transmission Repetition Rate: 100 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 242 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65266 (0x00FEF2)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Fuel Rate	183
3-4	2 bytes	Engine Instantaneous Fuel Economy	184
5-6	2 bytes	Engine Average Fuel Economy	185
7	1 byte	Engine Throttle Valve 1 Position	51
8	1 byte	Engine Throttle Valve 2 Position	3673

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PGN 65267**Vehicle Position****VP**

Transmission Repetition Rate: 5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 243 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65267 (0x00FEF3)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Latitude	584
5-8	4 bytes	Longitude	585

PGN 65268**Tire Condition****TIRE**

Tire Condition Message

NOTE—Message has to be repeated as necessary to transmit all available information. This method of location identification requires individual SPNs to be assigned to report failures specific to each individual component (i.e. each tire, each axle, etc.).

Transmission Repetition Rate: 10 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 244 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65268 (0x00FEF4)

Start Position	Length	Parameter Name	SPN
1	8 bits	Tire Location	929
2	1 byte	Tire Pressure	241
3-4	2 bytes	Tire Temperature	242
5.1	2 bits	CTI Wheel Sensor Status	1699
5.3	2 bits	CTI Tire Status	1698
5.5	2 bits	CTI Wheel End Electrical Fault	1697
6-7	2 bytes	Tire Air Leakage Rate	2586
8.6	3 bits	Tire Pressure Threshold Detection	2587

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PGN 65269**Ambient Conditions****AMB**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 245 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65269 (0x00FEF5)

Start Position	Length	Parameter Name	SPN
1	1 byte	Barometric Pressure	108
2-3	2 bytes	Cab Interior Temperature	170
4-5	2 bytes	Ambient Air Temperature	171
6	1 byte	Engine Air Intake Temperature	172
7-8	2 bytes	Road Surface Temperature	79

PGN 65270**Intake/Exhaust Conditions 1****IC1**

Transmission Repetition Rate: 0.5 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 246 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65270 (0x00FEF6)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Diesel Particulate Filter Intake Pressure	81
2	1 byte	Engine Intake Manifold #1 Pressure	102
3	1 byte	Engine Intake Manifold 1 Temperature	105
4	1 byte	Engine Air Intake Pressure	106
5	1 byte	Engine Air Filter 1 Differential Pressure	107
6-7	2 bytes	Engine Exhaust Gas Temperature	173
8	1 byte	Engine Coolant Filter Differential Pressure	112

PGN 65271**Vehicle Electrical Power 1****VEP1**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 247 PGN Supporting Information: See Appendix D - PGN 65104
 Default Priority: 6
 Parameter Group Number: 65271 (0x00FEF7)

Start Position	Length	Parameter Name	SPN
1	1 byte	Net Battery Current	114
2	1 byte	Alternator Current	115
3-4	2 bytes	Charging System Potential (Voltage)	167
5-6	2 bytes	Battery Potential / Power Input 1	168
7-8	2 bytes	Keyswitch Battery Potential	158

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PGN 65272**Transmission Fluids 1****TRF1**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 248 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65272 (0x00FEF8)

Start Position	Length	Parameter Name	SPN
1	1 byte	Clutch Pressure	123
2	1 byte	Transmission Oil Level 1	124
3	1 byte	Transmission Filter Differential Pressure	126
4	1 byte	Transmission Oil Pressure	127
5-6	2 bytes	Transmission Oil Temperature 1	177
7	1 bytes	Transmission Oil Level 1 High / Low	3027
8.1	4 bits	Transmission Oil Level 1 Countdown Timer	3028
8.5	4 bits	Transmission Oil Level 1 Measurement Status	3026

PGN 65273**Axle Information****AI**

Axle information message

NOTE—Message must be repeated as necessary to transmit all available information. This method of location identification requires individual SPNs to be assigned to report failures specific to each individual component (i.e. each tire, each axle, etc.).

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 249 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65273 (0x00FEF9)

Start Position	Length	Parameter Name	SPN
1	1 byte	Steering Axle Temperature	75
2	8 bits	Drive Axle Location	930
3	1 byte	Drive Axle Lift Air Pressure	579
4	1 byte	Drive Axle Temperature	578
5	1 byte	Drive Axle Lube Pressure	2613
8	1 byte	Steering Axle Lube Pressure	2614

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PGN 65274**Brakes****B**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 250 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65274 (0x00FEFA)

Start Position	Length	Parameter Name	SPN
1	1 byte	Brake Application Pressure	116
2	1 byte	Brake Primary Pressure	117
3	1 byte	Brake Secondary Pressure	118
4.1	2 bits	Parking Brake Actuator	619
4.3	2 bits	Parking Brake Red Warning Signal	3557
4.5	2 bits	Park Brake Release Inhibit Status	3808

PGN 65275**Retarder fluids****RF**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 251 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65275 (0x00FEFB)

Start Position	Length	Parameter Name	SPN
1	1 byte	Hydraulic Retarder Pressure	119
2	1 byte	Hydraulic Retarder Oil Temperature	120
3.1	2 bits	Driveline Retarder Overheat Indicator	5346

PGN 65276**Dash Display****DD**

Transmission Repetition Rate: 1s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 252 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65276 (0x00FEFC)

Start Position	Length	Parameter Name	SPN
1	1 byte	Washer Fluid Level	80
2	1 byte	Fuel Level 1	96
3	1 byte	Engine Fuel Filter Differential Pressure	95
4	1 byte	Engine Oil Filter Differential Pressure	99
5-6	2 bytes	Cargo Ambient Temperature	169
7	1 byte	Fuel Level 2	38

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PGN 65277**Alternate Fuel 1****A1**

Transmission Repetition Rate: 500 ms
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 253 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65277 (0x00FEFD)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Blower Bypass Valve Position	72
2-3	2 bytes	Engine Gas Supply Pressure	159

PGN 65278**Auxiliary Water Pump Pressure****AWPP**

Transmission Repetition Rate: 1 s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 254 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65278 (0x00FEFE)

Start Position	Length	Parameter Name	SPN
1	1 byte	Auxiliary Pump Pressure	73

(R) PGN 65279**Operator indicators****OI**

Transmission Repetition Rate: 10 s or on change but no more often than 1s
 Data Length: 8
 Extended Data Page: 0
 Data Page: 0
 PDU Format: 254
 PDU Specific: 255 PGN Supporting Information:
 Default Priority: 6
 Parameter Group Number: 65279 (0x00FEFF)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Water In Fuel Indicator	97
1.3	2 bits	Operator Shift Prompt	5675
2.1	3 bits	Driver Warning System Indicator Status	5825
2.4	3 bits	Emission Control System Operator Inducement Severity	5826

APPENDIX D SUPPORTING INFORMATION

SPN 16 – Fuel Filter (Suction Side) Differential Pressure

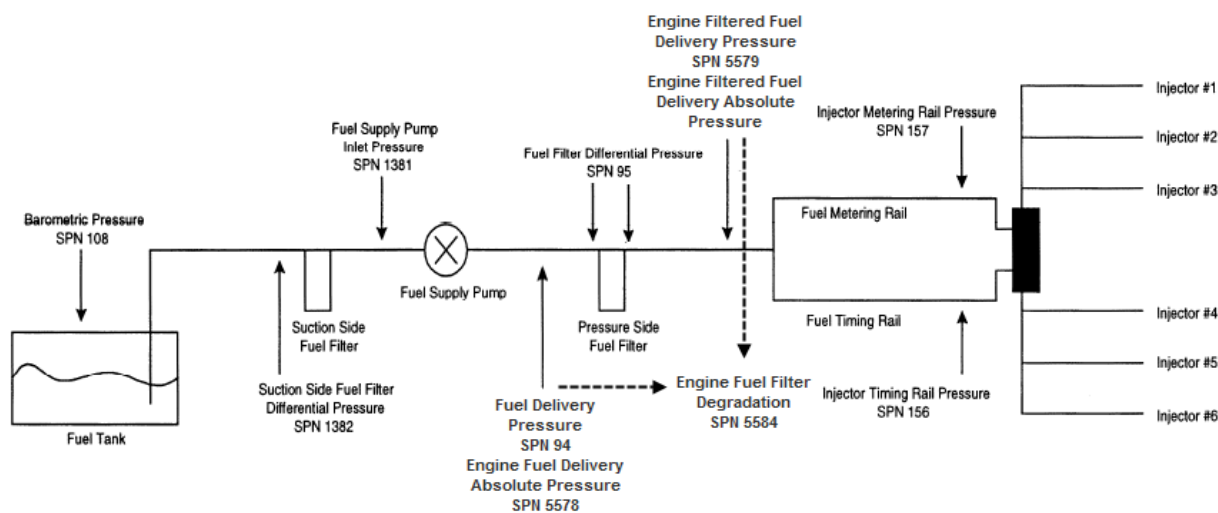


FIGURE SPN16_A - FUEL SYSTEM WITH RAILS

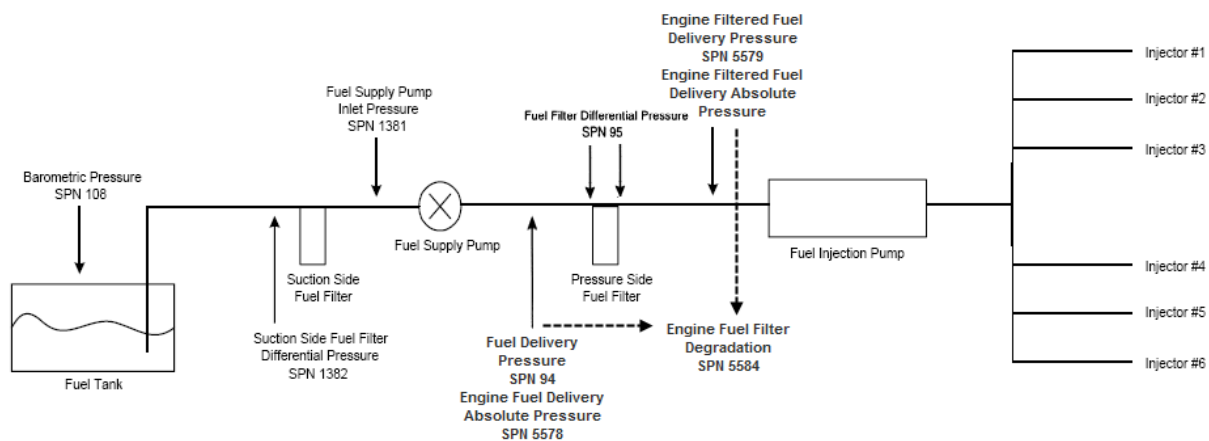


FIGURE SPN16_B - FUEL SYSTEM WITH PUMP

SPN 27 – EGR System Diagram

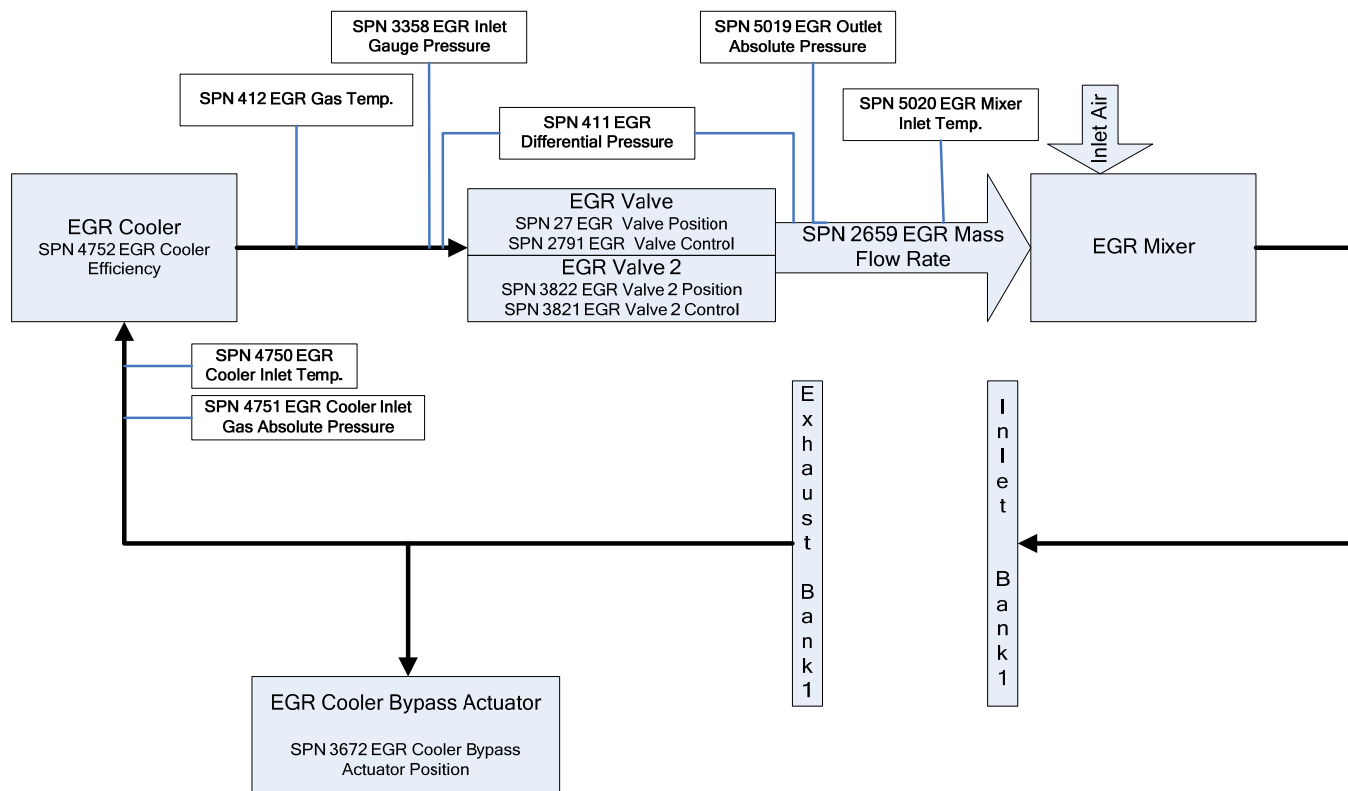


FIGURE SPN27_A – EGR SYSTEM

SPN 512 – Driver's Demand Engine – Percent Torque

Figure SPN512_A and Figure SPN512_B show two typical torque calculations in an engine controller. On the left side of the figures there are single engine controller functions. The output torque signals of these functions are connected in the manner shown. The result is the actual engine percent torque which is realized by the engine.

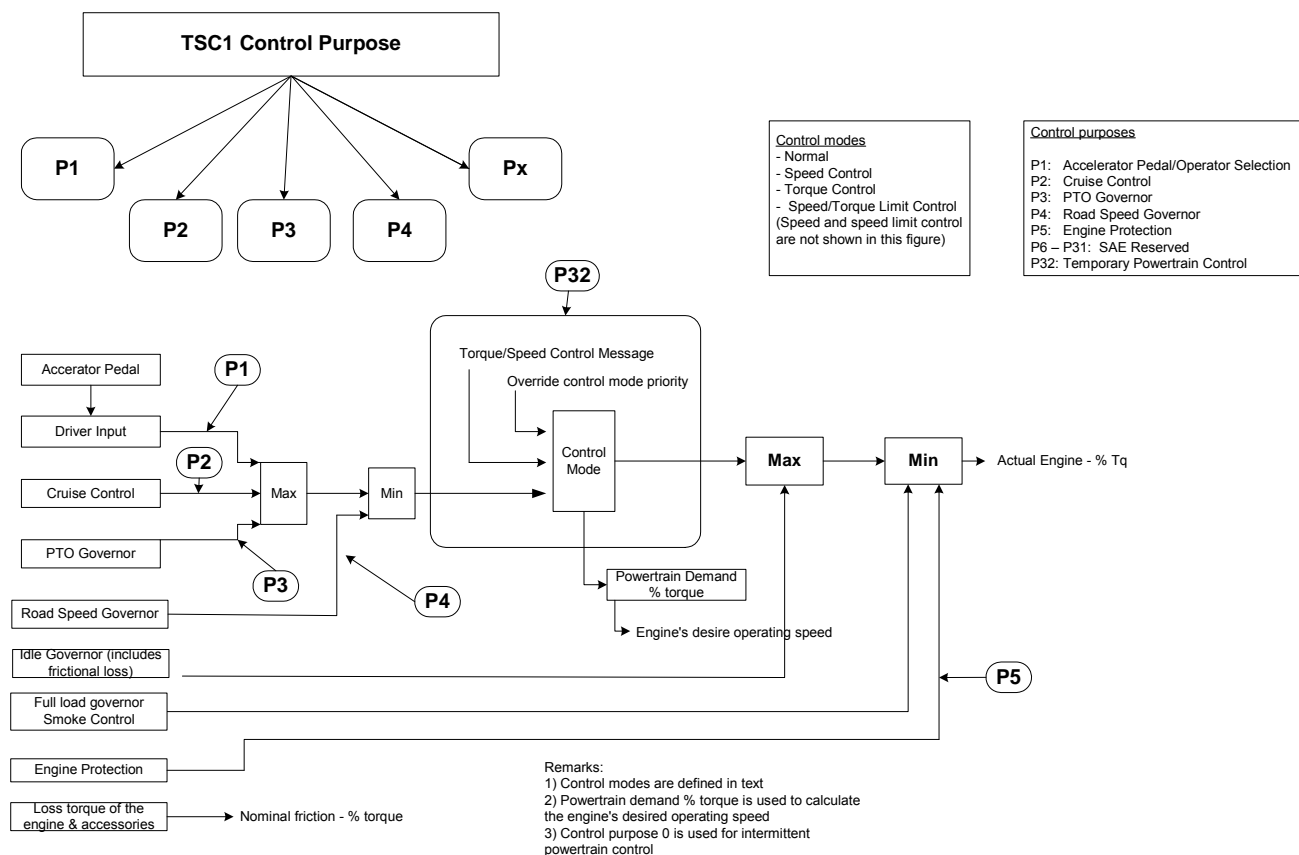


FIGURE SPN512_A - TORQUE COMMANDS AND CALCULATIONS WHEN A "MAXIMUM SELECTION FOR LOW IDLE" TECHNIQUE IS USED

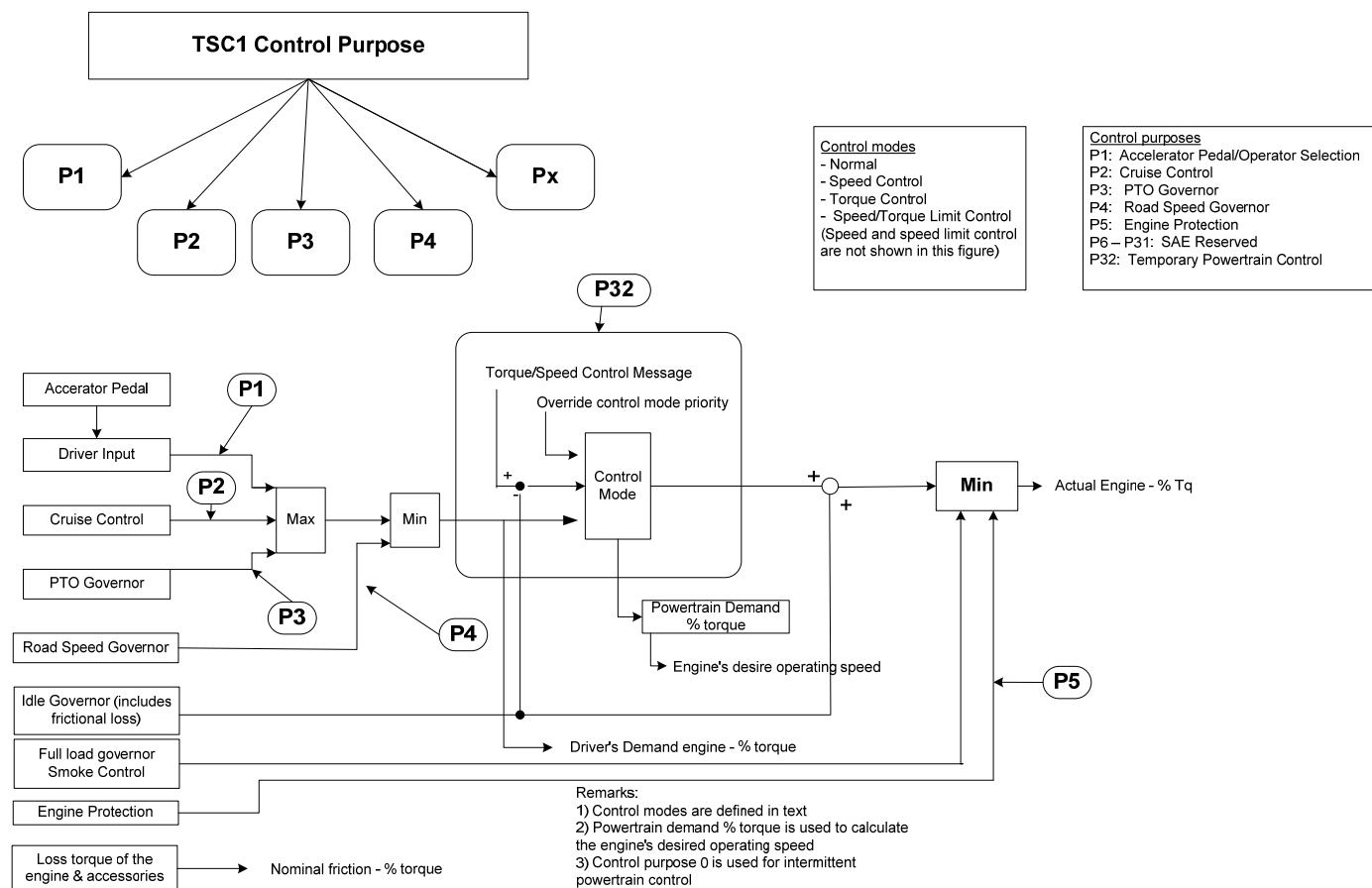


FIGURE SPN512_B - TORQUE COMMANDS AND CALCULATIONS WHEN A "SUMMATION WITH LOW IDLE" TECHNIQUE IS USED

On top of the figures, external torque commands (e.g., traction and transmission control) can control the engine. These commands can influence the engine torque by four control modes. Four engine internal signals are transmitted to the network:

- Driver's demand engine - percent torque
- Actual engine - percent torque
- Nominal friction - percent torque
- Engine's desired operating speed

The difference between Figure SPN512_A and Figure SPN512_B is the connection of the idle governor output to the torque calculation. In Figure SPN512_A there is a maximum selection, while in Figure SPN512_B a summation is used. The summation method needs a subtraction point for each external command input because the starting point of an ASR or a shift operation should be the present actual engine - percent torque value. As the actual engine - percent torque signal contains the idle governor output and the external commands are compared with the driver's demand engine - percent torque or the powertrain demand which don't contain the idle governor output, the external commands must be subtracted by the idle governor output to get the correct signals for comparison.

The advantage of the maximum selection (Figure SPN512_A) is that no other speed controller can work parallel to the idle governor. This allows for a better optimization of the different speed control loops. The advantage of the summation method (Figure SPN512_B) is that changes of the idle governor output influence the engine directly (no dead zones exist).

SPN 518 – Engine Requested Torque/Torque Limit

When preparing to send a request to a retarder, the states of the Retarder Enable - Shift Assist Switch and the Retarder Enable - Brake Assist Switch must be checked by the requesting device to determine whether the request may be sent to the Retarder. Figure SPN518_A shows how those switches and other operator and network inputs are used to create the actual retarder operating point on a system-wide basis. The Retarder may or may not be the device reading the actual switches; even if it is, it will not accept or reject a request based on its knowledge of the switch states. Its function is to send the switch states via J1939 (in its ERC1 message) and it expects other J1939 nodes to honor those switch states by refraining from sending inappropriate commands.

Several elements affect the retarder besides the Requested Torque parameter in the TSC1 message. These elements are not looked at by the retarder itself, but are used by various other devices to determine if they may ask the retarder to be engaged. These are the Retarder Enable Shift Assist Switch, and the Retarder Enable Brake Assist Switch. The relationship between those switches and the retarder (as well as that between the operator and retarder) is described in Figure SPN518_A.

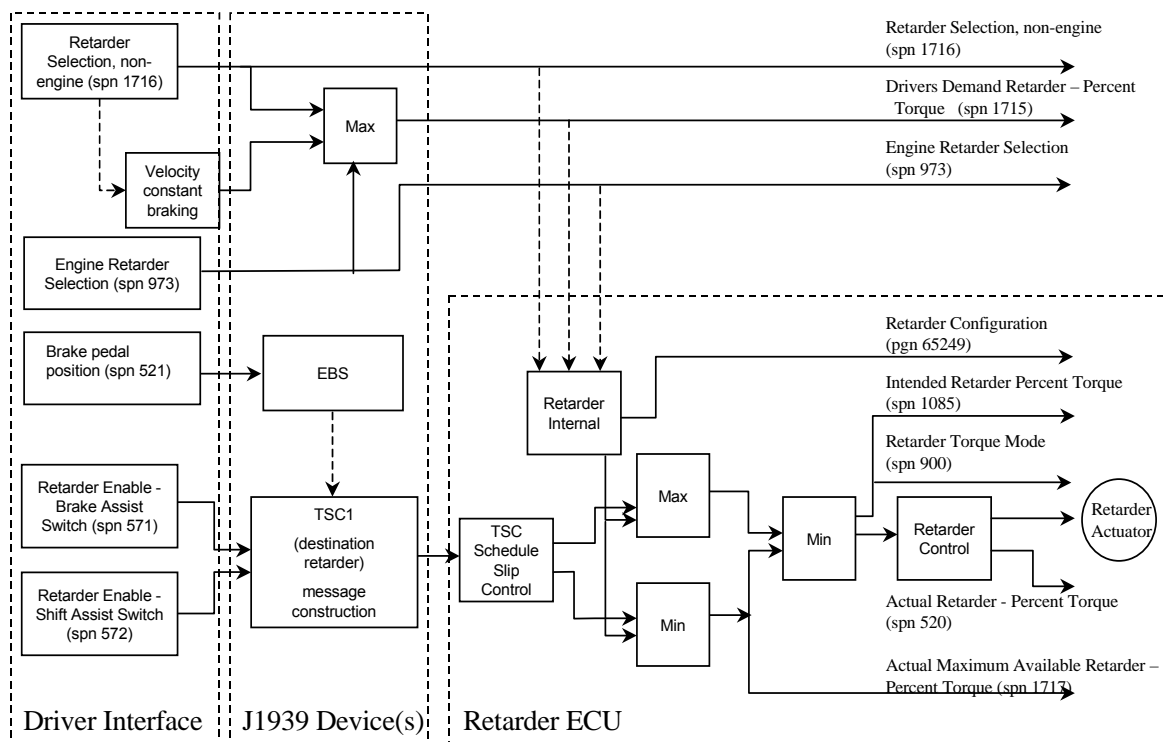


FIGURE SPN518_A - RELATIONSHIP BETWEEN OPERATOR/SWITCH INPUTS AND RETARDERS

Tables SPN518_A and SPN518_B identify many use cases. Each row is the summary of one or more uses. One of the primary communications provided by these tables is that the retarder can be activated by the J1939 TSC1 message, although the operator input is "off."

**TABLE SPN518_A—PRIMARY RETARDER – BEFORE TRANSMISSION
(Compression Release Engine Retarder)**

J1939 Inputs¹ (TSC1)	Operator Inputs			Outputs	
	Cruise Control²	Accel Pedal³	Torque Request Via "Retarder Selection, Engine"⁴	May Retarder Provide Brake Torque?	Retarder Torque Mode (base 2)
T	Any	Any	Any	No	0000
R	Any	Any	Any	Yes	> 0001
NTR	Any	T	Any	No	0000
NTR	R	ZR	R	Yes	> 0001
NTR	R	ZR	ZR	Yes	0010
NTR	NTR	ZR	R ⁵	Yes ⁵	0001
NTR	NTR	ZR	ZR	No	0000
ZR	Any	Any	Any	No	0000

Key:

T = request positive Torque

R = request Retarder torque

NTR = No Torque Request

ZR = Zero torque Requested by retarder

Any = This value has no bearing whether or not the Retarder is available. The retarder will NOT be available because some other entity is requesting positive torque.

Footnotes:

1. Note that the TSC1 inputs will override Operator Torque Selection. The J1939 devices that generate the TSC1 messages will assure that the Retarder Enable Brake Assist Switch and Retarder Enable Shift Assist Switch are enabled as appropriate before commanding the Retarder to engage. See parameters SPN 571 and 572 for descriptions of these switches. Also, for the purposes of this table, it is assumed that if the TSC1, Destination Retarder message is requesting Retarder Torque, no other TSC1, Destination Engine messages are requesting engine fueling. That arbitration is beyond the scope of this section.
2. This refers to the torque requested by the cruise control, and does not refer to the cruise switches. Cruise control is defined to be on and engaged in this column. The cruise control should not request retarder torque unless the Retarder Enable - Brake Assist Switch is enabled.
3. The Accelerator Pedal is inherently incapable of requesting negative torque. It may have no particular torque demands, or it may request some engine fueling, which prevents the retarder from engaging. Consequently, the chart is complete even though no rows exist for the AP to request retarder torque.

4. The Operator Torque Request is incapable of requesting positive torque. The table is complete without the Operator Torque Request asking for positive Engine Torque
5. This description assumes no other switch (such as brake pedal depressed) is needed in order for the operator torque request to initiate retarder braking. Other implementation specific rules would apply if such a catalyst were needed.

Table SPN518_B shows the relationship between various inputs and an after engine retarder.

The biggest difference between this type of retarder and an engine brake is that the exhaust brake may be engaged while the engine is still being fueled. Also, if cruise control is communicating with the retarder, it would do so using the TSC1 message.

Consequently, columns for accelerator pedal input and cruise control input would only serve to confuse the issue of retarder availability in Table SPN518_B.

TABLE SPN518_B—PRIMARY RETARDER – AFTER ENGINE (EXHAUST BRAKE, HYDRAULIC RETARDER)

Operator Inputs		Outputs	
J1939 Inputs ¹ (TSC1)	Torque Request Via operator torque request ²	May Retarder Provide Brake Torque?	Retarder Torque Mode (base 2)
R	R	Yes	> 0001
R	ZR	Yes	> 0001
NTR	R ³	Yes ³	0001
NTR	ZR	No	0000
ZR	Any	No	0000

Key:

R = request Retarder torque - some amount of braking torque is requested of the retarder.

ZR = Zero Retarder request - Zero percent torque is requested of the retarder

NTR = No retarder Torque Request - No request is being made of the retarder one way or another.

Any = This value has no bearing whether or not the retarder is available. In fact, because of what some other entity is requesting, the retarder will NOT be available.

Footnotes:

1. Note that the TSC1 inputs will override Operator Torque Selection. The J1939 devices that generate the TSC1 messages will assure that the Retarder Enable Brake Assist Switch and Retarder Enable Shift Assist Switch are enabled before commanding the Retarder to engage. Also, for the purposes of this table, it is assumed that if the TSC1, Destination Retarder message is requesting Retarder Torque, no other TSC1, Destination Engine messages are requesting engine fueling. That arbitration is beyond the scope of this section.
2. The Operator Torque Request is incapable of requesting positive torque. The table is complete without the Operator Torque Request asking for positive Engine Torque
3. This description assumes no other switch (such as brake pedal depressed) is needed in order for the operator torque request to initiate retarder braking. Other implementation specific rules would apply if such a requirement were needed.

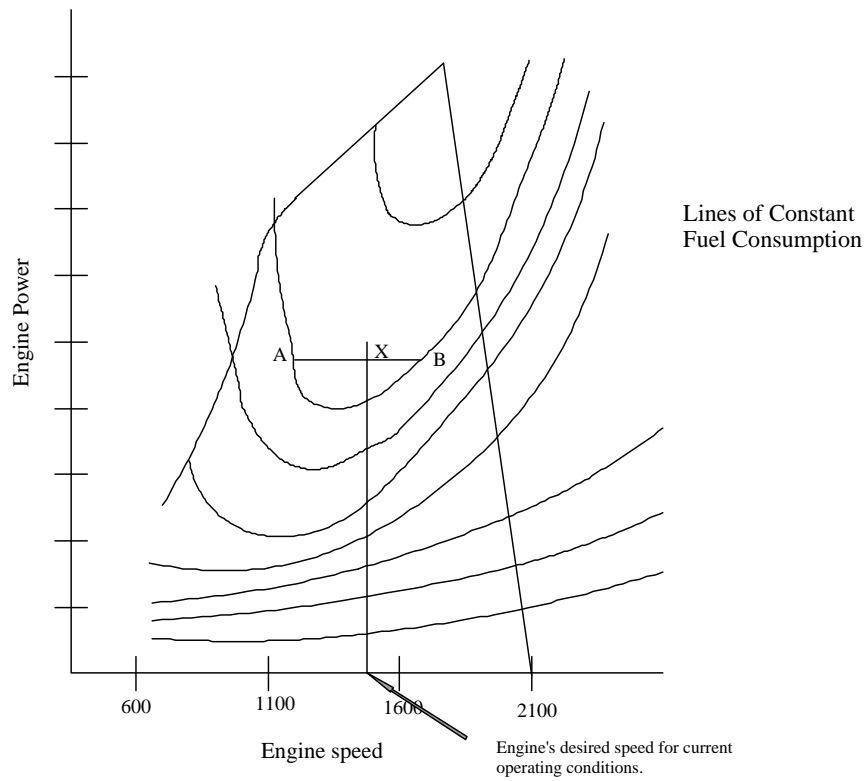
SPN 519 – Desired Operating Speed Asymmetry Adjustment

FIGURE SPN519_A—DESIRED OPERATING SPEED ASYMMETRY ADJUSTMENT

SPN 527 – Cruise Control States**TABLE SPN527_A —CRUISE CONTROL STATES**

Bit States	Cruise Control State
000	Off/Disabled
001	Hold
010	Accelerate
011	Decelerate/Coast
100	Resume
101	Set
110	Accelerator override
111	Not available

State Descriptions:

000b Off/Disabled —Used to indicate that the cruise control device is off or on standby. Note that the cruise control system switch does not necessarily have to be off to be in this mode.

001b Hold —Used to indicate that the cruise control device is active and currently maintaining a captured operating speed.

010b Accelerate —Used to indicate that the cruise control device is in the process of ramping up the operating speed.

011b Decelerate —Used to indicate that the cruise control device is in the process of ramping down, or coasting, the operating speed.

100b Resume —Used to indicate that the cruise control device is in the process of resuming the operating speed to a previously captured value.

101b Set —Used to indicate that the cruise control device is establishing the current vehicle speed as the operating speed (captured value).

110b Accelerator Override —Used to indicate that the cruise control device is active but not currently maintaining the captured operating speed.

SPN 564 – Differential Lock Positions

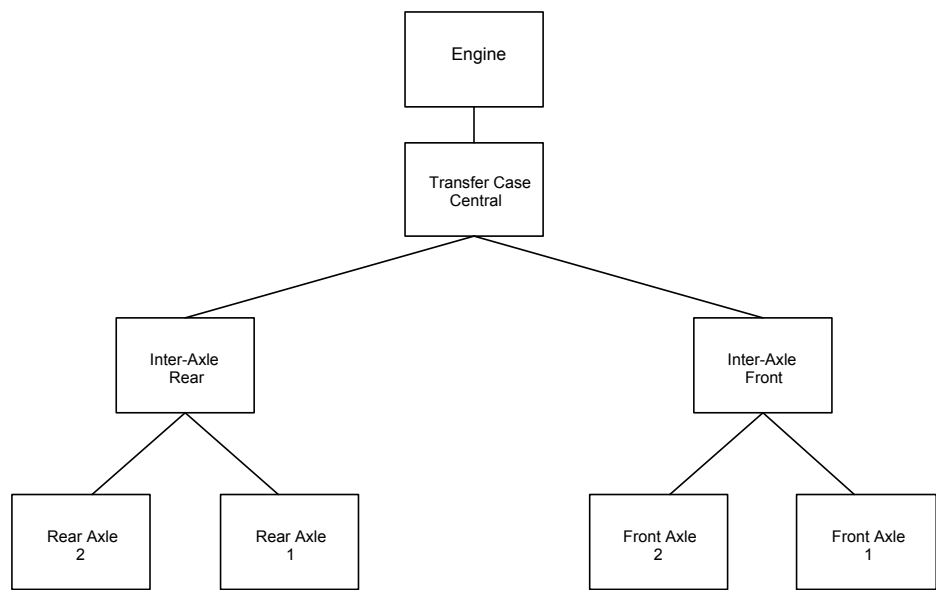


FIGURE SPN564_A—DIFFERENTIAL LOCK POSITIONS

SPN 574 – Shift in Process

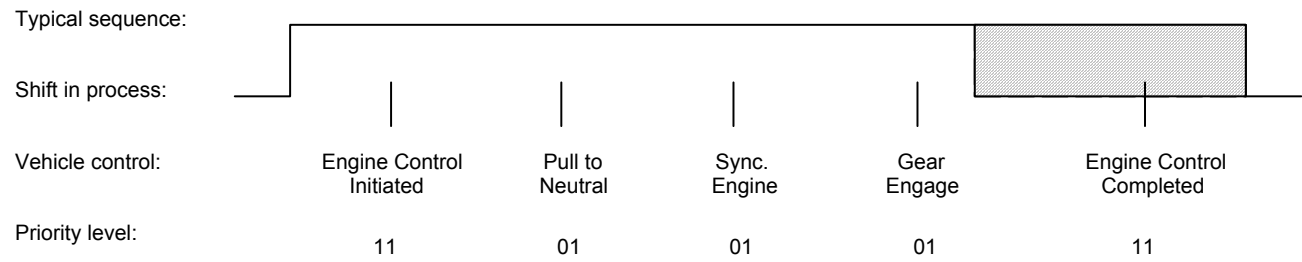


FIGURE SPN574_A—SHIFT IN PROCESS

SPN 590 – Idle Shutdown

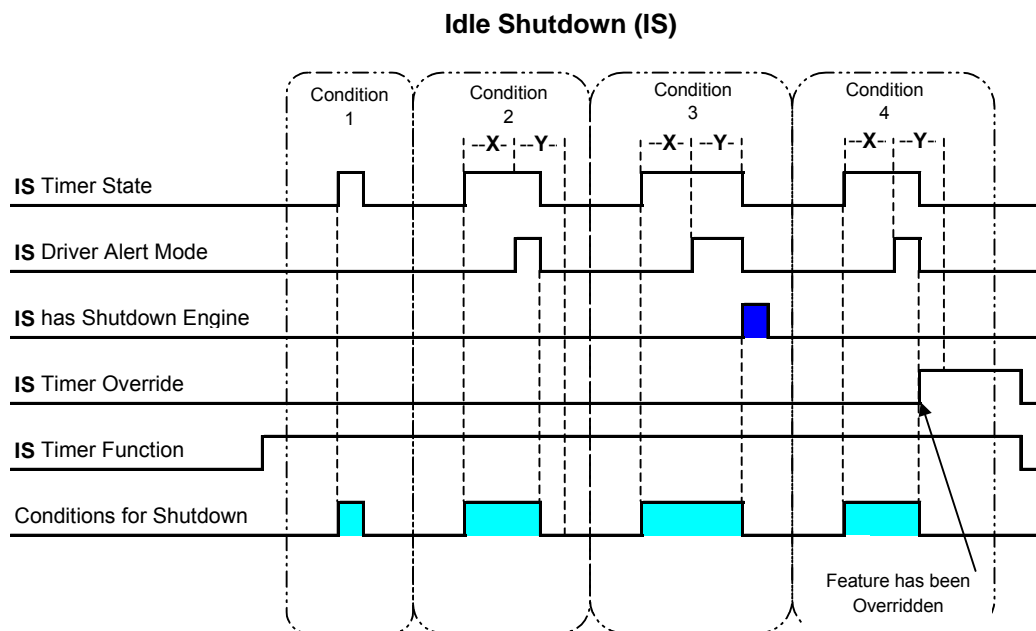


FIGURE SPN590_A—IDLE SHUTDOWN (IS)

Condition 1 - When the IS Timer Override is inactive, the IS Timer State will become inactive if the conditions for shutdown no longer exist before the "X" time interval has expired or IS Driver Alert Mode is activated.

Condition 2 - When the IS Timer Override is inactive, the IS Timer State will become inactive if the conditions for shutdown no longer exist before the IS Driver Alert Mode "Y" time interval has expired.

Condition 3 - When the IS Timer Override is inactive, then the IS has Shutdown Engine will be active after the "Y" time interval has expired.

Condition 4 - When the IS Timer Override is active during the "Y" time interval, then the IS feature shall be overridden and will no longer be available until the system has been re-initiated.

NOTE —0 State – Inactive, disabled in calibration, or conditions for idle shutdown do not exist.

1 State – Active, enabled in calibration, or conditions for idle shutdown do exist.

SPN 695 – Engine Override Control Mode

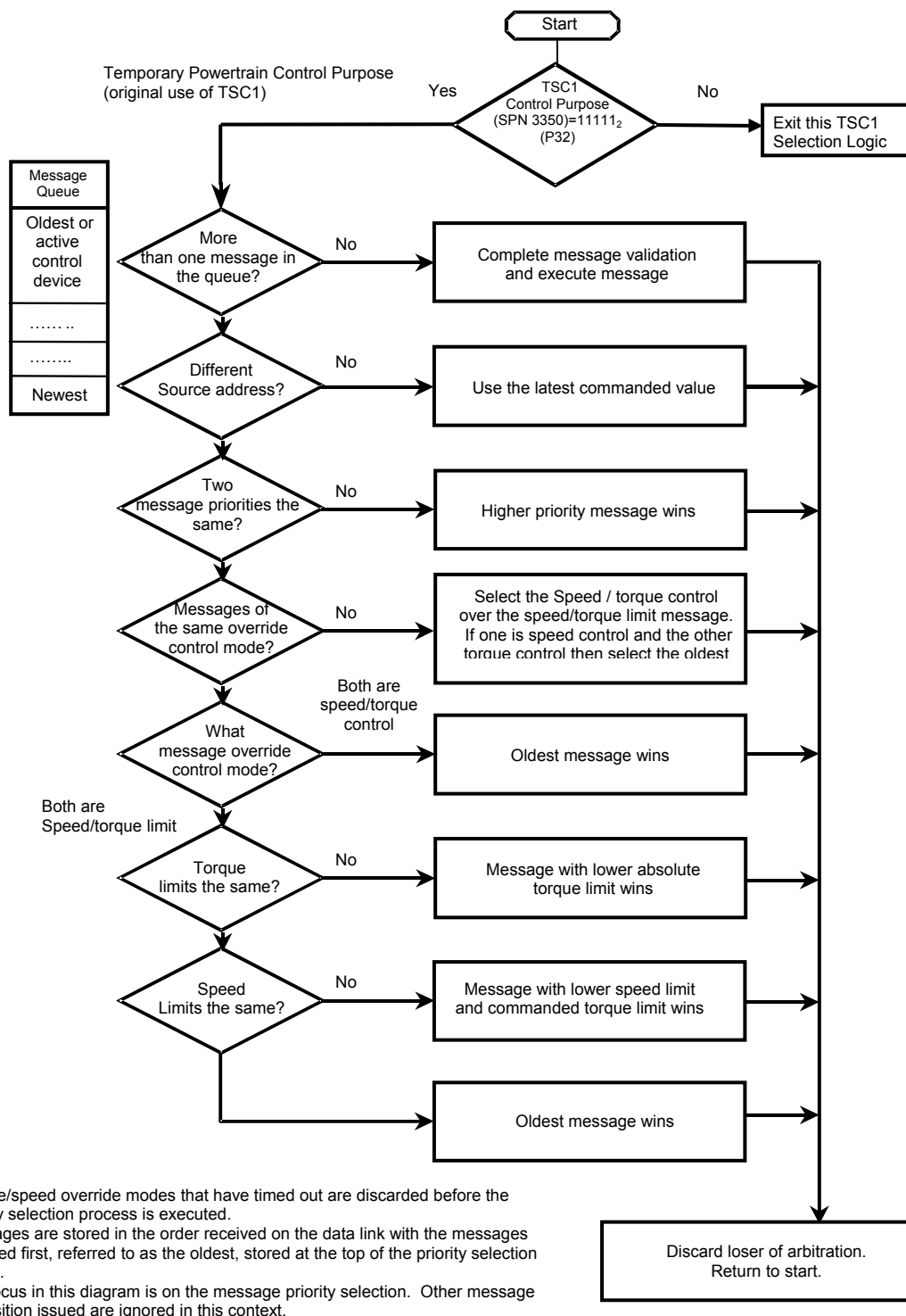


FIGURE SPN695_A—TORQUE/SPEED CONTROL PRIORITY SELECTION LOGIC

SPN 899 – Engine/Retarder Torque Modes

TABLE SPN899_A—ENGINE/RETARDER TORQUE MODES

Bit States	Engine/Retarder Torque Mode
0000	Low idle governor/no request (default mode)
0001	Accelerator pedal/operator selection
0010	Cruise control
0011	PTO governor
0100	Road speed governor
0101	ASR control
0110	Transmission control
0111	ABS control
1000	Torque limiting
1001	High speed governor
1010	Braking system
1011	Remote accelerator
1100	Service procedure
1101	not defined
1110	Other
1111	Not available

State Descriptions:

0000b Low Idle Governor/No request (Default mode) - This mode is active if the accelerator pedal (not necessarily the torque output of the driver input, see Figure SPN512_A and Figure SPN512_B) is zero. This is the default mode. At low speed, the low idle governor may be active while at higher speed, it is zero.

0001b Accelerator Pedal - This mode is active if the accelerator pedal position is active (being followed). This mode is active for the retarder if it is turned on by the operator. Note that it may be disabled by the accelerator pedal or clutch switches (operator selection).

0010b Cruise Control - This mode is active if cruise control is active and greater than the accelerator pedal request.

0011b PTO Governor - This mode is active if the PTO governor is active.

0100b Road Speed Governing - Indicates that road speed governing is active and limiting torque.

0101b ASR Control - Indicates that the ASR command is active (Speed, Torque, or Speed/Torque Limit Control).

0110b Transmission Control - Indicates that the transmission command is active (Speed, Torque, or Speed/Torque Limit Control).

0111b ABS Control - Indicates that the ABS is controlling torque.

1000b Torque Limiting - This mode is active if the demanded or commanded engine torque is limited by internal logic due to full load, smoke and/or emissions control, engine protection and/or other factors. A reduced torque limit may be necessary for engine protection if the engine temperature is too high or a sensor fails (speed, timing, or boost pressure), as examples.

1001b High Speed Governor - This mode is active if the engine is controlled by the high speed governor due to normal operation.

1010b Brake System (Electronic) - This indicates that the brake pedal is controlling the torque. Note that this may include enabling of the retarder when the brake pedal is depressed (touched).

Note that if there is a request to the retarder but operating conditions do not allow braking, this situation will be reflected by the Percent Retarder Torque = 0 when broadcast.

1011b Remote Accelerator - This mode is active if the remote accelerator is controlling engine speed.

1100b Service procedure - This mode is active if the engine is operating in a specific service mode. For example, fuel injection may be disabled to allow a service procedure to crank the engine without fuel injection occurring.

1110b Other - Torque control by a type of device which is different than those defined in states 0000b to 1100b.

SPN 901 – Retarder Type**TABLE SPN901_A —RETARDER TYPES**

Bit States	Retarder Type
0000	Electric/Magnetic
0001	Hydraulic
0010	Cooled Friction
0011	Compression Release (Engine retarder)
0100	Exhaust
0101-1101	Not defined
1110	Other
1111	Not available

Electric/Magnetic Retarder - The electric/magnetic retarder functions by creating eddy currents generated in a conductive armature when placed in a variable magnetic field. Currently, electric retarders have a stator on which field coils are mounted. The rotors, mounted on both sides of the drive shaft, are ribbed for heat dissipation. In order to brake the vehicle, voltage is applied to the field coils which generate a magnetic field inducing eddy currents in the rotors as they pass through the field. Magnetic retarders use a permanent magnet to generate the eddy currents. Braking-torque is dependent on stator excitation and on the air gap between the rotor and the stator.

Hydraulic Retarder - The hydraulic retarder is a hydrodynamic coupling device. Two impellers which face each other, a rotor and a stator, are filled with oil. When the rotor, which is connected to the vehicle drive shaft rotates, it drives the oil in the direction of rotation. The mechanical energy produced by the rotor is converted into kinetic energy in the operating fluid. Hydrodynamic coupling between the rotor and stator converts the kinetic energy into heat and the rotor is retarded. This retardation effect is transmitted to the drive shaft and the vehicle is retarded.

Cooled Friction Brake - The cooled friction brake uses air or hydraulic fluid to dissipate heat from the friction surface of the service brake. By controlling the friction surface temperature, retarding torque is improved, along with a reduced rate of wear.

Compression Release Engine Retarder - The compression release engine retarder converts a power-producing diesel engine into a power-absorbing retarding mechanism by opening the exhaust valve near the top dead center in the engine compression cycle. No positive power will be produced, since the compressed air mass is released. The vehicle is retarded as it must provide energy to compress the cylinder air charge and subsequently to return the piston to the bottom position.

Exhaust Brake - The exhaust brake restricts the escape of the exhaust gas from the exhaust manifold. Each succeeding exhaust stroke builds up a back pressure in the manifold which exerts a retarding effect to the pistons during the exhaust stroke. The engine turns against this back pressure creating a braking effect to the vehicle.

Auxiliary Retarder - Fans, air conditioners, or any power-absorbing device in the vehicle can also function as retarders as they impose parasitic loading on the engine or vehicle.

SPN 911 – Service Component Identification

TABLE SPN911_A—SERVICE COMPONENT IDENTIFICATION

Identification	Component
0	Service check for entire vehicle
1	Brake lining; left front axle
2	Brake lining; right front axle
3	Brake lining; left rear axle
4	Brake lining; right rear axle
5	Clutch lining
6-10	Not defined
11	Brake lining; left rear axle #2
12	Brake lining; right rear axle #2
13	Brake lining; left rear axle #3
14	Brake lining; right rear axle #3
15	Brake lining: general
16	Regulated general check for entire vehicle
17	Brake system special check
18	In-between check
19	Check trip recorder
20	Check exhaust gas
21	Check vehicle speed limiter
22-29	Not defined
30	Engine coolant change
31	Engine coolant filter change
32	Engine oil—engine #1
33	Engine oil—engine #2
34	Not defined
35	Steering oil
36	Not defined
37	Transmission oil—transmission #1
38	Transmission oil—transmission #2
39	Not defined
40	Intermediate transmission oil
41	Not defined
42	Front axle oil
43	Rear axle oil
44-47	Not defined
48	Tires
49	Engine air filter
50	Engine oil filter
51	Engine Fuel Filter
52-60	Not defined
61	Tachograph
62	Driver card #1
63	Driver card #2
64-70	Not defined
71	Diesel Particulate Filter 1 Ash
72	Diesel Particulate Filter 2 Ash
73-239	Not defined
240-249	Manufacturer specific
250-251	Reserved
252	Reset all components
253	No action to be taken
254	Error
255	Component identification not available

SPN 988 – Trip Group 1

TABLE SPN988_A—TRIP GROUP 1

Parameter	SPN
Trip distance	244
Trip fuel	182
High resolution trip distance	918
Trip compression brake distance	990
Trip service brake applications	993
Trip maximum engine speed	1013
Trip average engine speed	1014
Trip drive average load factor	1015
Trip average fuel rate	1029
Trip average fuel rate (Gaseous)	1031
Aftertreatment 1 Trip Fuel Used	3733
Aftertreatment 1 Trip Active Regeneration Time	3734
Aftertreatment 1 Trip Disabled Time	3735
Aftertreatment 1 Trip Number of Active Regenerations	3736
Aftertreatment 1 Trip Passive Regeneration Time	3737
Aftertreatment 1 Trip Number of Passive Regenerations	3738
Aftertreatment 1 Trip Number of Active Regeneration Inhibit Requests	3739
Aftertreatment 1 Trip Number of Active Regeneration Manual Requests	3740
Aftertreatment 2 Trip Fuel Used	3741
Aftertreatment 2 Trip Active Regeneration Time	3742
Aftertreatment 2 Trip Disabled Time	3743
Aftertreatment 2 Trip Number of Active Regenerations	3744
Aftertreatment 2 Trip Passive Regeneration Time	3745
Aftertreatment 2 Trip Number of Passive Regenerations	3746
Aftertreatment 2 Trip Number of Active Regeneration Inhibit Requests	3747
Aftertreatment 2 Trip Number of Active Regeneration Manual Requests	3748
Parameter Group	PGN
Aftertreatment 2 Trip Information	64888
Aftertreatment 1 Trip Information	64889
Trip time information #2	65200
Trip time information #1	65204
Trip shutdown information	65205
Trip vehicle speed/cruise distance information	65206
Trip fuel information (Gaseous)	65208
Trip fuel information	65209
Trip distance information	65210
Trip fan information	65211

SPN 1014 – Trip Average Engine Speed

The equation is as follows:

$$\text{Trip average engine speed} = \frac{\sum_{i=0}^N \text{RPM}(i)}{N} \quad (\text{Eq.SP1014_A})$$

where:

RPM is the engine speed at sample i, N is the number of samples of engine speed and is proportional to the current trip elapsed time

SPN 1085 – Intended Retarder Percent Torque

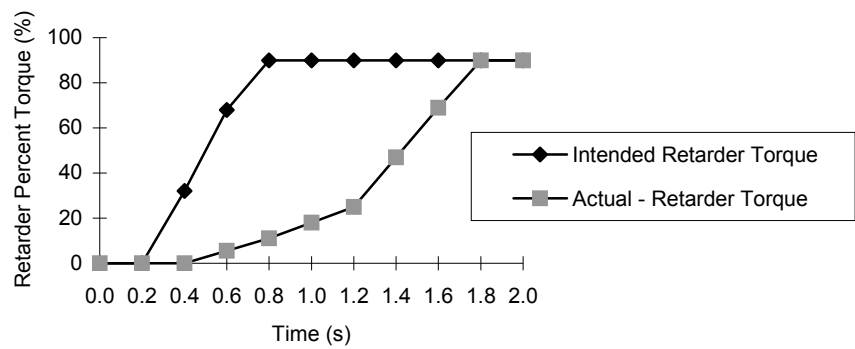


FIGURE SPN1085_A—INTENDED RETARDER PERCENT TORQUE

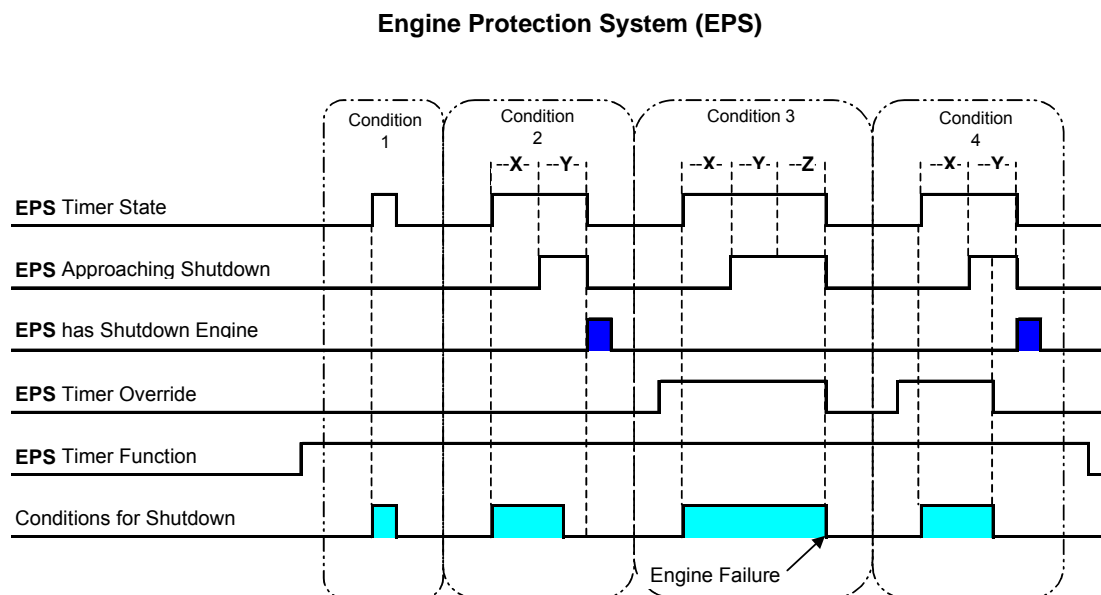
SPN 1107 – Engine Protection System Timer State

FIGURE SPN1107_A—ENGINE PROTECTION SYSTEM (EPS)

Condition 1 – When the EPS Timer Override is inactive, the EPS Timer State will become inactive if the conditions for shutdown no longer exist before the "X" time interval has expired or EPS Approaching Shutdown is activated.

Condition 2 – When the EPS Timer Override is inactive and conditions for shutdown exist during the "Y" time interval, then the Engine will shutdown, even though shutdown conditions subside before the "Y" time interval has expired.

Condition 3 – When the EPS Timer Override is active, then the EPS feature shall be overridden allowing for an engine failure when the "Z" time interval has expired.

Condition 4 – When the EPS Timer Override is active and then allowed to go inactive during the "Y" time interval, the response by the EPS shall be the same as condition 2. The time intervals for "X" and "Y" shall always start when conditions for shutdown first commence regardless whether the EPS Timer Override is enabled or not.

NOTE: 0 State – Inactive, disabled in calibration, or conditions for Engine Protection do not exist.

1 State – Active, enabled in calibration, or conditions for Engine Protection do exist.

SPN 1734 – Nominal Level Front Axle

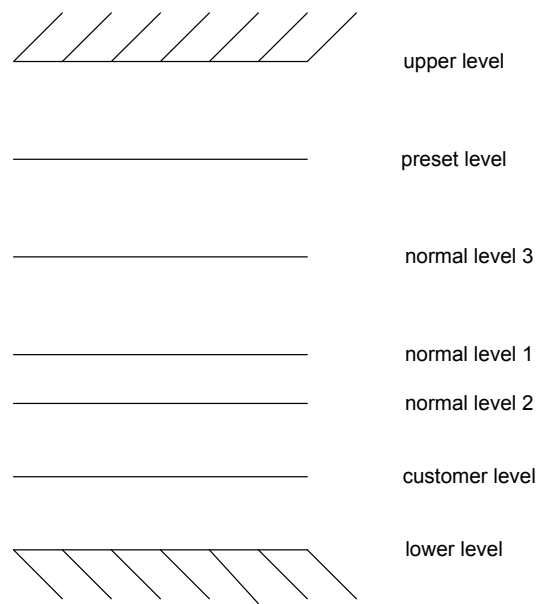


FIGURE SPN1734_A: EXAMPLE FOR NOMINAL LEVELS

If the vehicle height, to be controlled by the ASC, is not within the tolerances of the defined nominal levels, the nominal level is set to not specified.

The defined vehicle heights can be activated via the ASC 2 (PGN: 53760) message or via a remote control (see figure SPN1734_B). The remote control is an external unit to operate the suspension system.

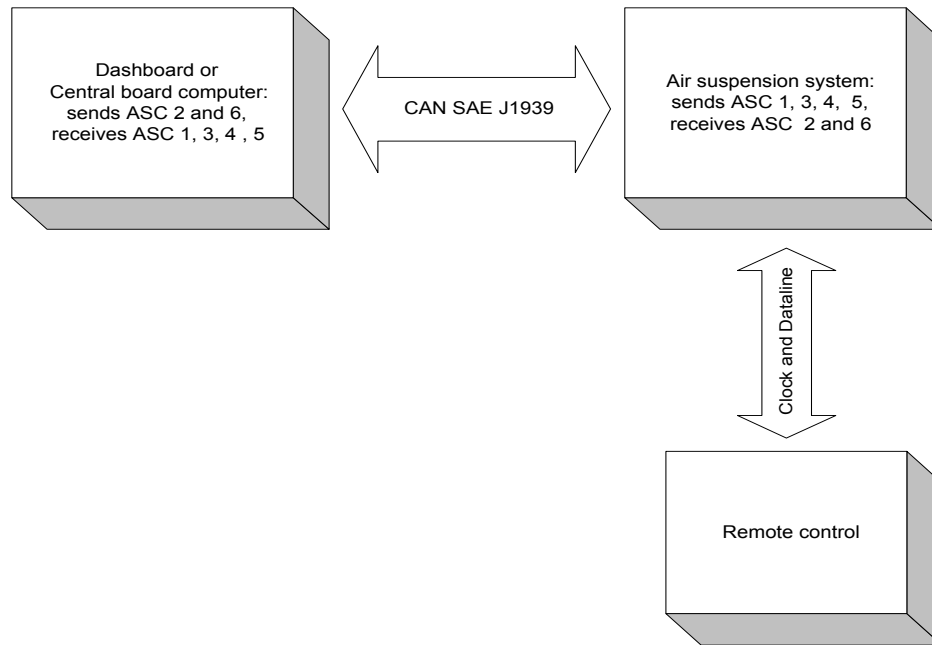
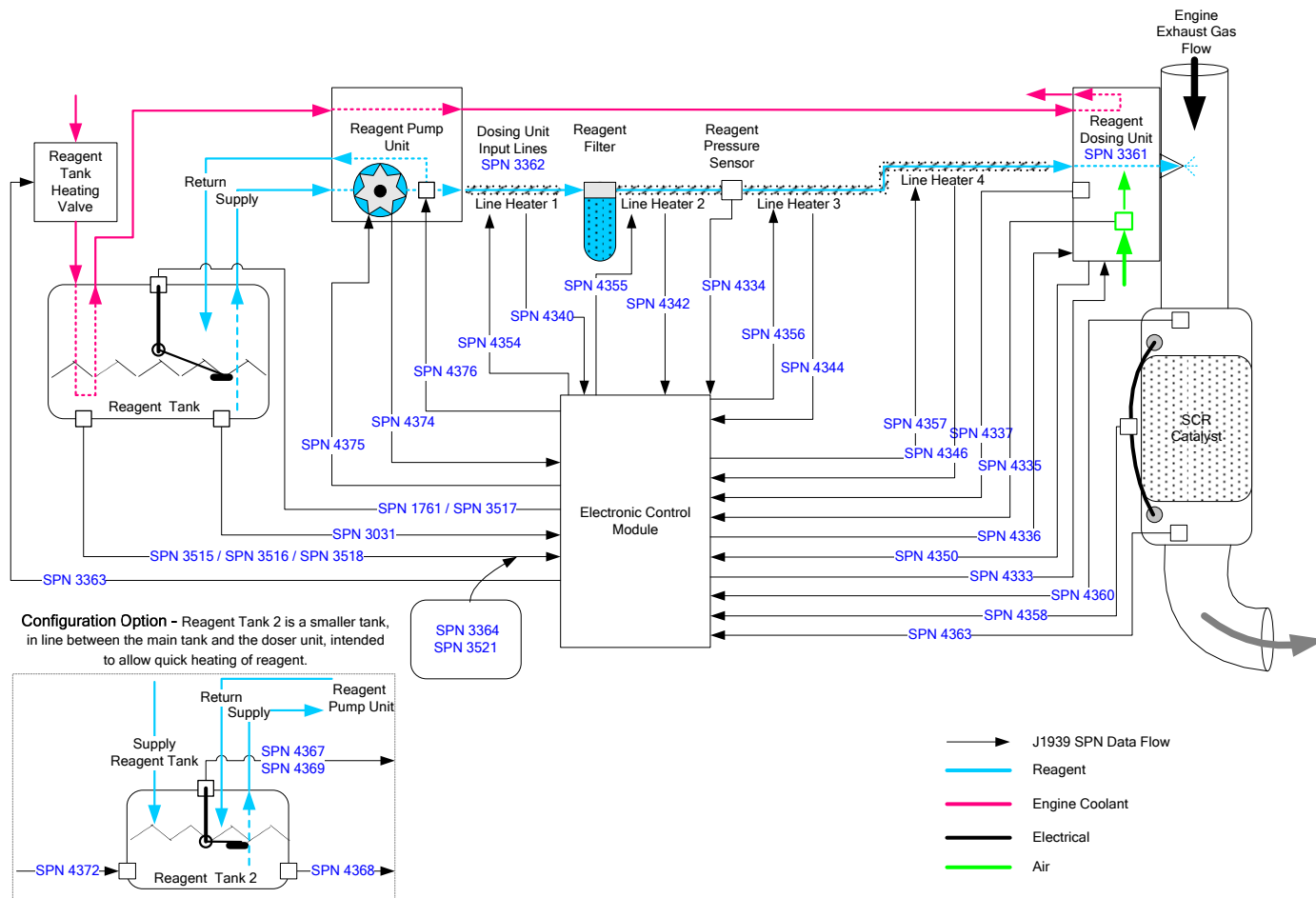


FIGURE SPN1734_B: POSSIBLE INTEGRATION OF ASC SYSTEM INTO VEHICLE NETWORK

An example: The nominal level is the normal level 1. Via remote control a new nominal level (for instance upper level) is requested. The nominal level is then set to upper level and during the height modification the ASC is indicating that the actual level is below nominal level until the upper level is reached.

SPN 1761 - Aftertreatment System Diagram



SPN	SPN Name	SPN	SPN Name
1761	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Level	4344	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 State
3031	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Temperature	4346	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 4 State
3361	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit	4350	Aftertreatment 1 Diesel Exhaust Fluid Requested Quantity of Integrator
3362	Aftertreatment 1 Diesel Exhaust Fluid Dosing Unit Input Lines	4354	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 Request
3363	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Heater	4355	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 Request
3364	Aftertreatment 1 Diesel Exhaust Fluid Tank 1 Quality	4356	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 3 Request
3515	Aftertreatment 1 Diesel Exhaust Fluid Temperature 2	4357	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 4 Request
3516	Aftertreatment 1 Diesel Exhaust Fluid Concentration	4358	Aftertreatment 1 SCR Exhaust Gas Differential Pressure
3517	Aftertreatment 1 Diesel Exhaust Fluid Tank Level 2	4360	Aftertreatment 1 SCR Catalyst Intake Gas Temperature
3518	Aftertreatment 1 Diesel Exhaust Fluid Conductivity	4363	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature
3521	Aftertreatment 1 Diesel Exhaust Fluid Property	4367	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Level
4333	Aftertreatment 1 Diesel Exhaust Fluid Actual Quantity of Integrator	4368	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Temperature
4334	Aftertreatment 1 Diesel Exhaust Fluid Doser Absolute Pressure	4369	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Level 2
4335	Aftertreatment 1 SCR Dosing Air Assist Absolute Pressure	4372	Aftertreatment 1 Diesel Exhaust Fluid Tank 2 Heater
4336	Aftertreatment 1 SCR Dosing Air Assist Valve	4374	Aftertreatment 1 Diesel Exhaust Fluid Pump Motor Speed
4337	Aftertreatment 1 Diesel Exhaust Fluid Dosing Temperature	4375	Aftertreatment 1 Diesel Exhaust Fluid Pump Drive Percentage
4340	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 1 State	4376	Aftertreatment 1 Diesel Exhaust Fluid Return Valve
4342	Aftertreatment 1 Diesel Exhaust Fluid Line Heater 2 State		

FIGURE SPN1761 – Example Aftertreatment System Schematic

SPN 2432 – Engine Demand - Percent Torque**Background:**

During periods of TSC#1 engine control, other devices on the J1939 network may wish to know where the engine wants to go once it is released from TSC#1 control. In order for option transitions of driveline torque between different devices, it becomes necessary to understand the *engine's* desired torque for all phases of a TSC#1 control sequence.

Driver's Demand Engine – Percent Torque (SPN 512) provides a partial prediction of the torque the engine wishes to produce after a TSC#1 command is removed. Included in Driver's Demand Torque are external requestors to the powertrain such as accelerator pedal, cruise control, and road speed limit governors. However, *excluded* from DDT are (1) dynamic commands within the powertrain such as smoke control, noise control, and low and high speed engine governing, and (2) external TSC#1 commands to the engine such as those generated by traction control, unless SPN 3350 in the received TSC1 message is equal to P1 (Accelerator Pedal / Operator Selection), P2 (Cruise Control), P3 (PTO Governor), or P4 (Road Speed Governor). Since those control purposes originate from the driver, they shall be included in the calculation of DDT.

For a controller to properly determine the engine's desired output torque during a TSC#1 sequence, it needs knowledge of the torque being scheduled by all active controls within the engine. Since DDT excludes many of these active controllers from its calculation, it cannot be used to accurately predict the desired output torque. The effects of the external TSC#1 commands can be approximated by other devices by means of monitoring TSC#1 messages to the engine; however the effects of the engine's internal dynamic commands are completely unknown and cannot be estimated.

Actual Engine – Percent Torque (SPN 513) provides a window to the engine's desired torque output when no TSC#1 commands are actively controlling the engine. However, when the engine is responding to TSC#1 commands, the Actual Engine – Percent Torque parameter is no longer indicative of the torque that the engine will produce once those TSC#1 commands are removed.

In simplest terms, Engine Demand – Percent Torque (or "EDT") contains the engine's internal dynamic commands that are excluded from the Driver's Demand Engine – Percent Torque definition, including smoke control, noise control, and low and high speed governing. With this additional piece of information, devices on the network that are controlling the engine via TSC#1 messages can determine the torque direction of the engine once the current TSC#1 command is relinquished.

It is important to note that the Engine Demand – Percent Torque parameter is used as information. The addition of the EDT parameter should in no way cause a change to the engine's actual torque command architecture.

EDT Calculation:

When no devices are controlling the engine via TSC#1 messages, the value of EDT is equal to the Actual Engine – Percent Torque parameter. When the engine is being controlled via a TSC#1 message, it is necessary for the engine controller to calculate what its' target torque *would be* if there were no external commands being received. This "runner up" in engine control will come from internal dynamic engine commands.

In the calculation of Actual Engine – Percent Torque, the output of the engine's idle governor must be considered, along with the impact of the engine's full load governor, smoke controls and other internal limiting logic. In the determination of the Engine Demand Torque parameter, these same engine logic components are needed, as indicated in Figure SPN 2432_A. However, there is a significant difference: These components only affect the Actual Engine – Percent Torque parameter determination if they are the component *actively* controlling the engine. In EDT, any of these components will be used to calculate EDT if they are the "*runner up*" for engine control. Even though these components may lose in the engine's internal control arbitration, the engine output torque that they would produce if in command needs to be found to determine EDT.

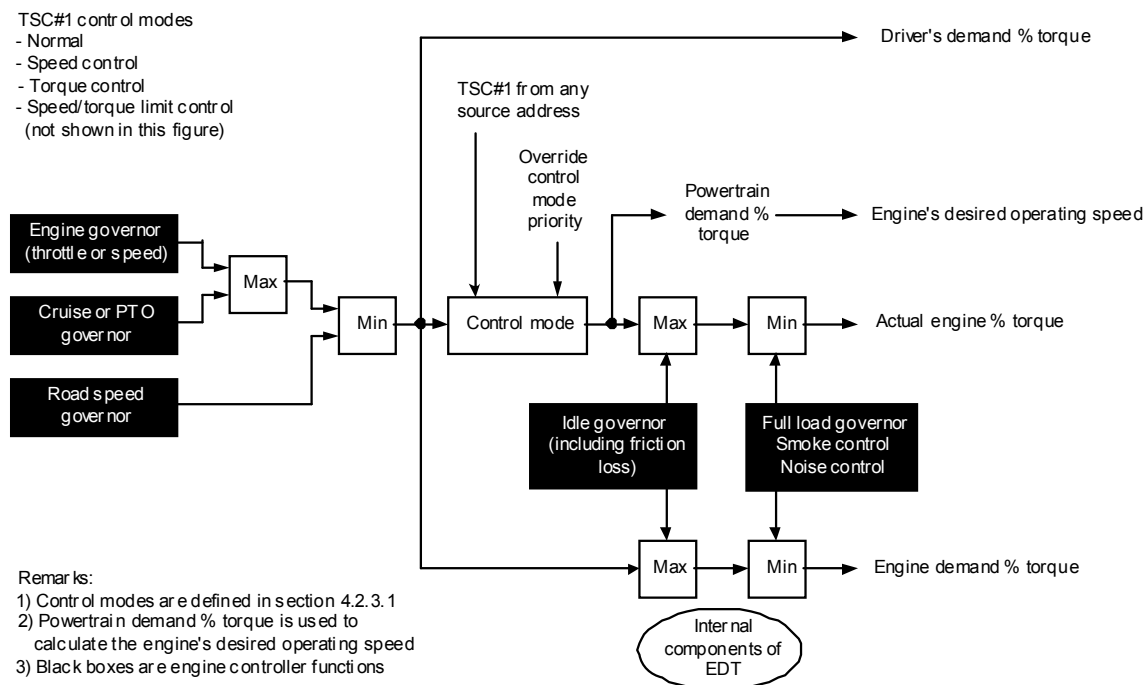


FIGURE SPN2432_A – TORQUE COMMANDS AND CALCULATIONS WHEN A “MAXIMUM LOW IDLE” TECHNIQUE IS USED

If speed governors are involved in determining these components of the EDT calculation, any of the following 3 special cases may need to be addressed:

Special Case #1: Speed Governors

If the engine governor referenced in Figure SPN2432_A is a speed-based governor instead of a throttle table arrangement, a new challenge is presented in determining EDT. Since the speed governor output is directly influenced by the TSC#1 command in control (for example, integrator anti-windup logic), the speed governor's output during TSC#1 commands cannot be used to calculate EDT.

Instead, an *approximation* of the speed governor output without the effects of any TSC#1 commands is required for use in the EDT calculation. “Approximation” refers to removing the effects of integrator terms and any other dynamic components that result from the controlling TSC#1 commands. All elements affecting the speed governor reference should be included before the reference is translated into terms of torque.

All control algorithms with dynamic elements (e.g., speed governors) that execute during TSC#1 commands need to have their outputs replaced by “steady-state” approximations for use in the EDT calculation. Again note that these approximations are for use only in the EDT calculation; the actual engine control logic remains unchanged.

Figure SPN2432_B illustrates EDT and speed governor output during a typical control sequence. The output of the speed governor may tend to lag the engine's torque trace during and after the TSC#1 command sequence. Note however that the TSC#1's influence is not factored into EDT; only when the command sequence ends or is no longer winning in terms of engine control arbitration do the dynamic effects of the speed governor(s) appear in the EDT signal.

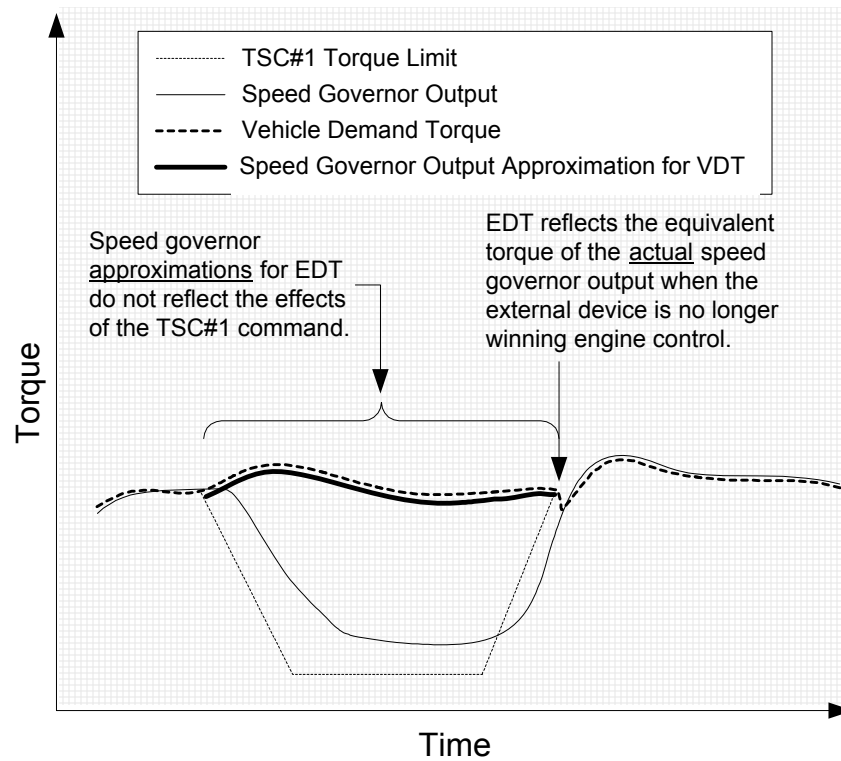


FIGURE SPN2432_B – EDT AND SPEED GOVERNOR OUTPUT RELATIONSHIP DURING A CONTROL SEQUENCE

One method of converting the speed governor reference to torque is shown in Figure SPN2432_C. The inputs of current engine speed, accelerator pedal position and the shape of the governor droop curves can be used to find the equivalent torque output of the governor. A lookup table or calculation could be used.

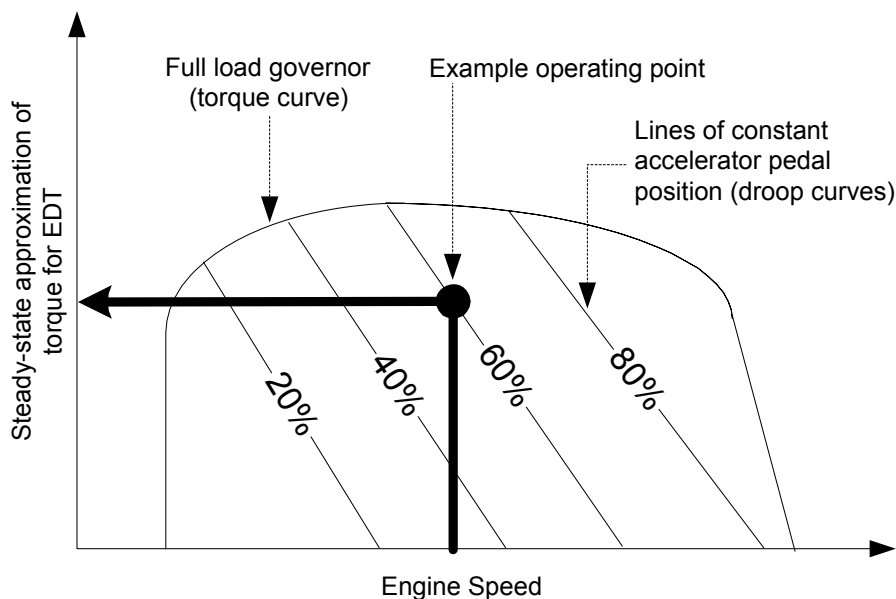


FIGURE SPN2432_C - FINDING EDT TORQUE APPROXIMATION FOR A SPEED GOVERNOR

Special Case #2: “Steep” or zero droop speed governors

Using a steady-state approximation with a “steep” or zero droop speed governor can cause large EDT changes over small speed changes. For example, if a cruise control governor has a zero droop and the vehicle speed is just below the cruise set speed, the steady-state torque approximation using the method described previously is very large. If vehicle speed increases a small amount to above the cruise set speed, the steady-state torque approximation becomes very small or zero.

As a result, a more accurate steady-state torque approximation is needed when steep droop governors are involved. A steep droop speed governor is defined as having a droop slope greater than 0.2% actual torque per rpm as seen below in Figure SPN2432_D.

The following method can be used to determine a steady-state torque approximation for steep or zero droop governors with fast responding integrator anti-windup / integrator resetting:

Upon a TSC#1 message actively controlling engine torque, save the last value of torque commanded by the speed governor (τ_{SG0}) and the last value of speed governor error (ϵ_{SG0}).

During this control sequence, calculate speed governor error (ϵ_{SGi})

Calculate an estimated torque for EDT determination use: $\tau_{SGestimated} = \tau_{SG0} + K_{pSG} * (\epsilon_{SG0} - \epsilon_{SGi})$

where K_{pSG} is the speed governor proportional gain

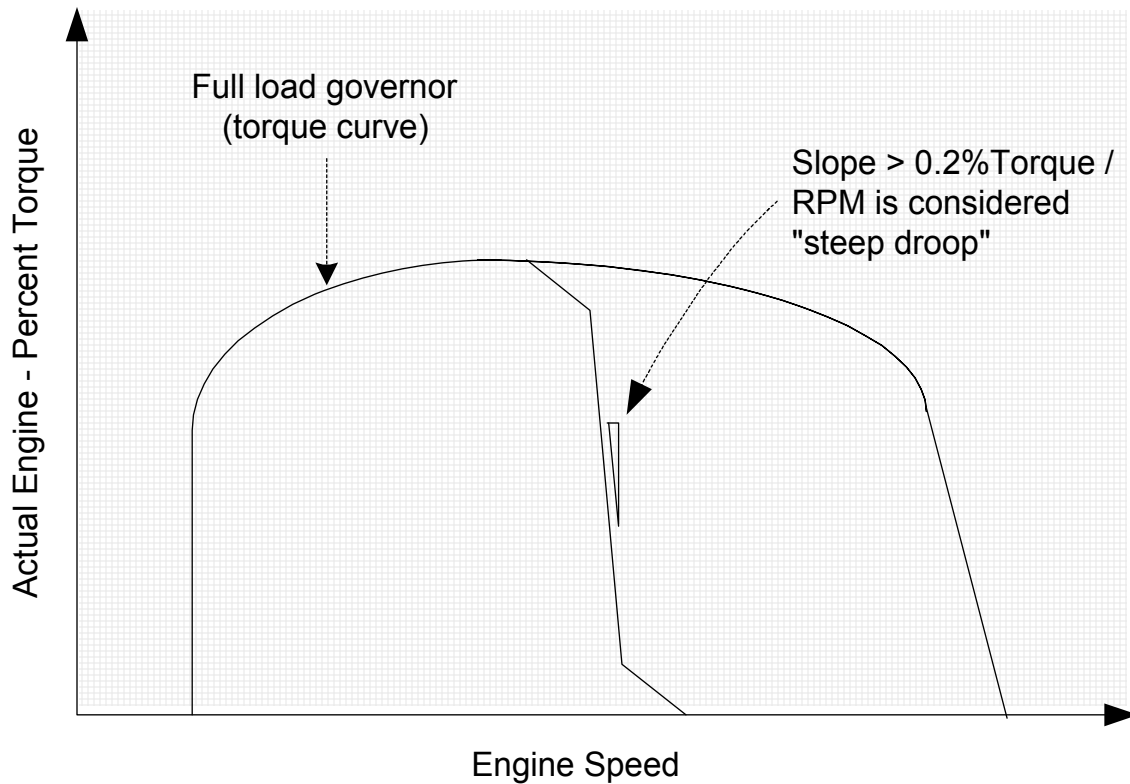


FIGURE SPN2432_D - EXAMPLE OF "STEEP DROOP" SPEED GOVERNOR

Special Case #3: "Slow Response" Speed Governors

If the speed governor dynamic elements are slow to respond to a 1 second torque derate, then the speed governor can simply be executed during the TSC#1 event and the output used directly in determining EDT. This is an alternative for a speed governor which does not contain an integrator, or if the integrator anti-windup logic is slow to respond. A guideline for "slow response" is that the governor output after 1 second of torque limiting has only moved 1/3 of the way to the limit, as shown for example in Figure SPN2432_E.

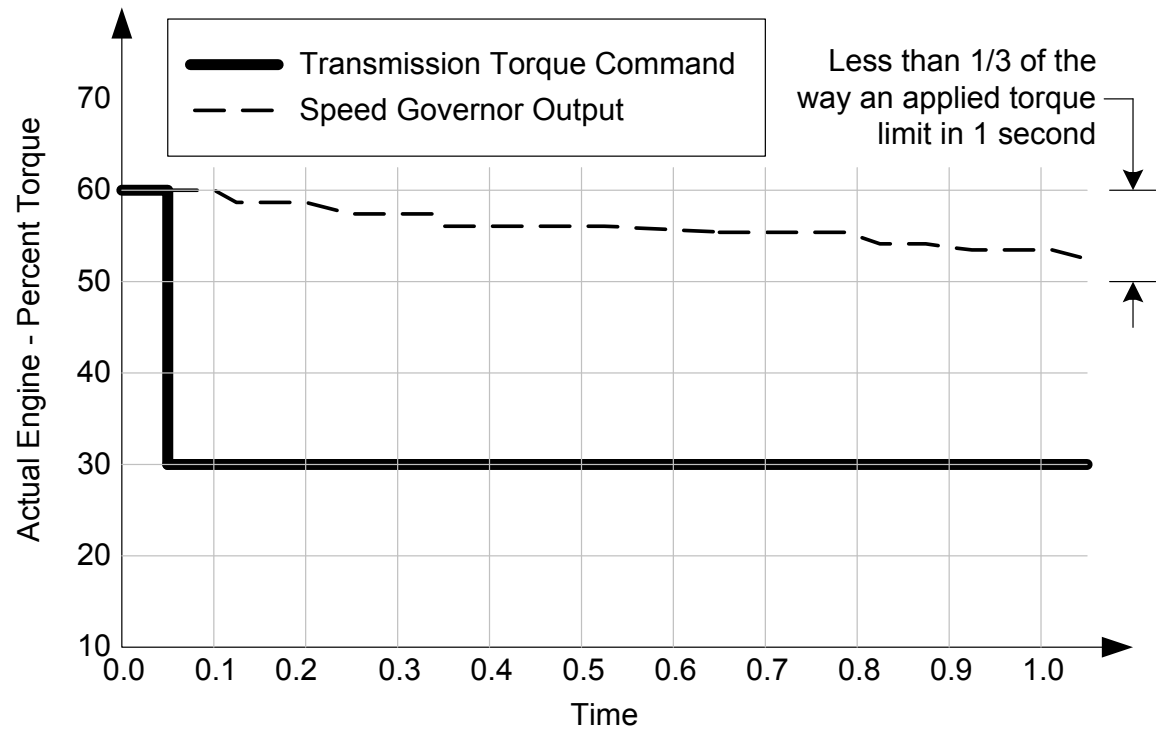


FIGURE SPN2432_E – EXAMPLE OF “SLOW TO RESPOND” SPEED GOVERNOR

SPN 2927 - Actual Inner wheel steering angle

Following sketch shows an example for the actual inward wheel angles of the steering axes in the requested PGN :

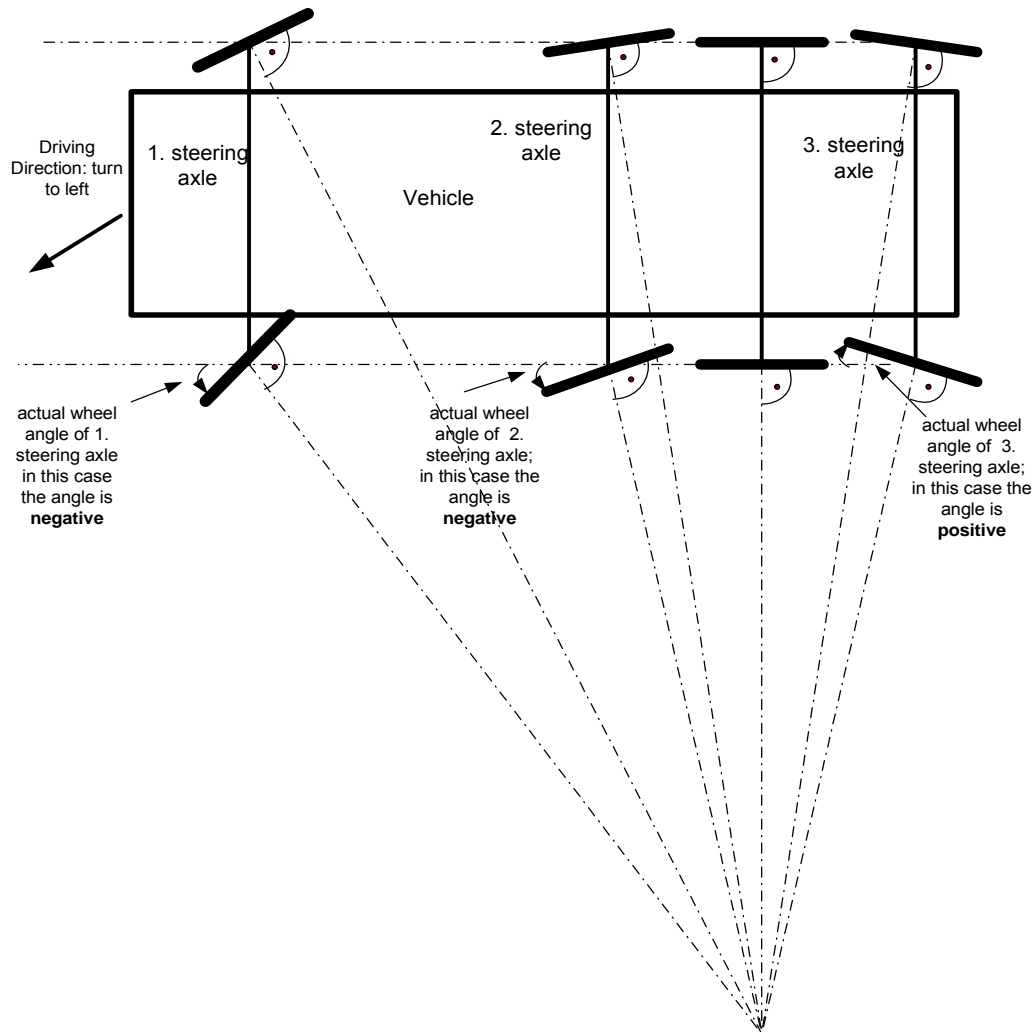


FIGURE SPN2927_A: STEERING AXLE ORIENTATION

SPN 3697 – Diesel Particulate Filter Lamp Command

		SAE J1939 Parameters					DM1 Message
State of Regeneration Cycle		SPN 3697 - Diesel Particulate Filter Lamp Command	SPN 3698 - Exhaust System High Temperature Lamp Command ¹	SPN 3703 - Diesel Particulate Filter Active Regeneration Inhibited Due to Inhibit Switch	SPN 3700 - Diesel Particulate Filter Active Regeneration Status	SPN 3701 - Diesel Particulate Filter Status	
1	Regeneration not needed	000	000	00	00	000	Per active DTCs
2	Regeneration needed – Request Level	001	000	00	10	001	Per active DTCs
3	Regeneration needed – Warning Level	100	000	00	10	010	Per active DTCs
4	Regeneration needed - Service Level	100	000	00	10	011	Per active DTCs. Amber Lamp shall be on with active DTC indicating regeneration level.
5	Regeneration needed – Stop Level	100	000	00	10	011	Per active DTCs. Red Lamp shall be on with active DTC indicating regeneration level.
6	Manual Regeneration Request Acknowledge	Per Filter Status - lamp will reflect actual level of DPF fill.	000	00	At transition. Change to 01 following switch input.	Per appropriate regeneration needed level	Per active DTCs
7	Regeneration active with exhaust temperature above a threshold	Per Filter Status - lamp will reflect actual level of DPF fill.	001	00	01	Per appropriate regeneration needed level	Per active DTCs
8	Regeneration active with exhaust temperature below a threshold	Per Filter Status - lamp will reflect actual level of DPF fill.	000	00	01	Per appropriate regeneration needed level	Per active DTCs
9	Regeneration Inhibit Acknowledge	Per Filter Status - lamp will reflect actual level of DPF fill.	Per exhaust temperature.	At transition. From 00 to 01 following switch input.	The following is for information only during this state: If SPN 3700 is equal to 01, then it will change from 01 to the appropriate state following switch input. If it is not equal to 01, then value remains the same.	Per appropriate regeneration needed level	Per active DTCs

The diesel particulate filter (DPF) thresholds used in the explanations below are relative to each other in the following manner: Request Level < Warning Level < Service Level < Stop Level

1. Regeneration not needed: Amount of particulate matter in DPF is below the request level threshold.
2. Regeneration needed - Request Level: Amount of particulate matter in DPF has exceeded request level threshold, but has not exceeded the warning level threshold.
3. Regeneration needed - Warning Level: Amount of particulate matter in DPF has exceeded warning level threshold, but has not exceeded the service level threshold.
4. Regeneration needed - Service Level: Amount of particulate matter in DPF has exceeded service level threshold, but has not exceeded the stop level threshold.
5. Regeneration needed - Stop Level: Amount of particulate matter in DPF has exceeded stop level threshold.
6. Manual Regeneration Request Acknowledge: When the operator sets the SPN 3696 Diesel Particulate Filter Regeneration Force Switch to 01, then SPN 3700 will indicate that regeneration is active.
7. Regeneration active with exhaust temperature above a threshold: Needs no explanation.
8. Regeneration active with exhaust temperature below a threshold: Needs no explanation.
9. Regeneration Inhibit Acknowledge: If the operator has activated the Diesel Particulate Filter Regeneration Inhibit Switch (SPN 3695), then another device on the network can detect this event by monitoring SPN 3703 to change from 00 to 01.

The actual values of all thresholds referenced above are defined by the manufacturer.

Note ¹: In addition to the above table, the exhaust system high temperature lamp can be set due to high exhaust temperatures that are independent of a regeneration cycle.

FIGURE SPN3697_A – DIESEL PARTICULATE FILTER LAMP COMMAND

SPN 3785 – Tractor Brake Stroke System

The brake stroke system has essentially two inputs:

- 1) Sensor at each actuator that allows the determination of 3 regions of stroke (Fully Returned, Normal Stroke Range, or Overstroke Range)
- 2) A sensor to detect the use of the brake pedal (similar to Stop Light Switch)

The ECU then determines the brake stroke status as follows:

		Brake Pedal	
		OFF	ON
		OK	Non-functional
Stroke Sensor	RETURNED	OK	Non-functional
	NORMAL	Dragging	OK
	OVERSTROKE	Dragging	Overstroke

FIGURE SPN3785_A – Tractor Brake Stroke Definitions

SPN 4151 – Engine Exhaust Gas Temperature Average

Up to 3 different exhaust port temperature averages will be computed. These three averages include the left bank average exhaust port temperature, the right bank average exhaust port temperature and the engine average exhaust port temperature. The example below illustrates how these averages would be computed for a V8 engine configuration. Inline engines would utilize SPN 4151 for Engine Average Exhaust Temperature.

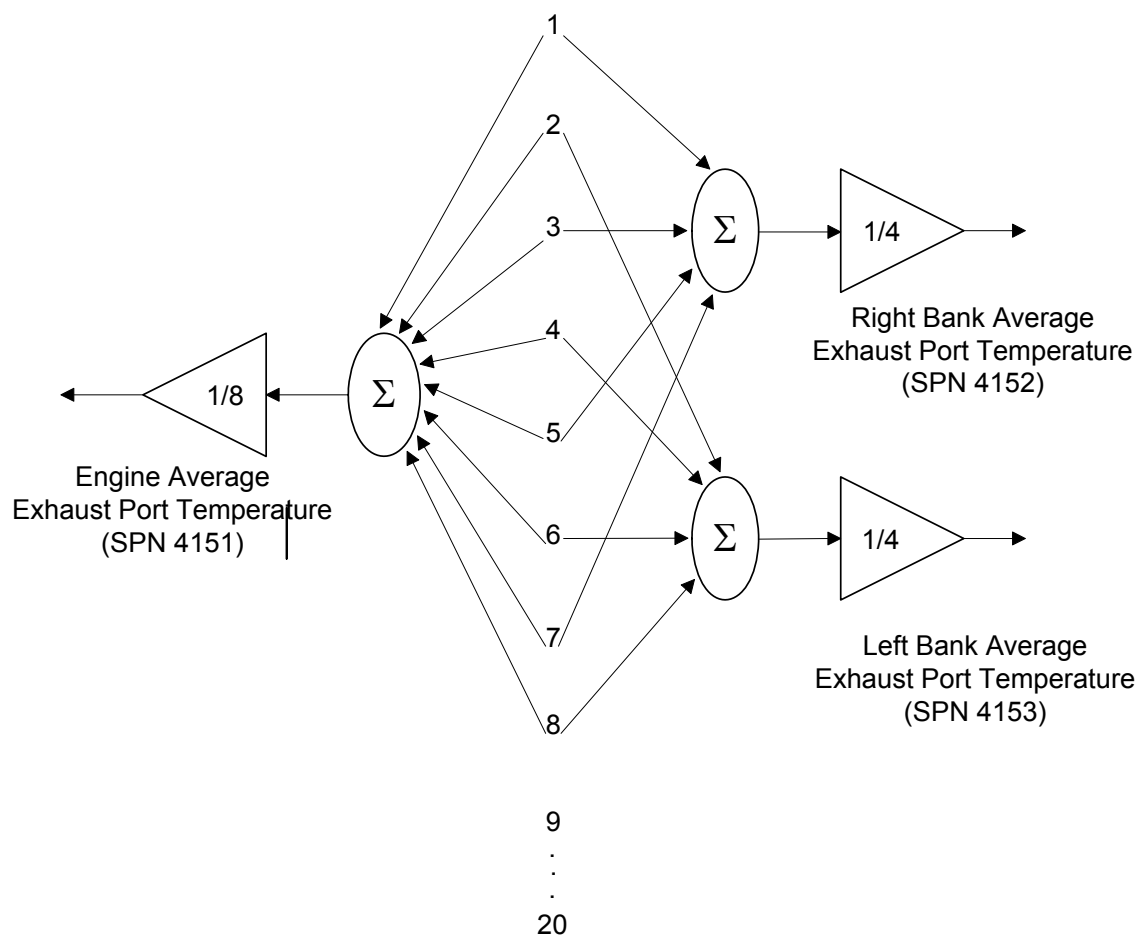
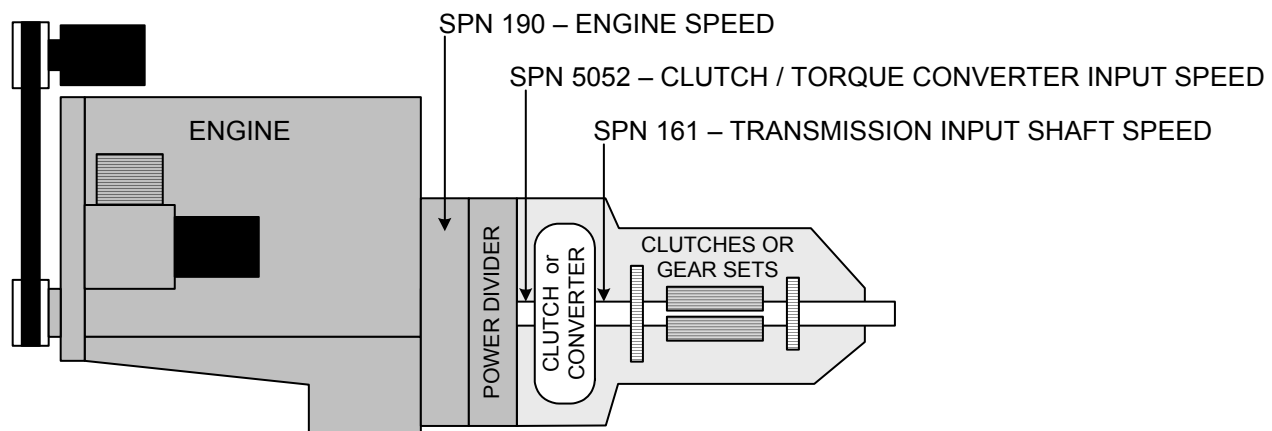


FIGURE SPN4151_A – Engine Exhaust Gas Temperature Averaging Method

SPN 5052 – Clutch/Torque Converter Input Speed**FIGURE SPN5052_A – Power Divider Schematic**

SPN 5275 – PARK BRAKE ACTIVATION

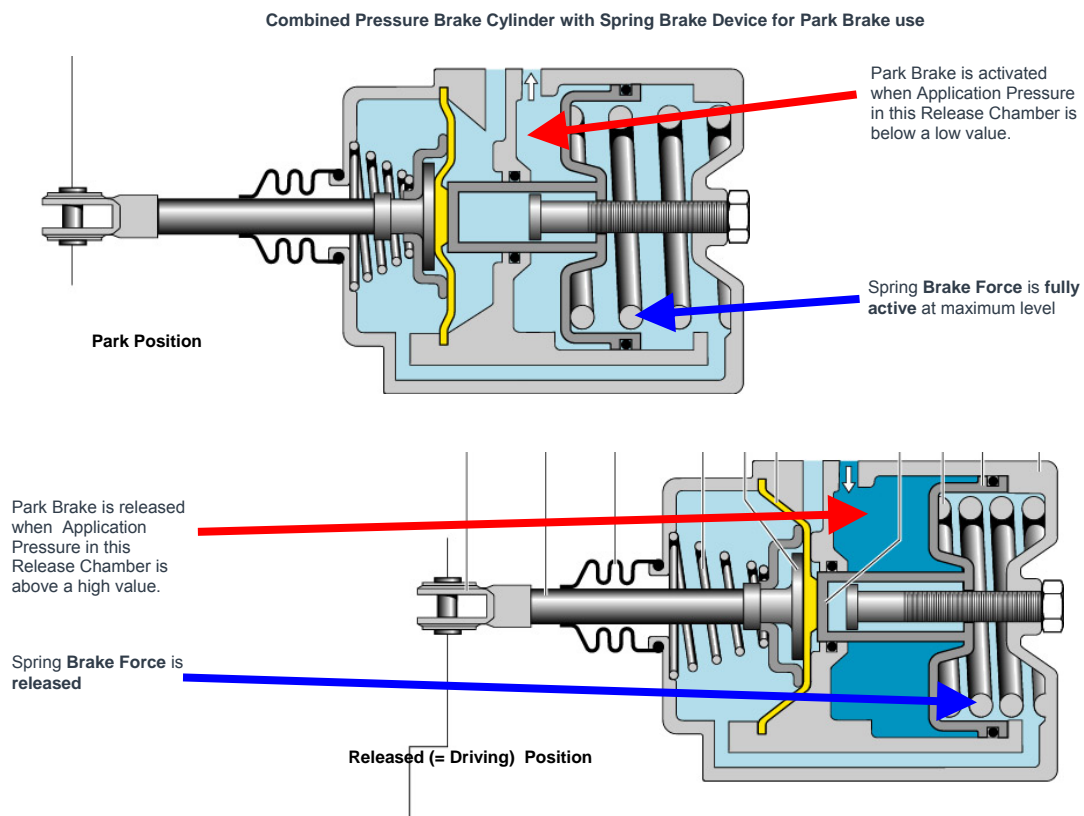


FIGURE SPN_5275A – PARK BRAKE ACTIVATION

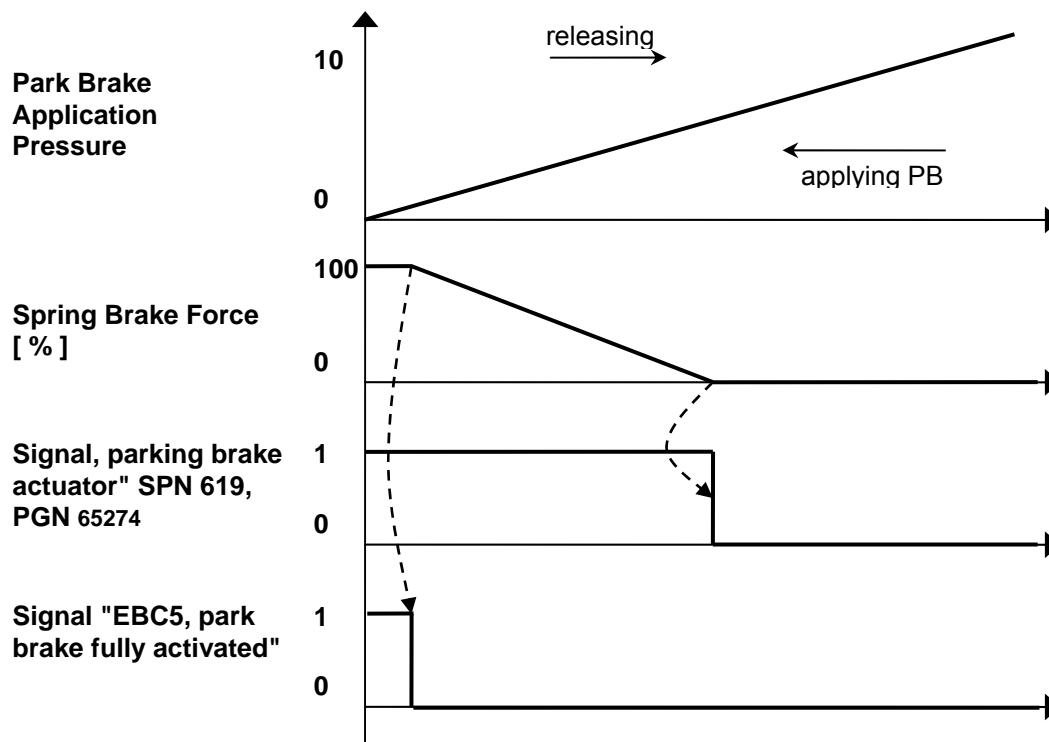


FIGURE SPN_5275B – PARK BRAKE ACTIVATION STATES

PGN 1024 – External Brake Request

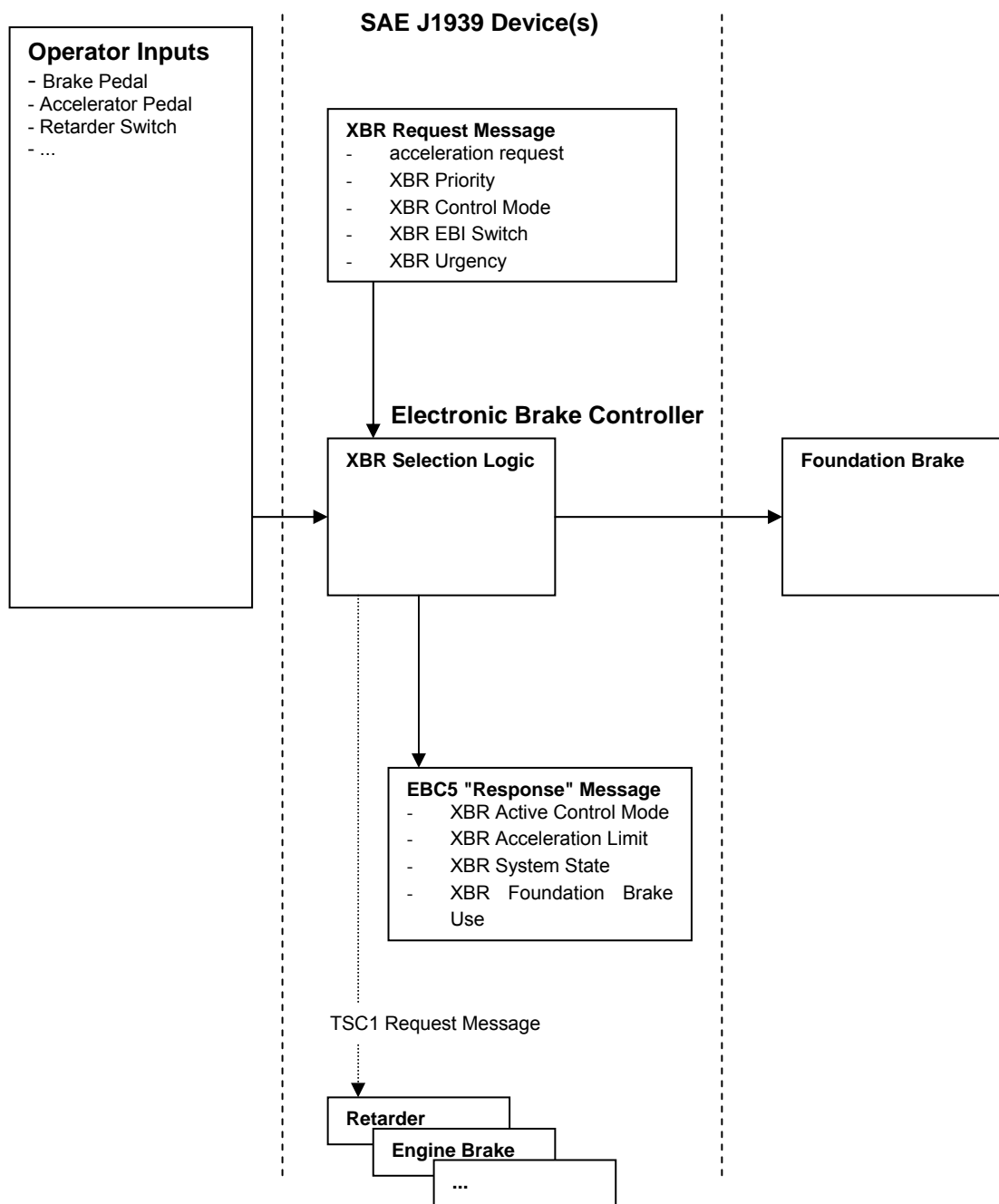
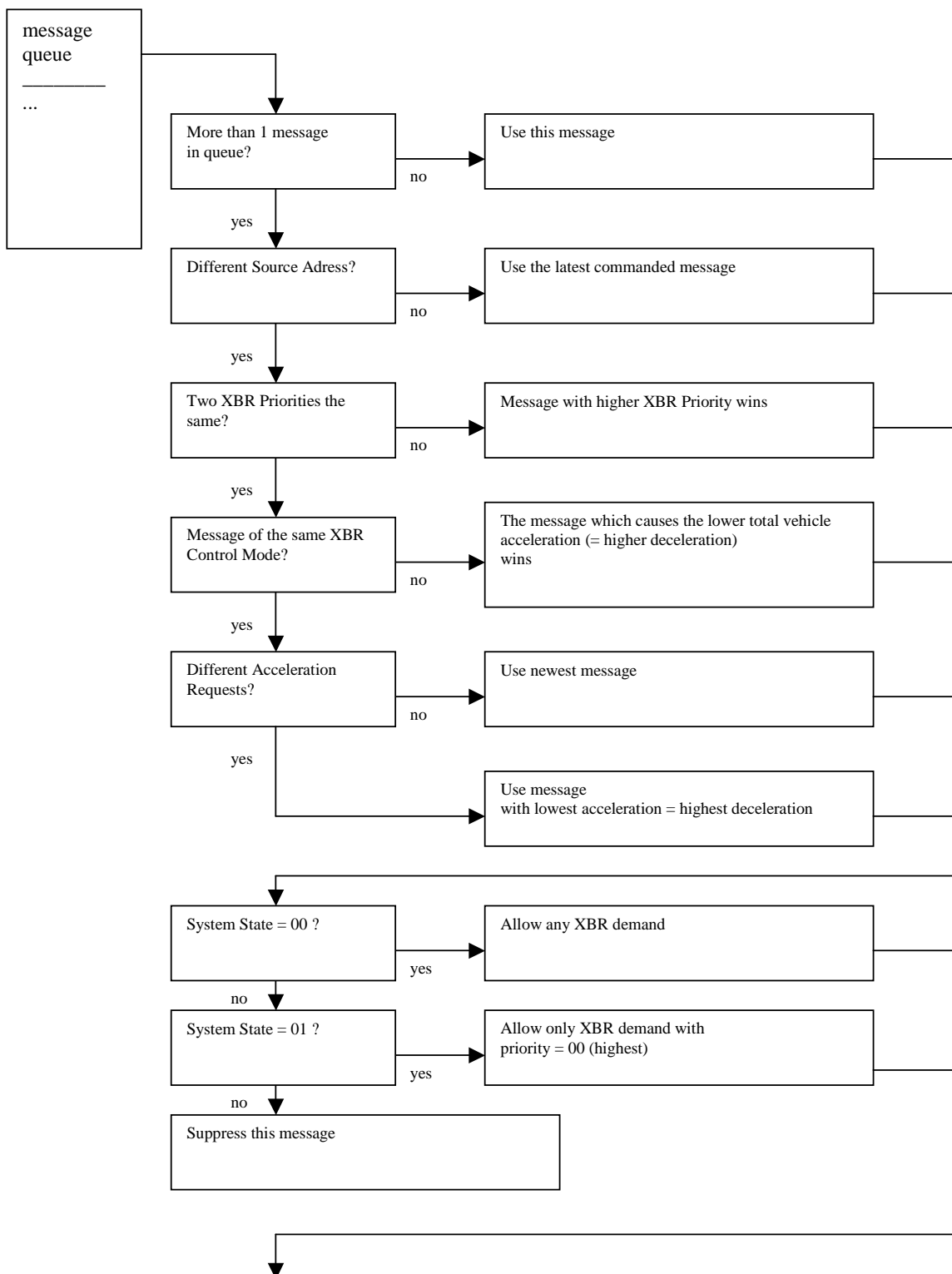


FIGURE PGN1024_A - DATA FLOW DIAGRAM FOR EXTERNAL BRAKE REQUEST



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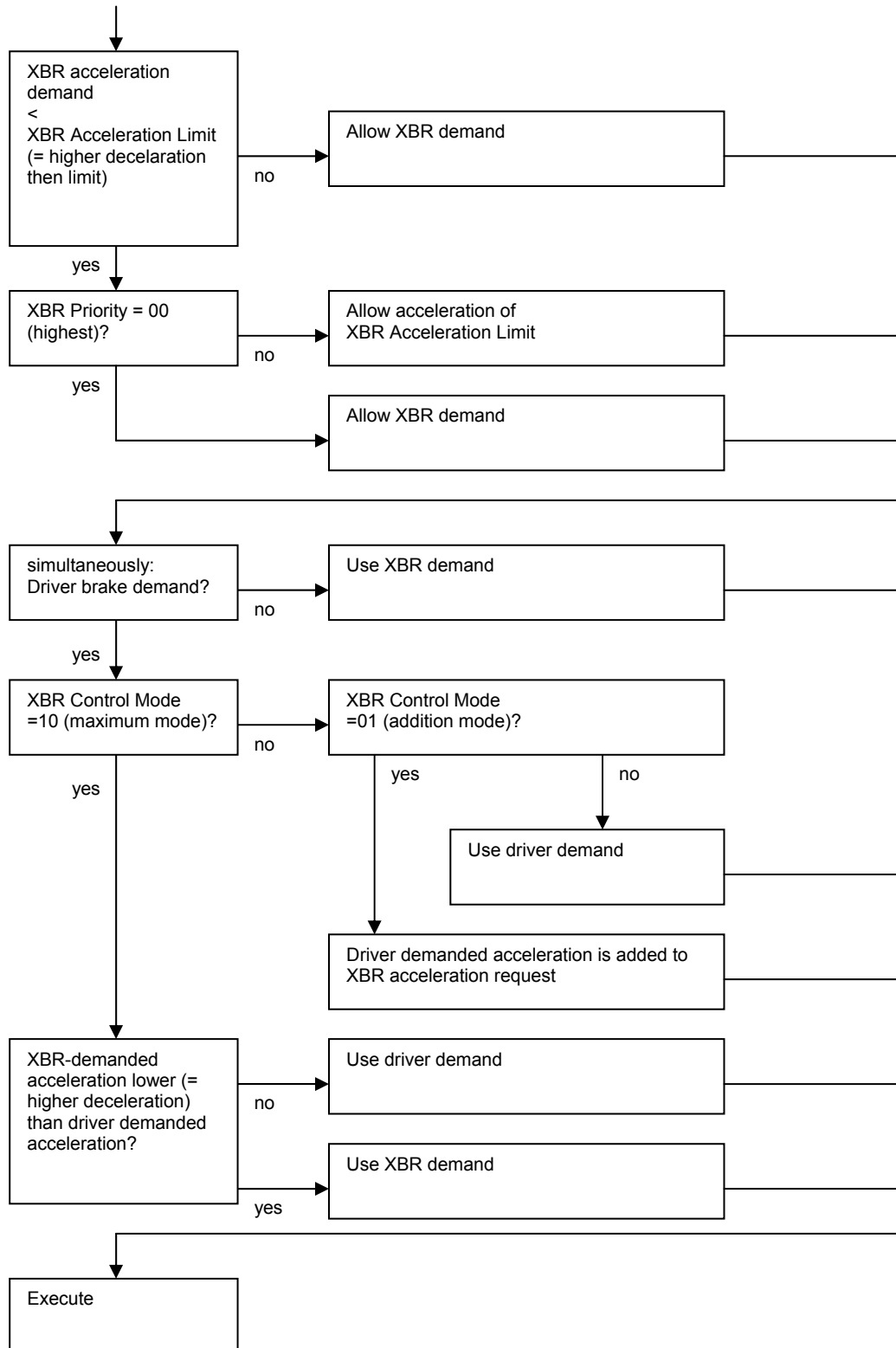


FIGURE PGN1024_B - XBR PRIORITY SELECTION LOGIC

PGN 2560 – CRUISE CONTROL/VEHICLE SPEED

Inputs								Outputs					
Cruise Control Enable Switch (SPN 596)	Cruise Control Resume Switch (SPN 601)	Cruise Control Set Switch (SPN 599)	Cruise Control Coast Switch (SPN 600)	Cruise Control Accel Switch (SPN 602)	Cruise Control Disable Command (SPN 5603)	Cruise Control Pause Command (SPN 5605)	Cruise Control Resume Command (SPN 5604)	Action by Cruise Control Device	Cruise Control System Command State (SPN 5607)	Cruise Control States (SPN 527)	Cruise Control Active (SPN 595)	Source Address of Controlling Device for Disabling Cruise Control (SPN 5609)	Source Address of Controlling Device for Pausing Cruise Control (SPN 5609)
00	don't care	don't care	don't care	don't care	don't care	don't care	don't care	Cruise control is disabled.	000	Off (000)	Off (00)	0xFE	0xFE
01	Operator selection	Operator selection	Operator selection	Operator selection	00	don't care	don't care	Cruise Control Device shall execute the operator's request.	000	Based on operator selection	Based on operator selection	0xFE	0xFE
01	don't care	don't care	don't care	don't care	01	don't care	don't care	Cruise control is not active. Cruise control set speed is not retained.	001	Off (000)	Off (00)	SA of Device	0xFE
01	00	00	00	00	01 → 00 ¹	don't care	don't care	Cruise control is not active. Cruise control set speed is not retained.	001	Off (000)	Off (00)	0xFE	0xFE
01	don't care	don't care	don't care	don't care	00	01	don't care	Cruise control is not active. Cruise control set speed is retained	010	Off (000)	Off (00)	0xFE	SA of Device
01	00	00	00	00	00	01 → 00 ²	don't care	Cruise control is not active. Cruise control set speed is retained	010	Off (000)	Off (00)	0xFE	0xFE
01	00	00	00	00	00	01 → 00 ⁴	00 → 01 ⁴	If a previous set speed exists, then cruise control will become active.	011 ³	Resume (100)	On (01)	0xFE	0xFE
01	00	00	00	00	00	00	01	If a previous set speed exists, then cruise control will become active.	011 ³	Resume (100)	On (01)	0xFE	0xFE
01	00	00	00	00	00	00	01	If a previous set speed does not exist, then cruise control will not become active.	100	Off (000)	Off (00)	0xFE	0xFE

¹ The values in the Output columns apply to the transition and after the transition until a valid command is received. If Cruise Control Disable Command has been used to disable cruise control, then a valid command is the Cruise Control Set Switch can be used to activate cruise control.

² The values in the Output columns apply to the transition and after the transition until a valid command is received. If Cruise Control Pause Command has been used to disable cruise control, then a valid command to activate cruise control is (1) the Cruise Control Resume Switch, (2) the Cruise Control Set Switch, or (3) Cruise Control Resume Command.

³ Cruise Control System Command State will change to the appropriate value when Cruise Control States is no longer equal to Resume (100).

⁴ Information in this row indicates that Cruise Control Pause Command and Cruise Control Resume Command can transition in the same message and still achieve the desired cruise control resume functionality.

Note: The table above is intended to demonstrate that a request to disable cruise control shall have priority over another type of request. A request to disable cruise control includes one of the following: Cruise Control Enable Switch in the OFF position, a Cruise Control Disable Command received as 01, or a Cruise Control Pause Command received as 01.

FIGURE PGN2560_A – RELATIONSHIP BETWEEN CRUISE CONTROL COMMAND PARAMETERS

PGN 39680 – Proprietary Messaging Information

This PGN allows an ECU to report basic information about its data methods for the PropA, PropA2, and PropB messages for ECUs to determine proprietary messaging compatibility. Once proprietary messaging compatibility is determined through this PGN, then those ECUs could rely upon messages within that compatible proprietary space to negotiate more specific details of compatibility, such as the set of messages specifically supported and the data dictionary details. An accurate assessment of the proprietary messaging compatibility between ECUs in a network is vital to avoiding system operational hazards resulting from improper interpretation of proprietary messages.

Using the J1939 Proprietary Messages (PropA, PropA2, and PropB) for communications between ECUs in a system requires ECUs to determine which, if any, of the other ECUs support and use the same data methods (i.e. data dictionary, ID assignments, data field structures, etc). Presently, the only SAE J1939 standardized data available to ECUs for determining such proprietary messaging compatibility is the Manufacturer Code parameter in the J1939 NAME reported in the address claim message. This information is marginally sufficient for ECUs to limit proprietary messaging use with peer ECUs of the same Manufacturer Code. However, this information is not sufficient when proprietary messaging is needed between ECUs with different Manufacturer Codes.

Using proprietary messages to communicate between ECUs from different manufacturers requires design time negotiations between manufacturers to establish the data dictionary, message IDs, etc. Often only a small range of message IDs are sectioned off for these interactions and the rest of the proprietary space in each ECU is the native proprietary language of that manufacturer. When using the PropA and PropA2 messages, an ECU can restrict to only those sent specifically to its address and validate the Manufacturer Code and other NAME elements of the Source Address before applying the negotiated methods. However, it is possible that the negotiated language for the sectioned off IDs is applicable by each manufacturer for those specific components, and such space may have different language rules for other components or similar components on other systems. When using the PropB messages, an ECU can only cross reference the Manufacturer Code and other NAME elements of the Source Address. However, it is not possible to determine how the message source has encoded the message or if the source even intended for the ECU to use the message. Consequently, the J1939 NAME is not really sufficient for determining any compatibility for the PropA, PropA2, and PropB messages.

Notes

The data field consists of zero or more Proprietary Method data structures. Each Proprietary Method data structure consists of a Manufacturer Code parameter and a Method ID parameter. The J1939 Manufacturer Code values (J1939 Table B10) shall serve as the enumeration standard for the Manufacturer Code. The Method ID parameter is a 21-bit value defined and set by the manufacturer.

Each Proprietary Method structure allow an ECU to essentially say "This ECU supports Manufacturer X's Proprietary Method '123' ". Since the message supports the ability to report multiple Proprietary Methods, this structure allows an ECU to essentially say:

```
"This ECU supports
Manufacturer X's proprietary method '123'
Manufacturer X's proprietary method '456'
Manufacturer Y's proprietary method '321' "
```

In the above example, Manufacturer X method 123 (X-123) might be for PropA messaging and may have a set of the rules for discovering further PropA proprietary details. Those ECUs with X-123 knowledge will be able to perform the discovery and possibly initiate messaging conversations using the X-123 methods. The Manufacturer X method 456 (X-456) might be for PropA2 messaging and may have a set of the rules for discovering further PropA2 proprietary details. Similarly, those ECUs with X-456 knowledge will be able to perform the discovery and possibly initiate messaging conversations using the X-456 methods. Finally, an ECU could limit acceptance and interpretation of proprietary messages only to those ECUs that indicate specific Proprietary Methods. When establishing proprietary messaging between ECUs with different manufacturer codes, the parties can establish the Proprietary Method ID which indicates the use of the that specific negotiated messaging.

A destination specific message is requested to allow an ECU to customize its message response for the requesting device.

This is a standardized mechanism for an ECU to report a listing of the manufacturer specific (i.e. proprietary) methods it supports when using the PropA, PropA2, and PropB PGNs. The ability to support multiple manufacturer proprietary methods allows manufacturers to collaborate on application specific communication needs that are not of interest to the SAE J1939 committee. The process of selecting a specific method for ECUs that list multiple mutually exclusive methods is intended to be defined by the manufacturer and therefore not within the scope of this PGN.

NOTE—The placement of the Manufacturer Code and Method ID bits into the 4-byte space is illustrated in Figure PGN39680_A.

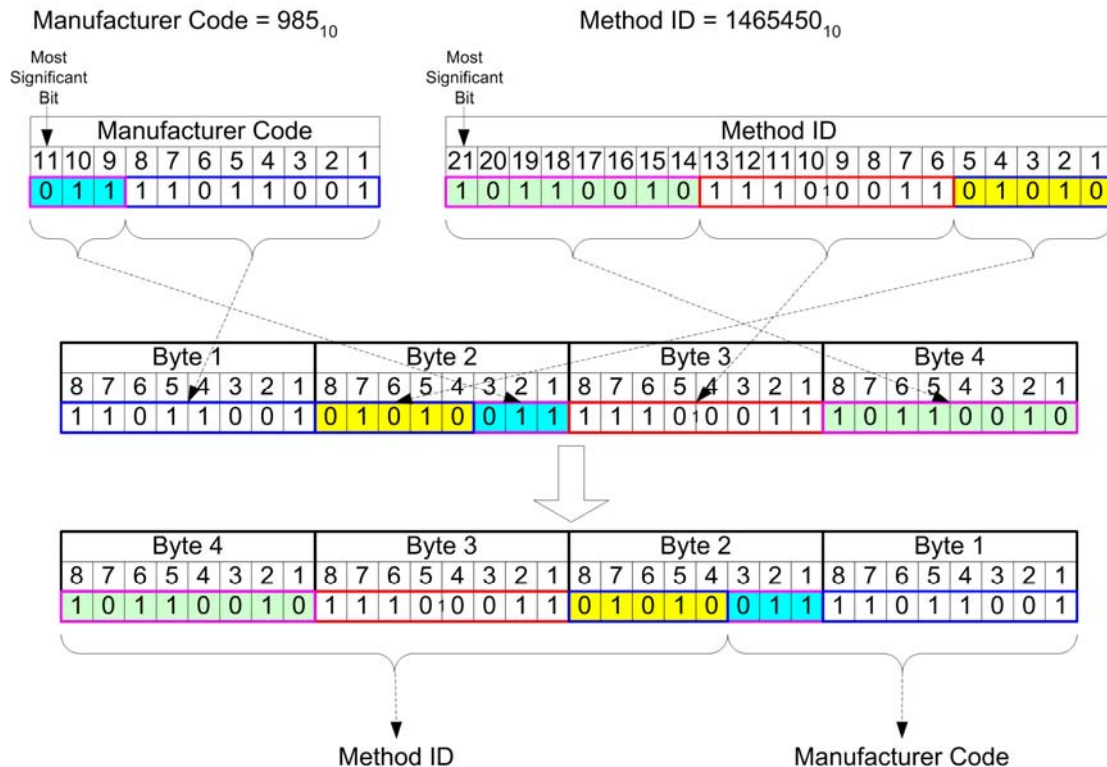


Figure PGN39680_A - Placement of Manufacturer Code and Method ID Data

EXAMPLE 1—The following illustrates the message format for when there are more than one proprietary method to report.

Given:

a = Manufacturer Code
b = Method ID

Message form is as follows: a,b,a,b,a,b,a,b,etc. In this example, the transport protocol of SAE J1939-21 has to be used to send the information because it requires more than 8 data bytes. Actually any time there is more than two methods to report, the services of the transport protocol have to be used.

PGN 52992 – Continuous Torque & Speed Limit Request

The TSC1 message allows J1939 network devices to temporarily control engine and retarder speed and torque. This approach allows engine (and retarder) speed to be controlled by one device for a limited period of time. This may need to happen for brief emergency conditions (as requested by an anti-lock braking system for example) or in order to synchronize engine speed with some other device such as a transmission in order to allow a shift. Conflicting speed and torque requests from different devices are resolved by a predefined arbitration scheme.

Not every torque or speed need is satisfactorily addressed by this plan, however. Occasionally a network device may wish to impose longer lasting limits on speed and torque. For instance, as long as a transmission is in third gear, it may not be able to withstand all the torque the engine (or retarder) can produce. Or, an auxiliary device such as a pump may only operate correctly if engine speed and torque are kept within some fairly limited range *but not necessarily at one precise speed/torque!* In these cases, the network device does not need to command the precise speed or torque, but does have a legitimate desire to keep it within some boundary for an extended period of time. The TSC1 message doesn't provide this ability.

How: The ECM and retarder controller(s) first must define a "window" within the torque map. The window should be chosen carefully, and shouldn't be any larger than necessary. Any requests for continuous limits that attempt to intrude on this window will succeed only in setting limits at the very threshold of the window. For example, if the ECM declares that minimum continuous torque limits must be less than 900 lb-ft, and some device attempts to set a minimum continuous torque of 1000 lb-ft, the actual applied continuous limit will be 900 lb-ft (thus 900 lb-ft is the *minimum continuous* torque). When this limit is applied, the engine will always produce at least 900 lb-ft of torque. Similarly, if the engine declares that minimum continuous engine speed cannot be more than 1100 RPM, any attempts at setting a minimum continuous engine speed of over 1100 RPM will result in a minimum continuous engine speed of 1100 RPM. That is, the engine has declared beforehand that it will *always* be able to operate at least at 1100 RPM.

Periodically, the ECM and retarder controller(s) will transmit the dimensions of this window, as well as what actual continuous limits have been applied. This allows the engine to adjust the size and shape of the "window" to allow for derates and provides feedback to the various devices requesting continuous torque and/or speed limits.

The following figure shows an example torque curve with a "window" inside.

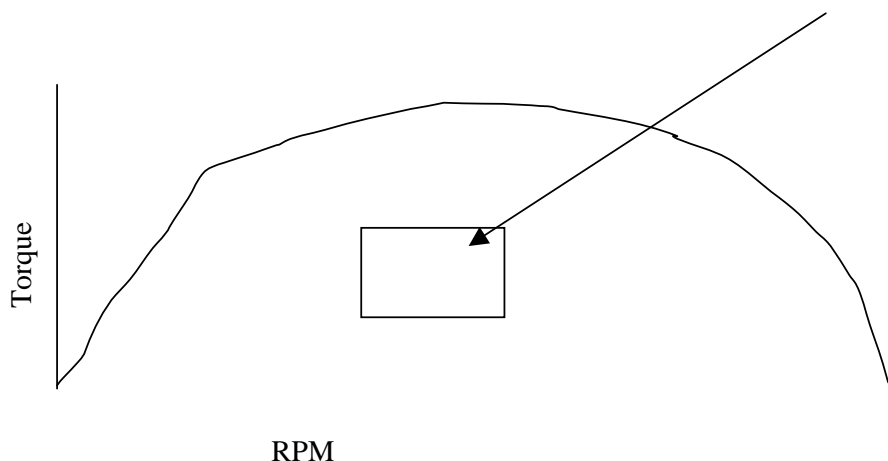


FIGURE PGN52992_A

The following figure shows how the ECM will treat requests that are outside of the bounds set by the “window.” Note that the ECM has declared a “maximum allowable minimum” and a “minimum allowable maximum” for both speed and torque. These limits form a sort of rectangular “window” within the torque. The engine **must** be free to operate within this window; no continuous limits will be accepted that would intrude on it. In the diagram, some network device has ignored those values and attempted to set a minimum continuous speed higher than allowed. Remember, a minimum continuous speed means that the engine must always maintain an RPM of that value or greater. The ECM cannot accept the requested limit, so it applies a continuous limit as close as possible: right at the boundary set by “maximum value allowed for minimum continuous speed.” Requests for Minimum Continuous Speed and Max/Min continuous torque are handled the same way.

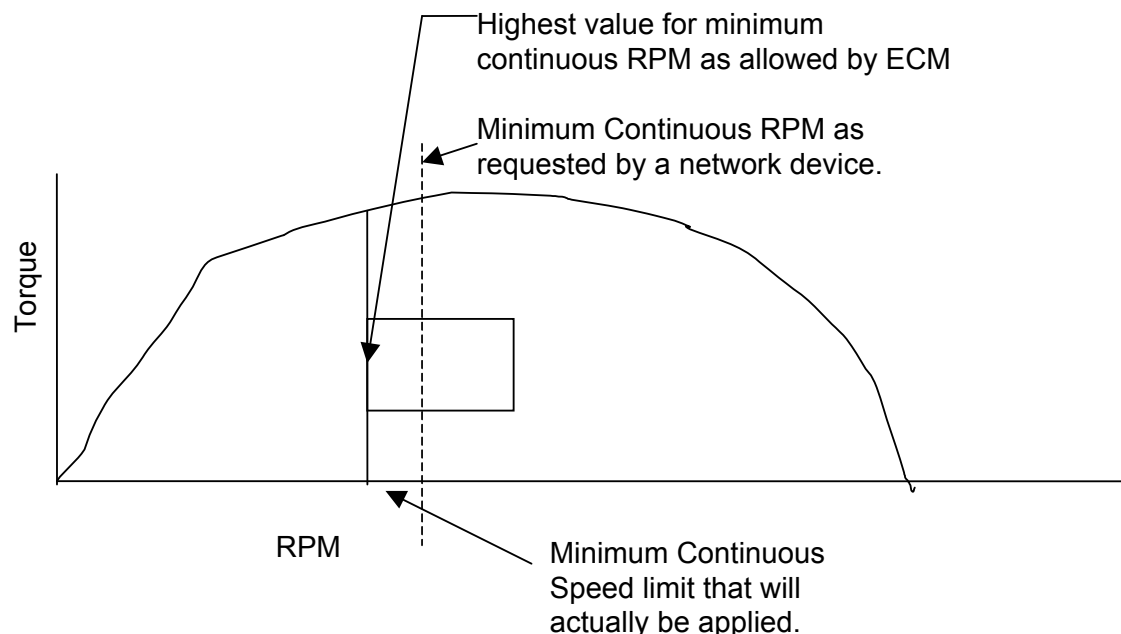


FIGURE PGN52992_B

Things get a little more complicated when a retarder is included. Fortunately, only the engine compression brake retarder has any real relationship to the engine's torque map. Because other retarders may work against the engine, only the compression brake is generally controlled by the same ECU. For this reason, we must give it more careful attention.

The following figure illustrates one of the problems. Suppose continuous limits have been applied to the engine and retarder as indicated by the rectangular boxes within the torque maps. If the engine is prohibited from allowing torque to decrease below x , how can the retarder be engaged? An engine compression brake retarder needs zero fueling for the engine in order to engage. The simple answer is that if there is a minimum continuous torque limit applied to the engine, the retarder will not be engaged.

How does the reverse case behave? If the retarder is of a type other than engine compression brake, it may work against the engine and continuously produce a negative torque. Engine compression brake retarders must not send out a list of acceptable limits that would allow such conundrums. In practical terms, this means that engine compression brake retarders must set their Maximum Continuous Torque limit (think of it as MINIMUM continuous BRAKING torque limit) to zero in order for the retarder to ever be engaged. Similarly, the continuous limits as actually applied to the engine must allow zero torque if the retarder is to be engaged.

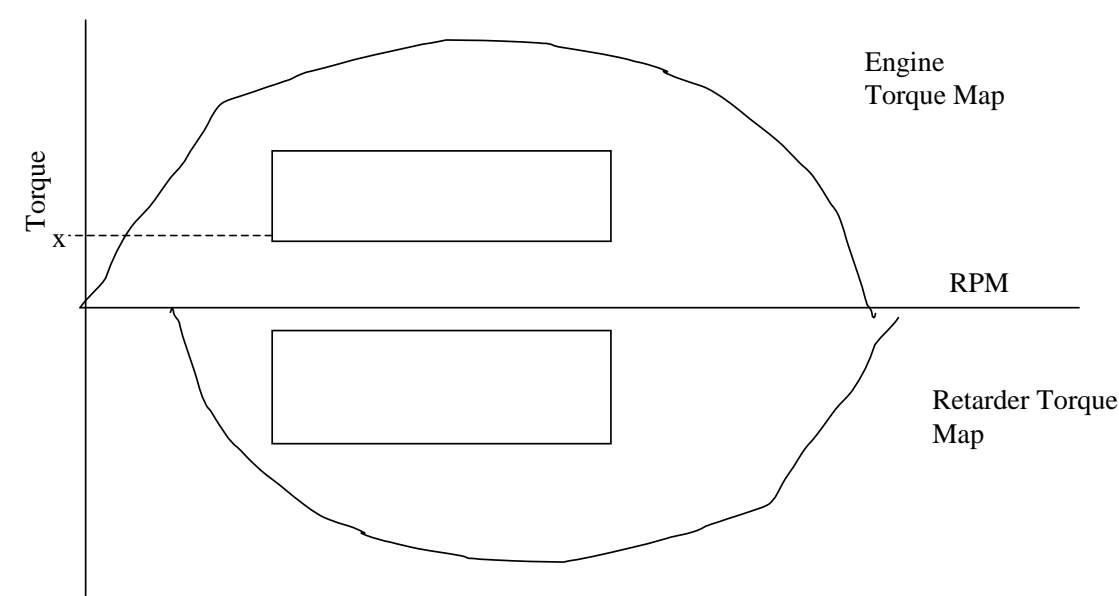


FIGURE PGN52992_C

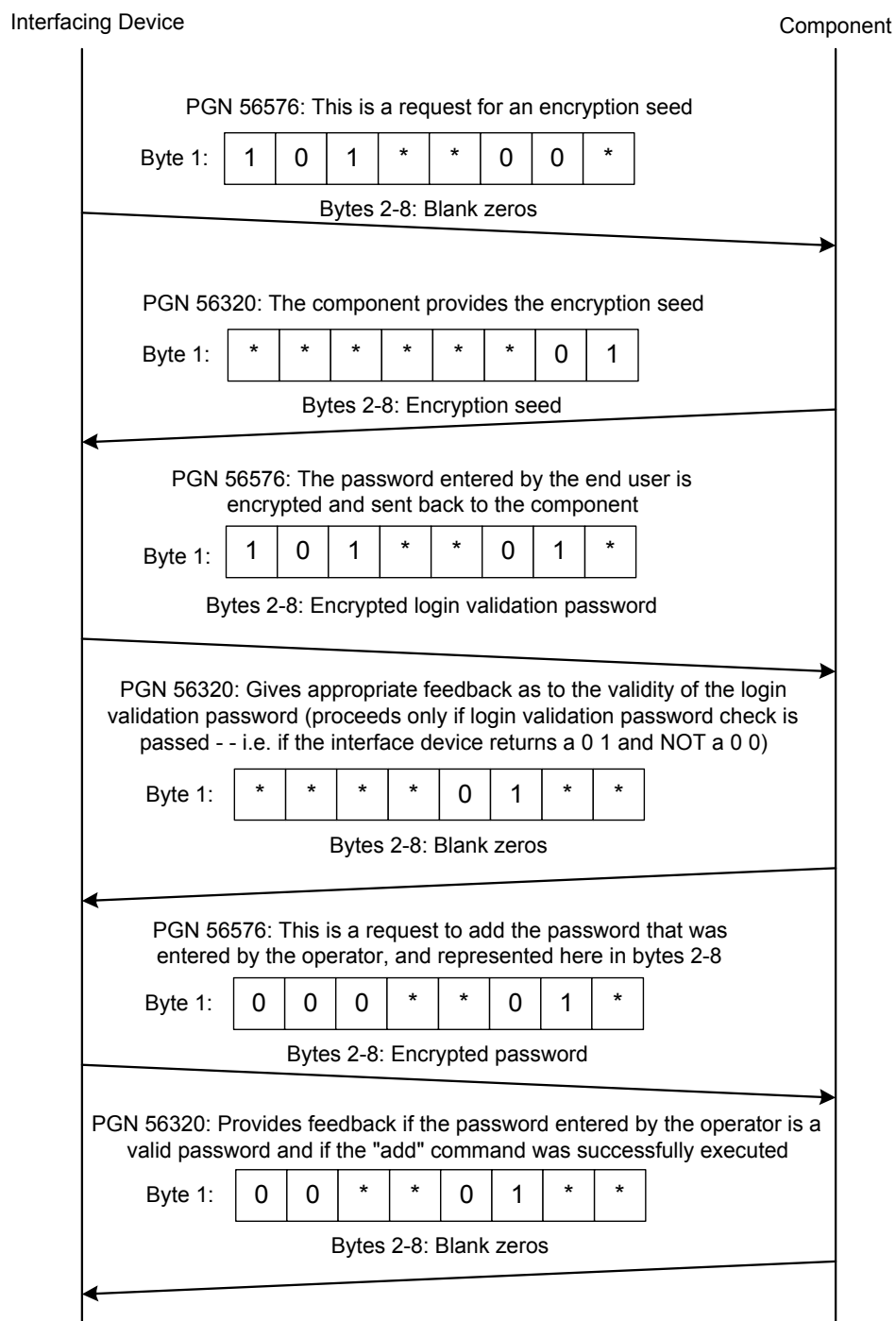
PGN 56320 – Anti-Theft Status

FIGURE PGN56320_A - OPERATOR DESIRES TO ADD A PASSWORD TO THE
COMPONENT'S PASSWORD STRUCTURE

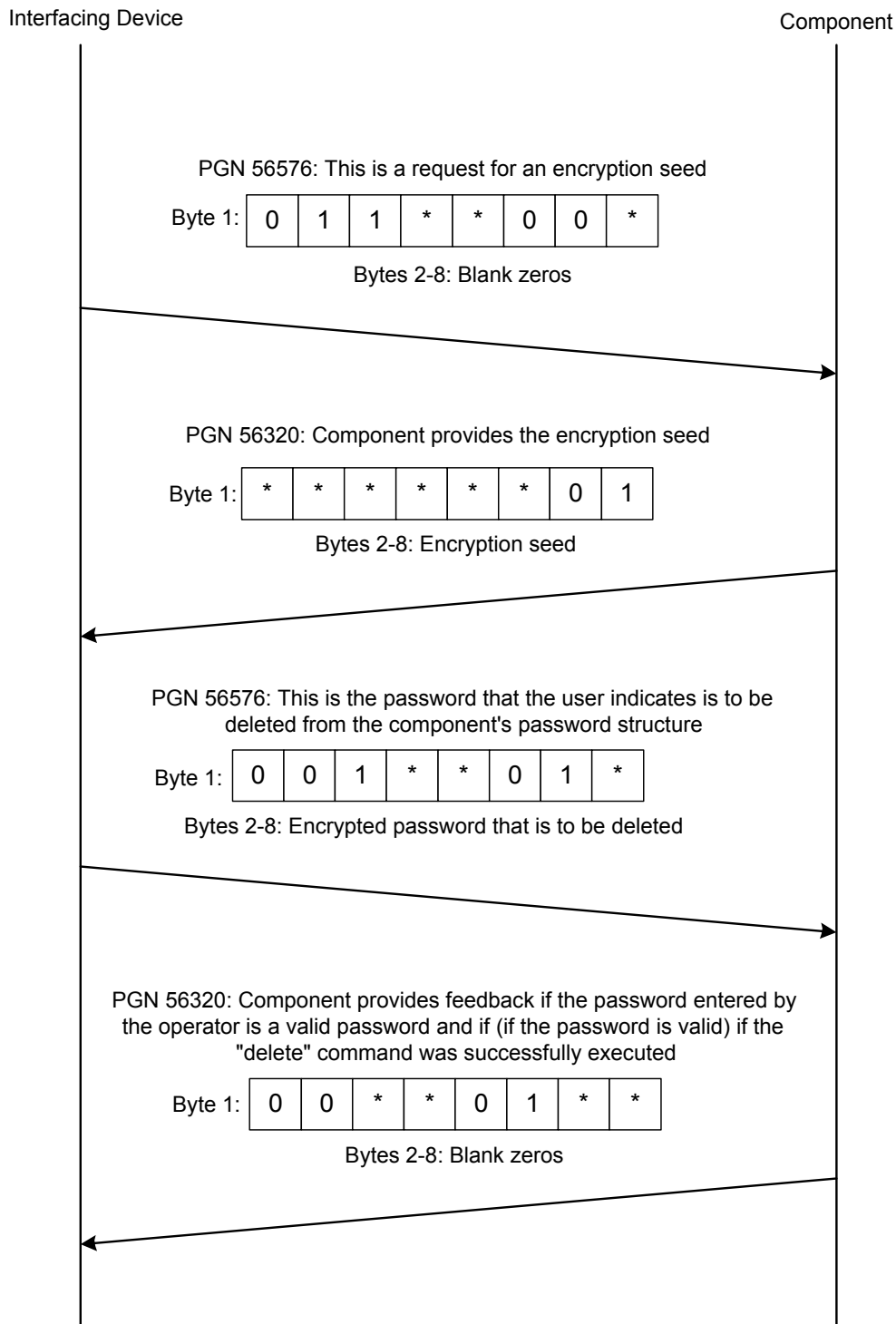


FIGURE PGN56320_B—OPERATOR DESIRES TO DELETE A PASSWORD FROM THE COMPONENT'S PASSWORD STRUCTURE

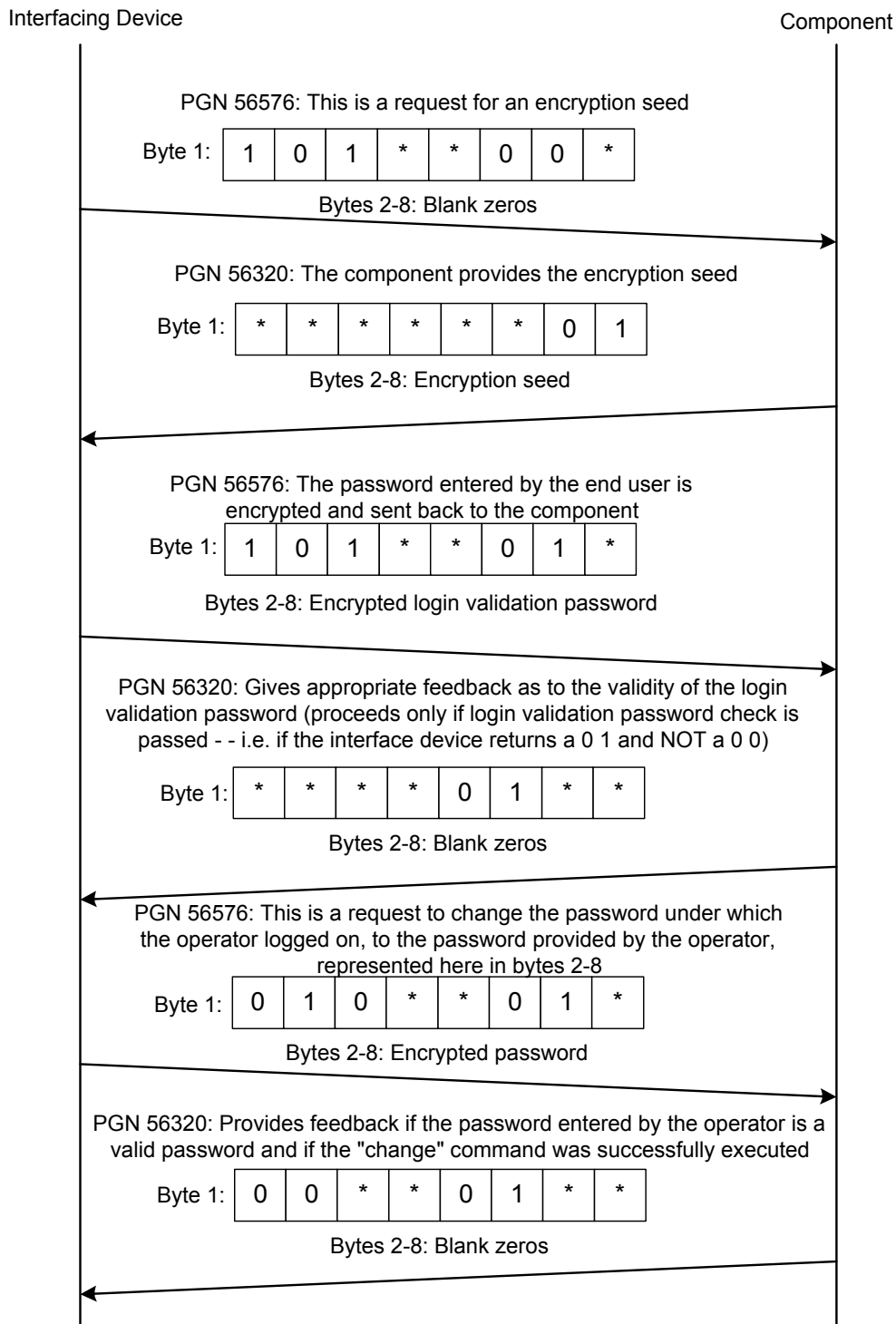


FIGURE PGN56320_C—OPERATOR DESIRES TO CHANGE A PASSWORD WITHIN THE COMPONENT'S PASSWORD STRUCTURE

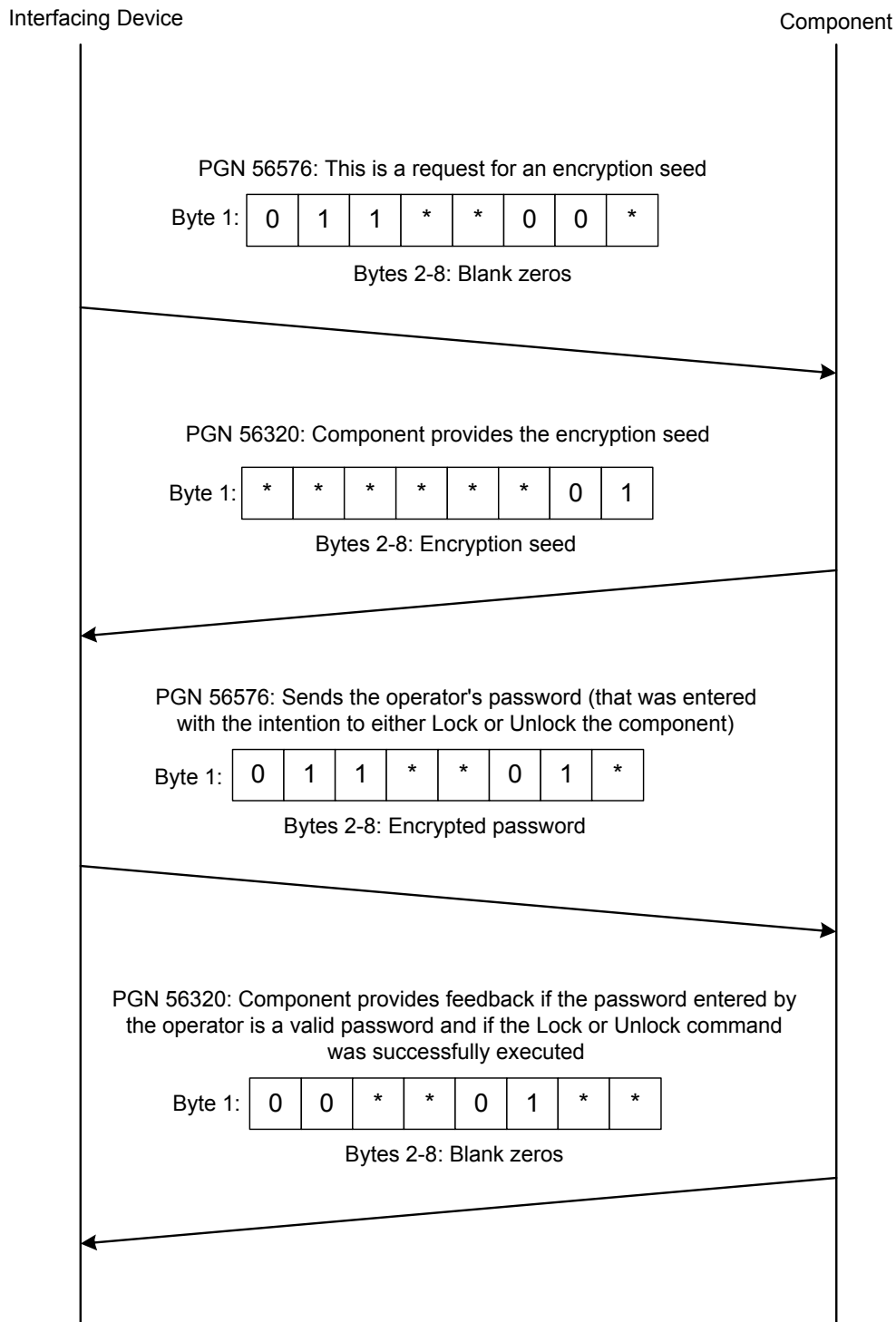


FIGURE PGN56320_D—OPERATOR DESIRES TO LOCK OR UNLOCK THE COMPONENT

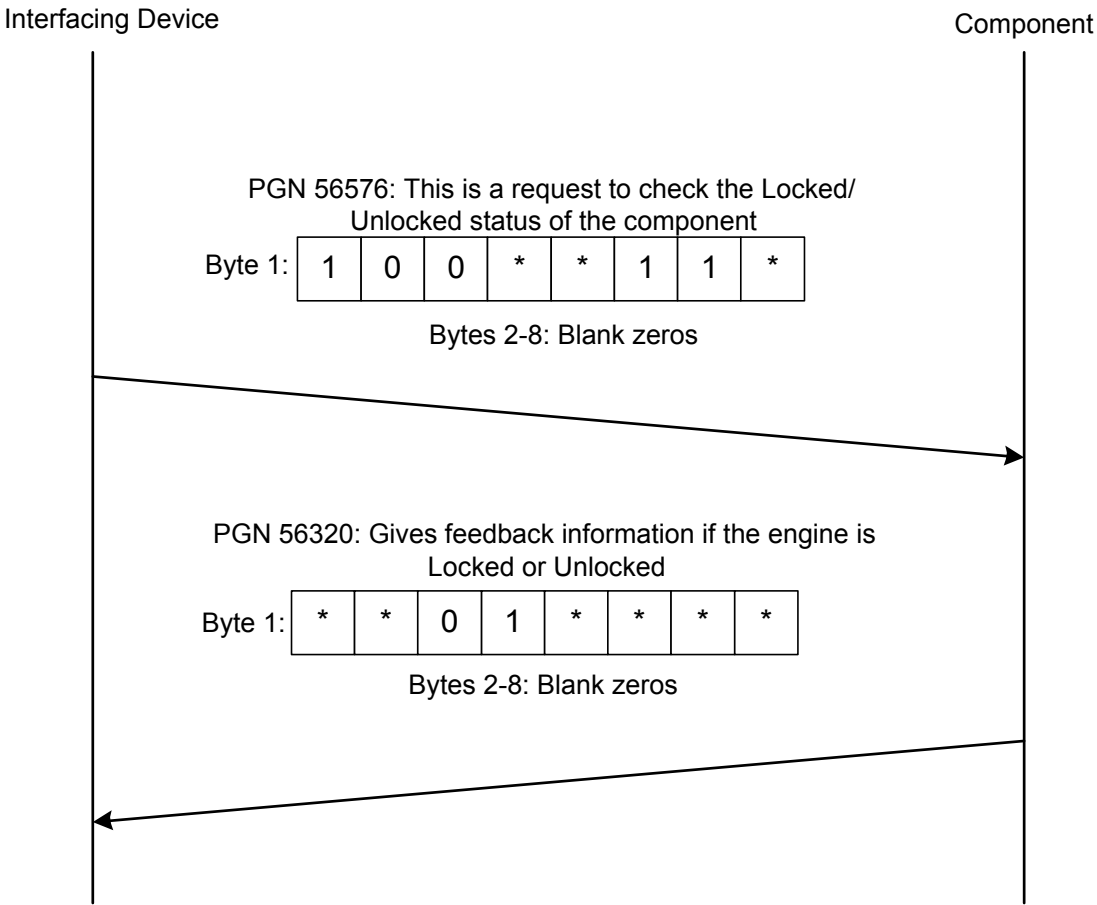


FIGURE PGN56320_E—CHECKING STATUS OF THE COMPONENT

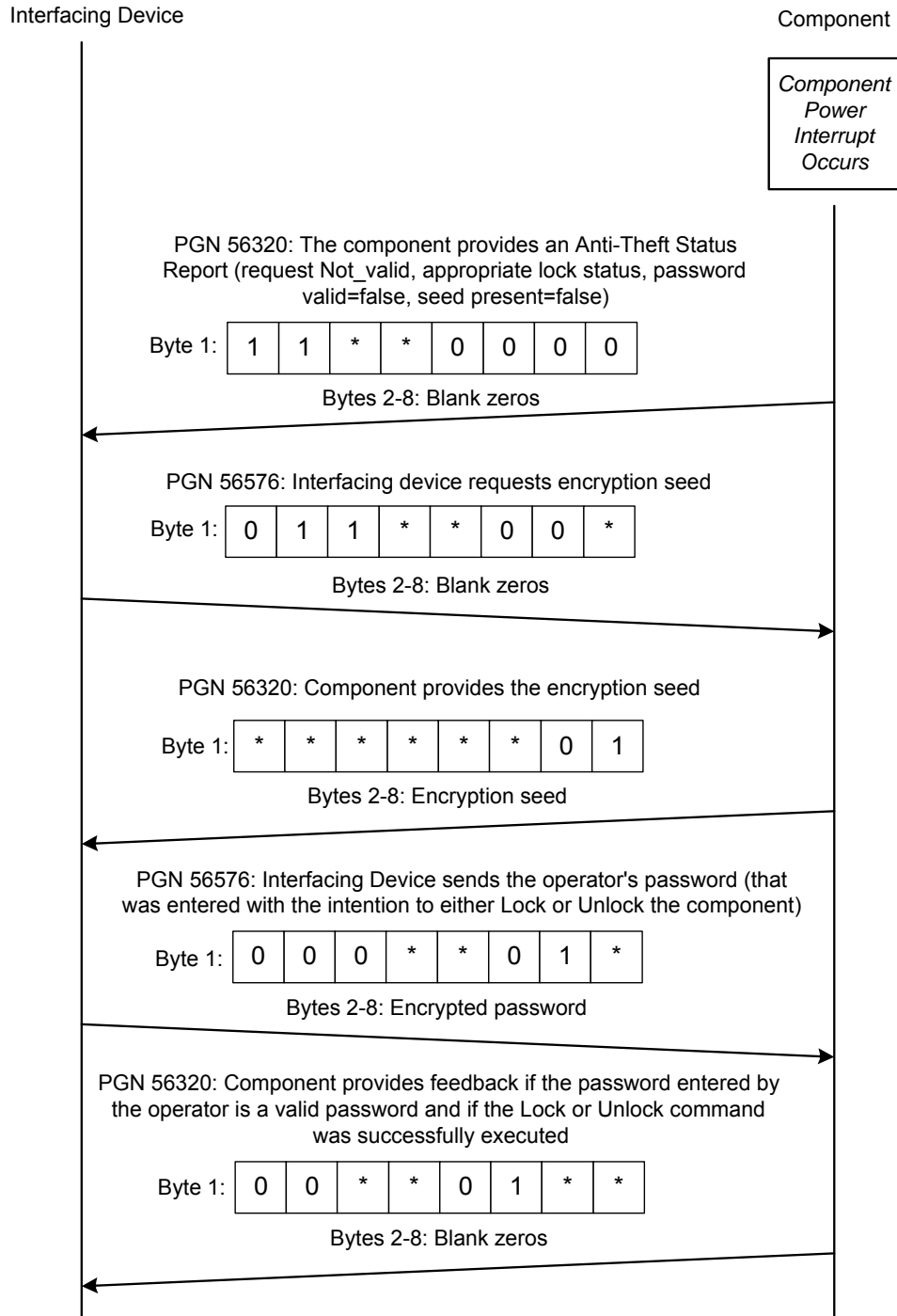


FIGURE PGN56320_F—ABNORMAL COMPONENT POWER INTERRUPTION
(INTERFACING DEVICE POWER IS NOT INTERRUPTED)

PGN 61459 – Slope Sensor Information

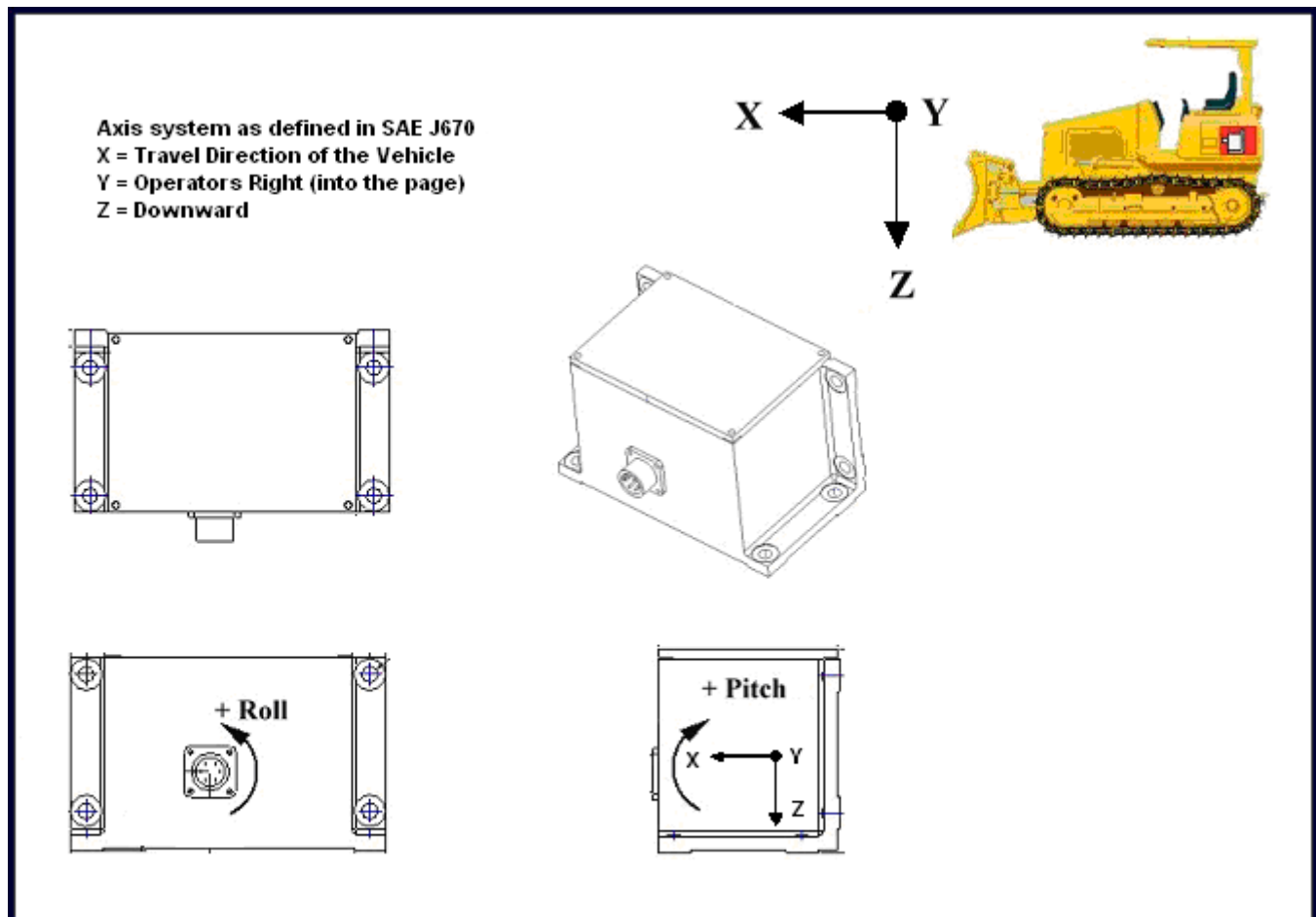


FIGURE PGN61459_A—SLOPE SENSOR ORIENTATIONS

PGN 61466 – Engine Throttle / Fuel Actuator Control Command

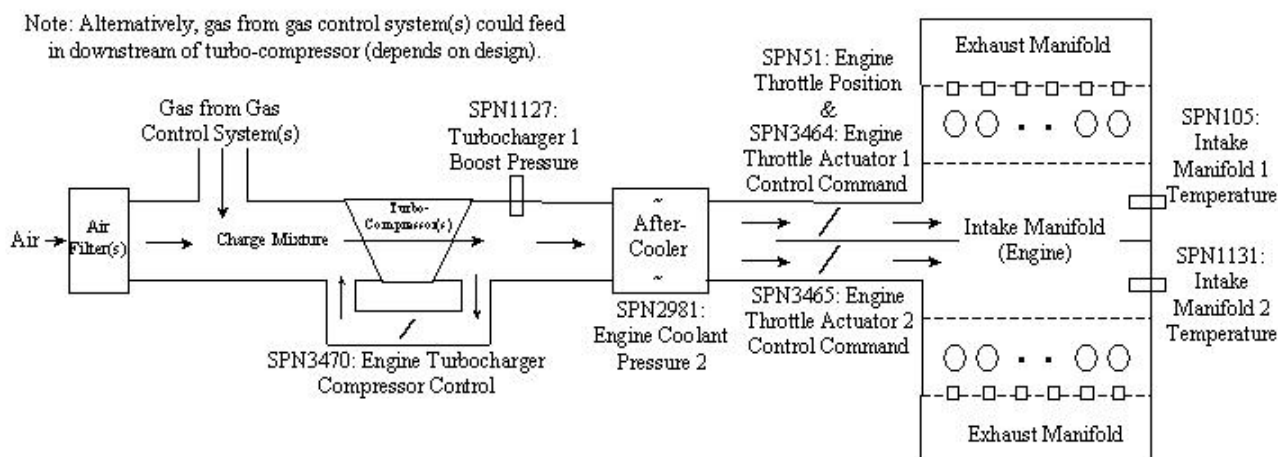
Air Handling Systems

FIGURE PGN61466_A – AIR HANDLING SYSTEMS

(R) **PGN 64719 – NOx Sensor Self-Diagnosis Request**

Some NOx sensors support a self-diagnosis mode. Once this self-diagnosis is initiated, it can take several seconds to execute. During this self-diagnostic period, normal data is not available. See FIGURE PGN64719_A for a typical timing schedule for NOx Sensor. Contact the sensor manufacturer for more details.

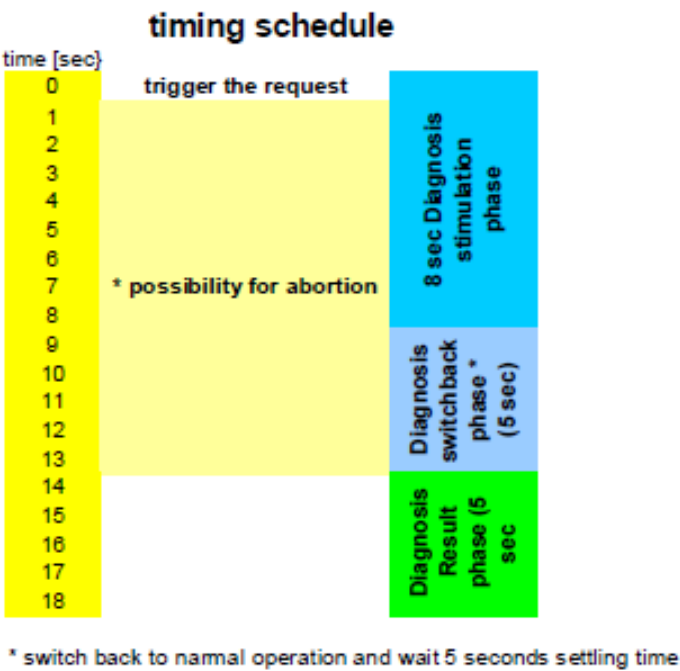
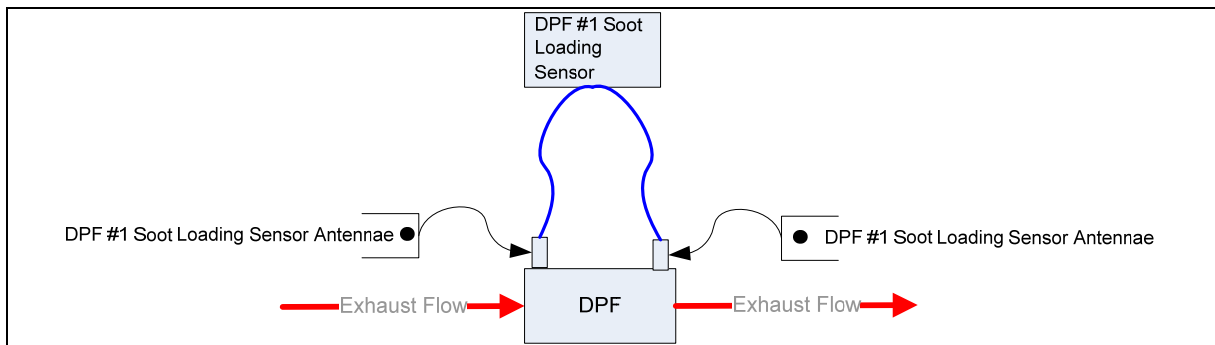
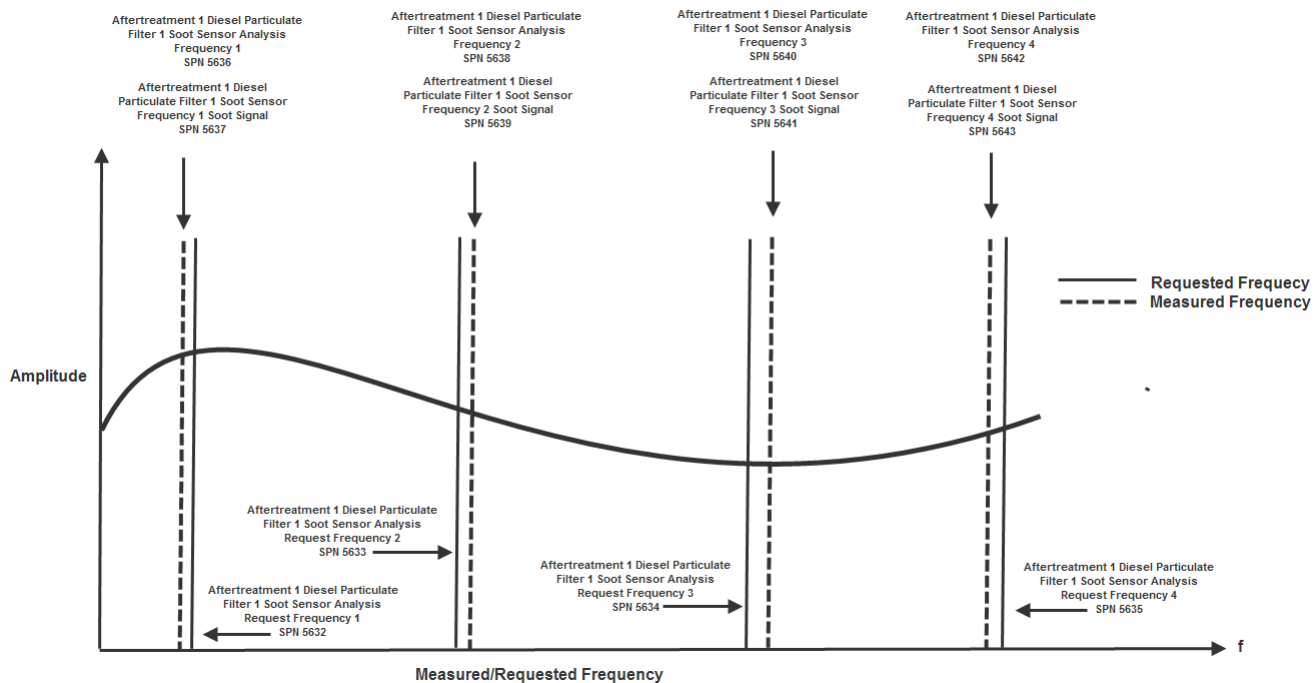
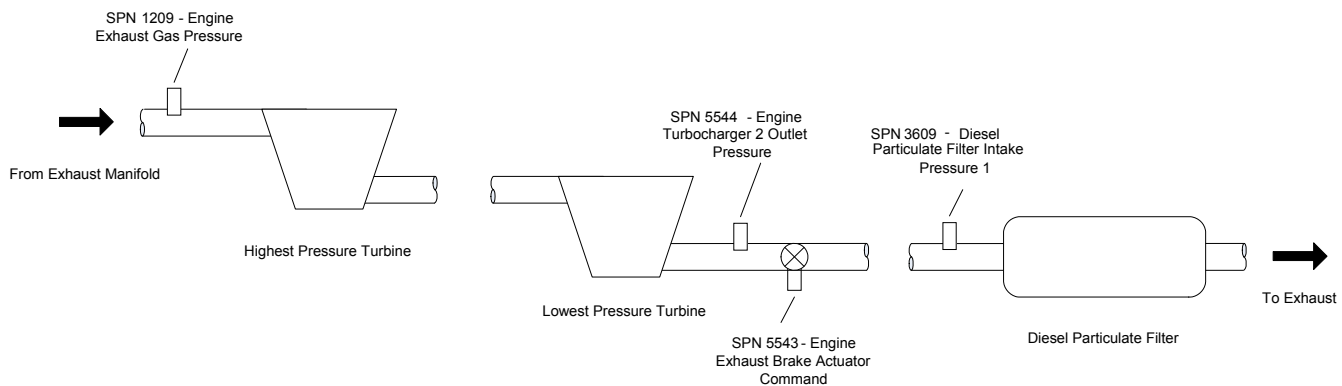


FIGURE PGN64719_A – TIMING SCHEDULE FOR NOx SENSOR SELF-DIAGNOSIS

PGN 64730 – Diesel Particulate Filter Soot Sensor measurement

The DPF Soot Loading Sensor (aka Soot Sensor) consists of a pair of antennae mounted across the DPF filter. The sensor operates by applying a signal on one antenna and measures the attenuation of the signal on the other antenna. The sensor can vary the frequency characteristics of the applied signal, thereby providing the ability to do frequency spectrum analysis of the DPF filter. The requested command and data messages provide the ability for another ECU within the system to request the attenuation measurements for 4 specific frequencies at any point in time.

**FIGURE PGN64730_A – SOOT LOADING SENSOR ANTENNAE LOCATIONS****FIGURE PGN64730_B – SOOT LOADING SENSOR MEASUREMENT LOCATIONS**

PGN 64739 - Engine Exhaust Brake Control**FIGURE 64739_A – ENGINE EXHAUST BRAKE CONTROL SIGNALS**

Data Byte:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Decimal	78	79	82	77	65	76	42	80	76	79	87	42	42	42	42	42	42
ASCII:	'N'	'O'	'R'	'M'	'A'	'L'	*('P'	'L'	'O'	'W'	*(*(*(*(*(*(

PGN 64906 – SAE J2012 DTC Display

Conveys basic SAE J2012 DTC information for on-board or service tool displays.

Data byte arrangement: A B₁ B₂ B₃ B₄ B₅ C₁ B_{1x} B_{2x} B_{3x} B_{4x} B_{5x} C_x . . .

...where:

Data Byte	Definition
A	Number of J2012 DTCs
B _{1x}	1 st Character of J2012 DTC x
B _{2x}	2 nd Character of J2012 DTC x
B _{3x}	3 rd Character of J2012 DTC x
B _{4x}	4 th Character of J2012 DTC x
B _{5x}	5 th Character of J2012 DTC x
C _x	Bit 8: J2012 DTC Status Bits 7-1: J2012 DTC Occurrence Count

If PGN 64906 is requested and a supporting device has no active or inactive J2012 DTCs, PGN 64906 shall be sent as a single frame message with the first data byte (*Number of J2012 DTCs*) set to zero. When two or more J2012 DTCs are indicated, PGN 64906 must be sent via Transport Protocol (See J1939-21).

EXAMPLE – A device conveying (1) an active P1482 with 9 counts and (2) an inactive U0100 with 4 counts would populate the data bytes as follows:

Data Byte:	1	2	3	4	5	6	7	8	9	10	11	12	13
Decimal	2	80	49	52	56	50	137	85	48	49	48	48	4
ASCII:	--	'P'	'1'	'4'	'8'	'2'	--	'U'	'0'	'1'	'0'	'0'	--

PGN 64912 – Advertised Engine Torque Curve

This map conveys the advertised torque curve for the engine, as typically seen on specification sheets available from most engine manufacturers. The collection conditions for the data conveyed are indicated by SPN 3558 – AETC Data Collection Standard.

This map does not contain dynamic elements, and does not change during engine operation. For engines capable of dynamically switching between torque curves or ratings during operation, this map contains values for the highest (most powerful) rating. This map is not intended for use in real time engine control, but merely to indicate what engine rating is installed in the vehicle.

Data points on the curve are in order from left to right, and, at a minimum, must span from the lowest rpm where peak torque can be produced to the high speed governor breakpoint. SPN 3559 – Number of AETC Data Points indicates the number of data points being sent. A minimum of 5 points must be supported, with up to 15 available as needed to properly convey the shape of the torque curve. As illustrated below, speed values need not be evenly incremented.

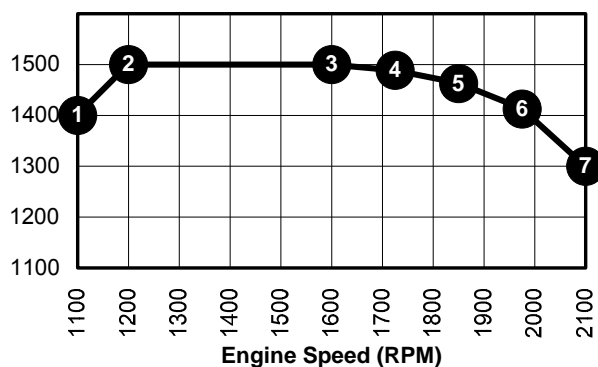


FIGURE PGN64912_A – ADVERTISED ENGINE TORQUE CURVE

PGN 64932 – PTO Drive Engagement

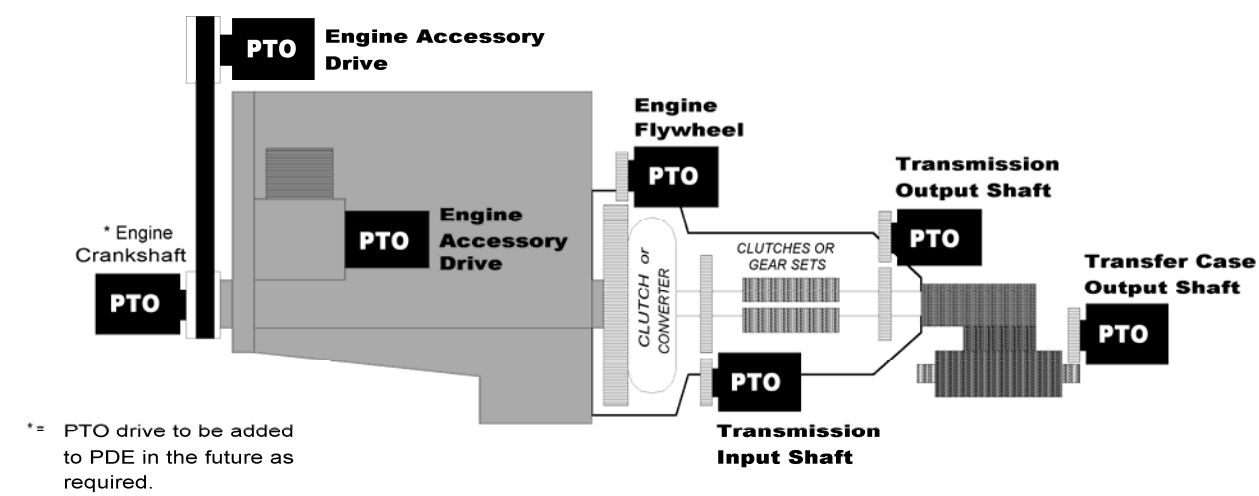


FIGURE PGN64932_A – PTO DRIVE ENGAGEMENT LOCATIONS

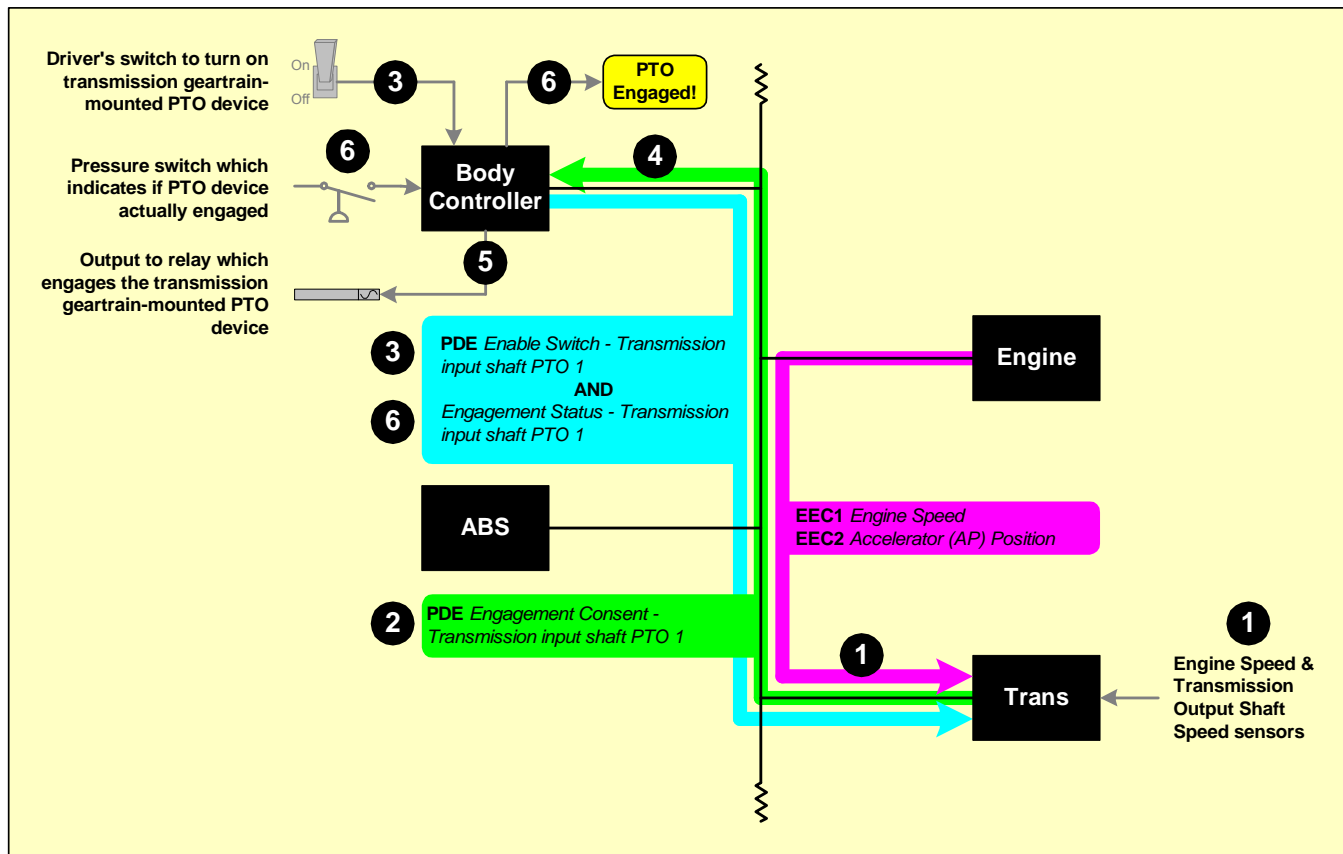


FIGURE PGN64932_B – VEHICLE OEM CONTROLLER INTERFACES WITH ALL PTO WIRING

More ideal from an OEM standpoint, as they no longer need any specialized PTO wiring for different makes of transmissions.

1. The transmission continually monitors the conditions it requires before its PTO drive can be engaged. This may include internal sensors as well as data collected from the network, such as accelerator pedal position.
2. Regardless of whether the operator has requested PTO engagement, the 'engagement consent' status is continually broadcast by the transmission.
3. The operator turns on the cab switch to activate the PTO device mounted on the transmission. The Body Controller reflects this switch status in its PDE message broadcast; the transmission or other devices on the network may choose to use this information in their control logic.
4. Among its conditions and inputs required before engaged the PTO drive, the Body Controller checks the 'consent' status broadcast from the transmission.
5. If conditions are acceptable, the Body Controller power the circuit to engage the PTO mounted on the transmission.
6. The Body Controller monitors the progress of the physical PTO engagement, and reflects this in its PDE broadcast so that other on the network may use the information.
7. The Body Controller continues to monitor the transmissions 'consent' broadcast, and disengages the PTO if at any time the transmission rescinds its consent.

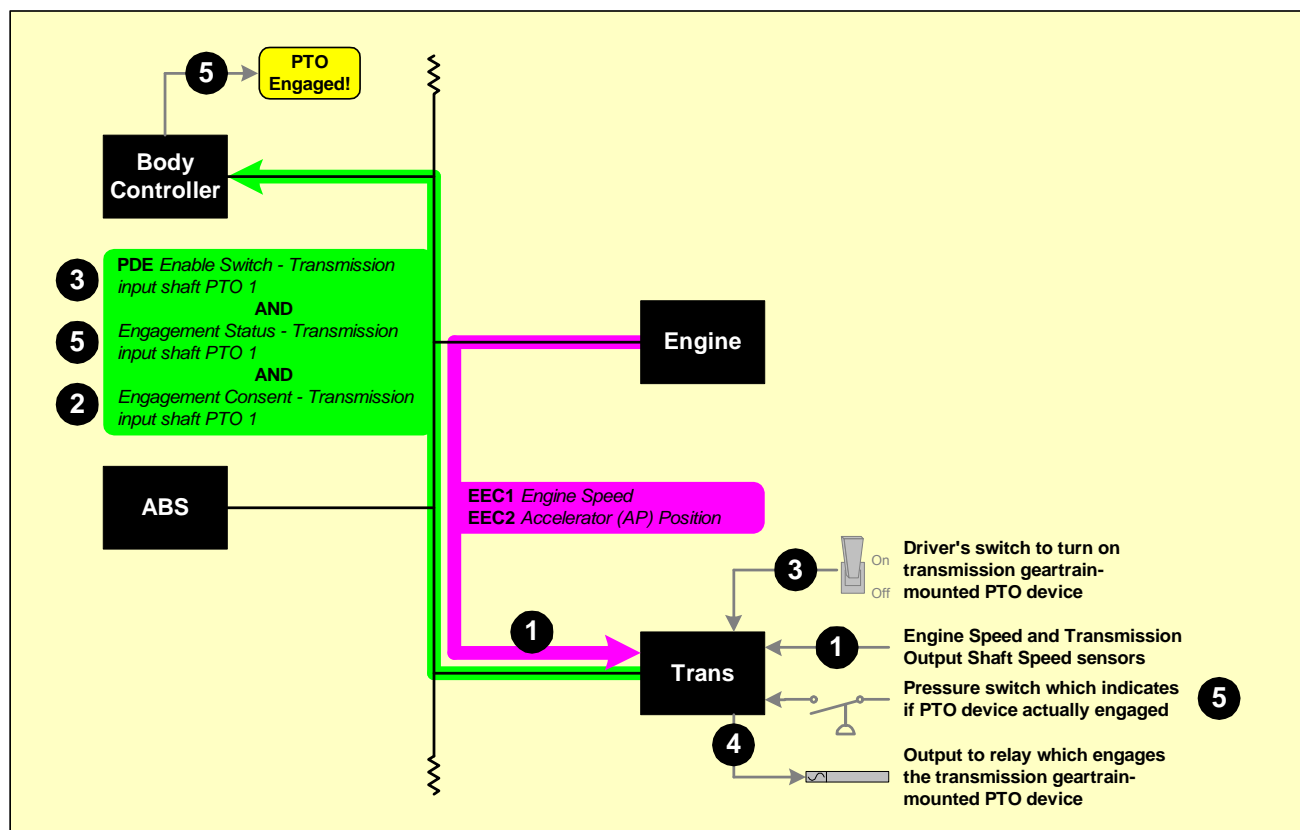


FIGURE PGN64932_C – COMPONENT DRIVING PTO INTERFACES WITH ALL PTO WIRING

This arrangement might be better suited for small OEMs who would rather not deal with figuring out the PTO wiring.

The key point is that the PTO Engagement message structure would adapt to either configuration. Note that the Body Controller broadcasts no new messages; only the transmission sends the PDE message.

1. The transmission continually monitors the conditions it requires before its PTO drive can be engaged. This may include internal sensors as well as data collected from the network, such as accelerator pedal position.
2. Regardless of whether the operator has requested PTO engagement, the 'engagement consent' status is continually broadcast by the transmission.
3. The operator turns on the cab switch to activate the PTO device mounted on the transmission. The Transmission Controller reflects this switch status in its PDE message broadcast; the Body Controller or other devices on the network may choose to use this information in their control logic.
4. If conditions are acceptable, the Transmission Controller power the circuit to engage the PTO mounted on the transmission.
5. The Transmission Controller monitors the progress of the physical PTO engagement, and reflects this in its PDE broadcast so that other on the network may use the information.

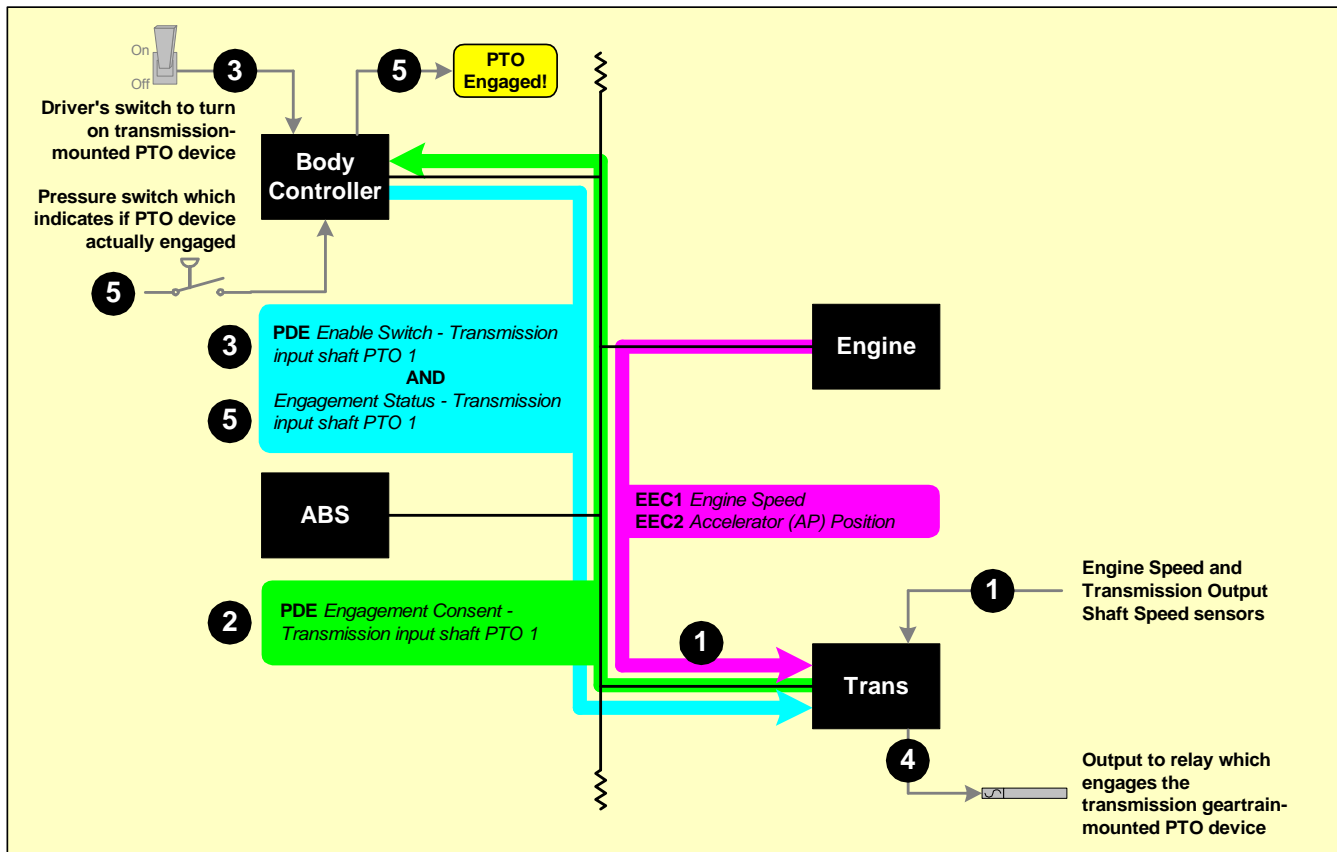


FIGURE PGN64932_D – DISTRIBUTED PTO INTERFACES WIRING

This arrangement is shown to illustrate the flexibility of the PDE messaging.

The various inputs are distributed among two or three controllers that are part of the PTO engagement system.

1. The transmission continually monitors the conditions it requires before its PTO drive can be engaged. This may include internal sensors as well as data collected from the network, such as throttle position.
2. Regardless of whether the operator has requested PTO engagement, the 'engagement consent' status is continually broadcast by the transmission.
3. The operator turns on the cab switch to activate the PTO device mounted on the transmission. The Body Controller reflects this switch status in its PDE message broadcast; the Transmission Controller receives this input.
4. If conditions are acceptable, the Transmission Controller power the circuit to engage the PTO mounted on the transmission.
5. The Body Controller monitors the progress of the physical PTO engagement, and reflects this in its PDE broadcast so that other on the network may use the information.

PGN 64938 – Engine Fluid, Level and Pressure 4

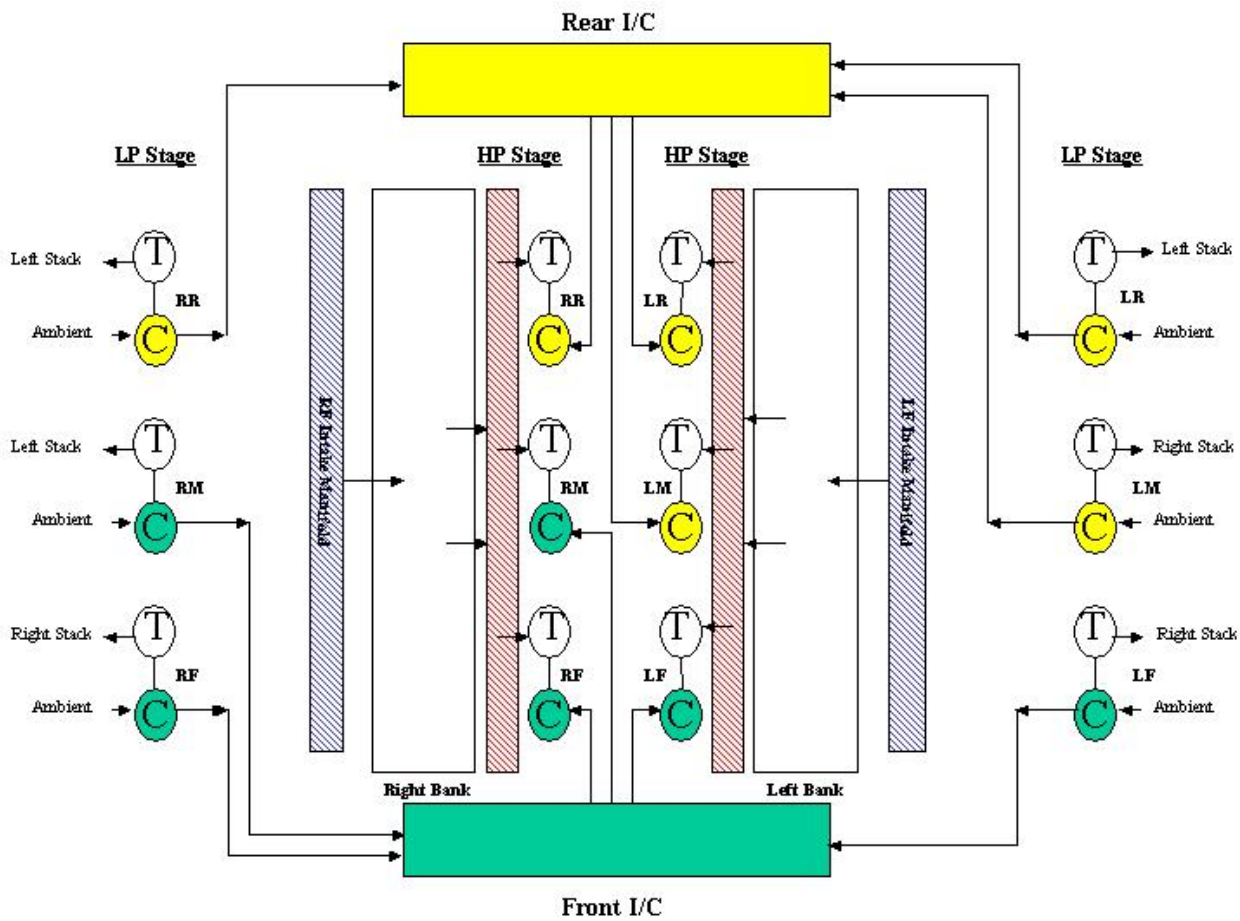


FIGURE PGN64938_A – ENGINE CHARGE AIR COOLER PRESSURES

PGN 64948 – Aftertreatment Systems

The diagram illustrates an aftertreatment configuration that consists of a Warm Up Diesel Oxidation Catalyst, a Diesel Oxidation Catalyst, and a Diesel Particulate Filter. An optional component is displayed within the dashed lines.

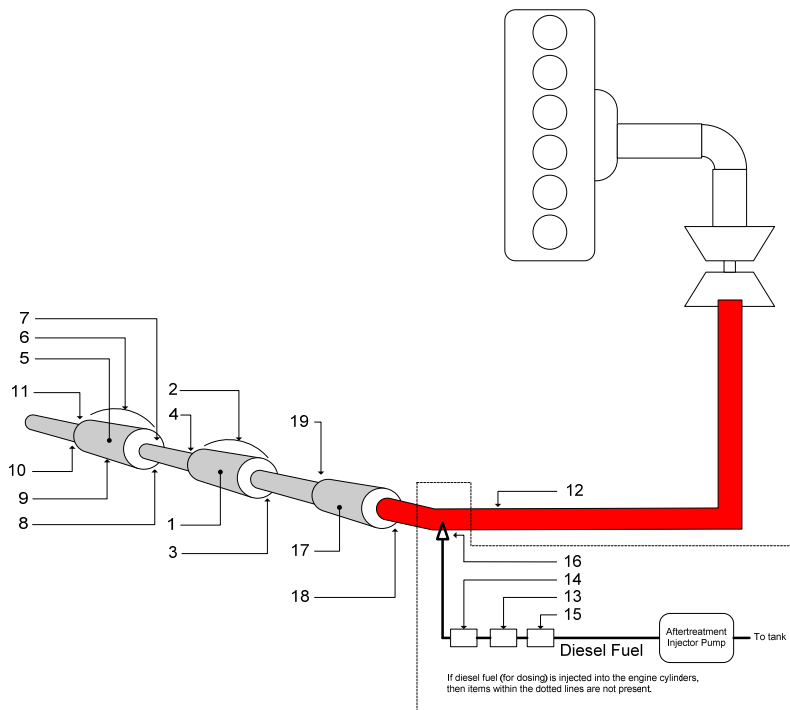
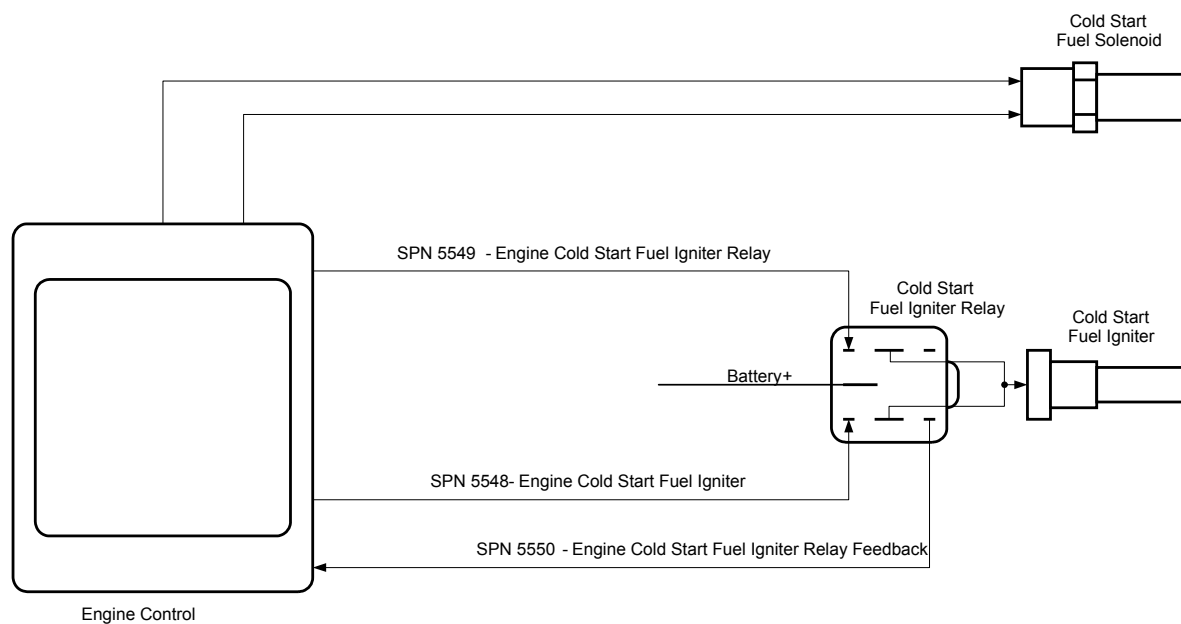
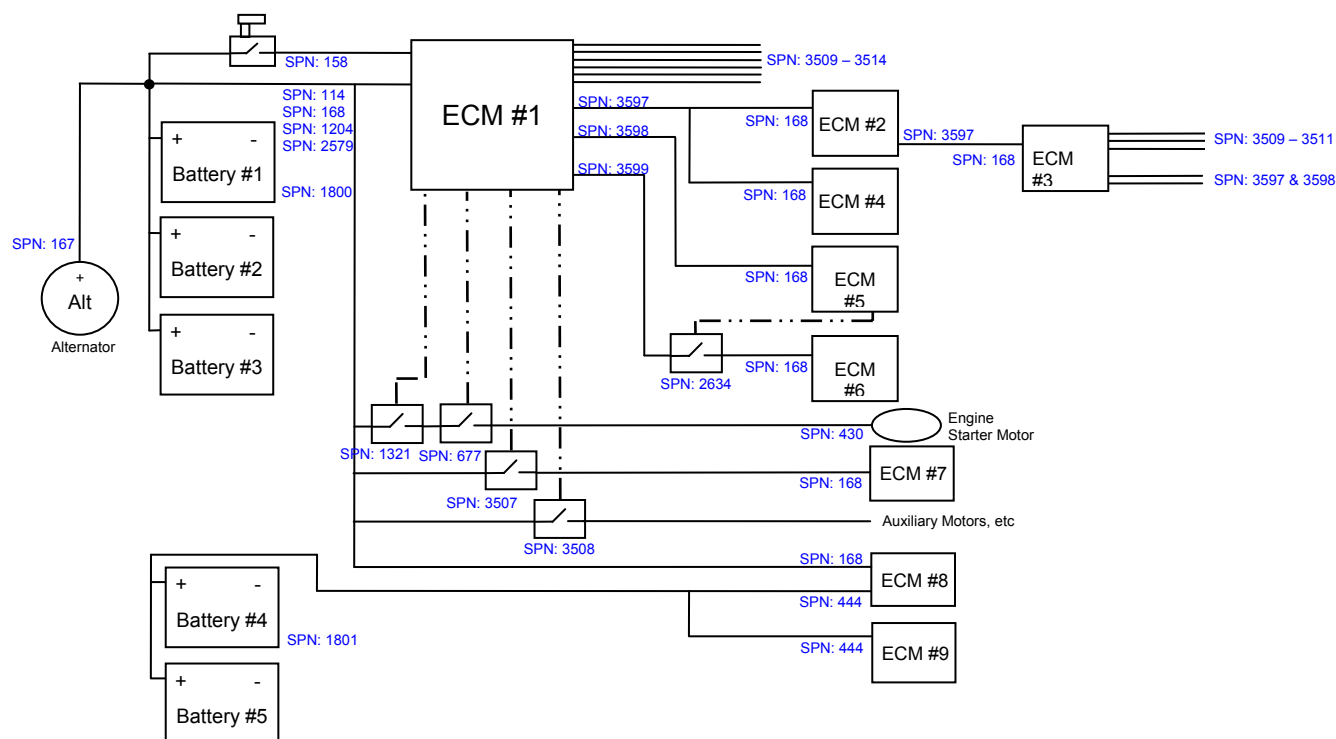


FIGURE PGN64948_A - CONFIGURATION SHOWING WARM UP DIESEL OXIDATION CATALYST, DIESEL OXIDATION CATALYST, AND DIESEL PARTICULATE FILTER

Numerical Identifier in FIGURE PGN64948_A	Parameter Name	Example: J1939 SPN
1	Aftertreatment Diesel Oxidation Catalyst	5018
2	Aftertreatment Diesel Oxidation Catalyst Differential Pressure	4767
3	Aftertreatment Diesel Oxidation Catalyst Intake Temperature	4765
4	Aftertreatment Diesel Oxidation Catalyst Outlet Temperature	4766
5	Aftertreatment Diesel Particulate Filter	3936
6	Aftertreatment Diesel Particulate Filter Differential Pressure	3251
7	Aftertreatment Diesel Particulate Filter Intake Pressure	3609
8	Aftertreatment Diesel Particulate Filter Intake Temperature	3242
9	Aftertreatment Diesel Particulate Filter Intermediate Gas Temperature	3250
10	Aftertreatment Diesel Particulate Filter Outlet Pressure	3610
11	Aftertreatment Diesel Particulate Filter Outlet Temperature	3246
12	Aftertreatment Exhaust Gas Temperature	3241
13	Aftertreatment Fuel Drain Actuator	4097
14	Aftertreatment Fuel Pressure	3480
15	Aftertreatment Fuel Shutoff Valve	3482
16	Aftertreatment Hydrocarbon Doser	3556
17	Aftertreatment Warm Up Diesel Oxidation Catalyst	4791
18	Aftertreatment Warm Up Diesel Oxidation Catalyst Intake Temperature	4809
19	Aftertreatment Warm Up Diesel Oxidation Catalyst Outlet Temperature	4810

PGN 64966 – Cold Start Aids**FIGURE 64966_A – COLD START AID SIGNALS**

PGN 65104 – Battery Information



Note: The ECMs shown in this diagram could represent an ECM, or any intelligent device that is capable of diagnostics.

FIGURE PGN65104_A – BATTERY INFORMATION

SPN	SPN Name	SPN	SPN Name
114	Net Battery Current	2579	Net Battery Current (High Range/Resolution)
115	Alternator Current	2634	Power Relay
158	Keyswitch Battery Potential	3507	TECU ECU PWR Relay
167	Charging System Potential (Voltage)	3508	TECU PWR Relay
168	Battery Potential / Power Input 1	3509	Sensor Supply 1
430	Engine Starter Solenoid Voltage	3510	Sensor Supply 2
444	Battery Potential / Power Input 2	3511	Sensor Supply 3
677	Engine Starter Motor Relay	3512	Sensor Supply 4
1204	Electrical Load	3513	Sensor Supply 5
1321	Engine Starter Solenoid Lockout Relay Driver Circuit	3514	Sensor Supply 6
1795	Alternator Current (High Range/Resolution)	3597	ECU Power Output 1
1800	Battery 1 Temperature	3598	ECU Power Output 2
1801	Battery 2 Temperature		

FIGURE PGN65104_B – BATTERY INFORMATION LEGEND

PGN 65135 – Adaptive Cruise Control

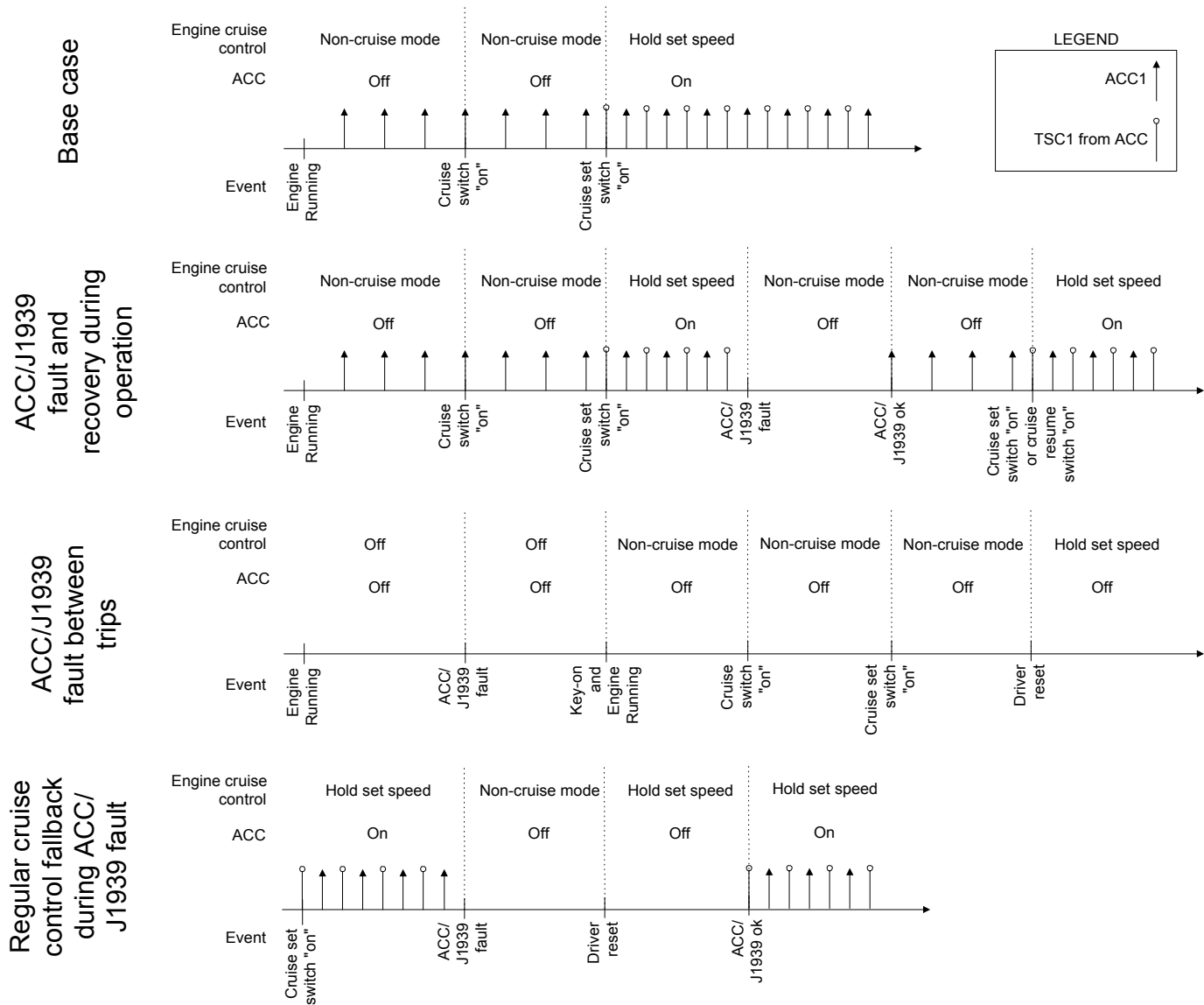


FIGURE PGN65135_A – ADAPTIVE CRUISE CONTROL TIMING DIAGRAM

PGN 65163 – Gaseous Fuel Pressure

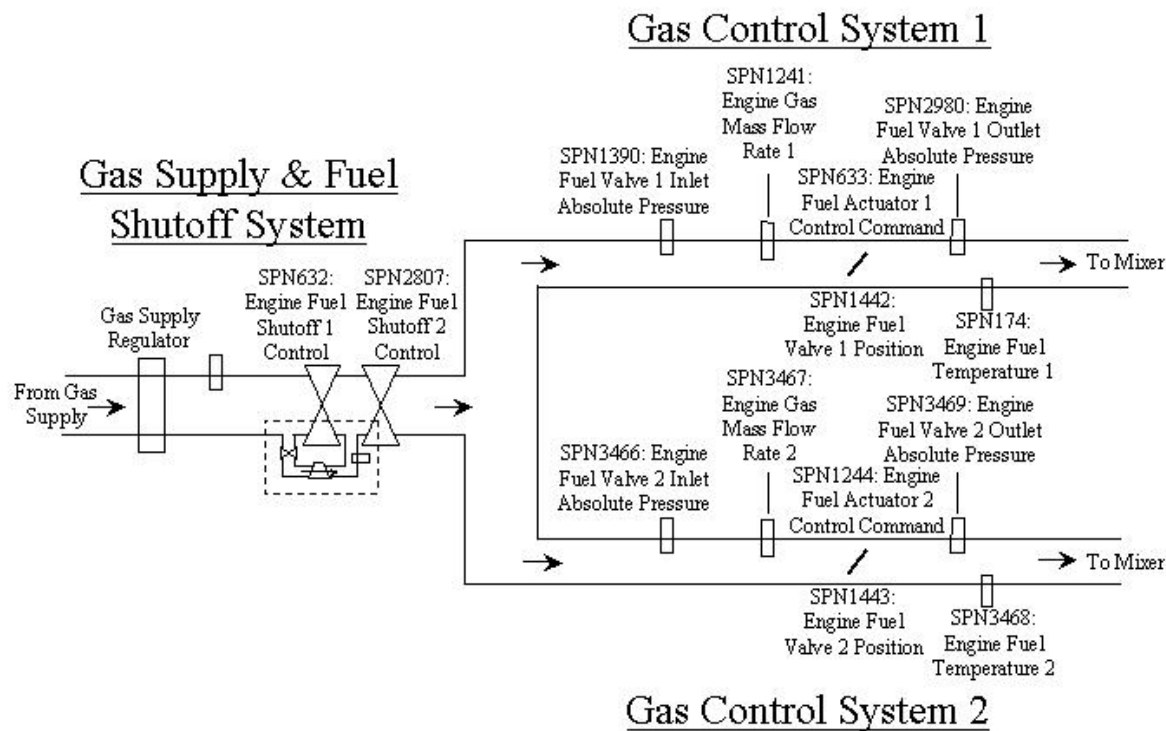
Gas Supply and Control Systems

FIGURE PGN65163_A – GAS SUPPLY AND CONTROL SYSTEMS

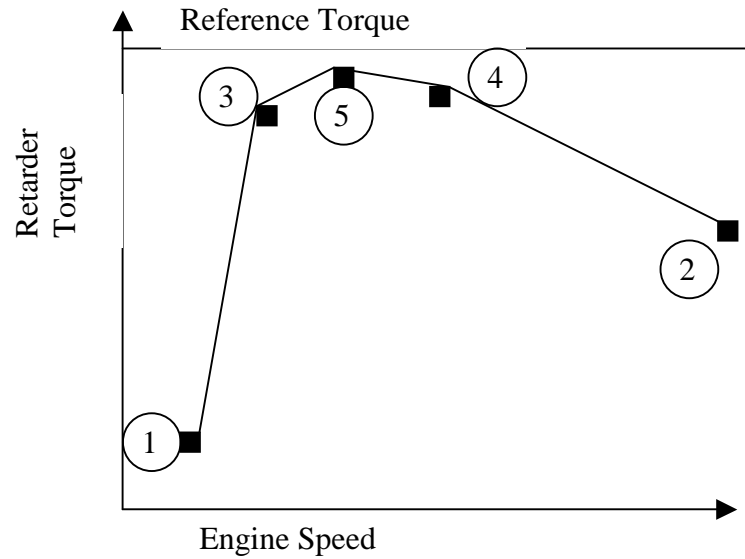
PGN 65249 – Retarder Information

FIGURE PGN65249_A—TYPICAL HYDRAULIC RETARDER TORQUE CURVE

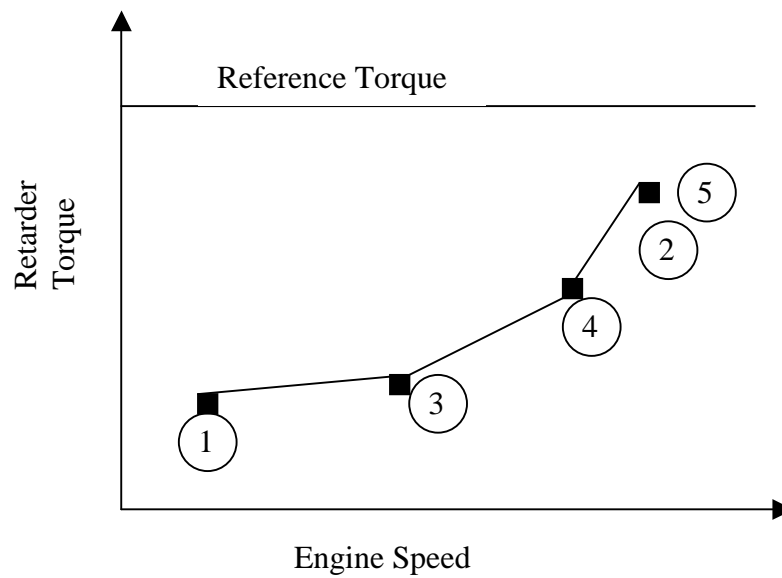


FIGURE PGN65249_B—TYPICAL ENGINE COMPRESSION BRAKE TORQUE CURVE

PGN 65251 – Engine Configuration 1**TABLE PGN65251_A—ENGINE CONFIGURATION CHARACTERISTIC MODES**

Mode	Torque/Speed Point 2	Governor Gain KP	High Idle Speed
1	Available	Not available	Available
2	Not Available	Available	Available
3	Available	Available	Not available

The following points are shown in Figures PGN65251_A, PGN65251_B, and PGN65251_C.

Point 1 (required): Torque/speed point at idle

Point 2 (required): Mode 1 & 3: Torque/speed point at which the high speed governor becomes active

Mode 2: Normal torque/speed point

Point 3,4,5 (required): Torque/speed points between points 1 and 2 to permit linear interpolation over the entire torque range. It is required that one of these points indicate the peak torque point for the current engine torque map.

Point 6 (mode dependent): Mode 1 & 2: High idle speed (torque = 0)

Mode 3: Not available (point is defined by the endspeed governor where torque = 0)

Point 7 (optional): Maximum momentary engine override speed (torque = 0)

Reference engine torque: Engine torque in Nm.

This parameter is the reference value of 100% for all defined indicated engine torque parameters. It is only defined once and doesn't change if a different engine torque map becomes valid.

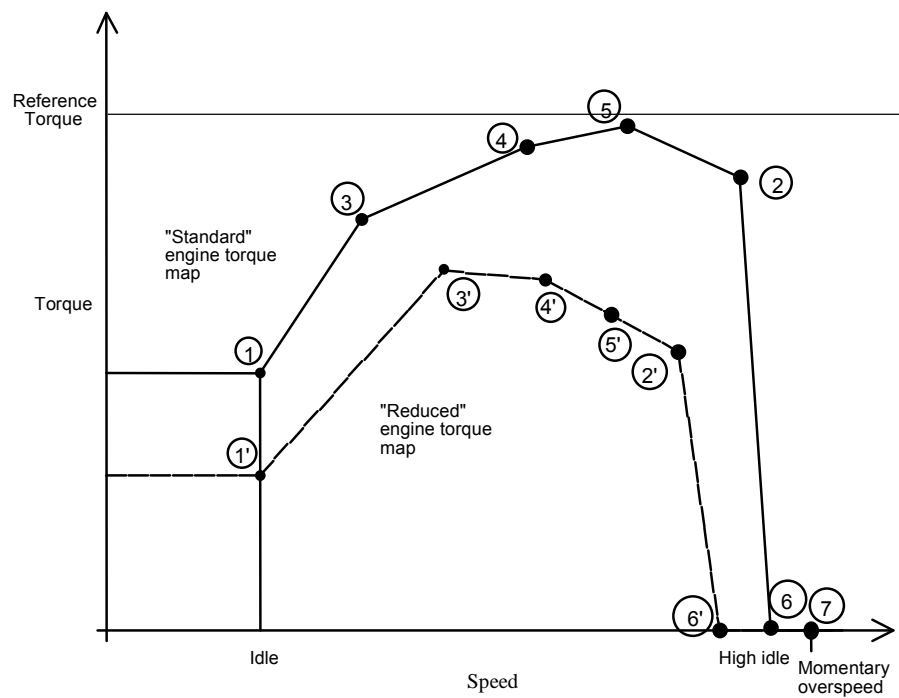


FIGURE PGN65251_A—ENGINE CONFIGURATION MAP-MODE 1

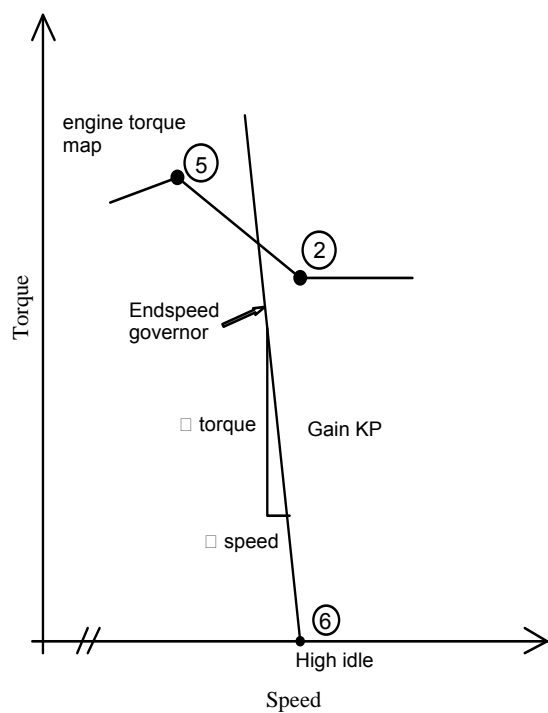


FIGURE PGN65251_B—ENGINE CONFIGURATION MAP-MODE 2

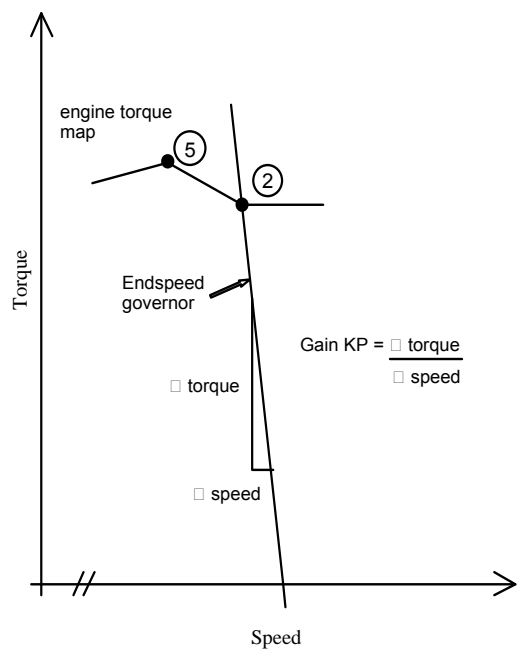


FIGURE PGN65251_C—ENGINE CONFIGURATION MAP-MODE 3

PGN 65254 – Time/Date Broadcast

Decision Tree for Reporting Time and Date and Local Hour Offset

The flow chart shows the correct values to report for the Time and Date (SPNs 959-964) and Local Hour Offset (SPN 1602), depending upon the Time Standard (UTC or Local Time) used for SPNs 959-964 data and support of Local Offset.

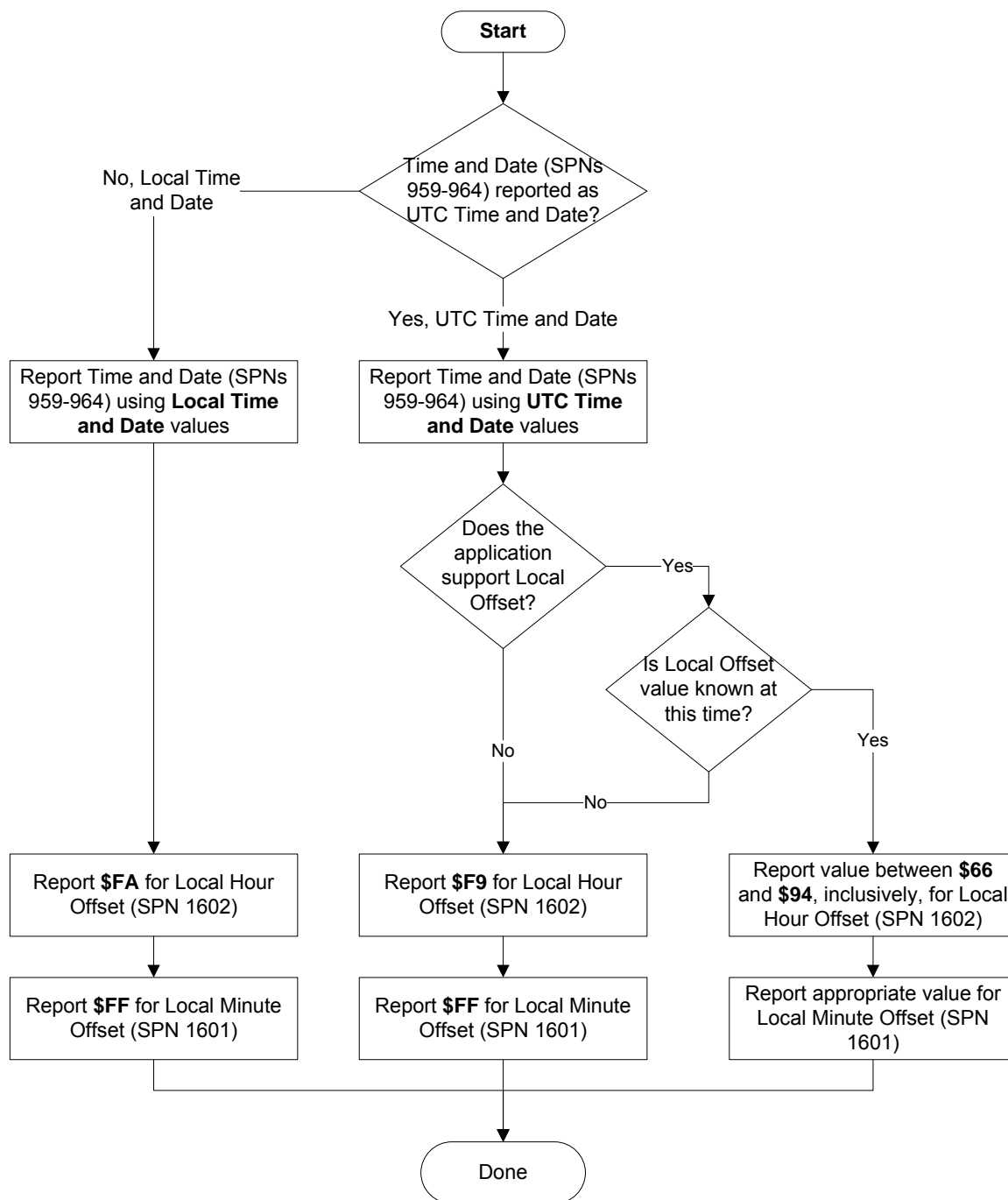


FIGURE 65254_A: FLOW CHART FOR REPORTING TIME AND DATE AND LOCAL HOUR OFFSET

Flow Chart for Interpreting Time and Date and Local Hour Offset

The flow chart shows how to determine the Time Standard (UTC or Local Time) used for SPNs 959-964 data and Local Offset support based upon the value reported for the Local Hour Offset (SPN 1602).

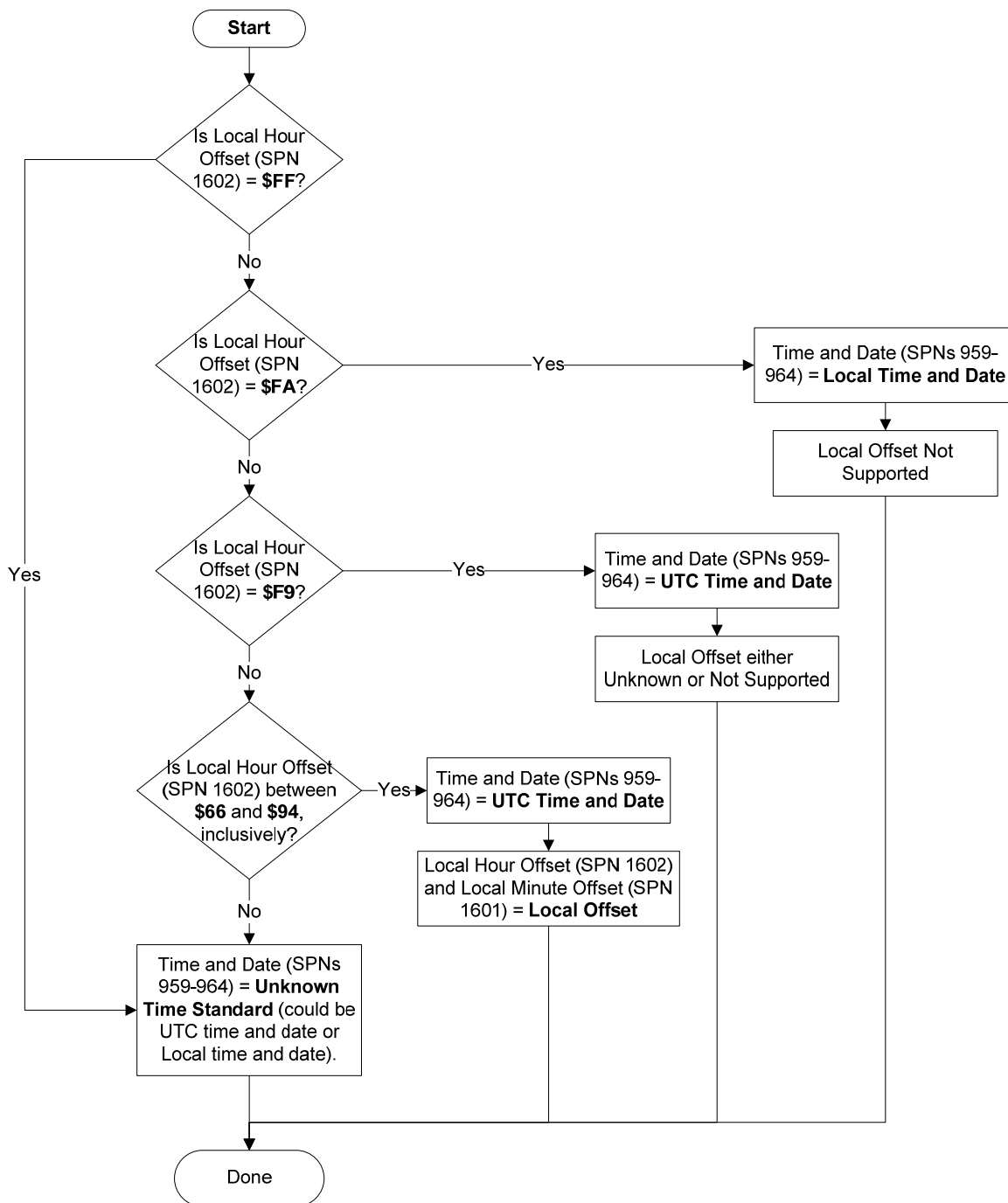


FIGURE 65254_B: FLOW CHART FOR INTERPRETING TIME AND DATE AND LOCAL HOUR OFFSET