

**National Marine Electronics Association**



**NMEA 2000 ®**

## **Appendix B.1 -- Parameter Groups**

### **STANDARD FOR SERIAL-DATA NETWORKING OF MARINE ELECTRONIC DEVICES**

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# ISO Acknowledgment

PGN: 059392

hex: E800

This message is provided by ISO 11783 for a handshake mechanism between transmitting and receiving devices. This message is the possible response to acknowledge the reception of a "normal broadcast" message or the response to a specific command to indicate compliance or failure. The application layer is responsible for determining when this message is desired, outside of network management requirements specified by this standard (e.g. response to ISO Request message). The destination address of this PGN shall always contain a destination specific address.

Note 1: Version 1.000 of the NMEA 2000 Standard required the destination address to be the global address of 255.

Note 2: It is prohibited to request this PGN.

Single Frame: Yes Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Address Query Support: Prohibited Command Support: Prohibited ACK Rqmnts: None

## Field # Field Name

1	Control Byte	Byte Field Size:	Request Parameter	Prohibited				
		Bit Field Size:	8	Command Parameter: Prohibited				
	DD177	ISO 11783 ACK Status	0x00 = Positive Acknowledgment; 0x01 = Negative Acknowledgment; 0x02 = PGN supported but access denied; 0x03 to 0xFF = Reserved					
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
2	Group Function Value	Byte Field Size:	Request Parameter	Prohibited				
		Bit Field Size:	8	Command Parameter:	Prohibited			
	DD178	Group Function Value	Group Function of PGN being acknowledged. This field identifies for a device the specific group function of a PGN being acknowledged or declined. This field is not used if the PGN being acknowledged or declined is not a group function PGN.					
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
3	NMEA Reserved	Byte Field Size:	Request Parameter					
		Bit Field Size:	resv	24	Command Parameter:			
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"					
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.							
4	PGN of Requested Information	Byte Field Size:	Request Parameter	Prohibited				
		Bit Field Size:	24	Command Parameter:	Prohibited			
	DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first					
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields

ISO 11783 defines this message to provide a method for requesting the transmission of a PGN from a network device or devices. As defined by ISO, this message has a data length of 3 bytes with no padding added to complete the single frame. The appropriate response to this message is based on the PGN being requested, and whether the receiver supports the requested PGN.

See section 5.4.3 of 11783-3:2018(E) for the rules governing the response to this PGN.

Single Frame: Yes

Priority Default: 6

Default Update Rate:

milliseconds

Frequency: NA

cycles per second

Destination: Address

Query Support: Optional

Command Support: Optional

ACK Rqmnts: Requested data or 59392 ISO  
Acknowledge with error code.

Field #	Field Name			
1	PGN being requested	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 24	Command Parameter:	Optional
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
			Used to construct bit fields	

# ISO Transport Protocol, Data Transfer

PGN: 060160

hex: EB00

ISO 11783 defines this PGN as part of the transport protocol method used for transmitting messages that have 9 or more data bytes. This PGN represents a single packet of a multipacket message and is used in conjunction with PGN 60416. Once a connection has been established or a broadcast announcement has been made, this message is transmitted using the timing and handshake requirements in section 3.10 of 11783-3 until all the message's packets are transmitted or the transmission is aborted. Although this PGN is addressable, when used with the Broadcast Announce Message (BAM) method, the destination shall be 255.

Single Frame: Yes Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Address Query Support: Optional Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Sequence number of multi-packet frame	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 8	Command Parameter:	Optional
	DD180 Multi-packet frame counter	Valid range 0x01 to 0xFF		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
2	Multi-packet packetized data	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 56	Command Parameter:	Optional
	DD181 Multi-packet packetized data	56 bits organized as seven 8-bit bytes, each of the bytes is transmitted in the same order as it would in a standard (i.e., single frame) message. Unused bytes shall be filled with 0xFF.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	

# ISO Transport Protocol, Connection Management - RTS group function

PGN: 060416

hex: EC00

ISO 11783 defines this group function PGN as part of the transport protocol method used for transmitting messages that have 9 or more data bytes. This PGN's role in the transport process is determined by the group function value found in the first data byte of the PGN. RTS - When the group function is Request To Send (RTS), the PGN is asking a specific node on the network for permission to transmit a larger than 8 byte message to the node. This process is referred to as opening a connection. For a complete description of this PGN's usage and timing requirements see section 3.10 of 11783-3.

Single Frame: Yes Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Address Query Support: Optional Command Support: Optional ACK Rqmnts: Refer to Section 3.10 of ISO 11783-3

## Field # Field Name

1	RTS Group Function Code	Byte Field Size: 8 Bit Field Size: 8	Request Parameter: Optional Command Parameter: Optional
DD179	Group Function, Connection Management	0x10 = Request to Send; 0x11 = Clear to Send; 0x13 = End of Message; 0x20 = Broadcast Announce Message; 0xFF = Abort; 0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
This is the RTS message, set = 0x10			
2	Total message size, bytes	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
Only values in the range of 9 to 1785 are allowed.			
3	Total number of frames to be transmitted	Byte Field Size: 8 Bit Field Size: 8	Request Parameter: Optional Command Parameter: Optional
DD180	Multi-packet frame counter	Valid range 0x01 to 0xFF	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
4	NMEA Reserved	Byte Field Size: 8 Bit Field Size: resv 8	Request Parameter: Optional Command Parameter: Optional
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.			
5	PGN of multi-packet message	Byte Field Size: 24 Bit Field Size: 24	Request Parameter: Optional Command Parameter: Optional
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields

## Field # Field Name

1	CTS Group Function Code	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 8	Command Parameter:	Optional
DD179	Group Function, Connection Management	0x10 = Request to Send; 0x11 = Clear to Send; 0x13 = End of Message; 0x20 = Broadcast Announce Message; 0xFF = Abort; 0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved		
DF52	Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
This is the CTS message, set = 0x11				
2	Number of frames that can be sent	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 8	Command Parameter:	Optional
DD180	Multi-packet frame counter	Valid range 0x01 to 0xFF		
DF52	Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
3	Number of next frame to be transmitted	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 8	Command Parameter:	Optional
DD180	Multi-packet frame counter	Valid range 0x01 to 0xFF		
DF52	Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
4	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 16	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
Used to align subsequent data on a byte boundary.				
5	PGN of multi-packet message	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 24	Command Parameter:	Optional
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first		
DF52	Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields

## Field # Field Name

1	<b>EOM Group Function Code</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	8	<i>Command Parameter:</i>	Optional
	<b>DD179</b> Group Function, Connection Management				0x10 = Request to Send; 0x11 = Clear to Send; 0x13 = End of Message; 0x20 = Broadcast Announce Message; 0xFF = Abort; 0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved		
	<b>DF52</b> Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
	This is the EOM message, set = 0x13						
2	<b>Total message size, bytes</b>			<i>Byte Field Size:</i>	2	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD007</b> Generic numeric ID, medium				Number of route, waypoint, event, mark, etc.		
	<b>DF54</b> Integer, 16 bit unsigned	uint16	<i>Range:</i>	0 to 65,532	<i>Resolution:</i>	1 bit	Unit-less number
	Only values in the range of 9 to 1785 are allowed.						
3	<b>Total number of frames received</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	8	<i>Command Parameter:</i>	Optional
	<b>DD180</b> Multi-packet frame counter				Valid range 0x01 to 0xFF		
	<b>DF52</b> Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
4	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i>	resv 8	<i>Command Parameter:</i>	
	<b>DD001</b> Reserved field				Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b> Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.						
5	<b>PGN of multi-packet message</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	24	<i>Command Parameter:</i>	Optional
	<b>DD009</b> PGN				24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first		
	<b>DF52</b> Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields

## Field # Field Name

1	<b>BAM Group Function Code</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	8	<i>Command Parameter:</i>	Optional
	<b>DD179</b> Group Function, Connection Management				0x10 = Request to Send; 0x11 = Clear to Send; 0x13 = End of Message; 0x20 = Broadcast Announce Message; 0xFF = Abort; 0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved		
	<b>DF52</b> Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
	This is the BAM message, set = 0x20						
2	<b>Total message size, bytes</b>			<i>Byte Field Size:</i>	2	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD007</b> Generic numeric ID, medium				Number of route, waypoint, event, mark, etc.		
	<b>DF54</b> Integer, 16 bit unsigned	uint16	<i>Range:</i>	0 to 65,532	<i>Resolution:</i>	1 bit	Unit-less number
	Maximum value = 1785						
3	<b>Total number of frames to be transmitted</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	8	<i>Command Parameter:</i>	Optional
	<b>DD180</b> Multi-packet frame counter				Valid range 0x01 to 0xFF		
	<b>DF52</b> Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
4	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i>	resv 8	<i>Command Parameter:</i>	
	<b>DD001</b> Reserved field				Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b> Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.						
5	<b>PGN of multi-packet message</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	24	<i>Command Parameter:</i>	Optional
	<b>DD009</b> PGN				24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first		
	<b>DF52</b> Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields



# ISO Transport Protocol, Connection Management - Abort group function

PGN: 060416

hex: EC00

## Field # Field Name

1	Abort Group Function Code	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 8	Command Parameter:	Optional
DD179	Group Function, Connection Management	0x10 = Request to Send; 0x11 = Clear to Send; 0x13 = End of Message; 0x20 = Broadcast Announce Message; 0xFF = Abort; 0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved		
DF52	Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
This is the Abort message, set = 0xFF				
2	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 32	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
Used to align subsequent data on a byte boundary.				
3	PGN of multi-packet message	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 24	Command Parameter:	Optional
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first		
DF52	Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields

## ISO Address Claim

PGN: 060928

hex: EE00

This network management message is used to claim a network address and to respond with device information (NAME) requested by the ISO Request (PGN 059904) or Complex Request Group Function (PGN 126208).

This parameter group is always transmitted with a destination address global.

This PGN contains several fields that are Request Parameters.

These Request Parameters can be used independently or in any combination. A node receiving an ISO Request (PGN 059904) for this PGN shall respond by providing this PGN.

- If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving node shall respond in the following manner:
- If no Request Parameter fields have been specified with the Complex Request, then the response is to return this PGN, just like responding to the ISO Request (PGN 59904) described above.
- If the Complex Request (PGN 126208) specifies one or more Request Parameter fields, then the response shall be filtered by the one or more fields and field values contained within the request.

For example, if the Complex Request for this PGN contained a value for field 2, the Manufacturer's Code, then the device would respond with this PGN, if and only if the device's Manufacturer Code matched the value requested.

If the device's Manufacturer code did not match the value requested, then the response would depend on whether the request was global or addressed.

A global request containing one or more requested field values that do not match requires no response, while an addressed request containing requested field values, in which one or more do not match, requires a response with the Acknowledge Group PGN (126208), containing the appropriate error codes for each of the requested fields, such as "0x3 = Request or command parameter out-of-range", for the fields that did not match.

ISO Requests for Address Claim parameter group are restricted in address mode and request frequency by the Main NMEA 2000 document, section 8.3.2, "Address to NAME Association Tables".

The ISO Address Claim parameter group is not to be used as a heartbeat message.

Single Frame: Yes Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Address Query Support: Required Command Support: Optional ACK Rqmnts: Refer to Section 6.4 of ISO 11783-5

### Field # Field Name

1	Unique Number (ISO Identity Number)	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 21	Command Parameter:	Optional
	DD173 NMEA Unique Number	Binary number assigned by manufacturer to ensure that the NAME field for each manufactured device is unique, reference NMEA Network Management Section 8.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
2	Manufacturer Code	Byte Field Size:	Request Parameter	Required
		Bit Field Size: 11	Command Parameter:	Optional
	DD172 NMEA Manufacturer Code	Assigned by NMEA Committee		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	

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## ISO Address Claim

PGN: 060928

hex: EE00

3	<b>Device Instance Lower (ISO ECU Instance)</b>		Byte Field Size:		Request Parameter	Required
			Bit Field Size:	3	Command Parameter:	Optional
	<b>DD201</b> Generic instance 2 (3-bit)		0x0 to 0x7 = instance 0 to 7			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
The combination of fields 3 & 4 make up the 8 bit NMEA Device Instance. NMEA Device Instance values are not intended to be unique on the network. When NMEA Device Instances are configured, they should be unique within all devices of the same Class & Function code.						
4	<b>Device Instance Upper (ISO Function Instance)</b>		Byte Field Size:		Request Parameter	Required
			Bit Field Size:	5	Command Parameter:	Optional
	<b>DD174</b> Generic instance (5-bit)		0x00 to 0x1F = Instance 0 to 31;			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
The combination of fields 3 & 4 make up the 8 bit NMEA Device Instance. NMEA Device Instance values are not intended to be unique on the network. When NMEA Device Instances are configured, they should be unique within all devices of the same Class & Function code.						
5	<b>Device Function (ISO Function)</b>		Byte Field Size:		Request Parameter	Required
			Bit Field Size:	8	Command Parameter:	Optional
	<b>DD171</b> NMEA Function Code		Dependent on NMEA Device Class DD170, reference NMEA Class & Function Codes, Appendix B6.			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
6	<b>NMEA Reserved</b>		Byte Field Size:		Request Parameter	
			Bit Field Size:	1	Command Parameter:	
	<b>DD175</b> Dominant Bit		Set = 0			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
7	<b>Device Class</b>		Byte Field Size:		Request Parameter	Required
			Bit Field Size:	7	Command Parameter:	Optional
	<b>DD170</b> NMEA Device Class		Dependent on Industry Group DD 168, reference NMEA Class & Function Codes, Appendix B6.			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
8	<b>System Instance (ISO Device Class Instance)</b>		Byte Field Size:		Request Parameter	Required
			Bit Field Size:	4	Command Parameter:	Optional
	<b>DD169</b> Generic instance (4-bit)		0x0 to 0xF = Instance number 0 to 15;			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

## ISO Address Claim

PGN: 060928

hex: EE00

## 9 Industry Group

Byte Field Size:

Bit Field Size: 3

Request Parameter

Required

Command Parameter:

Optional

DD168 Industry Group

0 = Global;  
1 = On-Highway;  
2 = Agricultural and Forestry;  
3 = Construction;  
4 = Marine;  
5 = Industrial - Process  
Control - Stationary (Gen-Sets)  
6 = Reserved for SAE  
7 = Reserved for SAE

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Marine Industry Group, set = 4

## 10 NMEA Reserved (ISO Self Configurable)

Byte Field Size:

Bit Field Size: resv 1

Request Parameter

Optional

Command Parameter:

Optional

DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## ISO Commanded Address

PGN: 065240

hex: FED8

ISO 11783 defined this message to provide a mechanism for assigning a network address to a node. The NAME information in the data portion of the message must match the name information of the node whose network address is to be set. ISO 11783-5 requires this message to be sent using the BAM Transport Protocol method. The appropriate response to this message is defined in section 5.2.3 of 11783-5.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: Refer to Section 6.4 of ISO 11783-5

### Field # Field Name

1	Unique Number (ISO Identity Number)	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 21	Command Parameter:	Optional
DD173	NMEA Unique Number	Binary number assigned by manufacturer to ensure that the NAME field for each manufactured device is unique, reference NMEA Network Management Section 8.		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
2	Manufacturer Code	Byte Field Size:	Request Parameter	Required
		Bit Field Size: 11	Command Parameter:	Optional
DD172	NMEA Manufacturer Code	Assigned by NMEA Committee		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
3	Device Instance Lower (ISO ECU Instance)	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 3	Command Parameter:	Optional
DD201	Generic instance 2 (3-bit)	0x0 to 0x7 = instance 0 to 7		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
4	Device Instance Upper (ISO Function Instance)	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 5	Command Parameter:	Optional
DD174	Generic instance (5-bit)	0x00 to 0x1F = Instance 0 to 31;		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
5	Device Function (ISO Function)	Byte Field Size:	Request Parameter	Required
		Bit Field Size: 8	Command Parameter:	Optional
DD171	NMEA Function Code	Dependent on NMEA Device Class DD170, reference NMEA Class & Function Codes, Appendix B6.		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
6	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: 1	Command Parameter:	
DD175	Dominant Bit	Set = 0		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
7	Device Class	Byte Field Size:	Request Parameter	Required
		Bit Field Size: 7	Command Parameter:	Optional
DD170	NMEA Device Class	Dependent on Industry Group DD 168, reference NMEA Class & Function Codes, Appendix B6.		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	

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## ISO Commanded Address

PGN: 065240

hex: FED8

8	System Instance (ISO Device Class Instance)		Byte Field Size:		Request Parameter		Optional
			Bit Field Size: 4		Command Parameter:		Optional
	DD169	Generic instance (4-bit)	0x0 to 0xF = Instance number 0 to 15;				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
9	Industry Group		Byte Field Size:		Request Parameter		Required
			Bit Field Size: 3		Command Parameter:		Optional
	DD168	Industry Group	0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserved for SAE 7 = Reserved for SAE				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
	Marine Group, set = 4						
10	Reserved (ISO Self Configurable)		Byte Field Size:		Request Parameter		Optional
			Bit Field Size: resv 1		Command Parameter:		Optional
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
11	New Source Address		Byte Field Size:		Request Parameter		Optional
			Bit Field Size: 8		Command Parameter:		Optional
	DD176	Network Address	0x00 to 0xFB (0 to 251) = Claimable NMEA network address space; 0xFC (252) = Reserved; 0xFD (253) = Reserved; 0xFE (254) = Null address; 0xFF (255) = Global address				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
	Only values less than 252 shall be used.						

## NMEA - Request group function

PGN: 126208

hex: 1ED00

The Request / Command / Acknowledge Group type of function is defined by first field. The message will be a Request, Command, or Acknowledge Group Function.

The Request Group Function is defined as follows: This message requests the transmission of a specific set of data in a Parameter Group by setting variable parameters within the Parameter Group specified by the field number. Field number and parameter value may appear in any order in this message.

When multiple fields and parameters are specified the request is treated as an "AND" function. This PGN may be used to set the transmission interval and the delay before the first transmission. NMEA encourages manufacturers to provide the capability of altering the values of transmission time for NMEA certified products on the network. When the values of transmission time or delay before the first transmission are altered, they should be maintained after power cycling.

All parameter value fields of this request must be padded if necessary to ensure byte boundaries are adhered to. Note 1: Acknowledge Requirements - Requested data as scheduled or Acknowledge Group Function with acknowledgement error codes.

Single Frame: No Priority Default: 3 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Address Query Support: Required Command Support: Optional ACK Rqmnts: Note 1

### Field # Field Name

1	Request Group Function Code	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Required
DD144	Group Function, Request/Command/Acknowledge	0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields Message, 4 = Read Fields Reply Message, 5 = Write Fields Message, 6 = Write Fields Reply Message	
DF53	Integer, 8 bit unsigned This is the Request message, set = 0x00.	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
2	Requested PGN	Byte Field Size: Bit Field Size: 24	Request Parameter: Required Command Parameter: Required
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	Transmission interval	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD035	Data transmit interval	Time interval between data transmissions Where: 0x0000 0000 = Turn-off transmission, 0xFFFF FFFE = Restore Default Interval 0xFFFF FFFF = Do not change interval	
DF65	Time interval, standard 0xFFFF FFFF in this field and 0xFFFF in field 4: Transmit now without changing timing variables.	uint32 Range: 0 to ~4.295x10E+6 s Resolution: 1x10E-3 s	
4	Transmission interval offset	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD036	Data transmit offset	Offset in transmit time from time of request command: 0x0 = transmit immediately 0xFFFF = Do not change offset.	
DF66	Time interval, .01sec 0xFFFF in this field and 0xFFFF FFFF in field 3: Transmit now without changing timing variables.	uint16 Range: 0 to 655.32s Resolution: 1x10E-2sec	

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## NMEA - Request group function

**PGN: 126208**  
**hex: 1ED00**

5	Number of Pairs of Request Parameters to follow			Byte Field Size: 1	Request Parameter	Optional
				Bit Field Size:	Command Parameter:	Optional
	DD006	Generic counter, short		Numeric count, event counter, sequence counter		
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
6	Field number of first requested parameter			Byte Field Size: 1	Request Parameter	Optional
				Bit Field Size:	Command Parameter:	Optional
	DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
7	Value of first requested parameter			Byte Field Size: ?	Request Parameter	Optional
				Bit Field Size: n	Command Parameter:	Optional
	DD000	Undefined				
	DF00	Undefined	Undefined	Range: undefined	Resolution: undefined	Application specific, defined at time of use.
Requested parameter size and type is dependent on the PGN and the specific request parameter field.						
8	Variable Number of fields, Field number 6 repeated			Byte Field Size: 1	Request Parameter	Optional
				Bit Field Size:	Command Parameter:	Optional
	DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
9	Variable Number of fields, Field number 7 repeated			Byte Field Size: ?	Request Parameter	Optional
				Bit Field Size: n	Command Parameter:	Optional
	DD000	Undefined				
	DF00	Undefined	Undefined	Range: undefined	Resolution: undefined	Application specific, defined at time of use.
Requested parameter size and type is dependent on the PGN and the specific request parameter field.						



# NMEA - Command group function

PGN: 126208

hex: 1ED00

Field # Field Name

1	Command Group Function Code	Byte Field Size: 1	Request Parameter: Required
		Bit Field Size:	Command Parameter: Required
DD144	Group Function, Request/Command/Acknowledge	0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields Message, 4 = Read Fields Reply Message, 5 = Write Fields Message, 6 = Write Fields Reply Message	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
This is the Command message, set = 0x01.			
2	Commanded PGN	Byte Field Size:	Request Parameter: Required
		Bit Field Size: 24	Command Parameter: Required
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
3	Priority Setting	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 4	Command Parameter: Optional
DD182	Priority, Set	0x0 to 0x7 = commanded priority value; 0x8 = do not change priority; 0x9 = return priority to default; 0xA to 0xF = reserved	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
4	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 4	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
Used to align subsequent data on a byte boundary.			
5	Number of Pairs of Commanded Parameters to follow	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
6	Field number of first commanded parameter	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
7	Value of first command parameter	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined	Range: undefined Resolution: undefined Application specific, defined at time of use.
Commanded parameter size and type is dependent on the PGN and the specific command parameter field.			

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

NMEA - Command group function

PGN: 126208  
hex: 1ED00

8	Variable Number of fields, Field number 6 repeated		Byte Field Size:	1	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.			
9	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
	Variable Number of fields, Field number 7 repeated		Byte Field Size:	?	Request Parameter	Optional
			Bit Field Size:	n	Command Parameter:	Optional
	DD000	Undefined				
	DF00	Undefined	Undefined	Range: undefined	Resolution: undefined	Application specific, defined at time of use.
	Commanded parameter size and type is dependent on the PGN and the specific command parameter field.					

# NMEA - Acknowledge group function

PGN: 126208  
hex: 1ED00

## Field # Field Name

1	Acknowledgment Group Function Code	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Required
DD144	Group Function, Request/Command/Acknowledge	0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields Message, 4 = Read Fields Reply Message, 5 = Write Fields Message, 6 = Write Fields Reply Message	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This is the Acknowledgement message, set = 0x02.			
2	Requested or Commanded PGN # being acknowledged	Byte Field Size: Bit Field Size: 24	Request Parameter: Required Command Parameter: Required
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	PGN error code	Byte Field Size: Bit Field Size: 4	Request Parameter: Optional Command Parameter: Optional
DD037	Error codes, Acknowledgement	0x0 = No Error/Acknowledge, 0x1 = PGN not supported, 0x2 = PGN temporarily not available, 0x3 = Access denied, 0x4 = Request or Command is not supported, 0x5 = Definer Tag is not supported, 0x6 = Read or Write is not supported	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
4	Transmission Interval / Priority error code	Byte Field Size: Bit Field Size: 4	Request Parameter: Optional Command Parameter: Optional
DD139	Error codesTransmit interval acknowledgement	0x0 = No Error/Acknowledge, 0x1 = Transmit Interval /Priority not supported, 0x2 = Transmit interval is less than measurement/calculation interval, 0x3 = Access denied. 0x4 = Request is not supported.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
For read or write, group function acknowledgement, this field shall be set to 0x0.			
5	Number of Requested or Commanded Parameters	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
If Field 3 is 0x4 or you are replying to a read or write group function, this field shall be set to 0xFF. Value 0xFF indicates no fields follow.			

## NMEA - Acknowledge group function

**PGN: 126208**  
**hex: 1ED00**

<b>6</b>	<b>First parameter error code</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i> <b>4</b>	<i>Command Parameter:</i>	Optional
<b>DD141</b>	Error Codes Command Acknowledgement	0x0 = No Error/Acknowledge; 0x1 = Invalid request or command parameter field; 0x2 = Temporarily unable to comply; 0x3 = Request or command parameter out-of-range; 0x4 = Access denied; 0x5 = Request or Command is not supported; 0x6 = Read or Write is not supported;		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1 Used to construct bit fields
<b>7</b>	<b>Variable Number of fields, Field number 6 repeated</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i> <b>4</b>	<i>Command Parameter:</i>	Optional
<b>DD141</b>	Error Codes Command Acknowledgement	0x0 = No Error/Acknowledge; 0x1 = Invalid request or command parameter field; 0x2 = Temporarily unable to comply; 0x3 = Request or command parameter out-of-range; 0x4 = Access denied; 0x5 = Request or Command is not supported; 0x6 = Read or Write is not supported;		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1 Used to construct bit fields

# NMEA - Read Fields - group function

PGN: 126208  
hex: 1ED00

## Field # Field Name

1	Complex Request Group Function Code	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD144	Group Function, Request/Command/Acknowledge	0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields Message, 4 = Read Fields Reply Message, 5 = Write Fields Message, 6 = Write Fields Reply Message	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This is the Read Fields message, set = 0x03			
2	PGN Number	Byte Field Size: Bit Field Size: 24	Request Parameter: Optional Command Parameter: Optional
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	Manufacturer's Code	Byte Field Size: Bit Field Size: 11	Request Parameter: Optional Command Parameter: Optional
DD172	NMEA Manufacturer Code	Assigned by NMEA Committee	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
4	NMEA Reserved	Byte Field Size: Bit Field Size: resv 2	Request Parameter: Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
5	Industry Group	Byte Field Size: Bit Field Size: 3	Request Parameter: Optional Command Parameter: Optional
DD168	Industry Group	0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserved for SAE 7 = Reserved for SAE	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
6	Unique ID	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This field links the read fields reply group function with the read fields group function.			

# NMEA - Read Fields - group function

PGN: 126208  
hex: 1ED00

7	Number of Selection Pairs	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
8	Number of Parameter Pairs to be Read	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
9	Field Number of First Selection Pair	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
10	Field Value of First Selection Pair	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.
11	Variable Number of fields, field 9 repeated	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
12	Variable Number of Fields, field 10 repeated	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.
13	Field Number of First Parameter Pair to be Read	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
14	Variable Number of Fields, field 13 repeated	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number

# NMEA - Read Fields Reply - group function

PGN: 126208

hex: 1ED00

## Field # Field Name

1	Complex Request Group Function Code	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD144	Group Function, Request/Command/Acknowledge	0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields Message, 4 = Read Fields Reply Message, 5 = Write Fields Message, 6 = Write Fields Reply Message	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This is the Read Fields Reply message, set = 0x04			
2	PGN Number	Byte Field Size: Bit Field Size: 24	Request Parameter: Optional Command Parameter: Optional
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	Manufacturer's Code	Byte Field Size: Bit Field Size: 11	Request Parameter: Optional Command Parameter: Optional
DD172	NMEA Manufacturer Code	Assigned by NMEA Committee	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
4	NMEA Reserved	Byte Field Size: Bit Field Size: resv 2	Request Parameter: Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
5	Industry Group	Byte Field Size: Bit Field Size: 3	Request Parameter: Optional Command Parameter: Optional
DD168	Industry Group	0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserved for SAE 7 = Reserved for SAE	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
6	Unique ID	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This field links the read fields group function with the read fields reply group function.			

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# NMEA - Read Fields Reply - group function

PGN: 126208  
hex: 1ED00

7	Number of Selection Pairs	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
8	Number of Parameter Pairs to be Read	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
9	Field Number of First Selection Pair	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
10	Field Value of First Selection Pair	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.
11	Variable Number of fields, field 9 repeated	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
12	Variable Number of Fields, field 10 repeated	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.
13	Field Number of First Parameter Pair to be Read	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
14	Field Value of First Parameter Pair to be Read	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.



NMEA - Read Fields Reply - group function

PGN: 126208  
hex: 1ED00

15	Variable Number of Fields, field 13 repeated			Byte Field Size: 1	Request Parameter	Optional
				Bit Field Size:	Command Parameter:	Optional
	DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
16	Variable Number of Fields, field 14 repeated			Byte Field Size: ?	Request Parameter	Optional
				Bit Field Size: n	Command Parameter:	Optional
	DD000	Undefined				
	DF00	Undefined	Undefined	Range: undefined	Resolution: undefined	Application specific, defined at time of use.

# NMEA - Write Fields - group function

PGN: 126208

hex: 1ED00

## Field # Field Name

1	Complex Request Group Function Code	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD144	Group Function, Request/Command/Acknowledge	0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields Message, 4 = Read Fields Reply Message, 5 = Write Fields Message, 6 = Write Fields Reply Message	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This is the Write Fields message, set = 0x05			
2	PGN Number	Byte Field Size: Bit Field Size: 24	Request Parameter: Optional Command Parameter: Optional
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	Manufacturer's Code	Byte Field Size: Bit Field Size: 11	Request Parameter: Optional Command Parameter: Optional
DD172	NMEA Manufacturer Code	Assigned by NMEA Committee	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
4	NMEA Reserved	Byte Field Size: Bit Field Size: resv 2	Request Parameter: Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
5	Industry Group	Byte Field Size: Bit Field Size: 3	Request Parameter: Optional Command Parameter: Optional
DD168	Industry Group	0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserved for SAE 7 = Reserved for SAE	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
6	Unique ID	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This field links the write fields reply group function with the write fields group function.			

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# NMEA - Write Fields - group function

PGN: 126208  
hex: 1ED00

7	Number of Selection Pairs	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
8	Number of Parameter Pairs to be Written	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
9	Field Number of First Selection Pair	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
10	Field Value of First Selection Pair	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.
11	Variable Number of fields, field 9 repeated	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
12	Variable Number of Fields, field 10 repeated	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.
13	Field Number of First Parameter Pair to be Written	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
14	Field Value of First Parameter Pair to be Written	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.

NMEA - Write Fields - group function

PGN: 126208  
hex: 1ED00

15	Variable Number of Fields, field 13 repeated			Byte Field Size: 1	Request Parameter	Optional
				Bit Field Size:	Command Parameter:	Optional
	DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
16	Variable Number of Fields, field 14 repeated			Byte Field Size: ?	Request Parameter	Optional
				Bit Field Size: n	Command Parameter:	Optional
	DD000	Undefined				
	DF00	Undefined	Undefined	Range: undefined	Resolution: undefined	Application specific, defined at time of use.

# NMEA - Write Fields Reply - group function

PGN: 126208

hex: 1ED00

## Field # Field Name

1	Complex Request Group Function Code	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD144	Group Function, Request/Command/Acknowledge	0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields Message, 4 = Read Fields Reply Message, 5 = Write Fields Message, 6 = Write Fields Reply Message	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This is the Write Fields Reply message, set = 0x06			
2	PGN Number	Byte Field Size: Bit Field Size: 24	Request Parameter: Optional Command Parameter: Optional
DD009	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	Manufacturer's Code	Byte Field Size: Bit Field Size: 11	Request Parameter: Optional Command Parameter: Optional
DD172	NMEA Manufacturer Code	Assigned by NMEA Committee	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
4	NMEA Reserved	Byte Field Size: Bit Field Size: resv 2	Request Parameter: Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
5	Industry Group	Byte Field Size: Bit Field Size: 3	Request Parameter: Optional Command Parameter: Optional
DD168	Industry Group	0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserved for SAE 7 = Reserved for SAE	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When Field 2 (PGN number) contains a non-proprietary PGN number, this field is not included in the message.			
6	Unique ID	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This field links the write fields group function with the write fields reply group function.			

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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# NMEA - Write Fields Reply - group function

PGN: 126208  
hex: 1ED00

7	Number of Selection Pairs	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
8	Number of Parameter Pairs to be Written	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
9	Field Number of First Selection Pair	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
10	Field Value of First Selection Pair	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined	Range: undefined Resolution: undefined Application specific, defined at time of use.
11	Variable Number of fields, field 9 repeated	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
12	Variable Number of Fields, field 10 repeated	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined	Range: undefined Resolution: undefined Application specific, defined at time of use.
13	Field Number of First Parameter Pair to be Written	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
14	Field Value of First Parameter Pair to be Written	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined	Range: undefined Resolution: undefined Application specific, defined at time of use.

NMEA - Write Fields Reply - group function

PGN: 126208  
hex: 1ED00

15	Variable Number of Fields, field 13 repeated			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.			
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit
16	Variable Number of Fields, field 14 repeated			Byte Field Size:	?	Request Parameter	Optional
				Bit Field Size:	n	Command Parameter:	Optional
	DD000	Undefined					
	DF00	Undefined	Undefined	Range:	undefined	Resolution:	undefined

PGN List - Transmit PGNs group function

PGN: 126464  
hex: 1EE00

The PGN List group function type is defined by the first field.

Transmit PGNs group function: This message contains a list of the Transmitted PGNs that are supported by a node.

If the Group Function Code (Field #1) is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with both the Transmitted PGNs and Received PGNs group functions. (This PGN will be transmitted twice.)

All ISO Request (PGN 059904) requests for the PGN List parameter group shall be destination address specific (as opposed to global). Once a node issues an ISO Request for PGN List, the node shall not issue a subsequent ISO Request for PGN List until the full response has been received for the first request or the response has timed out in accordance with ISO 11783-3, "Controller response time and time out defaults".

All NMEA Request group function (PGN 126208) requests for the PGN List parameter group shall be destination address specific (as opposed to global).

Once a node issues an NMEA Request for PGN List, the node shall not issue a subsequent NMEA Request for PGN List until the full response has been received for the first request or the response has timed out in accordance with ISO 11783-3, "Controller response time and time out defaults".

This PGN will be requested as needed.

Single Frame: NoPriority Default: 6Default Update Rate: millisecondsFrequency: NAcycles per second

Destination: AddressQuery Support: RequiredCommand Support: RequiredACK Rqmnts: Requested data or Acknowledgement Group Function containing error codes of reasons for non-compliance.

Field #	Field Name					
1	Transmitted PGN Group Function Code	Byte Field Size: 1	Request Parameter Required	Command Parameter Required		
	DD145 Group Function, Transmit and Receive PGN List	0 = Transmit PGN List Message, 1 = Receive PGN List Message				
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number	
	This is the Transmitted Group List, set = 0x00					
2	First PGN supported	Byte Field Size: Bit Field Size: 24	Request Parameter Optional	Command Parameter Optional		
	DD009 PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
3	Variable Number of fields, Field number 2 repeated	Byte Field Size: Bit Field Size: 24	Request Parameter Optional	Command Parameter Optional		
	DD009 PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	



## PGN List - Received PGNs group function

**PGN: 126464**  
**hex: 1EE00**

Field # Field Name

<b>1</b>	<b>Received PGN Group Function Code</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Required</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Required</b>
<b>DD145</b>	Group Function, Transmit and Receive PGN List	0 = Transmit PGN List Message, 1 = Receive PGN List Message	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> <i>Range:</i> <b>0 to 252</b> <i>Resolution:</i> <b>1 bit</b>	Unit-less number
This is the Receive Group List, set = 0x01			
<b>2</b>	<b>First PGN supported</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i> <b>24</b>	<i>Command Parameter:</i> <b>Optional</b>
<b>DD009</b>	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
<b>DF52</b>	Bit field	<b>bit(n)</b> <i>Range:</i> <b>Variable</b> <i>Resolution:</i> <b>1</b>	Used to construct bit fields
<b>3</b>	<b>Variable Number of fields, Field number 2 repeated</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i> <b>24</b>	<i>Command Parameter:</i> <b>Optional</b>
<b>DD009</b>	PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first	
<b>DF52</b>	Bit field	<b>bit(n)</b> <i>Range:</i> <b>Variable</b> <i>Resolution:</i> <b>1</b>	Used to construct bit fields

## Alert

PGN: 126983

hex: 1F007

This PGN is used to report the status of an alert and is required for all Alert Service implementations.

The PGN is transmitted according to the update rate when the Alert is active or upon request.

The Command Group function PGN (126208) is used to request or command the Alert PGN.

Query Support for this PGN is required. ISO request is not allowed.

Note 1: When requested or commanded using PGN 126208, if any field 1 thru to 5 is included within the parameter list, it represents a qualifier identifying the target alert or alerts. Any or all of the fields not included as qualifiers are treated as wild cards and the request or command is applied to the remaining fields.

Note 2: Field 18, Test mode can only be commanded, if the existing trigger condition is disabled. Once in test mode it is only possible to command back to disabled. Note 3: Field 19 can only be commanded if the current trigger condition is test mode.

Single Frame: No Priority Default: 2 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Alert Type	Byte Field Size:	Request Parameter	Note 1
		Bit Field Size: 4	Command Parameter:	Note 1
DD315	Alert Type	0 = Reserved 1 = Emergency Alarm 2 = Alarm 3 = Reserved 4 = Reserved 5 = Warning 6 = Reserved 7 = Reserved 8 = Caution 13 = Reserved 14 = Data out of range 15 = Data not available		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
The Alert Service shall convey the Alert type as a means of identification				
2	Alert Category	Byte Field Size:	Request Parameter	Note 1
		Bit Field Size: 4	Command Parameter:	Note 1
DD316	Alert Category	0 = Navigational 1 = Technical 13 = Reserved 14 = Data out of range 15 = Data not available		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
The Alert Service shall convey the Alert Category as a means of identification. Dependent on NMEA Alert Code Definition Table.				
3	Alert System	Byte Field Size: 1	Request Parameter	Note 1
		Bit Field Size:	Command Parameter:	Note 1
DD317	Alert System	Values defined by the Alert Codes in Appendix B		
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number	
The Alert Service shall convey the Alert System as a means of identification, which will describe the main system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.				

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## Alert

PGN: 126983

hex: 1F007

4	Alert Sub-System	Byte Field Size: 1	Request Parameter: Note 1
		Bit Field Size:	Command Parameter: Note 1
DD318	Alert Sub-System	Values defined by the Alert Codes in Appendix B	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
The Alert Service shall convey the Alert Sub-system as a means of identification, which will describe the sub system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.			
5	Alert ID	Byte Field Size: 2	Request Parameter: Note 1
		Bit Field Size:	Command Parameter: Note 1
DD319	Alert ID	Values defined by the Alert Codes in Appendix B	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
The Alert Service shall convey the Alert ID as a means of describing the actual cause of an Alert. Dependent on NMEA Alert Code Definition Table.			
6	Data Source Network ID NAME	Byte Field Size: 8	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
DD320	Network ID NAME	This field is defined by fields 1- 10 of PGN 60928	
DF56	Integer, 64 bit unsigned	uint64 Range: 0 to (2E+64)-4	Resolution: 1 bit Unit-less number
The Data Source 64 bit network NAME field found within PGN 060928. This is the NAME of the device providing the data that is monitored by this alert.			
7	Data Source Instance	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
DD128	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
The Data Source Instance identifies either the Device Instance or the Data Instance (as applicable) of the source of data monitored by this Alert. This parameter is used in conjunction with the Data Source Network ID and the Data Source Index to uniquely identify Alerts of the same type, from the same source but from using a different input or sensor to generate the Alert.			
If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			
Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).			

## Alert

PGN: 126983

hex: 1F007

## 8 Data Source Index / Source

Byte Field Size: 1  
Bit Field Size:Request Parameter: Optional  
Command Parameter: Prohibited

DD128 Generic instance

0 = Instance 0  
1 = Instance 1  
2 = Instance 2  
n = Instance n, where n < 253  
253 = Reserved  
254 = Error  
255 = Not available

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

The Data Source Index is an index into a set of data associated with the same Data Source Instance.

If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.

Note: Refer to Alert Codes(Appendix B) &amp; Alert Application Notes (Appendix D).

## 9 Alert Occurrence Number

Byte Field Size: 1  
Bit Field Size:Request Parameter: Optional  
Command Parameter: Prohibited

DD006 Generic counter, short

Numeric count, event counter, sequence counter

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

This parameter is a number starting at zero and incremented by one for each occurrence of the same Alert.

## 10 Temporary Silence Status

Byte Field Size:  
Bit Field Size: 1Request Parameter: Optional  
Command Parameter: Prohibited

DD321 Temporary Silence Status

0 = Not Temporary Silence  
1 = Temporary Silence

DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields

This single bit status denotes whether a temporary silence period is active for the current alert.

## 11 Acknowledge Status

Byte Field Size:  
Bit Field Size: 1Request Parameter: Optional  
Command Parameter: Prohibited

DD322 Acknowledge Status

0 = Not Acknowledged  
1 = Acknowledged

DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields

This single bit status denotes whether the current alert has been acknowledged.

## 12 Escalation Status

Byte Field Size:  
Bit Field Size: 1Request Parameter: Optional  
Command Parameter: Prohibited

DD323 Escalation Status

0 = Not Escalated  
1 = Escalated

DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields

This single bit status denotes whether the current alert has been escalated.

## 13 Temporary Silence Support

Byte Field Size:  
Bit Field Size: 1Request Parameter: Optional  
Command Parameter: Optional

DD324 Temporary Silence Support

0 = Not Supported  
1 = Supported

DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields

This single bit status denotes whether the current Alert supports the temporary silence feature.

## Alert

PGN: 126983

hex: 1F007

14	<b>Acknowledge Support</b>		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Optional
	<b>DD325</b> Acknowledge Support		0 = Not Supported 1 = Supported			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
This single bit status denotes whether the current Alert supports the acknowledge feature.						
15	<b>Escalation Support</b>		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Optional
	<b>DD326</b> Escalation Support		0 = Not Supported 1 = Supported			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
This single bit status denotes whether the current Alert supports escalation.						
16	<b>NMEA Reserved</b>		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 2	Command Parameter:	
	<b>DD001</b> Reserved field		Variable number of reserved bits, all set to logic "1"			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.						
17	<b>Acknowledge Source Network ID NAME</b>		Byte Field Size:	8	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Prohibited
	<b>DD320</b> Network ID NAME		This field is defined by fields 1- 10 of PGN 60928			
	<b>DF56</b>	Integer, 64 bit unsigned	uint64	Range: 0 to (2E+64)-4	Resolution: 1 bit	Unit-less number
The Acknowledge Source 64 bit network NAME field found within PGN 060928. This is the NAME of the device that acknowledged this alert.						
18	<b>Trigger Condition</b>		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	4	Command Parameter:	Note 2
	<b>DD328</b> Trigger Condition		0 = Manual (triggered by human) 1 = Auto (triggered autonomously) 2 = Test (alert is in test mode) 3 = Disabled (alert is not operational) 13 = Reserved 14 = Data out of range 15 = Data not available			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
19	<b>Threshold Status</b>		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	4	Command Parameter:	Note 3
	<b>DD329</b> Threshold Status		0 = Normal 1 = Threshold Exceeded 2 = Extreme Threshold Exceeded, field added to support 0183 3 = Low Threshold Exceeded, field added to support 0183 4 = Extreme Low Threshold Exceeded, field added to support 0183 13 = Reserved 14 = Data out of range 15 = Data not available			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

## Alert

PGN: 126983

hex: 1F007

## 20 Alert Priority

Byte Field Size: 1

Request Parameter Optional

Bit Field Size: Command Parameter: Optional

DD006 Generic counter, short

Numeric count, event counter, sequence counter

DF53 Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

The Alert priority is a numeric value in the range of 0 to 252, where 0 is the highest priority.

## 21 Alert State

Byte Field Size: 1

Request Parameter Optional

Bit Field Size: Command Parameter: Prohibited

DD330 Alert State

0 = Disabled

1 = Normal

2 = Active

3 = Silenced

4 = Acknowledged

5 = Awaiting Acknowledge

253 = Reserved

254 = Data out of range

255 = Data not available

DF53 Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

## Alert Response

PGN: 126984

hex: 1F008

This PGN is used to control an active Alert. The function of this PGN is to send an acknowledge command or a temporary silence command to the Alert Source. Since this is a broadcast PGN, a destination Alert Source name field is included.

The PGN also includes data source instance to enable the product providing an alert to distinguish from multiple sensors.

Note 1: It is not possible to request or command this PGN.

Single Frame: No Priority Default: 2 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Prohibited Command Support: Prohibited ACK Rqmnts: None

### Field # Field Name

1	Alert Type	Byte Field Size:	Request Parameter	Note 1
		Bit Field Size: 4	Command Parameter:	Prohibited
	DD315 Alert Type	0 = Reserved 1 = Emergency Alarm 2 = Alarm 3 = Reserved 4 = Reserved 5 = Warning 6 = Reserved 7 = Reserved 8 = Caution 13 = Reserved 14 = Data out of range 15 = Data not available		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
The Alert Service shall convey the Alert type as a means of identification.				
2	Alert Category	Byte Field Size:	Request Parameter	Note 1
		Bit Field Size: 4	Command Parameter:	Prohibited
	DD316 Alert Category	0 = Navigational 1 = Technical 13 = Reserved 14 = Data out of range 15 = Data not available		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
The Alert Service shall convey the Alert Category as a means of identification. Dependent on NMEA Alert Code Definition Table.				
3	Alert System	Byte Field Size: 1	Request Parameter	Note 1
		Bit Field Size:	Command Parameter:	Prohibited
	DD317 Alert System	Values defined by the Alert Codes in Appendix B		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit		Unit-less number
The Alert Service shall convey the Alert System as a means of identification, which will describe the main system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table				
4	Alert Sub-System	Byte Field Size: 1	Request Parameter	Note 1
		Bit Field Size:	Command Parameter:	Prohibited
	DD318 Alert Sub-System	Values defined by the Alert Codes in Appendix B		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit		Unit-less number
The Alert Service shall convey the Alert Sub-system as a means of identification, which will describe the sub system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.				

## Alert Response

**PGN: 126984**  
**hex: 1F008**

<b>5</b>	<b>Alert ID</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i> <b>Note 1</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Prohibited</b>
	<b>DD319</b> Alert ID	Values defined by the Alert Codes in Appendix B	
	<b>DF54</b> Integer, 16 bit unsigned	<b>uint16</b> <i>Range:</i> <b>0 to 65,532</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	The Alert Service shall convey the Alert ID as a means of describing the actual cause of an Alert. Dependent on NMEA Alert Code Definition Table.		
<b>6</b>	<b>Data Source Network ID NAME</b>	<i>Byte Field Size:</i> <b>8</b>	<i>Request Parameter</i> <b>Note 1</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Prohibited</b>
	<b>DD320</b> Network ID NAME	This field is defined by fields 1- 10 of PGN 60928	
	<b>DF56</b> Integer, 64 bit unsigned	<b>uint64</b> <i>Range:</i> <b>0 to (2E+64)-4</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	The Data Source 64 bit network NAME field found within PGN 060928. This is the NAME of the device providing the data that is monitored by this alert.		
<b>7</b>	<b>Data Source Instance</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Note 1</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Prohibited</b>
	<b>DD128</b> Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> <i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	The Data Source Instance identifies either the Device Instance or the Data Instance (as applicable) of the source of data monitored by this Alert. This parameter is used in conjunction with the Data Source Network ID and the Data Source Index to uniquely identify Alerts of the same type, from the same source but from using a different input or sensor to generate the Alert.		
	Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).		
<b>8</b>	<b>Data Source Index / Source</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Note 1</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Prohibited</b>
	<b>DD128</b> Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> <i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	The Data Source Index is an index into a set of data associated with the same Data Source Instance.		
	Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).		
<b>9</b>	<b>Alert Occurrence Number</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Note 1</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Prohibited</b>
	<b>DD006</b> Generic counter, short	Numeric count, event counter, sequence counter	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> <i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	This parameter is a number starting at zero and incremented by one for each occurrence of the same Alert.		



## Alert Response

PGN: 126984

hex: 1F008

### 10 Acknowledge Source Network ID NAME

Byte Field Size: 8

Request Parameter

Note 1

Bit Field Size:

Command Parameter:

Prohibited

DD320 Network ID NAME

This field is defined by fields 1- 10 of PGN 60928

DF56 Integer, 64 bit unsigned

uint64

Range: 0 to (2E+64)-4

Resolution: 1 bit

Unit-less number

The Acknowledge Source 64 bit network NAME field found within PGN 060928. This is the NAME of the device that acknowledged this alert.

### 11 Response Command

Byte Field Size:

Request Parameter

Note 1

Bit Field Size: 2

Command Parameter:

Prohibited

DD332 Response Command

0 = Acknowledge

1 = Temporary Silence

2 = Test Command off

3 = Test Command on

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

### 12 NMEA Reserved

Byte Field Size:

Request Parameter

Bit Field Size: resv 6

Command Parameter:

DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on byte boundary.

## Alert Text

PGN: 126985

hex: 1F009

The Alert text PGN is used to convey identification and location text strings associated with source of an Alert. This PGN is not a mandatory requirement to implement the Alert Service.

This PGN would either be transmitted cyclically once an alert is active or upon request. If the PGN is transmitted cyclically then the frequency shall not be any more than once every 10 seconds.

This PGN shall be transmitted upon request regardless of alert status. The Command Group function PGN (126208) is used to request or command the Alert Text PGN.

Note 1: When requested or commanded using PGN 126208, if any field 1 thru to 5 is included within the parameter list, it represents a qualifier identifying the target alert or alerts.

Any or all of the fields not included as qualifiers are not considered or used in the selection process of applying the request or command to the remaining fields (These are considered as wild cards).

Note 2: Field 10 can be used to request text strings by a defined language.

Single Frame: No Priority Default: 2 Default Update Rate: 10000 milliseconds Frequency: .1 cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Alert Type	Byte Field Size:	Request Parameter
		Bit Field Size: 4	Note 1
			Command Parameter: Note 1

DD315 Alert Type

0 = Reserved  
1 = Emergency Alarm  
2 = Alarm  
3 = Reserved  
4 = Reserved  
5 = Warning  
6 = Reserved  
7 = Reserved  
8 = Caution  
13 = Reserved  
14 = Data out of range  
15 = Data not available

DF52 Bit field

bit(n) Range: Variable

Resolution: 1

Used to construct bit fields

The Alert Service shall convey the Alert type as a means of identification.

2	Alert Category	Byte Field Size:	Request Parameter
		Bit Field Size: 4	Note 1
			Command Parameter: Note 1

DD316 Alert Category

0 = Navigational  
1 = Technical  
13 = Reserved  
14 = Data out of range  
15 = Data not available

DF52 Bit field

bit(n) Range: Variable

Resolution: 1

Used to construct bit fields

The Alert Service shall convey the Alert Category as a means of identification. Dependent on NMEA Alert Code Definition Table

3	Alert System	Byte Field Size: 1	Request Parameter
		Bit Field Size:	Note 1
			Command Parameter: Note 1

DD317 Alert System

Values defined by the Alert Codes in Appendix B

DF53 Integer, 8 bit unsigned

uint8 Range: 0 to 252

Resolution: 1 bit

Unit-less number

The Alert Service shall convey the Alert System as a means of identification, which will describe the main system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.

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## Alert Text

**PGN: 126985**  
**hex: 1F009**

### 4 Alert Sub-System

Byte Field Size: **1**  
Bit Field Size:

Request Parameter: Note 1  
Command Parameter: Note 1

#### DD318 Alert Sub-System

Values defined by the Alert Codes in Appendix B

**DF53** Integer, 8 bit unsigned **uint8** Range: 0 to 252 Resolution: 1 bit Unit-less number

The Alert Service shall convey the Alert Sub-system as a means of identification, which will describe the sub system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.

### 5 Alert ID

Byte Field Size: **2**  
Bit Field Size:

Request Parameter: Note 1  
Command Parameter: Note 1

#### DD319 Alert ID

Values defined by the Alert Codes in Appendix B

**DF54** Integer, 16 bit unsigned **uint16** Range: 0 to 65,532 Resolution: 1 bit Unit-less number

The Alert Service shall convey the Alert ID as a means of describing the actual cause of an Alert. Dependent on NMEA Alert Code Definition Table.

### 6 Data Source Network ID NAME

Byte Field Size: **8**  
Bit Field Size:

Request Parameter: Note 2  
Command Parameter: Note 2

#### DD320 Network ID NAME

This field is defined by fields 1- 10 of PGN 60928

**DF56** Integer, 64 bit unsigned **uint64** Range: 0 to (2E+64)-4 Resolution: 1 bit Unit-less number

The Data Source 64 bit network NAME field found within PGN 060928. This is the NAME of the device providing the data that is monitored by this alert.

### 7 Data Source Instance

Byte Field Size: **1**  
Bit Field Size:

Request Parameter: Note 2  
Command Parameter: Note 2

#### DD128 Generic instance

0 = Instance 0  
1 = Instance 1  
2 = Instance 2  
n = Instance n, where n < 253  
253 = Reserved  
254 = Error  
255 = Not available

**DF53** Integer, 8 bit unsigned **uint8** Range: 0 to 252 Resolution: 1 bit Unit-less number

The Data Source Instance identifies either the Device Instance or the Data Instance (as applicable) of the source of data monitored by this Alert. This parameter is used in conjunction with the Data Source Network ID and the Data Source Index to uniquely identify Alerts of the same type, from the same source but from using a different input or sensor to generate the Alert.

If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.

Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).

## Alert Text

PGN: 126985

hex: 1F009

## 8 Data Source Index / Source

Byte Field Size: 1

Request Parameter: Note 2

Bit Field Size:

Command Parameter: Note 2

DD128 Generic instance

0 = Instance 0  
 1 = Instance 1  
 2 = Instance 2  
 n = Instance n, where n < 253  
 253 = Reserved  
 254 = Error  
 255 = Not available

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

The Data Source Index is an index into a set of data associated with the same Data Source Instance.

If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.

Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).

## 9 Alert Occurrence Number

Byte Field Size: 1

Request Parameter: Optional

Bit Field Size:

Command Parameter: Prohibited

DD006 Generic counter, short

Numeric count, event counter, sequence counter

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

The parameter is a number starting at zero and incremented by one for each occurrence of the same Alert.

## 10 Language ID

Byte Field Size: 1

Request Parameter: Note 2

Bit Field Size:

Command Parameter: Optional

DD355 Language ID

0 = English (US)  
 1 = English (UK)  
 2 = Arabic  
 3 = Chinese (simplified)  
 4 = Croatian  
 5 = Danish  
 6 = Dutch  
 7 = Finnish  
 8 = French  
 9 = German  
 10 = Greek  
 11 = Italian  
 12 = Japanese  
 13 = Korean  
 14 = Norwegian  
 15 = Polish  
 16 = Portuguese(Brazilian)  
 17 = Russian  
 18 = Spanish  
 19 = Swedish

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

This is a numeric number ranged 0 to 252 denoting the language used within both of the following text strings.

## Alert Text

PGN: 126985  
hex: 1F009

### 11 Alert Text Description

Byte Field Size: 8 or 16 n  
Bit Field Size:

Request Parameter Optional  
Command Parameter: Optional

**DD004** Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

**DF50** String, variable, short **ch8or16(n)** Range: 0 to 250 ASCII or 0 to 125 Unicode Characters

Resolution: 1 ASCII or 1 Unicode Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

This is a text string describing the Alert.

### 12 Alert Location Text Description

Byte Field Size: 8 or 16 n  
Bit Field Size:

Request Parameter Optional  
Command Parameter: Optional

**DD004** Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

**DF50** String, variable, short **ch8or16(n)** Range: 0 to 250 ASCII or 0 to 125 Unicode Characters

Resolution: 1 ASCII or 1 Unicode Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

This is a text string describing the location of the Alert.

## Alert Configuration

**PGN: 126986**  
**hex: 1F00A**

This PGN shall be required for all Alert Service implementations. This PGN is used to report the configuration of an alert.

When reporting the configuration, the "User Defined Alert Assignment" Field 11 shall be set to a value of "2" meaning "Not Applicable" This PGN can also be used in conjunction with the Command Group Function PGN (126208) to change the configuration of an alert.

This PGN can also be used in conjunction with the Command Group Function PGN (126208) to create a new "User Defined" Alert that does not exist within the current network and is not already defined within the NMEA 2000 Alert Codes. (See NMEA 2000 Appendix B, Alert Codes). This PGN can also be used in conjunction with the Command Group Function PGN (126208) to remove a single "User Defined" Alert that was previously created within the current network.

This PGN shall be broadcast after the acknowledgement required by the Command Group Function (126208).

Note 1: When commanded using PGN 126208, if any field 1 thru 5 is included in the commanded parameter list, it represents a qualifier identifying the specific alert or alerts that the command will apply to. Any field 1 thru 5 that is not included is treated as a wild card and the command is applied to all alerts matching the remaining fields.

Note 2: Fields 6, 7 & 8, can also optionally be requested or commanded. Fields 7 & 8 are dependent on field 6.

For more information, see Alert Application Notes in Appendix D.

Note 3: The ability to command Field 10 shall be required. Note 4: Commanding the "User Defined Alert Assignment" Field 11 is optional. When commanded this field is used for two purposes: 1 - To create a new (user defined) Alert that does not exist within the current network and that is not already defined within the NMEA 2000 Alert Codes. (See NMEA 2000 Appendix B). When commanded using PGN 126208, this field is set to a value of "0 = Instantiate (new) User Defined Alert".

When commanded using PGN 126208, fields 2 thru 5 shall be included in the commanded parameter list, identifying the specific alert that the command will apply to. The fields shall be interpreted as follows: For Field 2 – "Alert Category" shall be used as a qualifier to determine which NMEA defined category (Navigational or Technical) the new "User Defined Alert" should be assigned to. For Field 3 – "Alert System", the values determine the action taken.

If the provided value is within the NMEA "User Defined Range for this field" and does not exist within the current network, a new "User Defined" Alert System entry is created; If the provided value is already defined by NMEA or previous "User Defined" actions, the value is treated as qualifier as to what Alert System the new "User Defined Alert" is assigned to.

For Field 4 – "Alert Subsystem", the values determine the action taken. If the provided value is within the NMEA "User Defined Range for this field" and does not exist within the current network, a new "User Defined" Alert Subsystem entry is created; If the provided value is already defined by NMEA or previous "User Defined" actions, the value is treated as qualifier as to what Alert Subsystem the new "User Defined Alert" is assigned to.

For Field 5 – "Alert ID": The provided value must be within the NMEA "User Defined" Range for this field and does not exist within the current network, then a new "User Defined" Alert ID entry is created; If the provided value is already defined by NMEA or previous "User Defined" actions, this is an invalid command and should be Acknowledged as such.

2 - To remove an existing "User Defined" Alert that exists within the current network. When commanded using PGN 126208, this field is set to a value of "1 = Remove (existing) User Defined Alert".

When commanded using PGN 126208, fields 2 thru 5 shall be included in the as necessary commanded parameter list, identifying the specific alert that the command will apply to. For instance if there is only a "User Defined" Alert System with no associated Alert Subsystem, the Alert Subsystem Field 4 does not need to be commanded.

The fields shall be interpreted as follows; For Field 2 – "Alert Category" shall be used as a qualifier to determine which NMEA defined category (Navigational or Technical) the existing "User Defined Alert" should be removed from.

For Field 3 – "Alert System", the values determine the action taken. If the provided value is within the NMEA "User Defined Range for this field", and exists within the current network, and there are no "User Defined" Alert Subsystems associated with the Alert System value, the "User Defined" Alert System is removed; If the provided value is already defined by NMEA, or defined by previous "User Defined" actions and is associated with one or more "User Defined" Alert Subsystems, the value is treated as qualifier as to what Alert System the "User Defined Alert" is to be removed from.

For Field 4 – "Alert Subsystem", the values determine the action taken. If the provided value is within the NMEA "User Defined Range for this field", exists within the current network, and there are no "User Defined" Alert IDs associated with the Alert Subsystem

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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## Alert Configuration

PGN: 126986

hex: 1F00A

value, the "User Defined" Alert Subsystem is removed; If the provided value is already defined by NMEA, or defined by previous "User Defined" actions and is associated with one or more "User Defined" Alert IDs, the value is treated as qualifier as to what Alert Subsystem the "User Defined Alert" is to be removed from.

For Field 5 – "Alert ID": The provided value must be within the NMEA "User Defined" Range for this field and exists within the current network, only then can the "User Defined" Alert ID is removed; If the provided value is already defined by NMEA or does not exist from previous "User Defined" actions, this is an invalid command and should be Acknowledged as such.

NMEA defined Alerts shall not be affected by the "User Defined Alert Assignment" Field 11.

Single Frame: No Priority Default: 2 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Alert Type	Byte Field Size:	Request Parameter	Required
		Bit Field Size: 4	Command Parameter:	Optional
	DD315 Alert Type	0 = Reserved 1 = Emergency Alarm 2 = Alarm 3 = Reserved 4 = Reserved 5 = Warning 6 = Reserved 7 = Reserved 8 = Caution 13 = Reserved 14 = Data out of range 15 = Data not available		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
The Alert Service shall convey the Alert type as a means of identification.				
2	Alert Category	Byte Field Size:	Request Parameter	Required
		Bit Field Size: 4	Command Parameter:	Note 1
	DD316 Alert Category	0 = Navigational 1 = Technical 13 = Reserved 14 = Data out of range 15 = Data not available		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
The Alert Service shall convey the Alert Category as a means of identification. Dependent on NMEA Alert Code Definition Table.				
3	Alert System	Byte Field Size: 1	Request Parameter	Required
		Bit Field Size:	Command Parameter:	Note 1
	DD317 Alert System	Values defined by the Alert Codes in Appendix B		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number	
The Alert Service shall convey the Alert System as a means of identification, which will describe the main system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.				

## Alert Configuration

PGN: 126986  
hex: 1F00A

4	Alert Sub-System	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Note 1
DD318	Alert Sub-System	Values defined by the Alert Codes in Appendix B	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
The Alert Service shall convey the Alert Sub-system as a means of identification, which will describe the sub system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.			
5	Alert ID	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Note 1
DD319	Alert ID	Values defined by the Alert Codes in Appendix B	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
The Alert Service shall convey the Alert ID as a means of describing the actual cause of an Alert. Dependent on NMEA Alert Code Definition Table.			
6	Data Source Network ID NAME	Byte Field Size: 8 Bit Field Size:	Request Parameter: Note 2 Command Parameter: Note 2
DD320	Network ID NAME	This field is defined by fields 1- 10 of PGN 60928	
DF56	Integer, 64 bit unsigned	uint64 Range: 0 to (2E+64)-4 Resolution: 1 bit	Unit-less number
The Data Source 64 bit network NAME field found within PGN 060928. This is the NAME of the device providing the data that is monitored by this alert.			
7	Data Source Instance	Byte Field Size: 1 Bit Field Size:	Request Parameter: Note 2 Command Parameter: Note 2
DD128	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
The Data Source Instance identifies either the Device Instance or the Data Instance (as applicable) of the source of data monitored by this Alert. This parameter is used in conjunction with the Data Source Network ID and the Data Source Index to uniquely identify Alerts of the same type, from the same source but from using a different input or sensor to generate the Alert. If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			
Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).			



## Alert Configuration

**PGN: 126986**  
**hex: 1F00A**

<b>8</b>	<b>Data Source Index / Source</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter:</i> Note 2
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> Note 2
<b>DD128</b>	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> <i>Range:</i> 0 to 252 <i>Resolution:</i> 1 bit	Unit-less number
The Data Source Index is an index into a set of data associated with the same Data Source Instance. If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field. Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).			
<b>9</b>	<b>Alert Occurrence Number</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> Prohibited
<b>DD006</b>	Generic counter, short	Numeric count, event counter, sequence counter	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> <i>Range:</i> 0 to 252 <i>Resolution:</i> 1 bit	Unit-less number
The parameter is a number starting at zero and incremented by one for each occurrence of the same Alert.			
<b>10</b>	<b>Alert Control</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <b>2</b>	<i>Command Parameter:</i> Required
<b>DD333</b>	Alert Control	0 = Disabled 1 = Enabled	
<b>DF52</b>	Bit field	<b>bit(n)</b> <i>Range:</i> Variable <i>Resolution:</i> 1	Used to construct bit fields
0 = Alert Disabled 1 = Alert Enabled			
<b>11</b>	<b>User Defined Alert Assignment</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <b>2</b>	<i>Command Parameter:</i> Note 4
<b>DD411</b>	User Defined Alert Assignment	0 = Instantiate (new) User Defined Alert 1 = Remove (existing) User Defined Alert 2 = Null – not applicable	
<b>DF52</b>	Bit field	<b>bit(n)</b> <i>Range:</i> Variable <i>Resolution:</i> 1	Used to construct bit fields
<b>12</b>	<b>NMEA Reserved</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i>
		<i>Bit Field Size:</i> <b>resv 4</b>	<i>Command Parameter:</i>
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"	
<b>DF52</b>	Bit field	<b>bit(n)</b> <i>Range:</i> Variable <i>Resolution:</i> 1	Used to construct bit fields
Used to align subsequent data on byte boundary.			
<b>13</b>	<b>Reactivation Period</b>	<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> Optional
<b>DD334</b>	Reactivation Period	Range: 0 to ~4.295x10E+9 s	
<b>DF67</b>	Time interval, large	<b>uint32</b> <i>Range:</i> 0 to ~4.295x10E+9 s <i>Resolution:</i> 1 sec	
This field contains the reactivation period associated with the target Alert. The reactivation period is used to change the state of an Alert from acknowledged back to Active. This value is in seconds			

## Alert Configuration

**PGN: 126986**  
**hex: 1F00A**

### 14 Temporary Silence Period

Byte Field Size: **4**  
Bit Field Size:

Request Parameter: Optional  
Command Parameter: Optional

#### DD335 Temporary Silence Period

Range: 0 to ~4.295x10E+9 s

**DF67** Time interval, large **uint32** Range: 0 to ~4.295x10E+9 s Resolution: 1 sec

This field contains the temporary silence period associated with the target Alert. The temporary Silence period is used to determine how long an audible device remains muted after a temporary silence command has been issued. This value is in seconds.

### 15 Escalation Period

Byte Field Size: **4**  
Bit Field Size:

Request Parameter: Optional  
Command Parameter: Optional

#### DD336 Escalation Period

Range: 0 to ~4.295x10E+9 s

**DF67** Time interval, large **uint32** Range: 0 to ~4.295x10E+9 s Resolution: 1 sec

This field contains the escalation period associated with the target Alert. The Escalation period is used as an elapsed time before the status of an Alert is escalated. The value is defined in seconds.

## Alert Threshold

**PGN: 126987**  
**hex: 1F00B**

The Alert Threshold PGN is used to convey or program the trigger method and threshold level associated with an Alert. This PGN is not a mandatory requirement to implement the Alert Service.

The Command Group function PGN (126208) is used to request or command the Alert Threshold PGN.

Note 1: When requested or commanded fields 1 thru to 5 represent a qualifier indentifying the target alert or alerts. Any or all of the fields 1 thru to 5 not included as qualifiers are treated as wild cards and the request or command is applied to the remaining fields.

Note 2: Fields 6, 7 and 8 can also be used to qualify a specific request or command of this PGN. Fields 7 and 8 are dependent on field 6.

Note 3: Fields 10 thru 15 shall be specified when this PGN is commanded. When programming threshold parameters, fields 11 thru 14 for each parameter must be specified each time this Alert is commanded. Each issuance of commanding the Alert Threshold PGN replaces all previously assigned parameters.

Single Frame: No Priority Default: 2 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Alert Type	Byte Field Size:	Request Parameter	Note 1
		Bit Field Size: 4	Command Parameter:	Note 1

**DD315** Alert Type

0 = Reserved  
1 = Emergency Alarm  
2 = Alarm  
3 = Reserved  
4 = Reserved  
5 = Warning  
6 = Reserved  
7 = Reserved  
8 = Caution  
13 = Reserved  
14 = Data out of range  
15 = Data not available

**DF52** Bit field

**bit(n)** Range: Variable Resolution: 1 Used to construct bit fields

The Alert Service shall convey the Alert type as a means of identification.

2	Alert Category	Byte Field Size:	Request Parameter	Note 1
		Bit Field Size: 4	Command Parameter:	Note 1

**DD316** Alert Category

0 = Navigational  
1 = Technical  
13 = Reserved  
14 = Data out of range  
15 = Data not available

**DF52** Bit field

**bit(n)** Range: Variable Resolution: 1 Used to construct bit fields

The Alert Service shall convey the Alert Category as a means of identification. Dependent on NMEA Alert Code Definition Table

3	Alert System	Byte Field Size: 1	Request Parameter	Note 1
		Bit Field Size:	Command Parameter:	Note 1

**DD317** Alert System

Values defined by the Alert Codes in Appendix B

**DF53** Integer, 8 bit unsigned

**uint8** Range: 0 to 252 Resolution: 1 bit Unit-less number

The Alert Service shall convey the Alert System as a means of identification, which will describe the main system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.

## Alert Threshold

PGN: 126987

hex: 1F00B

4	Alert Sub-System	Byte Field Size: 1	Request Parameter: Note 1
		Bit Field Size:	Command Parameter: Note 1
DD318	Alert Sub-System	Values defined by the Alert Codes in Appendix B	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
The Alert Service shall convey the Alert Sub-system as a means of identification, which will describe the sub system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.			
5	Alert ID	Byte Field Size: 2	Request Parameter: Note 1
		Bit Field Size:	Command Parameter: Note 1
DD319	Alert ID	Values defined by the Alert Codes in Appendix B	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
The Alert Service shall convey the Alert ID as a means of describing the actual cause of an Alert. Dependent on NMEA Alert Code Definition Table.			
6	Data Source Network ID NAME	Byte Field Size: 8	Request Parameter: Note 2
		Bit Field Size:	Command Parameter: Note 2
DD320	Network ID NAME	This field is defined by fields 1- 10 of PGN 60928	
DF56	Integer, 64 bit unsigned	uint64 Range: 0 to (2E+64)-4	Resolution: 1 bit Unit-less number
The Data Source 64 bit network NAME field found within PGN 060928. This is the NAME of the device providing the data that is monitored by this alert.			
7	Data Source Instance	Byte Field Size: 1	Request Parameter: Note 2
		Bit Field Size:	Command Parameter: Note 2
DD128	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
The Data Source Instance identifies either the Device Instance or the Data Instance (as applicable) of the source of data monitored by this Alert. This parameter is used in conjunction with the Data Source Network ID and the Data Source Index to uniquely identify Alerts of the same type, from the same source but from using a different input or sensor to generate the Alert.			
If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			
Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).			

## Alert Threshold

**PGN: 126987**  
**hex: 1F00B**

<b>8</b>	<b>Data Source Index / Source</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: Note 2 Command Parameter: Note 2
<b>DD128</b>	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
<b>DF53</b>	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
The Data Source Index is an index into a set of data associated with the same Data Source Instance. If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field. Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).			
<b>9</b>	<b>Alert Occurrence Number</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: Optional Command Parameter: Prohibited
<b>DD006</b>	Generic counter, short	Numeric count, event counter, sequence counter	
<b>DF53</b>	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
The parameter is a number starting at zero and incremented by one for each occurrence of the same Alert.			
<b>10</b>	<b>Total Number of Threshold Parameters</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: Optional Command Parameter: Note 3
<b>DD006</b>	Generic counter, short	Numeric count, event counter, sequence counter	
<b>DF53</b>	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This field contains a parameter that defines the total number of threshold parameters used to trigger the alert.			
<b>11</b>	<b>Parameter Number</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: Optional Command Parameter: Note 3
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This field defines numerically which parameter is to follow up to a maximum of the total threshold parameters.			
<b>12</b>	<b>Trigger Method</b>	Byte Field Size: Bit Field Size: <b>8</b>	Request Parameter: Optional Command Parameter: Note 3
<b>DD337</b>	Trigger Method	0 = Manual 1 = Automatic 2 = Threshold Reached Ascending 3 = Threshold Reached Descending 253 = Reserved 254 = Data out of range 255 = Data not available	
<b>DF52</b>	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
<b>13</b>	<b>Threshold Data Format</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: Optional Command Parameter: Note 3
<b>DD338</b>	Threshold Data Format	As an example to reference an unsigned high voltage (DF96), the Threshold Data format would be decimal 96. Range 0 to 252.	
<b>DF53</b>	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
This field contains the NMEA Network Message data format code used to define the threshold level below.			

Alert Threshold

PGN: 126987  
hex: 1F00B

14	Threshold Level	Byte Field Size: ? Bit Field Size:	Request Parameter: Optional Command Parameter: Note 3
DD339	Threshold Level	This parameter is defined by the Threshold Data Format and is a preset value used to trigger an Alert.	
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.
This field contains the threshold level that is used as a comparison against the data value to trigger the associated Alert. This field can contain a variable sized parameter defined by the Threshold Data Format code defined above.			
15	Fields 11 to 14 Repeat as necessary	Byte Field Size: ? Bit Field Size: n	Request Parameter: Optional Command Parameter: Note 3
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.
Application Specific defined at time of use			

## Alert Value

**PGN: 126988**  
**hex: 1F00C**

The Alert Value PGN is used to convey the instantaneous value parameter directly linked with an associated Alert. This PGN is not a mandatory requirement to implement the Alert Service.

The Request Group function PGN (126208) is used to request the Alert Value PGN.

The Command Group Function PGN (126208) shall not be used with this PGN.

Note 1: When requested or commanded fields 1 thru to 5 represent a qualifier identifying the target alert or alerts. Any or all of the fields 1 thru to 5 not included as qualifiers are treated as wild cards and the request or command is applied to the remaining fields.

Note 2: Fields 6, 7 and 8 can also be used to qualify a specific request of this PGN. Fields 7 and 8 are dependent on field 6.

Single Frame: No Priority Default: 2 Default Update Rate: 10000 milliseconds Frequency: .1 cycles per second

Destination: Global Query Support: Required Command Support: Prohibited ACK Rqmnts: None

### Field # Field Name

1	Alert Type	Byte Field Size:	Request Parameter	Note 1
		Bit Field Size: 4	Command Parameter:	Prohibited

**DD315** Alert Type

0 = Reserved  
1 = Emergency Alarm  
2 = Alarm  
3 = Reserved  
4 = Reserved  
5 = Warning  
6 = Reserved  
7 = Reserved  
8 = Caution  
13 = Reserved  
14 = Data out of range  
15 = Data not available

**DF52** Bit field

bit(n) Range: Variable Resolution: 1 Used to construct bit fields

The Alert Service shall convey the Alert type as a means of identification.

2	Alert Category	Byte Field Size:	Request Parameter	Note 1
		Bit Field Size: 4	Command Parameter:	Prohibited

**DD316** Alert Category

0 = Navigational  
1 = Technical  
13 = Reserved  
14 = Data out of range  
15 = Data not available

**DF52** Bit field

bit(n) Range: Variable Resolution: 1 Used to construct bit fields

The Alert Service shall convey the Alert Category as a means of identification. Dependent on NMEA Alert Code Definition Table.

3	Alert System	Byte Field Size: 1	Request Parameter	Note 1
		Bit Field Size:	Command Parameter:	Prohibited

**DD317** Alert System

Values defined by the Alert Codes in Appendix B

**DF53** Integer, 8 bit unsigned

uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

The Alert Service shall convey the Alert System as a means of identification, which will describe the main system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.

## Alert Value

**PGN: 126988**  
**hex: 1F00C**

<b>4</b>	<b>Alert Sub-System</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i>	<b>Note 1</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	<b>Prohibited</b>
	<b>DD318</b> Alert Sub-System	Values defined by the Alert Codes in Appendix B		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	The Alert Service shall convey the Alert Sub-system as a means of identification, which will describe the sub system where the cause of the Alert has occurred. Dependent on NMEA Alert Code Definition Table.			
<b>5</b>	<b>Alert ID</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	<b>Note 1</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	<b>Prohibited</b>
	<b>DD319</b> Alert ID	Values defined by the Alert Codes in Appendix B		
	<b>DF54</b> Integer, 16 bit unsigned	<b>uint16</b>	<i>Range:</i> <b>0 to 65,532</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	The Alert Service shall convey the Alert ID as a means of describing the actual cause of an Alert. Dependent on NMEA Alert Code Definition Table.			
<b>6</b>	<b>Data Source Network ID NAME</b>	<i>Byte Field Size:</i> <b>8</b>	<i>Request Parameter</i>	<b>Note 2</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	<b>Prohibited</b>
	<b>DD320</b> Network ID NAME	This field is defined by fields 1- 10 of PGN 60928		
	<b>DF56</b> Integer, 64 bit unsigned	<b>uint64</b>	<i>Range:</i> <b>0 to (2E+64)-4</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	The Data Source 64 bit network NAME field found within PGN 060928. This is the NAME of the device providing the data that is monitored by this alert.			
<b>7</b>	<b>Data Source Instance</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i>	<b>Note 2</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	<b>Prohibited</b>
	<b>DD128</b> Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	The Data Source Instance identifies either the Device Instance or the Data Instance (as applicable) of the source of data monitored by this Alert. This parameter is used in conjunction with the Data Source Network ID and the Data Source Index to uniquely identify Alerts of the same type, from the same source but from using a different input or sensor to generate the Alert. If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			
	Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).			



## Alert Value

PGN: 126988

hex: 1F00C

## 8 Data Source Index / Source

Byte Field Size: 1  
Bit Field Size:Request Parameter: Note 2  
Command Parameter: Prohibited

DD128 Generic instance

0 = Instance 0  
1 = Instance 1  
2 = Instance 2  
n = Instance n, where n < 253  
253 = Reserved  
254 = Error  
255 = Not available

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

The Data Source Index is an index into a set of data associated with the same Data Source Instance. If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.

Note: Refer to Alert Codes(Appendix B) & Alert Application Notes (Appendix D).

## 9 Alert Occurrence Number

Byte Field Size: 1  
Bit Field Size:Request Parameter: Optional  
Command Parameter: Prohibited

DD006 Generic counter, short

Numeric count, event counter, sequence counter

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

The parameter is a number starting at zero and incremented by one for each occurrence of the same Alert.

## 10 Total Number of Value Parameters

Byte Field Size: 1  
Bit Field Size:Request Parameter: Optional  
Command Parameter: Prohibited

DD006 Generic counter, short

Numeric count, event counter, sequence counter

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

This field contains a parameter that defines the total number of value parameters used to trigger the alert.

## 11 Value Parameter Number

Byte Field Size: 1  
Bit Field Size:Request Parameter: Optional  
Command Parameter: Prohibited

DD005 Generic numeric ID, short

Number of route, waypoint, event, mark, etc.

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

This field defines numerically which parameter is to follow up to a maximum of the total value parameters.

## 12 Value Data Format

Byte Field Size: 1  
Bit Field Size:Request Parameter: Optional  
Command Parameter: Prohibited

DD340 Value Data Format

As an example to reference an unsigned high voltage (DF96), the Threshold Data format would be decimal 96. Range 0 to 252.

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

This field contains the NMEA Network Message data format code used to define the value data below.

## 13 Value Data

Byte Field Size: ?  
Bit Field Size:Request Parameter: Optional  
Command Parameter: Prohibited

DD341 Value Data

The value data range is defined by the value data format. The Value data is the dynamic parameter used to trigger the alert.

DF00 Undefined Undefined Range: undefined Resolution: undefined Application specific, defined at time of use.

This field contains the value data that compared against the threshold level to trigger the associated Alert. This field can contain a variable sized parameter defined by the Value Data Format code defined above.

14	Fields 11 to 13 Repeat as necessary	Byte Field Size: ?	Request Parameter	Optional
		Bit Field Size: n	Command Parameter:	Prohibited
	DD000	Undefined		
	DF00	Undefined	Undefined Range: undefined	Resolution: undefined
	Application Specific defined at time of use			
	Application specific, defined at time of use.			

## System Time

**PGN: 126992**  
**hex: 1F010**

The purpose of this parameter group is to provide a regular transmission of UTC time and date, with minimal latency. Optionally, the transmission of this parameter group may use the SID to provide synchronism for measurement data in other parameter groups from the same source address. The default update rate for this PGN is only applicable when sending the current UTC time and date independently, otherwise the update rate will be determined by the update rate of the PGN(s) related by the SID.

Single Frame: **Yes** Priority Default: **3** Default Update Rate: **1000** milliseconds Frequency: **1.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Prohibited** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Note 1</b> Command Parameter: <b>Prohibited</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Source</b>	Byte Field Size: Bit Field Size: <b>4</b>	Request Parameter: <b>Note 1</b> Command Parameter: <b>Prohibited</b>
<b>DD066</b>	Time Source	<p>0x0 = GPS, 0x1 = GLONASS, 0x2 = WWV or equivalent Radio Station Time Sync, 0x3 = Local Cesium clock, 0x4 = Local Rubidium clock, 0x5 = Local Crystal clock, 0x6 - 0xE = reserved, 0xF = Null</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>3</b>	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: <b>resv 4</b>	Request Parameter: Command Parameter:
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Used to align subsequent data on a byte boundary.			
<b>4</b>	<b>Date</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Note 1</b> Command Parameter: <b>Optional</b>
<b>DD039</b>	Generic date	Days since January 1, 1970, Date is relative to UTC Time.	
<b>DF41</b>	Date, day count	<b>uint16</b> Range: <b>0 to 65,532 days</b> Resolution: <b>1 day</b>	0 = January 1, 1970, max = ~179 years

5	Time	Byte Field Size: 4	Request Parameter	Note 1
		Bit Field Size:	Command Parameter:	Optional
DD158	Generic time of day	24 hour clock, 0 = midnight, time is in UTC		
DF06	Time of day	uint32	Range: 0 to 86,401 s	Resolution: 1x10E-4 s
				~24 hours, 0 = midnight, range allows for up to two leap seconds per day

## Heartbeat

PGN: 126993

hex: 1F011

This PGN shall be transmitted by all NMEA devices.

Reception of this PGN confirms that a device is still present on the network.

Reception of this PGN may also be used to maintain an address to NAME association table within the receiving device.

The transmission interval may be used by the receiving unit to determine the time-out value for the connection supervision.

The value contained in Field 1 of this PGN reflects the PGN's current Transmission Interval. Changes to this PGN's Transmission Interval shall be reflected in Field 1.

The transmission interval can only be changed by using the Request Group Function PGN 126208 with no pairs of request parameters provided. Field 3 of the Request Group Function PGN 126208 may contain values between 1,000ms and 60,000ms.

This PGN cannot be requested by the ISO Request PGN 059904 or Request Group Function PGN 126208. In Request Group Function PGN 126208, setting Field 3 to a value of 0xFFFF FFFF and Field 4 to a value of 0xFFFF: "Transmit now without changing timing variables." is prohibited.

The Command Group Function PGN 126208 shall not be used with this PGN.

Fields 3 and 4 of this PGN provide information which can be used to distinguish short duration disturbances from permanent failures. See ISO 11898 -1 Sections 6.12, 6.13, 6.14, 13.1.1, 13.1.4, 13.1.4.3 and Figure 16 ( node status transition diagram) for additional context.

### Revisions:

20190624 - Devices that report NMEA Network Message Database Version 2.100 (and newer) in their Product Information PGN (126996) should be using a 1-millisecond resolution, per Data Dictionary #383 and Data Format #116, for Field 1 "Update Rate".

Devices that report NMEA Network Message Database Versions prior to 2.100 in their Product Information PGN (126996) should be using a 10-millisecond resolution, per Data Dictionary #036 and Data Format #66, for Field 1 "Update Rate".

Single Frame: **Y** Priority Default: **7** Default Update Rate: **60,000** milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Prohibited** Command Support: **Prohibited** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Update Rate</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Prohibited</b>
		Bit Field Size:	Command Parameter: <b>Prohibited</b>
	<b>DD383</b> Data Interval	Reporting interval in seconds. 0xFFFFD=Reserved 0xFFFFE=Error 0xFFFFF=Data not available	
	<b>DF116</b> Time Interval, .001 sec. <b>uint16</b>	Range: <b>0 - 65.532s</b>	Resolution: <b>1x10E-3 sec.</b>
Valid data range is between 1.000 sec and 60.000 sec.			
<b>2</b>	<b>Heartbeat Sequence Counter</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Prohibited</b>
		Bit Field Size:	Command Parameter: <b>Prohibited</b>
	<b>DD006</b> Generic counter, short	Numeric count, event counter, sequence counter	
	<b>DF53</b> Integer, 8 bit unsigned <b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number

## Heartbeat

PGN: 126993

hex: 1F011

### 3 Class 1 CAN Controller State

Byte Field Size:

Bit Field Size: 2

Request Parameter

Prohibited

Command Parameter:

Prohibited

DD384 CAN State

00= error active  
01= error passive  
10= bus off  
11= not available

Represents the worst state detected since the last transmission of this information.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Reflects the node state, as defined in ISO 11898-1 section 13.1.4, of the Class 1 CAN controller or the Class 2 System Instance 0 CAN controller.

### 4 Class 2 Second CAN Controller State

Byte Field Size:

Bit Field Size: 2

Request Parameter

Prohibited

Command Parameter:

Prohibited

DD384 CAN State

00= error active  
01= error passive  
10= bus off  
11= not available

Represents the worst state detected since the last transmission of this information.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Reflects the node state, as defined in ISO 11898-1 section 13.1.4, of the Class 2. System Instance 1 CAN controller.

### 5 Equipment Status

Byte Field Size:

Bit Field Size: 2

Request Parameter

Prohibited

Command Parameter:

Prohibited

DD385 Device Status

00= operational  
01= fault  
10= reserved  
11= not available

Operational = device has no active error conditions  
Fault = active error conditions exist

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

### 6 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 34

Request Parameter

Command Parameter:

DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on a byte boundary.

## Product Information

PGN: 126996

hex: 1F014

Provides product information onto the network that could be important for determining quality of data coming from this product. Each field must be provided if the data is typically available from such a product. At minimum the NMEA Network Database Version, NMEA Manufacturer's Product Code, and NMEA Certification Level must be provided.

All ISO Request (PGN 059904) requests for the Product Information parameter group shall be destination address specific (as opposed to global).

Once a node issues an ISO Request for Product Information, the node shall not issue a subsequent ISO Request for Product Information until the full response has been received for the first request or the response has timed out in accordance with ISO 11783-3, "Controller response time and time out defaults".

All NMEA Request group function (PGN 126208) requests for the Product Information parameter group without specifying request parameters shall be destination address specific (as opposed to global). Once a node issues an NMEA Request for Product Information, the node shall not issue a subsequent NMEA Request for Product Information until the full response has been received for the first request or the response has timed out in accordance with ISO 11783-3, "Controller response time and time out defaults".

Note 1: NMEA encourages manufacturers to provide the capability to support multiple NMEA Network Message database versions within their product. This provides a means for manufacturers products to retain backwards compatibility with previous versions of the database and existing legacy products.

This parameter group contains static information and therefore should not be requested periodically, but may be requested as needed.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	NMEA Network Message Database Version	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Note 1

DD007 Generic numeric ID, medium

Number of route, waypoint, event, mark, etc.

DF54 Integer, 16 bit unsigned uint16 Range: 0 to 65,532 Resolution: 1 bit Unit-less number

Defined by NMEA:

Decimal Number of the format AA.BBB where AA is the major release and BBB is a minor release. The decimal point position is assumed.

i.e. The first release of this standard is value 1000, which is to be referred to as Version 1.000

2	NMEA Manufacturer's Product Code	Byte Field Size: 2	Request Parameter	Required
		Bit Field Size:	Command Parameter:	Prohibited

DD007 Generic numeric ID, medium

Number of route, waypoint, event, mark, etc.

DF54 Integer, 16 bit unsigned uint16 Range: 0 to 65,532 Resolution: 1 bit Unit-less number

Assigned by NMEA:

Decimal Number assigned numerically to a manufacturer's product.

If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will with the unit's product code. Otherwise if this field is specified only the units with a matching product code will respond with this PGN.

## Product Information

PGN: 126996

hex: 1F014

### 3 Manufacturer's Model ID

Byte Field Size: char

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Prohibited

**DD192** Generic String, ASCII, Fixed length

Length specified by PGN field definition.

**DF63** String, fixed

**char8(n)**

**Range:** 0 to 1,785 characters

**Resolution:** 1 char

This is a n=32 character string, Format defined and documented by manufacturer. The beginning of the field should clearly define Manufacturer's Product.

0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.

### 4 Manufacturer's Software Version Code

Byte Field Size: char

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

**DD192** Generic String, ASCII, Fixed length

Length specified by PGN field definition.

**DF63** String, fixed

**char8(n)**

**Range:** 0 to 1,785 characters

**Resolution:** 1 char

This is a n=32 character string, Format defined and documented by manufacturer.

0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.

### 5 Manufacturer's Model Version

Byte Field Size: char

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Prohibited

**DD192** Generic String, ASCII, Fixed length

Length specified by PGN field definition.

**DF63** String, fixed

**char8(n)**

**Range:** 0 to 1,785 characters

**Resolution:** 1 char

This is a n=32 character string, Format defined and documented by manufacturer.

0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.

### 6 Manufacturer's Model Serial Code

Byte Field Size: char

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Prohibited

**DD192** Generic String, ASCII, Fixed length

Length specified by PGN field definition.

**DF63** String, fixed

**char8(n)**

**Range:** 0 to 1,785 characters

**Resolution:** 1 char

This is a n=32 character string, Format defined and documented by manufacturer.

0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.



## Product Information

**PGN: 126996**  
**hex: 1F014**

### 7 NMEA 2000 Certification Level

Byte Field Size: 1

Request Parameter Optional

Bit Field Size:

Command Parameter: Prohibited

**DD226** NMEA Certification Level

0 = Level A  
1 = Level B  
2 = Not Applicable

**DF53** Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

As of February 2015 and Version 2.000 of the NMEA 2000 Main Document, Certification Level Field (7) shall be set to 2 meaning "Not Applicable".

### 8 Load Equivalency

Byte Field Size: 1

Request Parameter Optional

Bit Field Size:

Command Parameter: Prohibited

**DD257** Load Equivalency Number

The "Load Equivalency Number" (LEN) is an NMEA 2000 concept. NMEA 2000 Virtual Devices shall report the value as defined in the NMEA 2000 Standard's Main Document in section 2.4.7 Interface Power. OneNet PGN Virtual Devices shall report a LEN of zero.

**DF53** Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

Free-form alphanumeric fields describing the installation (e.g., starboard engine room location) of the device and installation notes (e.g., calibration data).

All ISO Request (PGN 059904) requests for the Configuration Information parameter group shall be destination address specific (as opposed to global). Once a node issues an ISO Request for Configuration Information, the node shall not issue a subsequent ISO Request for Configuration Information until the full response has been received for the first request or the response has timed out in accordance with ISO 11783-3, "Controller response time and time out defaults".

All NMEA Request group function (PGN 126208) requests for the Configuration Information parameter group without specifying request parameters shall be destination address specific (as opposed to global). Once a node issues an NMEA Request for Configuration Information, the node shall not issue a subsequent NMEA Request for Configuration Information until the full response has been received for the first request or the response has timed out in accordance with ISO 11783-3, "Controller response time and time out defaults".

This parameter group contains static information and therefore should not be requested periodically, but may be requested as needed.

Note 1: Using this field as a request parameter is prohibited.

Single Frame: NoPriority Default: 6Default Update Rate:                      millisecondsFrequency:                      NAcycles per second

Destination: GlobalQuery Support: OptionalCommand Support: OptionalACK Rqmnts: None

Field #	Field Name					
1	Installation Description, Field 1		Byte Field Size:	8 or 16	n	Request Parameter
			Bit Field Size:			Command Parameter:
DD004	Generic name string, short		Name of place, route, waypoint, destination, vessel, vehicle, etc.			
DF50	String, variable, short	ch8or16(n)	Range:	0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution:	1 ASCII or 1 Unicode Character
	70 ASCII or 35 Unicode characters maximum					2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

## Configuration Information

PGN: 126998  
hex: 1F016

### 2 Installation Description, Field 2

Byte Field Size: 8 or 16 n  
Bit Field Size:

Request Parameter Note 1  
Command Parameter: Required

DD004 Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short

ch8or16(n) Range: 0 to 250 ASCII or  
0 to 125 Unicode  
Characters

Resolution: 1 ASCII or  
1 Unicode  
Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

70 ASCII or 35 Unicode characters maximum

### 3 Manufacturer Information, Field 3

Byte Field Size: 8 or 16 n  
Bit Field Size:

Request Parameter Note 1  
Command Parameter: Optional

DD004 Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short

ch8or16(n) Range: 0 to 250 ASCII or  
0 to 125 Unicode  
Characters

Resolution: 1 ASCII or  
1 Unicode  
Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

70 ASCII or 35 Unicode characters maximum

## Man Overboard Notification(MOB)

**PGN: 127233**

**hex: 1F101**

The MOB PGN is intended to provide notification from a MOB monitoring system. The included position information may be that of the vessel or the MOB device itself as identified in field "X", position source. Additional information may include the current state of the MOB device, time of activation, and MOB device battery status.

This PGN may be used to set a MOB waypoint, or to initiate an alert process.

This PGN may be used to command or register a MOB device emitter Ids or other applicable fields in the message with an MOB System or other equipment. If the fields in this PGN are configured over the network, the Command Group Function (PGN 126208) shall be used.

Queries for this PGN shall be requested using either the ISO Request (PGN 059904) or the NMEA Request Group Function (PGN 126208).

A device receiving an ISO (PGN 059904) for this PGN (127233), shall respond by providing as many of these PGNs (127233) as necessary for every MOB Emitter ID that has associated data fields.

If a Request Group Function (PGN 126208) requesting this PGN (127233) is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 055904) described above.
- If the Request Group Function (PGN 126208) includes the MOB Emitter ID field or MOB Status field, then the response shall be filtered by these fields contained within this request resulting in one or more PGN (127233) responses.

If the MOB Emitter ID requested is not considered a valid MOB Emitter ID by the receiving device, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) of "0x3 = Access denied." And the requested MOB Emitter ID field parameter error code (Field 6) of "0x3 = Requested or command parameter out-of-range;".

The Default update rate of this PGN is autonomous, as it is dependent upon notification rates of MOB devices.

Single Frame: **N** Priority Default: **3** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

Field # Field Name

# Man Overboard Notification(MOB)

PGN: 127233

hex: 1F101

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD056 Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
2	MOB Emitter ID	Byte Field Size: 4	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292 Resolution: 1 bit Unit-less number
	This provides a unique Identifier for each MOB emitter (MOB emitter is unique to the vessel)		
3	Man Overboard (MOB) Status	Byte Field Size:	Request Parameter: Required
		Bit Field Size: 3	Command Parameter: Optional
	DD369 Man Over Board (MOB) Status	<p>0=MOB Emitter Activated</p> <p>1=Manual on-board MOB Button Activation</p> <p>2=Test Mode</p> <p>3=MOB Not in Use</p> <p>4 - 5=Reserved</p> <p>6=Error</p> <p>7=Unknown/ Unavailable</p>	
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
4	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 5	Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
	Used to align subsequent data on a byte boundary.		
5	UTC Time of MOB Activation	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD158 Generic time of day	24 hour clock, 0 = midnight, time is in UTC	
	DF06 Time of day	uint32	Range: 0 to 86,401 s Resolution: 1x10E-4 s ~24 hours, 0 = midnight, range allows for up to two leap seconds per day
	UTC of MOB activation provides the time of the initial MOB device activation.		

# Man Overboard Notification(MOB)

PGN: 127233

hex: 1F101

6	Position Source			Byte Field Size:	3	Request Parameter	Optional	
				Bit Field Size:		Command Parameter:	Optional	
	DD370	Position Source				Identifies the source of the position information 0=MOB Position estimated by the Vessel 1=MOB position reported by MOB emitter 2-5= Reserved 6=Error 7=Unknown / Unavailable		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
7	NMEA Reserved			Byte Field Size:		Request Parameter		
				Bit Field Size:	resv 5	Command Parameter:		
	DD001	Reserved field				Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.							
8	UTC Date of Position			Byte Field Size:	2	Request Parameter	Optional	
				Bit Field Size:		Command Parameter:	Optional	
	DD039	Generic date				Days since January 1, 1970, Date is relative to UTC Time.		
	DF41	Date, day count	uint16	Range:	0 to 65,532 days	Resolution:	1 day	0 = January 1, 1970, max = ~179 years
9	UTC Time of Position			Byte Field Size:	4	Request Parameter	Optional	
				Bit Field Size:		Command Parameter:	Optional	
	DD158	Generic time of day				24 hour clock, 0 = midnight, time is in UTC		
	DF06	Time of day	uint32	Range:	0 to 86,401 s	Resolution:	1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
	The UTC of position provides the time of the position information.							
10	Latitude			Byte Field Size:	4	Request Parameter	Optional	
				Bit Field Size:		Command Parameter:	Optional	
	DD022	Latitude, WGS-84				Latitude referenced to WGS-84.		
	DF23	Latitude	int32	Range:	+/- 90 deg	Resolution:	1x10E-7 deg	"-" = South, resolution ~1.1 cm
11	Longitude			Byte Field Size:	4	Request Parameter	Optional	
				Bit Field Size:		Command Parameter:	Optional	
	DD023	Longitude, WGS-84				Longitude referenced to WGS-84.		
	DF25	Longitude	int32	Range:	+/- 180 deg	Resolution:	1x10E-7 deg	"-" = West, resolution ~1.1 cm

# Man Overboard Notification(MOB)

PGN: 127233

hex: 1F101

12	Course over ground Reference	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
DD117	Direction reference	0 = True, 1 = Magnetic, 2 = Error, 3 = Null	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
13	NMEA Reserved	Byte Field Size: 6 Bit Field Size: resv 6	Request Parameter: Optional Command Parameter: Optional
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
14	Course over ground	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
DD165	Course-Over-Ground (COG)	The direction of the path over ground actually followed by a vessel.	
DF02	Angle	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
15	Speed over ground	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
DD044	Generic Speed		
DF35	Speed	uint16 Range: 0 to 655.32 m/s Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s
16	MMSI of vessel of Origin	Byte Field Size: 4 Bit Field Size: 4	Request Parameter: Optional Command Parameter: Optional
DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
DF55	Integer, 32 bit unsigned	uint32 Range: 0 to 4,294,967,292 Resolution: 1 bit	Unit-less number
The MMSI number of the ship of origin may be set to 2,147,483,647 if unknown.			
17	MOB Emitter Battery Status	Byte Field Size: 3 Bit Field Size: 3	Request Parameter: Optional Command Parameter: Optional
DD371	Battery Status	0=Good 1=Low 2-5=Reserved 6=Error 7=Data not available	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
18	NMEA Reserved	Byte Field Size: 5 Bit Field Size: resv 5	Request Parameter: Optional Command Parameter: Optional
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.			

## Heading/Track Control

**PGN: 127237**  
**hex: 1F105**

Sends Commands to, and receives data from, heading control systems. Allows for navigational (remote) control of a heading control system and direct rudder control. When used as a command, the Commanded Rudder Direction field and the Commanded Rudder Angle should never contain order values at the same time.

Single Frame: **No** Priority Default: **2** Default Update Rate: **250** milliseconds Frequency: **4** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Rudder Limit Exceeded</b>	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: <b>2</b>	Command Parameter:	Prohibited
<b>DD002</b>	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
<b>DF52</b>	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
<b>2</b>	<b>Off-Heading Limit Exceeded</b>	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: <b>2</b>	Command Parameter:	Prohibited
<b>DD002</b>	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
<b>DF52</b>	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
Off-Heading Limit field can be generated if the Steering Mode is Heading Control Standalone, Heading Control, or Track Control.				
<b>3</b>	<b>Off-Track Limit Exceeded</b>	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: <b>2</b>	Command Parameter:	Prohibited
<b>DD002</b>	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
<b>DF52</b>	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
Off-Track Limit field can be generated if the Steering Mode is Track Control.				
<b>4</b>	<b>Override</b>	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: <b>2</b>	Command Parameter:	Prohibited
<b>DD163</b>	Autopilot Override	1 = Yes, 0 = No. Yes means a temporary interruption of the selected steering mode. As long as this field is Yes, Steering Mode and Turn Mode shall be ignored by the heading/track controller and its computing parts shall operate as if manual steering was selected.		
<b>DF52</b>	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	



## Heading/Track Control

PGN: 127237

hex: 1F105

5	Steering Mode			Byte Field Size:		Request Parameter	Optional	
				Bit Field Size:	3	Command Parameter:	Prohibited	
	DD153	Steering Mode			MSB/LSB: 000 = Main Steering, 001 = Non-Follow-up Device, 010 = Follow-up Device, 011 = Heading Control Standalone, 100 = Heading Control, 101 = Track Control. Definitions: Main Steering/Outside System – The main steering system is in use. Non-Follow-up Device – The system provides non-follow-up control. Rudder is moved in the commanded direction but a specific angle is not maintained. Follow-up – The system provides follow-up control. Rudder is moved to the commanded angle and maintained at that angle. Heading Control Standalone – The system works as a standalone heading controller. Heading Control – The system works as a remotely controlled heading controller with the commanded course input from an external device. Track Control – The system works as a track controller by correcting a commanded course. Corrections are based on additionally received track errors.			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
6	Turn Mode			Byte Field Size:		Request Parameter	Optional	
				Bit Field Size:	3	Command Parameter:	Prohibited	
	DD152	Turn Method			MSB/LSB: 000 = Rudder Limit controlled, 001 = turn rate controlled, 010 = radius controlled. Definitions: Rudder – An operator set rudder limit determines the maximum turning capability available, in which case the system outputs rudder orders up to and limited by the rudder limit. Turn Rate – An operator set turn rate limit determines the maximum turning capability available, in which case the system controls the rate of turn using whatever value of rudder order is necessary to control the rate. Radius – An operator set turn radius determines the maximum turning capability available which in this case is described as the minimum turn radius, in which case the system controls the rate of turn corresponding to the set turn radius.			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
7	Heading Reference			Byte Field Size:		Request Parameter	Optional	
				Bit Field Size:	2	Command Parameter:	Prohibited	
	DD117	Direction reference			0 = True, 1 = Magnetic, 2 = Error, 3 = Null			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
8	NMEA Reserved			Byte Field Size:		Request Parameter		
				Bit Field Size:	resv 5	Command Parameter:		
	DD001	Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.							

# Heading/Track Control

PGN: 127237

hex: 1F105

9	Commanded Rudder Direction	Byte Field Size: 3 Bit Field Size: 3	Request Parameter: Optional Command Parameter: Optional
DD147	Directional Command	MSB/LSB: 000 = No Order, 001 = Move to starboard, 010 = Move to port.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
10	Commanded Rudder Angle	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
DD146	Rudder Angle Signed	Rudder angle where positive values are starboard and negative values are port	
DF04	Angle, signed	int16 Range: +/-Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg
11	Heading-To-Steer (Course)	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
DD113	Course	The horizontal direction in which a vessel is steered or intended to be steered, expressed as angular distance 000 north, clockwise through 359 degrees. Not to be confused with Course-over-ground, Track, or Heading.	
DF02	Angle	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
12	Track	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
DD166	Track	The intended or desired horizontal direction of travel with respect to the earth. The track expressed in degrees of the compass may differ from the course due to allowances made in the course for such factors as sea and weather conditions in order to achieve the desired track. This field represents the course line (leg) between two waypoints. It may be altered dynamically in a track-controlled turn along a pre-planned radius.	
DF02	Angle	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
13	Rudder Limit	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Prohibited
DD148	Angular Limit		
DF02	Angle	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
14	Off-Heading Limit	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Prohibited
DD148	Angular Limit		
DF02	Angle	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
Off-Heading Limit field can be generated if the Steering Mode is Heading Control Standalone, Heading Control, or Track Control.			
15	Radius of Turn Order	Byte Field Size: 2 Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
DD149	Distance ordered	A commanded distance like radius order, off-track limit, etc.	
DF74	Distance, rough	int16 Range: +/-32,764 m Resolution: 1 m	

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## Heading/Track Control

PGN: 127237

hex: 1F105

16	Rate of Turn Order	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD150	Rate of Turn	+ = Bow turning to starboard, 1 deg/min = .00029 rad/sec	
DF73	Angular rate, signed	int16 Range: +/-1.0 rad/s	Resolution: 1/32 x 10E-3 rad/s Resolution 0.1 deg/min
17	Off-Track Limit	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
DD149	Distance ordered	A commanded distance like radius order, off-track limit, etc.	
DF74	Distance, rough	int16 Range: +/-32,764 m	Resolution: 1 m
Off-Track field can be generated if the Steering Mode is Track Control.			
18	Vessel Heading	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
DD167	Heading	The horizontal direction in which a ship actually points or heads at any instant, expressed in angular units from a reference direction, usually from 000 at the reference direction clockwise through 359 degrees.	
DF02	Angle	uint16 Range: 0 to 2Pi rad	Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad

# Rudder

**PGN: 127245**  
**hex: 1F10D**

Rudder order command in direction or angle with current rudder angle reading. The Direction Order field is for non-follow-up rudder orders and the Angle Order field is for follow-up rudder orders. When used as a command, the Direction Order field and the Angle Order field shall never contain order values at the same time. The Position should be set to 'Data Not Available' unless the unit which sources the command also sources the current angle. When used as a feedback from the rudder, the commanded rudder may be returned together with the current rudder angle reading. It is recommended to send both the commands and the current rudder angle messages at fixed intervals. The unit which controls the rudder should monitor the reception of rudder angle messages.

Single Frame: **Yes** Priority Default: **2** Default Update Rate: **100** milliseconds Frequency: **10.** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts: **None**

## Field # Field Name

<b>1</b>	<b>Rudder Instance</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Required</b>
<b>DD128</b>	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
<b>DF53</b>	Integer, 8 bit unsigned	uint8 Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
If this field is not specified in the "Request Group Function" or an ISO Request is made of this PGN, the response will be with all defined Rudder Instances. (This PGN will be transmitted for each instance.) If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			
<b>2</b>	<b>Direction Order</b>	Byte Field Size: Bit Field Size: <b>3</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD147</b>	Directional Command	MSB/LSB: 000 = No Order, 001 = Move to starboard, 010 = Move to port.	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Value should be "Not Available" when Angle Order is provided.			
<b>3</b>	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: <b>resv 5</b>	Request Parameter: Command Parameter:
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Used to align subsequent data on a byte boundary.			
<b>4</b>	<b>Angle Order</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD146</b>	Rudder Angle Signed	Rudder angle where positive values are starboard and negative values are port	
<b>DF04</b>	Angle, signed	int16 Range: <b>+/-Pi rad</b> Resolution: <b>1x10E-4 rad</b>	Resolution ~0.0057deg
Value should be "Not Available" when Direction Order is provided.			
<b>5</b>	<b>Position</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Prohibited</b>
<b>DD146</b>	Rudder Angle Signed	Rudder angle where positive values are starboard and negative values are port	
<b>DF04</b>	Angle, signed	int16 Range: <b>+/-Pi rad</b> Resolution: <b>1x10E-4 rad</b>	Resolution ~0.0057deg

Rudder

PGN: 127245  
hex: 1F10D

6	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 16	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to align subsequent data on a byte boundary.		Used to construct bit fields		

## Vessel Heading

PGN: 127250

hex: 1F112

Heading sensor value with a flag for True or Magnetic.

If the sensor value is Magnetic, the deviation field can be used to produce a Magnetic heading, and the variation field can be used to correct the Magnetic heading to produce a True heading.

To obtain Magnetic Heading from the Heading Sensor Reading: Add Deviation to Heading Sensor Reading. To obtain True Heading: Add Variation to Magnetic Heading. The Heading Sensor Reading may or may not be corrected for Deviation and the Deviation field set to 'Data Not Available'. (A fluxgate compass may be compensated for Deviation without being able to produce the Deviation corresponding to every Heading)

If the Heading sensor does not provide Variation by itself, it shall set the value to 'Data Not Available'. A source which provides Magnetic Variation only, should use PGN 127258 Magnetic Variation.

Variation provided in this PGN is the one currently in use by this device. If this device is also a source of variation, it should also transmit Magnetic Variation PGN 127258. A steering compass must send rapidly, a second backup compass may send at a slower rate, a Variation only source may send this at a slow rate. A deviation table may be programmed into the compass using the Command Group Function (PGN 126208) message and sending Heading Sensor Reading and Deviation for each entry of the table.

Single Frame: Yes Priority Default: 2 Default Update Rate: 100 milliseconds Frequency: 10. cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
	DD056 Sequence ID	Bit Field Size:	Command Parameter: Optional
	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.		
	0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)		
	253 - 254 = reserved for future use		
	255 = No binding provided. NMEA recommends using binding SID values whenever practical.		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
2	Heading Sensor Reading	Byte Field Size: 2	Request Parameter: Optional
	DD118 Heading Sensor Reading	Bit Field Size:	Command Parameter: Optional
	Primary output of heading as indicated by the heading sensor.		
	DF02 Angle	uint16 Range: 0 to 2Pi rad	Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
3	Deviation	Byte Field Size: 2	Request Parameter: Optional
	DD151 Magnetic Heading Correction	Bit Field Size:	Command Parameter: Optional
	Positive values are Easterly and negative values are Westerly.		
	DF04 Angle, signed	int16 Range: +/-Pi rad	Resolution: 1x10E-4 rad Resolution ~0.0057deg

## Vessel Heading

PGN: 127250

hex: 1F112

4	Variation		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD151	Magnetic Heading Correction	Positive values are Easterly and negative values are Westerly.			
	DF04	Angle, signed	int16	Range: +/-Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg
5	Heading Sensor Reference		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Optional
	DD117	Direction reference	0 = True, 1 = Magnetic, 2 = Error, 3 = Null			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
6	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 6	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.					

## Rate of Turn

PGN: 127251

hex: 1F113

Rate of Turn is the rate of change of the Heading. Heading is defined as the direction of the vertical projection of the fore-and-aft line of the ship onto the horizontal plane.

Single Frame: **Yes** Priority Default: **2** Default Update Rate: **100** milliseconds Frequency: **10.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Rate of Turn</b>	Byte Field Size: <b>4</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD224</b>	Rate of Turn	+ = Bow turning to starboard, 1 deg/min = .00029 rad/sec	
<b>DF85</b>	Angular rate, signed - Pre	<b>int32</b> Range: <b>+/-67.0 rad/s (approx. 230703 deg/min)</b> Resolution: <b>1/32 x 10E-6 rad/s</b>	
<b>3</b>	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: <b>resv 24</b>	Request Parameter: Command Parameter:
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Used to align subsequent data on a byte boundary.			



## Heave

PGN: 127252

hex: 1F114

The Heave PGN reports the vertical distance perpendicular to (smooth, wave-free water on) the earth's surface.

The vertical distance is the height that a vessel is lifted by the crest of a wave (-), or the depth that a vessel drops in the trough of a wave (+).

This convention conforms to the North-East-Down(NED) coordinate system, which is also referred to as positive down. Heave measurements can be used by a sounder to remove the effects of waves (heave) from the data presented on its display.

Field 3 may be configured over the network.

The Command Group Function (PGN126208) shall be used for any configuration of this PGN.

Note 1: Field 3 command support is optional. If it is supported, the sensor may accept a command to change the source of the delay value: 1) Change the delay to one of the manufacturer's preset values, or 2) Change the delay to a user defined value

Single Frame: **Y** Priority Default: **3** Default Update Rate: **100** milliseconds Frequency: **10.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

1	Sequence ID	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
DD056	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
		253 - 254 = reserved for future use	
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
DF53	Integer, 8 bit unsigned	uint8 Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
2	Heave	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
DD372	Heave	Vertical displacement perpendicular to (smooth, wave-free water on) the earth's surface. The height that a vessel is lifted by the crest of a wave (-), or the depth that a vessel drops in the trough of a wave (+). This convention conforms to the North-East-Down(NED) coordinate system, which is also referred to as positive down.	
DF14	Distance, short, signed	int16 Range: <b>+/-327.64 m</b>	Resolution: <b>1x10E-2 m</b>

**3 Delay**Byte Field Size: **2**

Request Parameter: Optional

Bit Field Size:

Command Parameter: Note 1

**DD373** Delay

Delay added by calculations.

When commanded:

0x0000 - 0xffff = Value within valid uint16 range

0xffffa = Set minimum value

0xffffb = Set maximum value

0xffffc = Restore Factory Defaults

**DF66** Time interval, .01sec**uint16**

Range: 0 to 655.32s

Resolution: 1x10E-2sec

The delay parameter is optional. If not supported, it must be transmitted as Data Not Available. Commanding this field may allow the sensor to fine tune its calculations given more or less time than its default setting.

**4 Delay Source**

Byte Field Size:

Request Parameter: Optional

Bit Field Size: **4**

Command Parameter: Optional

**DD374** Measurement Delay Source

0 = User Defined

1 = Minimum Supported Value

2 = Factory Default Value

3 = Maximum Supported Value

4 thru 13 = Reserved

14 = Data out of range

15 = Data not available

**DF52** Bit field**bit(n)**

Range: Variable

Resolution: 1

Used to construct bit fields

This field is used to report the source of the time delay value in field 3 in this PGN.

**5 NMEA Reserved**

Byte Field Size:

Request Parameter:

Bit Field Size: **resv 20**

Command Parameter:

**DD001** Reserved field

Variable number of reserved bits, all set to logic "1"

**DF52** Bit field**bit(n)**

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on a byte boundary.

## Attitude

**PGN: 127257**  
**hex: 1F119**

This PGN provides a single transmission that describes the position of a vessel relative to both horizontal and vertical planes. This would typically be used for vessel stabilization, vessel control and onboard platform stabilization. Products that directly interface to pitch, roll and yaw transducers would transmit this PGN

Single Frame: **Yes** Priority Default: **3** Default Update Rate: **1000** milliseconds Frequency: **1.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>		Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
			Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD056</b> Sequence ID		An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
			0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
			253 - 254 = reserved for future use	
			255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
<b>2</b>	<b>Yaw</b>		Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
			Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD063</b> Yaw		Oscillation of ship about it's vertical axis. Bow moving to starboard is positive.	
	<b>DF04</b> Angle, signed	<b>int16</b>	Range: <b>+/-Pi rad</b>	Resolution: <b>1x10E-4 rad</b> Resolution ~0.0057deg
<b>3</b>	<b>Pitch</b>		Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
			Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD062</b> Pitch		Oscillation of ship about it's latitudinal axis. Bow moving up is positive.	
	<b>DF04</b> Angle, signed	<b>int16</b>	Range: <b>+/-Pi rad</b>	Resolution: <b>1x10E-4 rad</b> Resolution ~0.0057deg
<b>4</b>	<b>Roll</b>		Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
			Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD061</b> Roll		Oscillation of ship about it's longitudinal axis. Roll to the starboard is positive.	
	<b>DF04</b> Angle, signed	<b>int16</b>	Range: <b>+/-Pi rad</b>	Resolution: <b>1x10E-4 rad</b> Resolution ~0.0057deg
	Roll to starboard is positive +/- 180 degrees			
<b>5</b>	<b>NMEA Reserved</b>		Byte Field Size:	Request Parameter:
			Bit Field Size: <b>resv 8</b>	Command Parameter:
	<b>DD001</b> Reserved field		Variable number of reserved bits, all set to logic "1"	
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields
	Used to align subsequent data on a byte boundary.			

## Magnetic Variation

**PGN: 127258**  
**hex: 1F11A**

Message for transmitting variation. The message contains a sequence number to allow synchronization of other messages such as Heading or Course over Ground. The quality of service and age of service are provided to enable recipients to determine an appropriate level of service if multiple transmissions exist.

Single Frame: **Yes** Priority Default: **6** Default Update Rate: **1000** milliseconds Frequency: **1.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Variation Source</b>	Byte Field Size: Bit Field Size: <b>4</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD232</b>	Variation Source	<p>0x00 = Manual Entry, "Variation has been entered via key entry"</p> <p>0x01 = Automatic - Chart, "Variation is derived from cartography present in system"</p> <p>0x02 = Automatic Table, "Variation has been computed from tabular based system"</p> <p>0x03 = Automatic Calculation, "Variation has been derived via calculation"</p> <p>0x04 = WMM 2000, "Variation is calc via World Magnetic Model for 2000"</p> <p>0x05 = WMM 2005, "Variation is calc via World Magnetic Model for 2005"</p> <p>0x06 = WMM 2010, "Variation is calc via World Magnetic Model for 2010"</p> <p>0x07 = WMM 2015, "Variation is calc via World Magnetic Model for 2015"</p> <p>0x08 = WMM 2020, "Variation is calc via World Magnetic Model for 2020"</p> <p>0x09 = Reserved, thru</p> <p>0x0E = Reserved,</p> <p>0x0F = Data Not Available</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>3</b>	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: <b>resv 4</b>	Request Parameter: Command Parameter:
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Used to align subsequent data on a byte boundary.			

## Magnetic Variation

PGN: 127258

hex: 1F11A

4	Age of Service (Date)	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD039	Generic date	Days since January 1, 1970, Date is relative to UTC Time.	
DF41	Date, day count	uint16 Range: 0 to 65,532 days Resolution: 1 day	0 = January 1, 1970, max = ~179 years
5	Variation	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD151	Magnetic Heading Correction	Positive values are Easterly and negative values are Westerly.	
DF04	Angle, signed	int16 Range: +/-Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg
6	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 16	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.			

## Engine Parameters, Rapid Update

PGN: 127488

hex: 1F200

Provides data with a high update rate for a specific engine in a single frame message. The first field provides information as to which engine. This PGN if used with PGN 127489 will provide most Engine data.

Single Frame: **Yes** Priority Default: **2** Default Update Rate: **100** milliseconds Frequency: **10.** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Engine Instance</b>	Byte Field Size:		Request Parameter	<b>Required</b>
		Bit Field Size:	<b>8</b>	Command Parameter:	<b>Optional</b>
	<b>DD410</b> Engine / Transmission Instance	This data instance field should be enumerated beginning on the Port side with instance number 0 and incrementing towards Starboard. Devices in Propulsion Class 50 and Function Code 140 should be the first enumeration sequence (i.e. 0, 1, 2, 3, ...n) prior to moving to a different Class and Function Code. Devices of the other Class and Function Code should continue the enumeration sequence (i.e. n+1, n+2,...).			
	<b>DF52</b> Bit field	bit(n)	Range: <b>Variable</b>	Resolution: <b>1</b>	Used to construct bit fields
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Engine Instances. (This PGN will be transmitted for each instance.) If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.				
<b>2</b>	<b>Engine Speed</b>	Byte Field Size:	<b>2</b>	Request Parameter	<b>Optional</b>
		Bit Field Size:		Command Parameter:	<b>Optional</b>
	<b>DD129</b> Rate of rotation				
	<b>DF72</b> Rotational rate, unsigned	uint16	Range: <b>0-16,383 RPM</b>	Resolution: <b>1/4 RPM</b>	
<b>3</b>	<b>Engine Boost Pressure</b>	Byte Field Size:	<b>2</b>	Request Parameter	<b>Optional</b>
		Bit Field Size:		Command Parameter:	<b>Optional</b>
	<b>DD049</b> Generic Pressure				
	<b>DF47</b> Pressure, medium	uint16	Range: <b>0 to 6,553,200 Pa</b>	Resolution: <b>1x10E+2 Pa</b>	
<b>4</b>	<b>Engine tilt/trim</b>	Byte Field Size:	<b>1</b>	Request Parameter	<b>Optional</b>
		Bit Field Size:		Command Parameter:	<b>Optional</b>
	<b>DD138</b> Generic percent of range				
	<b>DF30</b> Percent, Relative measure	int8	Range: <b>+/- 124%</b>	Resolution: <b>1%</b>	
	Range 0 - 100%, where 0% =Full Down (trim) and 100% = Full Up (tilt) Positions				
<b>5</b>	<b>NMEA Reserved</b>	Byte Field Size:		Request Parameter	
		Bit Field Size:	<b>resv 16</b>	Command Parameter:	
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"			
	<b>DF52</b> Bit field	bit(n)	Range: <b>Variable</b>	Resolution: <b>1</b>	Used to construct bit fields
	Used to align subsequent data on a byte boundary.				

## Engine Parameters, Dynamic

PGN: 127489

hex: 1F201

Used to provide real-time operational data and status relevant to a specific engine, indicated by the engine instance field. This message would normally be broadcasted periodically to provide information for instrumentation or control functions.

The Engine Discrete Status 1 and Engine Discrete Status 2 fields (11 and 12) are required and may not be transmitted as unavailable.

Reserved bits in these two fields shall be set to 0.

For example, if a sensor is not provided to detect water in the fuel, a 0 shall be placed in the corresponding bit position; If a sensor is provided to detect water in the fuel and water in the fuel is not indicated a 0 shall be placed in the bit position; The only time that a 1 is placed in the bit position is when both a sensor is provided to detect water in the fuel, and water in the fuel is indicated.

Single Frame: No Priority Default: 2 Default Update Rate: 500 milliseconds Frequency: 2. cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Engine instance	Byte Field Size:	Request Parameter	Required	
		Bit Field Size: 8	Command Parameter:	Optional	
DD410	Engine / Transmission Instance	This data instance field should be enumerated beginning on the Port side with instance number 0 and incrementing towards Starboard. Devices in Propulsion Class 50 and Function Code 140 should be the first enumeration sequence (i.e. 0, 1, 2, 3, ...n) prior to moving to a different Class and Function Code. Devices of the other Class and Function Code should continue the enumeration sequence ( i.e. n+1, n+2,...).			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Engine Instances. (This PGN will be transmitted for each instance.) If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.					
2	Engine oil pressure	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Prohibited	
DD049	Generic Pressure				
DF47	Pressure, medium	uint16	Range: 0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa	
3	Engine oil temp.	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Prohibited	
DD130	Temperature, high				
DF38	Temperature, high	uint16	Range: 0 to 6,553.2 deg K	Resolution: 1x10E-1 deg K	0.01° Kelvin
4	Engine temp.	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Prohibited	
DD043	Generic Temperature				
DF39	Temperature, low	uint16	Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K	
5	Alternator potential	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Prohibited	
DD136	Voltage, DC				
DF42	Voltage, high	int16	Range: +/- 327.64 V	Resolution: 1x10E-2 V	

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# Engine Parameters, Dynamic

PGN: 127489

hex: 1F201

6	Fuel rate		Byte Field Size: 2	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Prohibited
DD131	Flow rate, low				
DF18	Flow rate, low	int16	Range: +/-3.2764 cu-m/hr	Resolution: 1x10E-4 cu-m/hr	
7	Total engine hours		Byte Field Size: 4	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Optional
DD132	Run time, Engine				
DF67	Time interval, large	uint32	Range: 0 to ~4.295x10E+9 s	Resolution: 1 sec	
8	Engine coolant pressure		Byte Field Size: 2	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Prohibited
DD049	Generic Pressure				
DF47	Pressure, medium	uint16	Range: 0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa	
9	Fuel Pressure		Byte Field Size: 2	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Prohibited
DD225	Generic Pressure High				
DF29	Pressure	uint16	Range: 0 to 65,532,000 Pa	Resolution: 1x10E+3 Pa	
10	Not Available		Byte Field Size:	Request Parameter	
			Bit Field Size: resv 8	Command Parameter:	
DD001	Reserved field		Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Previously assigned Engine tilt/trim, moved to PGN 127488 field 4 for faster update rate. This value to be always set to +127 (Not Available) until future reuse.					
11	Engine Discrete Status 1		Byte Field Size:	Request Parameter	Optional
			Bit Field Size: 16	Command Parameter:	Prohibited
DD206	Engine Discrete Warning Status		xxxx xxxx xxxx xxx1 = Check Engine, xxxx xxxx xxxx xx1x = Over Temperature, xxxx xxxx xxxx x1xx = Low Oil Pressure, xxxx xxxx xxxx 1xxx = Low Oil Level, xxxx xxxx xxx1 xxxx = Low Fuel Pressure, xxxx xxxx xx1x xxxx = Low System Voltage, xxxx xxxx x1xx xxxx = Low Coolant Level, xxxx xxxx 1xxx xxxx = Water Flow, xxxx xxx1 xxxx xxxx = Water in Fuel, xxxx xx1x xxxx xxxx = Charge Indicator, xxxx x1xx xxxx xxxx = Preheat Indicator, xxxx 1xxx xxxx xxxx = High Boost Pressure, xxx1 xxxx xxxx xxxx = Rev Limit Exceeded, xx1x xxxx xxxx xxxx = EGR System, x1xx xxxx xxxx xxxx = Throttle Position Sensor, 1xxx xxxx xxxx xxxx = Engine Emergency Stop Mode where x = don't care		
Inactive states shall be transmitted as 0. Reserved and unsupported bits within the field shall be transmitted as 0.					
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields



12	Engine Discrete Status 2			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	16	Command Parameter:	Prohibited
	DD223	Engine Discrete Warning Status					
					xxxx xxxx xxxx xxx1 = Warning Level 1, xxxx xxxx xxxx xx1x = Warning Level 2, xxxx xxxx xxxx x1xx = Power Reduction, xxxx xxxx xxxx 1xxx = Maintenance Needed, xxxx xxxx xxx1 xxxx = Engine Comm Error, xxxx xxxx xx1x xxxx = Sub or Secondary Throttle, xxxx xxxx x1xx xxxx = Neutral Start Protect, xxxx xxxx 1xxx xxxx = Engine Shutting Down, xxxx xxx1 xxxx xxxx = Sensor Malfunction, xxxx xx1x xxxx xxxx = Aftertreatment System Cleaning Active, xxxx x1xx xxxx xxxx = reserved, xxxx 1xxx xxxx xxxx = reserved, xxx1 xxxx xxxx xxxx = reserved, xx1x xxxx xxxx xxxx = reserved, x1xx xxxx xxxx xxxx = reserved, 1xxx xxxx xxxx xxxx = reserved, where x = don't care		
					Inactive states shall be transmitted as 0. Reserved and unsupported bits within the field shall be transmitted as 0.		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
13	Percent Engine Load			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Prohibited
	DD138	Generic percent of range					
	DF30	Percent, Relative measure	int8	Range:	+/- 124%	Resolution:	1%
		Range 0 - 124%					
14	Percent Engine Torque			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Prohibited
	DD138	Generic percent of range					
	DF30	Percent, Relative measure	int8	Range:	+/- 124%	Resolution:	1%
		Range 0 - 124%					

## Electric Drive Status (Dynamic)

PGN: 127490

hex: 1F202

This PGN is used to provide Electric Drive Status data.

The Identifier field (Field1) specifies which motor the PGN message relates to and all following data fields refer only to that motor.

When a field is not supported, an output value of 'Data not available' shall be used

Application examples are located in NMEA 2000 Appendix D.

Single Frame: **No** Priority Default: **1** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **Yes**

### Field # Field Name

1	Inverter/Motor Identifier	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Required</b>
DD128	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
DF53	Integer, 8 bit unsigned	uint8 Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
2	Operating Mode	Byte Field Size: Bit Field Size: <b>4</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
DD500	Electric Drive Mode	0 = 'Normal' 1 = 'ECO' 2 = 'Power' 3 = 'Docking' 4 - 8 = Reserved 9 - 14 = Manufacturer Defined 15 = Data Not Available	
DF52	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
3	NMEA Reserved	Byte Field Size: Bit Field Size: <b>resv 4</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
4	Motor Temperature	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
DD043	Generic Temperature		
DF39	Temperature, low	uint16 Range: <b>0 to 655.32 deg K</b> Resolution: <b>1x10E-2 deg K</b>	
5	Inverter Temperature	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
DD043	Generic Temperature		
DF39	Temperature, low	uint16 Range: <b>0 to 655.32 deg K</b> Resolution: <b>1x10E-2 deg K</b>	

Inverter is also known as a Motor Controller.

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6	Coolant Temperature	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD043 Generic Temperature		
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K
7	Gear Temperature	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD043 Generic Temperature		
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K
8	Shaft Torque	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD263 Generic Absolute Percentage 0-252%		
	DF93 Percent, Absolute	uint8 Range: 0 - 252%	Resolution: 1%
Normal operating range designated by manufacturer is 0-100% values >100% can be used by the manufacturer to convey added performance.			

## Electric Energy Storage Status (Dynamic)

PGN: 127491

hex: 1F203

This PGN is used to provide Electric Energy Storage status of sources such as batteries. This message can provide dynamic data rates for information of an electric energy storage system.

The Instance Identifier field (Field 1) specifies which battery the PGN message relates to and all following data fields refer only to that source.

When a field is not supported, an output value of 'Data not available' shall be used

Application examples are located in NMEA 2000 Appendix D.

Single Frame: No Priority Default: 7 Default Update Rate: 1500 milliseconds Frequency: .7 cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: Yes

### Field # Field Name

1	Energy Storage Identifier	Byte Field Size: 1	Request Parameter: Required
	DD128 Generic instance	Bit Field Size:	Command Parameter: Required
		0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
2	State of Charge	Byte Field Size: 1	Request Parameter: Optional
	DD485 Range, Restricted Percentage	Bit Field Size:	Command Parameter: Optional
		0-100% 254 = Error 255 = Data Not Available	
	DF120 Percent, Restricted Range	uint8 Range: 0 - 100%	Resolution: 5x10E-1 0 = 0%, 100 = 50%, 200 = 100%
	Usable State of Charge (not physical State of Charge).		
3	Time Remaining	Byte Field Size: 2	Request Parameter: Optional
	DD533 Time Remaining	Bit Field Size:	Command Parameter: Optional
	DF71 Time interval, medium	int16 Range: +/-32,764 minutes	Resolution: 1.0 minute
	Negative = time to full / Positive = time to empty		
4	Highest Cell Temperature	Byte Field Size: 2	Request Parameter: Optional
	DD043 Generic Temperature	Bit Field Size:	Command Parameter: Optional
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K
	Temperature of the hottest cell		

## Electric Energy Storage Status (Dynamic)

PGN: 127491

hex: 1F203

5	<b>Lowest Cell Temperature</b>	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD043 Generic Temperature		
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K Resolution: 1x10E-2 deg K	
	Temperature of the coldest cell		
6	<b>Average Cell Temperature</b>	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD043 Generic Temperature		
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K Resolution: 1x10E-2 deg K	
	Average temperature of all cells in battery		
7	<b>Max. Discharge Current</b>	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD269 Current, Electric, Unsigned		
	DF95 Current, electric, high	uint16 Range: 0 - 6553.2 A Resolution: 1x10E-1 A	
	Changes with e.g. battery temperature		
8	<b>Max. Charge Current</b>	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD269 Current, Electric, Unsigned		
	DF95 Current, electric, high	uint16 Range: 0 - 6553.2 A Resolution: 1x10E-1 A	
	Changes with e.g. battery temperature		
9	<b>Cooling System Status</b>	Byte Field Size: Bit Field Size: 4	Request Parameter: Optional Command Parameter: Optional
	DD520 Battery Temperature System Warning Status	0x0 = Inactive, 0x1 = Active, 0x2 = Reserved, 0x3 = Reserved, 0x4 = Reserved, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Indicates the status of the of the cooling system		
10	<b>Heating System Status</b>	Byte Field Size: Bit Field Size: 4	Request Parameter: Optional Command Parameter: Optional
	DD520 Battery Temperature System Warning Status	0x0 = Inactive, 0x1 = Active, 0x2 = Reserved, 0x3 = Reserved, 0x4 = Reserved, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Indicates the status of the heating system		

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## Transmission Parameters, Dynamic

PGN: 127493

hex: 1F205

Used to provide the operational state and internal operating parameters of a specific transmission, indicated by the transmission instance field. This message would normally be broadcasted periodically to provide information for instrumentation or control functions.

Single Frame: Yes Priority Default: 2 Default Update Rate: 100 milliseconds Frequency: 10. cycles per second  
Destination: Global Query Support: Required Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Transmission instance	Byte Field Size:	Request Parameter	Required	
		Bit Field Size: 8	Command Parameter:	Required	
DD410	Engine / Transmission Instance	This data instance field should be enumerated beginning on the Port side with instance number 0 and incrementing towards Starboard. Devices in Propulsion Class 50 and Function Code 140 should be the first enumeration sequence (i.e. 0, 1, 2, 3, ...n) prior to moving to a different Class and Function Code. Devices of the other Class and Function Code should continue the enumeration sequence ( i.e. n+1, n+2,...).			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
If this field is not specified in the "Request Group Function" or an ISO Request is made of this PGN, the response will be with all defined Transmission Instances. (This PGN will be transmitted for each instance.) If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.					
2	Transmission Gear	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Optional	
DD222	Transmission Gear	0 = Forward. 1 = Neutral, 2 = Reverse, 3 = [Unavailable, Unknown]			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	NMEA Reserved	Byte Field Size:	Request Parameter		
		Bit Field Size: resv 6	Command Parameter:		
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.					
4	Transmission oil pressure	Byte Field Size: 2	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Prohibited	
DD049	Generic Pressure				
DF47	Pressure, medium	uint16	Range: 0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa	
5	Transmission oil temperature	Byte Field Size: 2	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Prohibited	
DD130	Temperature, high				
DF38	Temperature, high	uint16	Range: 0 to 6,553.2 deg K	Resolution: 1x10E-1 deg K	0.01° Kelvin

6	Transmission Discrete Status		Byte Field Size:	Request Parameter	Optional
			Bit Field Size: 8	Command Parameter:	Prohibited
DD221	Transmission Discrete Warning Status	xxxx xxx1 = Check Tranmission, xxxx xx1x = Over Temperature, xxxx x1xx = Low Oil Pressure, xxxx 1xxx = Low Oil Level, xxx1 xxxx = Sail Drive, xx1x xxxx = reserved, x1xx xxxx = reserved, 1xxx xxxx = reserved, where x = don't care			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

7	NMEA Reserved		Byte Field Size:	Request Parameter	
			Bit Field Size: resv 8	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.					

## Electric Drive Information

**PGN: 127494**  
**hex: 1F206**

This PGN is used to provide information about electric drive specifications and ratings.  
This PGN is available by request only.

The Identifier field (Field 1) specifies which motor the PGN message relates to and all following data fields refer only to that motor.

Application examples are located in NMEA 2000 Appendix D.

Single Frame: **No** Priority Default: **4** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **Yes**

### Field # Field Name

<b>1</b>	<b>Inverter/Motor Identifier</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Required</b>
		Bit Field Size:	Command Parameter: <b>Required</b>
	<b>DD128</b> Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Motor Type</b>	Byte Field Size:	Request Parameter: <b>Optional</b>
		Bit Field Size: <b>2</b>	Command Parameter: <b>Prohibited</b>
	<b>DD497</b> Voltage Type	0=DC 1=AC 2= Reserved 3=Data Not Available	
	<b>DF52</b> Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>3</b>	<b>NMEA Reserved</b>	Byte Field Size:	Request Parameter: <b>Optional</b>
		Bit Field Size: <b>resv 6</b>	Command Parameter: <b>Prohibited</b>
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"	
	<b>DF52</b> Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>4</b>	<b>Motor Voltage Rating</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Prohibited</b>
	<b>DD347</b> Voltage, AC or DC, High Range	6553.3 = Reserved 6553.4 = Out of Range 6553.5 = Not Available or Do Not Change	
	<b>DF106</b> Voltage - High Range	<b>uint16</b> Range: <b>0 - 6553.2 V</b> Resolution: <b>0.1V</b>	
<b>5</b>	<b>Maximum Continuous Motor Power</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Prohibited</b>
	<b>DD528</b> Power, High (kWatts)		
	<b>DF131</b> Power - High Range	<b>uint16</b> Range: <b>0-655kW</b> Resolution: <b>10W</b>	
<b>6</b>	<b>Maximum Boost Motor Power</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Prohibited</b>
	<b>DD528</b> Power, High (kWatts)		
	<b>DF131</b> Power - High Range	<b>uint16</b> Range: <b>0-655kW</b> Resolution: <b>10W</b>	



## Electric Drive Information

PGN: 127494

hex: 1F206

7	<b>Maximum Motor Temperature Rating</b>	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
	DD043 Generic Temperature		
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K
8	<b>Rated Motor Speed</b>	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
	DD129 Rate of rotation		
	DF72 Rotational rate, unsigned	uint16 Range: 0-16,383 RPM	Resolution: 1/4 RPM
9	<b>Maximum Controller Temperature Rating</b>	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
	DD043 Generic Temperature		
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K
10	<b>Motor Shaft Torque Rating</b>	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
	DD521 Torque		
	DF129 Torque	uint16 Range: 0 -6553.2	Resolution: 1x10E-1 Nm
11	<b>Motor DC-Voltage Derating Threshold</b>	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
	DD347 Voltage, AC or DC, High Range	6553.3 = Reserved 6553.4 = Out of Range 6553.5 = Not Available or Do Not Change	
	DF106 Voltage - High Range	uint16 Range: 0 - 6553.2 V	Resolution: 0.1V
	Voltage threshold below which performance will be reduced		
12	<b>Motor DC-Voltage Cut Off Threshold</b>	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
	DD347 Voltage, AC or DC, High Range	6553.3 = Reserved 6553.4 = Out of Range 6553.5 = Not Available or Do Not Change	
	DF106 Voltage - High Range	uint16 Range: 0 - 6553.2 V	Resolution: 0.1V
	Voltage threshold below which device will be shut down		
13	<b>Drive/Motor Hours</b>	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
	DD132 Run time, Engine		
	DF67 Time interval, large	uint32 Range: 0 to ~4.295x10E+9 s	Resolution: 1 sec

## Electric Energy Storage Information

PGN: 127495

hex: 1F207

This PGN is used to provide the information for power storage sources such as batteries.

The Instance Identifier field (Field 1) specifies which motor the PGN message relates to and all following data fields refer only to that source.

When a field is not supported, an output value of 'Data not available' shall be used"

Application examples are located in NMEA 2000 Appendix D.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: Yes

### Field # Field Name

1	Energy Storage Identifier	Byte Field Size: 1	Request Parameter: Required
		Bit Field Size:	Command Parameter: Required
DD128	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
2	Energy Storage Mode	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Required
DD532	Energy Storage Mode	00 = Normal Operation 01 = Storage Mode 10 = Reserved 11 = Failure	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 2	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields

## 4 Storage Chemistry/Conversion

Byte Field Size:

Bit Field Size: 12

Request Parameter

Optional

Command Parameter:

Optional

## DD538 Battery Chemistry/Conversion

0x000 Lead - No specified secondary  
 0x001 Lead - Lead Acid, Flooded  
 0x002 Lead - Lead Acid, AGM  
 0x003 Lead - Lead Acid, Gel  
 0x004 Lead - Lead Acid, Advanced Carbon or Carbon Foam  
 0x005 Lead - Silicon Dioxide (SiO<sub>2</sub>)  
 0x006...0x03F - Reserved  
  
 0x040 Lithium - No specified secondary  
 0x041 Lithium - Lithium Iron Phosphate (LiFePO<sub>4</sub>)  
 0x042 Lithium - Lithium Nickel Cobalt Aluminum Oxide (LiNiCoAlO<sub>2</sub>)  
 0x043 Lithium - Lithium Manganese Oxide (LiMn<sub>2</sub>O<sub>4</sub> or LiMnO<sub>3</sub>)  
 0x044 Lithium - Lithium Nickel Manganese Cobalt Oxide (LiNiMnCoO<sub>2</sub>)  
 0x045 Lithium - Lithium Titanate  
 0x046 Lithium - Lithium Thionyl Chloride  
 0x047 Lithium - LiFe / LiS / Lithium CuO / Lithium Silver-Vanadium  
 0x048...0x07F - Reserved  
  
 0x080 Nickel - No specified secondary  
 0x081 Nickel - Nickel Cadmium (NiCd)  
 0x082 Nickel - Nickel Iron (NiFe)  
 0x083 Nickel - Nickel Zinc (NiZn)  
 0x084 Nickel - Nickel Metal Hydride (NiMh)  
 0x085...0x0BF - Reserved  
  
 0x0C0 Zinc - No specified secondary  
 0x0C1 Zinc - Zinc Air (ZnO<sub>2</sub>)  
 0x0C2 Zinc - Zinc Carbon  
 0x0C3...0x0FF - Reserved  
  
 0x100 Alkaline - No specified secondary  
 0x101 Alkaline - Manganese Dioxide  
 0x102...0x13F - Reserved  
  
 0x140 Magnesium - No specified secondary  
 0x141 Magnesium - Magnesium Aluminum  
 0x142...0x17F - Reserved  
  
 0x180 Silver - No specified secondary  
 0x181 Silver - Silver Oxide  
 0x182...0x1BF - Reserved  
  
 0x1C0 Solid Electrolyte Batteries - No specified secondary  
 0x1C1 Solid Electrolyte Batteries - Lithium Ion Solid Oxide (Li-SOx)  
 0x1C2...0x1FF - Reserved  
  
 0xE00 Transient Storage System/Array - Not specified  
 0xE01 Transient Storage System/Array - Super/Ultra-Capacitor  
 0xE02...0xE3F - Reserved  
  
 0xE40 Reserve Storage - Not specified  
 0xE41 Reserve Storage - Aqueous/Salt Water Activated  
 0xE42...0xE7F - Reserved  
  
 0xE80 Fuel Cell - No specified conversion system  
 0xE81 Fuel Cell - Hydrogen Conversion  
 0xE82 Fuel Cell - Compressed Gas Conversion  
 0xE83 Fuel Cell - Membrane/Ionomer Conversion  
 0xE84 Fuel Cell - Aqueous Alkaline Solution Conversion

# Electric Energy Storage Information

**PGN: 127495**  
**hex: 1F207**

0xE85...0xEBF - Reserved

0xEC0 General - No specified secondary  
0xEC1 General - Primary Cells or Batteries  
0xEC2...0xEFF - Reserved

0xFFE - Error  
0xFFF - Data Not Available

	<b>DF52</b>	Bit field	<b>bit(n)</b>	<b>Range:</b> Variable	<b>Resolution:</b> 1	Used to construct bit fields
<b>5</b>	<b>Maximum Temperature Derating</b>			<b>Byte Field Size:</b> 2	<b>Request Parameter:</b> Optional	<b>Command Parameter:</b> Optional
				<b>Bit Field Size:</b>		
	<b>DD043</b>	Generic Temperature				
	<b>DF39</b>	Temperature, low	<b>uint16</b>	<b>Range:</b> 0 to 655.32 deg K	<b>Resolution:</b> 1x10E-2 deg K	
Temperature threshold above which performance will be reduced.						
<b>6</b>	<b>Maximum Temperature Shut Off</b>			<b>Byte Field Size:</b> 2	<b>Request Parameter:</b> Optional	<b>Command Parameter:</b> Optional
				<b>Bit Field Size:</b>		
	<b>DD043</b>	Generic Temperature				
	<b>DF39</b>	Temperature, low	<b>uint16</b>	<b>Range:</b> 0 to 655.32 deg K	<b>Resolution:</b> 1x10E-2 deg K	
Temperature threshold above which performance will be disabled.						
<b>7</b>	<b>Minimum Temperature Derating</b>			<b>Byte Field Size:</b> 2	<b>Request Parameter:</b> Optional	<b>Command Parameter:</b> Optional
				<b>Bit Field Size:</b>		
	<b>DD043</b>	Generic Temperature				
	<b>DF39</b>	Temperature, low	<b>uint16</b>	<b>Range:</b> 0 to 655.32 deg K	<b>Resolution:</b> 1x10E-2 deg K	
Temperature threshold below which performance will be reduced						
<b>8</b>	<b>Minimum Temperature Shut Off</b>			<b>Byte Field Size:</b> 2	<b>Request Parameter:</b> Optional	<b>Command Parameter:</b> Optional
				<b>Bit Field Size:</b>		
	<b>DD043</b>	Generic Temperature				
	<b>DF39</b>	Temperature, low	<b>uint16</b>	<b>Range:</b> 0 to 655.32 deg K	<b>Resolution:</b> 1x10E-2 deg K	
Temperature threshold below which the battery output is disabled.						
<b>9</b>	<b>Usable Battery Energy</b>			<b>Byte Field Size:</b> 2	<b>Request Parameter:</b> Optional	<b>Command Parameter:</b> Optional
				<b>Bit Field Size:</b>		
	<b>DD537</b>	Battery Capacity (kWh)				
	<b>DF123</b>	Battery Capacity, Extend	<b>uint16</b>	<b>Range:</b> 0-6553.2 kWh	<b>Resolution:</b> 0.1	
Usable energy at full charge. Value may decrease over battery life time.						

# Electric Energy Storage Information

PGN: 127495

hex: 1F207

10	State of Health	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD485	Range, Restricted Percentage	0-100% 254 = Error 255 = Data Not Available	
DF120	Percent, Restricted Range	uint8 Range: 0 - 100% Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%
Indicates remaining service life of battery. 0% indicates battery replacement recommended.			
11	Battery Cycle Counter	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD008	Generic counter, medium	Numeric count, event counter, sequence counter	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
The number of discharge cycles			
12	Battery Full Status	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
01 = State set when BMS prevents further charging. Will vary with Max SOC.			
13	Battery Empty Status	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
01 = State set when BMS prevents further Discharge. Will vary with Min Charge SOC.			
14	NMEA Reserved	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: resv 4	Command Parameter: Optional
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
15	Maximum Charge (SOC)	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD485	Range, Restricted Percentage	0-100% 254 = Error 255 = Data Not Available	
DF120	Percent, Restricted Range	uint8 Range: 0 - 100% Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%
SOC above which the BMS will prevent further charging normally 100% but can be reduced to extend battery life.			

16	Minimum Discharge (SOC)	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD485	Range, Restricted Percentage	0-100% 254 = Error 255 = Data Not Available	
DF120	Percent, Restricted Range	uint8 Range: 0 - 100% Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%
SOC below which the BMS will prevent further discharge normally 0% but can be increased to extend battery life.			

# Trip Fuel Consumption, Vessel

PGN: 127496

hex: 1F208

Trip fuel parameters relative to Vessel

Single Frame: No Priority Default: 5 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

Field # Field Name

1	Time to Empty		Byte Field Size: 4		Request Parameter: Optional
			Bit Field Size:		Command Parameter: Optional
	DD134 Run time, Trip				
	DF65 Time interval, standard	uint32	Range: 0 to ~4.295x10E+6 s	Resolution: 1x10E-3 s	
2	Distance to Empty /Fuel Range		Byte Field Size: 4		Request Parameter: Optional
			Bit Field Size:		Command Parameter: Optional
	DD199 Distance, Unsigned				
	DF09 Distance	uint32	Range: 0 to ~4.295x10E+7 m	Resolution: 1x10E-2 m	
3	Estimated Fuel Remaining		Byte Field Size: 2		Request Parameter: Optional
			Bit Field Size:		Command Parameter: Optional
	DD135 Volume				
	DF44 Volume	uint16	Range: 0 to 65.532 cu m	Resolution: 1x10E-3 cu m	
4	Trip Run Time		Byte Field Size: 4		Request Parameter: Optional
			Bit Field Size:		Command Parameter: Optional
	DD134 Run time, Trip				
	DF65 Time interval, standard	uint32	Range: 0 to ~4.295x10E+6 s	Resolution: 1x10E-3 s	

# Trip Fuel Consumption, Engine

PGN: 127497

hex: 1F209

Engine related trip / fuel information. This PGN will be requested as needed.

Single Frame: No Priority Default: 5 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second  
Destination: Global Query Support: Required Command Support: Required ACK Rqmnts: None

## Field # Field Name

1	Engine instance		Byte Field Size:	8	Request Parameter	Required	
			Bit Field Size:		Command Parameter:	Required	
DD410	Engine / Transmission Instance				This data instance field should be enumerated beginning on the Port side with instance number 0 and incrementing towards Starboard. Devices in Propulsion Class 50 and Function Code 140 should be the first enumeration sequence (i.e. 0, 1, 2, 3, ...n) prior to moving to a different Class and Function Code. Devices of the othe Class and Function Code should continue the enumeration sequence ( i.e. n+1, n+2,...).		
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
If this field is not specified in the "Request Group Function" or an ISO Request is made of this PGN, the response will be with all defined Engine Instances. (This PGN will be transmitted for each instance.) If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.							
2	Trip fuel used		Byte Field Size:	2	Request Parameter	Optional	
			Bit Field Size:		Command Parameter:	Optional	
DD135	Volume						
DF44	Volume	uint16	Range:	0 to 65.532 cu m	Resolution:	1x10E-3 cu m	
3	Fuel Rate, Average		Byte Field Size:	2	Request Parameter	Optional	
			Bit Field Size:		Command Parameter:	Optional	
DD131	Flow rate, low						
DF18	Flow rate, low	int16	Range:	+/-3.2764 cu-m/hr	Resolution:	1x10E-4 cu-m/hr	
4	Fuel Rate, Economy		Byte Field Size:	2	Request Parameter	Optional	
			Bit Field Size:		Command Parameter:	Optional	
DD131	Flow rate, low						
DF18	Flow rate, low	int16	Range:	+/-3.2764 cu-m/hr	Resolution:	1x10E-4 cu-m/hr	
5	Instantaneous Fuel Economy		Byte Field Size:	2	Request Parameter	Optional	
			Bit Field Size:		Command Parameter:	Optional	
DD131	Flow rate, low						
DF18	Flow rate, low	int16	Range:	+/-3.2764 cu-m/hr	Resolution:	1x10E-4 cu-m/hr	



## Engine Parameters, Static

**PGN: 127498**  
**hex: 1F20A**

Provides identification information and rated engine speed for the engine indicated by the engine instance field. Used primarily by display devices.

This PGN will be requested as needed.

Single Frame: **No** Priority Default: **5** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Engine instance</b>	Byte Field Size:		Request Parameter	<b>Required</b>
		Bit Field Size:	<b>8</b>	Command Parameter:	<b>Required</b>
	<b>DD410</b> Engine / Transmission Instance	This data instance field should be enumerated beginning on the Port side with instance number 0 and incrementing towards Starboard. Devices in Propulsion Class 50 and Function Code 140 should be the first enumeration sequence (i.e. 0, 1, 2, 3, ...n) prior to moving to a different Class and Function Code. Devices of the other Class and Function Code should continue the enumeration sequence (i.e. n+1, n+2,...).			
	<b>DF52</b> Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	If this field is not specified in the "Request Group Function" or an ISO Request is made of this PGN, the response will be with all defined Engine Instances. (This PGN will be transmitted for each instance.) If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.				
<b>2</b>	<b>Rated engine speed</b>	Byte Field Size:	<b>2</b>	Request Parameter	<b>Optional</b>
		Bit Field Size:		Command Parameter:	<b>Optional</b>
	<b>DD129</b> Rate of rotation				
	<b>DF72</b> Rotational rate, unsigned	uint16	Range: 0-16,383 RPM	Resolution: 1/4 RPM	
<b>3</b>	<b>VIN</b>	Byte Field Size:	<b>8 or 16</b> <b>n</b>	Request Parameter	<b>Optional</b>
		Bit Field Size:		Command Parameter:	<b>Prohibited</b>
	<b>DD004</b> Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.			
	<b>DF50</b> String, variable, short	ch8or16(n)	Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	200 characters maximum				

4	Software ID	Byte Field Size: 8 or 16   n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n)Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
200 characters maximum		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	

## Load Controller Connection State / Control

PGN: 127500

hex: 1F20C

Broadcast the state and status of a Load Controller output/connection & control of the output/connection with PGN 126208 Command Group Function.

This PGN has two purposes. First, it provides a mechanism to broadcast the current state and status of a Load Controller output electrical connection/pin/channel. The values provided include the connection state, status, pulse width modulation (PWM) duty cycle, and timing parameters to control one-shot pulses. Depending on the state, the PWM and timing status parameters may not be defined and are set to 0xFF.

Second, the PGN provides the mechanism to command the state and status of a Load Controller output electrical connection/pin/channel. Commands are transmitted to a specific addressed Load Controller using the NMEA Command Group Function (PGN 126208, Function 0x01). When used in this manner, values must be provided for all fields defined in this parameter group to ensure unambiguous understanding.

Global ISO requests (PGN 059904) and Global NMEA Requests (PGN 126208) for this Parameter Group shall be ignored.

Response to an addressed ISO request for this Parameter Group shall be the transmission of this PGN once for each defined connection/pin/channel.

Response to an addressed NMEA Request for this Parameter Group without specifying a value for PGN 127500, Field #2 (Connection ID) shall be the transmission of this PGN once for each defined connection/pin/channel.

Response to an addressed NMEA Request for this Parameter Group with a specified value for PGN 127500, Field #2 (Connection ID) shall be the transmission of this PGN for the specified connection/pin/channel.

The recommended/default frequency is every 15,000ms.

The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address.

When no linkage exists, the value of the SID shall be set to 255.

Application specific examples can be found in Appendix D. This PGN is part of the Distributed Power System / Architecture.

Revision: 20180831 amendment to be added in version 2.20.

Single Frame: Y Priority Default: 3 Default Update Rate: 1500 milliseconds Frequency: .7 cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional

**DD056** Sequence ID

An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.

0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)

253 - 254 = reserved for future use

255 = No binding provided. NMEA recommends using binding SID values whenever practical.

**DF53** Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address. When no linkage exists, the value of the SID shall be set to 255.

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## Load Controller Connection State / Control

**PGN: 127500**  
**hex: 1F20C**

<b>2</b>	<b>Connection ID</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Required</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
	<b>DD005</b> Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned <b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	This field identifies the connection/pin/channel. The combination of the Connection ID and Source Address of the device sending the message is globally unique.		
<b>3</b>	<b>State</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i> <b>8</b>	<i>Command Parameter:</i> <b>Optional</b>
	<b>DD351</b> Connection State	Commandable States- Codes that may be reported as states and commanded using PGN 126208 0 = OFF Connection is OFF - Hi Impedance 1 = LOW Connected to Ground 2 = HIGH Connected to Supply 3 = TRIPPED Max. Device capabilities Exceeded - Connection is OFF 4 = PWM Connection is Pulse Width Modulated - Dimmer 5 = TIMED_OFF Connection is OFF for TimeOFF, then HIGH 6 = TIMED_ON Connection is HIGH for TimeON, then OFF 7 = CYCLE_OFF Connection is OFF for TimeOFF, then CYCLE_ON 8 = CYCLE_ON Connection is HIGH for TimeON, then CYCLE_OFF 9-127 = Reserved  State Only- Codes that can only be reported as states 128 = FAULT Internal Failure - Connection is OFF 129-191 = Reserved  Command Only- Codes that may be commanded using PGN 126208, but are never reported as states 192 = RESET Reset TRIPPED to OFF 193 = DESTROY Command to Destroy Fuse - Disable Output - set FAULT state 194-253 = Reserved 254 = Error 255 = Data not Available	
	<b>DF52</b> Bit field <b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b> Used to construct bit fields
	The physical State of the Connection.		

## Load Controller Connection State / Control

PGN: 127500

hex: 1F20C

4	Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 13	Command Parameter:	Optional
DD352	Connection Status	x xxxx xxxx xxx1 = SENSED_HIGH-HIGH voltage level detected x xxxx xxxx xx1x = SENSED_LOW- voltage level detected x xxxx xxxx x1xx = SHORT- Current draw Exceeds device capability x xxxx xxxx 1xxx = NO_LOAD- When HIGH, No Load detected - Amps=0 x xxxx xxx1 xxxx = FUSE_FAIL- Blown or removed x xxxx xx1x xxxx = FUSE_DESTRUCT - Fuse was Commanded to destroy x xxxx x1xx xxxx = GFCI_FAULT- Ground fault leakage detected x xxxx 1xxx xxxx = OVER_VOLTAGE- Voltage Greater than Over Voltage Value x xxx1 xxxx xxxx = OVER_CURRENT- Current Greater than Over Current Value x xx1x xxxx xxxx = UNDER_VOLTAGE- Voltage Less than Under Voltage Value x x1xx xxxx xxxx = UNDER_CURRENT- Current Less than Under Current Value x 1xxx xxxx xxxx = GFCI_EOL- Ground fault end of life reached; replace breaker 1 xxxx xxxx xxxx = ARC_FAULT- Arc fault detected 0 xxxx xxxx xxxx = Reserved x 0xxx xxxx xxxx = Reserved where x = don't care		
		Inactive states shall be transmitted as 0. Reserved and unsupported bits within the field shall be transmitted as 0.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to construct bit fields				
5	Operational Status & Control	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 3	Command Parameter:	Optional
DD362	Operational Status & Control	xx1 = Locked- Disable/Enable ability to Change State x1x = Security-Disable/Enable ability to Lock/Unlock 0xx = Reserved where x = don't care		
		Inactive states shall be transmitted as 0. Reserved and unsupported bits within the field shall be transmitted as 0.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to construct bit fields				
6	PWM Duty Cycle	Byte Field Size: 1	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD263	Generic Absolute Percentage 0-252%			
DF93	Percent, Absolute	uint8	Range: 0 - 252%	Resolution: 1%
The Duty Cycle Percentage value of Pulse Width Modulation (Only valid from 0% to 100%)				
7	TimeON	Byte Field Size: 1	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD361	Event Time- Short	Interval of time remaining before event change		
DF111	Time Interval Medium- S	uint8	Range: 0.00 - 2.52 seconds	Resolution: 0.01 seconds
Time remaining before the connection is changed to the OFF or CYCLE_OFF State				
8	TimeOFF	Byte Field Size: 1	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD361	Event Time- Short	Interval of time remaining before event change		
DF111	Time Interval Medium- S	uint8	Range: 0.00 - 2.52 seconds	Resolution: 0.01 seconds
Time remaining before the connection is changed to the HIGH or CYCLE_ON State				

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## Switch Bank Status

**PGN: 127501**  
**hex: 1F20D**

Universal status report for multiple banks of two-state indicators.

Use of PGN 127502 is optional for support of devices that may only accept PGN 127502 for commanding switches.

For new switching devices, use of PGN 126208 (Write Fields Group Function) referencing 127501 is recommended to command Field 1 (Binary Device Bank Instance).

Note 1: For Legacy Devices the field command parameter will remain prohibited.

For New Devices, the field command parameter is optional.

For new switching devices, use of PGN 126208 (Write Group Function) referencing 127501 is recommended to command the required switch. Recommended timing intervals is 15000ms or on change.

Single Frame: **Yes** Priority Default: **3** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

1	Binary Device Bank Instance	Byte Field Size: 1	Request Parameter: Required
		Bit Field Size:	Command Parameter: Note 1
DD005	Generic numeric ID, short Number of route, waypoint, event, mark, etc.		
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Binary Device Bank Instances. (This PGN will be transmitted for each instance.) For new switching devices, use of PGN 126208 (Write Fields Group Function) referencing 127501 is recommended to command the required switch.			
2	Status 1	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Note 1
DD002	Generic status pair MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	Status 2	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Note 1
DD002	Generic status pair MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
4	Status 3	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Note 1
DD002	Generic status pair MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields

## Switch Bank Status

PGN: 127501  
hex: 1F20D

5	Status 4			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
6	Status 5			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
7	Status 6			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
8	Status 7			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
9	Status 8			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
10	Status 9			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields

## Switch Bank Status

PGN: 127501  
hex: 1F20D

11	Status 10			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
12	Status 11			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
13	Status 12			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
14	Status 13			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
15	Status 14			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
16	Status 15			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields



## Switch Bank Status

PGN: 127501

hex: 1F20D

17	Status 16			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
18	Status 17			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
19	Status 18			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
20	Status 19			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
21	Status 20			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
22	Status 21			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Note 1
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields

## Switch Bank Status

**PGN: 127501**  
**hex: 1F20D**

23	Status 22	Byte Field Size:		Request Parameter		Optional
		Bit Field Size: <input type="text" value="2"/>		Command Parameter:		Note 1
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
24	Status 23	Byte Field Size:		Request Parameter		Optional
		Bit Field Size: <input type="text" value="2"/>		Command Parameter:		Note 1
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
25	Status 24	Byte Field Size:		Request Parameter		Optional
		Bit Field Size: <input type="text" value="2"/>		Command Parameter:		Note 1
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
26	Status 25	Byte Field Size:		Request Parameter		Optional
		Bit Field Size: <input type="text" value="2"/>		Command Parameter:		Note 1
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
27	Status 26	Byte Field Size:		Request Parameter		Optional
		Bit Field Size: <input type="text" value="2"/>		Command Parameter:		Note 1
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
28	Status 27	Byte Field Size:		Request Parameter		Optional
		Bit Field Size: <input type="text" value="2"/>		Command Parameter:		Note 1
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

Switch Bank Status

PGN: 127501  
hex: 1F20D

29	Status 28	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Note 1
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable	Resolution: 1	Used to construct bit fields

# Switch Bank Control - DEPRECATED

**PGN: 127502**  
**hex: 1F20E**

Universal commands to multiple banks of two-state devices.

For new switching devices, use of PGN 126208 (Write Fields Group Function) referencing 127501 is recommended to command the required switch.

Use of PGN 127502 is permitted for legacy support of devices that may only accept PGN 127502 for commanding switches.

Single Frame: **Yes** Priority Default: **3** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Required** ACK Rqmnts: **None**

## Field # Field Name

<b>1</b>	<b>Switch Bank Instance</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Required</b>
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned	uint8 Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
If this field is not specified in the "Request Group Function" or an ISO Request is made of this PGN, the response will be with all defined Switch Bank Instances. (This PGN will be transmitted for each instance.) If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			
<b>2</b>	<b>Switch 1</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Required</b>
<b>DD003</b>	Generic command pair	00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>3</b>	<b>Switch 2</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Required</b>
<b>DD003</b>	Generic command pair	00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>4</b>	<b>Switch 3</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Required</b>
<b>DD003</b>	Generic command pair	00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>5</b>	<b>Switch 4</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Required</b>
<b>DD003</b>	Generic command pair	00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields

## Switch Bank Control - DEPRECATED

PGN: 127502

hex: 1F20E

6	Switch 5			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
7	Switch 6			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
8	Switch 7			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
9	Switch 8			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
10	Switch 9			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
11	Switch 10			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1

## Switch Bank Control - DEPRECATED

PGN: 127502

hex: 1F20E

12	Switch 11			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
13	Switch 12			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
14	Switch 13			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
15	Switch 14			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
16	Switch 15			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
17	Switch 16			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields

## Switch Bank Control - DEPRECATED

PGN: 127502

hex: 1F20E

18	Switch 17			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
19	Switch 18			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
20	Switch 19			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
21	Switch 20			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
22	Switch 21			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
23	Switch 22			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields

## Switch Bank Control - DEPRECATED

PGN: 127502

hex: 1F20E

24	Switch 23			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
25	Switch 24			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
26	Switch 25			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
27	Switch 26			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
28	Switch 27			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
29	Switch 28			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD003	Generic command pair			00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1



# AC Input Status -DEPRECATED

PGN: 127503

hex: 1F20F

This PGN has been deprecated (as of NMEA Network Message Database version 1.300) and is not recommended for new designs. However, support of the deprecated PGN 127503 is strongly recommended to ensure compatibility with legacy equipment. Manufacturers shall use PGNs defined by J1939-75 for AC parameters related to Generators and Utility Connections. J1939-75 PGNs shall be implemented using the status bits as defined in J1939-71. The PGN description at the time of deprecation was as follows: Any device with an AC Input may transmit this message. Fields 3 through 12 may repeat as indicated by the Number of Lines. If requested via the ISO Request, a separate message will be returned for each AC Instance connected to the device.

Single Frame: No Priority Default: 6 Default Update Rate: 1500 milliseconds Frequency: .7 cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	AC Instance	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	The subsequent parameters pertain to this AC source.		
2	Number of Lines	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD006 Generic counter, short	Numeric count, event counter, sequence counter	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	This is the number of lines (tuples) being reported.		
3	Line	Byte Field Size: Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
	DD270 AC Line	0x00 = Line 1, 0x01 = Line 2, 0x02 = Line 3 0x03 = Reserved	
	DF52 Bit field bit(n)	Range: Variable Resolution: 1	Used to construct bit fields
	This is the physical connector that is supplying power. In the case of split phase there are two lines.		
4	Acceptability	Byte Field Size: Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
	DD259 AC Acceptability	0x00 = Bad Level, 0x01 = Bad Frequency, 0x02 = Being Qualified, 0x03 = Good	
	DF52 Bit field bit(n)	Range: Variable Resolution: 1	Used to construct bit fields
5	NMEA Reserved	Byte Field Size: Bit Field Size: resv 4	Request Parameter: Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field bit(n)	Range: Variable Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.		
6	Voltage	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD260 Voltage, AC RMS		
	DF96 Voltage, high, unsigned uint16	Range: +/- 655.32 V Resolution: 1x10E-2 V	

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## AC Input Status -DEPRECATED

PGN: 127503

hex: 1F20F

7	Current		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD269	Current, Electric, Unsigned		
	DF95	Current, electric, high	uint16 Range: 0 - 6553.2 A Resolution: 1x10E-1 A	
8	Frequency		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD267	Frequency		
	DF22	Frequency, low	uint16 Range: 0 to 655.32 Hz Resolution: 1x10E-2 Hz	
9	Breaker Size		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD269	Current, Electric, Unsigned		
	DF95	Current, electric, high	uint16 Range: 0 - 6553.2 A Resolution: 1x10E-1 A	
10	Real Power		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD261	Power (watts)		
	DF94	Power	uint32 Range: 0 - 4,294,967,292 W Resolution: 1 W	
11	Reactive Power		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD262	Volt Amps Reactive Power (VAR)		
	DF92	Power - VAR	uint32 Range: 0 - 4,294,967,292 VAR Resolution: 1 VAR	
12	Power Factor		Byte Field Size: 1	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD271	Power Factor	Cosine of the angle between the AC voltage and current	
	DF97	Power Factor	int8 Range: +/- 1.00 Resolution: 1x10E-2	

## AC Output Status -DEPRECATED

PGN: 127504

hex: 1F210

This PGN has been deprecated (as of NMEA Network Message Database version 1.300) and is not recommended for new designs. However, support of the deprecated PGN 127504 is strongly recommended to ensure compatibility with legacy equipment. Manufacturers shall use PGNs defined by J1939-75 for AC parameters related to Generators and Utility Connections. J1939-75 PGNs shall be implemented using the status bits as defined in J1939-71. The PGN description at the time of deprecation was as follows: Any device with an AC Output may transmit this message. Fields 3 through 12 may repeat as indicated by the Number of Lines. If requested via the ISO Request, a separate message will be returned for each AC Instance connected to the device.

Single Frame: **No** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
 Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

## Field # Field Name

<b>1</b>	<b>AC Instance</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
	<b>DD005</b> Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned <b>uint8</b>	Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
	The subsequent parameters pertain to this AC source.		
<b>2</b>	<b>Number of lines</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD006</b> Generic counter, short	Numeric count, event counter, sequence counter	
	<b>DF53</b> Integer, 8 bit unsigned <b>uint8</b>	Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
	This is the number of lines (tuples) being reported.		
<b>3</b>	<b>Line</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD270</b> AC Line	0x00 = Line 1, 0x01 = Line 2, 0x02 = Line 3 0x03 = Reserved	
	<b>DF52</b> Bit field <b>bit(n)</b>	Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
	This is the physical connector that is supplying power. In the case of split phase there are two lines.		
<b>4</b>	<b>Waveform</b>	Byte Field Size: Bit Field Size: <b>3</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD273</b> Waveform	0x00 = Sine Wave 0x01 = Modified Sine Wave 0x02 = Reserved thru 0x05 = Reserved 0x06 = Error 0x07 = Data Not Available	
	<b>DF52</b> Bit field <b>bit(n)</b>	Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>5</b>	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: <b>resv 3</b>	Request Parameter: Command Parameter:
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"	
	<b>DF52</b> Bit field <b>bit(n)</b>	Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
	Used to align subsequent data on a byte boundary.		

## AC Output Status -DEPRECATED

PGN: 127504

hex: 1F210

6	Voltage		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD260	Voltage, AC RMS		
	DF96	Voltage, high, unsigned	uint16 Range: +/- 655.32 V	Resolution: 1x10E-2 V
7	Current		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD269	Current, Electric, Unsigned		
	DF95	Current, electric, high	uint16 Range: 0 - 6553.2 A	Resolution: 1x10E-1 A
8	Frequency		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD267	Frequency		
	DF22	Frequency, low	uint16 Range: 0 to 655.32 Hz	Resolution: 1x10E-2 Hz
9	Breaker Size		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD269	Current, Electric, Unsigned		
	DF95	Current, electric, high	uint16 Range: 0 - 6553.2 A	Resolution: 1x10E-1 A
10	Real Power		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD261	Power (watts)		
	DF94	Power	uint32 Range: 0 - 4,294,967,292 W	Resolution: 1 W
11	Reactive Power		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD262	Volt Amps Reactive Power (VAR)		
	DF92	Power - VAR	uint32 Range: 0 - 4,294,967,292 VAR	Resolution: 1 VAR
12	Power Factor		Byte Field Size: 1	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD271	Power Factor	Cosine of the angle between the AC voltage and current	
	DF97	Power Factor	int8 Range: +/- 1.00	Resolution: 1x10E-2

## Fluid Level

PGN: 127505

hex: 1F211

Fluid Level contains an instance number, type of fluid, level of fluid, and tank capacity. For example the fluid instance may be the level of fuel in a tank or the level of water in the bilge. Used primarily by display or instrumentation devices.

Single Frame: **Yes** Priority Default: **6** Default Update Rate: **2500** milliseconds Frequency: **.4** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Fluid Instance</b>	Byte Field Size:		Request Parameter	<b>Required</b>
		Bit Field Size:	<b>4</b>	Command Parameter:	<b>Required</b>
	<b>DD169</b> Generic instance (4-bit)		0x0 to 0xF = Instance number 0 to 15;		
	<b>DF52</b> Bit field	bit(n)	Range: <b>Variable</b> Resolution: <b>1</b>		Used to construct bit fields
	If this field is not specified in the "Request Group Function" or an ISO Request is made of this PGN, the response will be with all defined Fluid Instances. (This PGN will be transmitted for each instance.) If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.				
<b>2</b>	<b>Fluid Type</b>	Byte Field Size:		Request Parameter	<b>Optional</b>
		Bit Field Size:	<b>4</b>	Command Parameter:	<b>Optional</b>
	<b>DD208</b> Type of Fluid		0x00 = Fuel, 0x01 = Fresh Water (Potable), 0x02 = Grey Water (Waste), 0x03 = Livewell, 0x04 = Oil, 0x05 = Black Water (Sewage), 0x06 = Gasoline, 0x07 = Diesel, 0x08 = Liquid Petroleum Gas (LPG), 0x09 = Liquid Natural Gas (LNG) , 0x0A = Hydraulic Oil, 0x0B = Raw Water, 0x0C = Reserved, 0x0D = Reserved, 0x0E = Error, 0x0F = Data not available		
	<b>DF52</b> Bit field	bit(n)	Range: <b>Variable</b> Resolution: <b>1</b>		Used to construct bit fields
<b>3</b>	<b>Fluid Level</b>	Byte Field Size:	<b>2</b>	Request Parameter	<b>Optional</b>
		Bit Field Size:		Command Parameter:	<b>Optional</b>
	<b>DD215</b> Generic Percent of Range, Medium				
	<b>DF84</b> Percent, Relative Measur	int16	Range: <b>-131.072% to 131.056%</b> Resolution: <b>4x10E-3 %</b>		
	Range 0 - 100%, where 0% =Empty and 100% = Full				
<b>4</b>	<b>Tank Capacity</b>	Byte Field Size:	<b>4</b>	Request Parameter	<b>Optional</b>
		Bit Field Size:		Command Parameter:	<b>Optional</b>
	<b>DD227</b> Volume				
	<b>DF86</b> Volume. Large	uint32	Range: <b>0 to~4.296x10E+5 cu m</b> Resolution: <b>1x10E-4 cu m</b>		

5	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 8	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to align subsequent data on a byte boundary.		Used to construct bit fields		

## DC Detailed Status

**PGN: 127506**  
**hex: 1F212**

Provides parametric data for a specific battery, indicated by the battery instance field. Used primarily by display or instrumentation devices, but may also be used by battery management controls. This PGN is an extension, via the SID, to the DC Status PGN.

Single Frame: **No** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>DC Instance</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
The subsequent parameters pertain to this DC source. Note: This maps to the Battery Instance field.			
<b>3</b>	<b>DC Type</b>	Byte Field Size: Bit Field Size: <b>8</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD288</b>	DC Type	<p>0x00 = Battery, 0x01 = Alternator, 0x02 = Convertor, 0x03 = Solar Cell, 0x04 = Wind Generator, 0x05 Reserved, thru 0xFD = Reserved 0xFE = Error 0xFF = Data Not Available</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>4</b>	<b>State of Charge</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD263</b>	Generic Absolute Percentage 0-252%		
<b>DF93</b>	Percent, Absolute	<b>uint8</b> Range: <b>0 - 252%</b> Resolution: <b>1%</b>	
% of total charge remaining			

## DC Detailed Status

PGN: 127506

hex: 1F212

5	State of Health	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD263 Generic Absolute Percentage 0-252%		
	DF93 Percent, Absolute	uint8 Range: 0 - 252%	Resolution: 1%
	% of total life remaining		
6	Time Remaining	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD268 Time		
	DF98 Time interval, medium, u	uint16 Range: 0 - 65,532 minutes	Resolution: 1 minute
	Time remaining at current rate of discharge		
7	Ripple Voltage	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD287 AC Ripple		
	DF102 AC Vrms	uint16 Range: 0 - 65.532	Resolution: 1x10E-3 V
	Resolution is 1mV.		
8	Amp Hours	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD283 Battery Capacity (Coulombs)		
	DF100 Battery Capacity	uint16 Range: 0 - 235,915,200 Coulombs	Resolution: 3600 C
	<p>This maps directly into Ampere Hours (AH) where 3600C = 1AH.</p> <p>The Amp Hours is the cumulative amp hours drawn since a battery was full. When a battery is fully charged again the Amp Hours should be zero. The Amp Hours differ from the State Of Charge since it does not depend on the effective capacity of the battery (Which is influenced by the Peukert exponent and Battery Temperature. e.g.)</p> <p>The Amp Hours is defined as unsigned to keep the same datatype as the Battery Capacity [0 – 65000 Ah in steps of 1Ah]. The value is typically displayed as a (strictly) negative number to indicate that is the charge removed from the</p>		



## Charger Status- DEPRECATED

PGN: 127507

hex: 1F213

This PGN has been deprecated (as of NMEA Network Message Database version 2.000) and is not recommended for new designs. However, support of the deprecated PGN 127507 is strongly recommended to ensure compatibility with legacy equipment. PGN 127750 shall be used for new designs. The PGN description at the time of deprecation was as follows: Any device capable of charging a battery may transmit this message as a status report.

Single Frame: **No** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Charger Instance</b>			Byte Field Size: <b>1</b>		Request Parameter: <b>Required</b>	
				Bit Field Size:		Command Parameter: <b>Required</b>	
	<b>DD005</b>	Generic numeric ID, short			Number of route, waypoint, event, mark, etc.		
	<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b>	Unit-less number	
<b>2</b>	<b>Battery Instance</b>			Byte Field Size: <b>1</b>		Request Parameter: <b>Required</b>	
				Bit Field Size:		Command Parameter: <b>Required</b>	
	<b>DD005</b>	Generic numeric ID, short			Number of route, waypoint, event, mark, etc.		
	<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b>	Unit-less number	
	The subsequent parameters pertain to this DC source.						
<b>3</b>	<b>Operating State</b>			Byte Field Size:		Request Parameter: <b>Optional</b>	
				Bit Field Size: <b>4</b>		Command Parameter: <b>Optional</b>	
	<b>DD264</b>	Charger Operating State			0x00 = Not Charging, 0x01 = Bulk, 0x02 = Absorption, 0x03 = Overcharge, 0x04 = Equalize, 0x05 = Float, 0x06 = No Float 0x07 = Constant VI, 0x08 = Disabled, 0x09 = Fault, thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available		
	<b>DF52</b>	Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b>	Used to construct bit fields	
<b>4</b>	<b>Charge Mode</b>			Byte Field Size:		Request Parameter: <b>Optional</b>	
				Bit Field Size: <b>4</b>		Command Parameter: <b>Optional</b>	
	<b>DD265</b>	Charger Mode			0x00 = Standalone, 0x01 = Primary, 0x02 = Secondary, 0x03 = Echo 0x04 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available		
	<b>DF52</b>	Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b>	Used to construct bit fields	

# Charger Status- DEPRECATED

PGN: 127507

hex: 1F213

5	Charger Enable/Disable	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
6	Equalization Pending	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
7	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 4	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
	Used to align subsequent data on byte boundary.			
8	Equalization Time Remaining	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD268	Time			
DF98	Time interval, medium, u	uint16 Range: 0 - 65,532 minutes Resolution: 1 minute		

## Battery Status

**PGN: 127508**  
**hex: 1F214**

Battery, Solar Cell, etc. Provides parametric data for a specific DC Source, indicated by the instance field. The type of DC Source can be identified from the DC Detailed Status PGN. Used primarily by display or instrumentation devices, but may also be used by power management controls.

Single Frame: **Yes** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Battery Instance</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b> Unit-less number	
If this field is not specified in the "Request Group Function" or an ISO Request is made of this PGN, the response will be with all defined Battery Instances. (This PGN will be transmitted for each instance.)			
<b>2</b>	<b>Battery Voltage</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD136</b>	Voltage, DC		
<b>DF42</b>	Voltage, high	<b>int16</b> Range: <b>+/- 327.64 V</b> Resolution: <b>1x10E-2 V</b>	
<b>3</b>	<b>Battery Current</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD140</b>	Current, Electric		
<b>DF07</b>	Current, electric, high	<b>int16</b> Range: <b>+/- 3,276.4 A</b> Resolution: <b>1x10E-1 A</b>	
<b>4</b>	<b>Battery Case Temperature</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD043</b>	Generic Temperature		
<b>DF39</b>	Temperature, low	<b>uint16</b> Range: <b>0 to 655.32 deg K</b> Resolution: <b>1x10E-2 deg K</b>	
<b>5</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.  0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)  253 - 254 = reserved for future use  255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b> Unit-less number	

## Inverter Status- DEPRECATED

PGN: 127509

hex: 1F215

This PGN has been deprecated (as of version 2.000) and is not recommended for new designs. However, support of PGN 127509 may be necessary to ensure compatibility with legacy equipment. PGN 127751 shall be used for new designs. The PGN description at the time of deprecation was as follows: Any device capable of inverting a DC source to an AC output may transmit this message. If requested via the ISO Request, a separate message will be returned for each AC Instance connected to the device.

Single Frame: No Priority Default: 6 Default Update Rate: 1500 milliseconds Frequency: .7 cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Inverter Instance	Byte Field Size: 1	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number
2	AC Instance	Byte Field Size: 1	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number
The subsequent parameters pertain to this AC source.			
3	DC Instance	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number
The subsequent parameters pertain to this DC source. Note: This maps to the Battery Instance field.			
4	Operating State	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 4	Command Parameter: Optional
	DD266 Invertor Operating State	0x00 = Invert, 0x01 = AC Passthru, 0x02 = Load Sense, 0x03 = Fault, 0x04 = Disabled 0x05 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available	
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields
5	Inverter Enable/Disable	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
	DD002 Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]	
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields

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6	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 2	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to align subsequent data on a byte boundary.		Used to construct bit fields		

## Charger Configuration Status

PGN: 127510

hex: 1F216

Any device capable of charging a battery may transmit this message. If requested via the ISO Request, a separate message will be returned for each Battery Instance connected to the device. The Request and Command group function messages (PGN 126208) can be used to set parameters within this PGN.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second

Destination: Global Query Support: Required Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Charger Instance	Byte Field Size: 1	Request Parameter: Required
	DD005 Generic numeric ID, short	Bit Field Size:	Command Parameter: Required
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number
	Number of route, waypoint, event, mark, etc.		
2	Battery Instance	Byte Field Size: 1	Request Parameter: Required
	DD005 Generic numeric ID, short	Bit Field Size:	Command Parameter: Required
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number
	Number of route, waypoint, event, mark, etc.		
	The subsequent parameters pertain to this DC source.		
3	Charger Enable/Disable	Byte Field Size:	Request Parameter: Optional
	DD003 Generic command pair	Bit Field Size: 2	Command Parameter: Optional
	DF52 Bit field bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
	00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
4	NMEA Reserved	Byte Field Size:	Request Parameter:
	DD001 Reserved field	Bit Field Size: resv 6	Command Parameter:
	DF52 Bit field bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
	Variable number of reserved bits, all set to logic "1"		
	Used to align subsequent data on a byte boundary.		
5	Charge Current Limit	Byte Field Size: 1	Request Parameter: Optional
	DD263 Generic Absolute Percentage 0-252%	Bit Field Size:	Command Parameter: Optional
	DF93 Percent, Absolute uint8	Range: 0 - 252%	Resolution: 1%
	Limits charger output current to a percentage (0-100%) of the designed maximum.		
6	Charging Algorithm	Byte Field Size:	Request Parameter: Optional
	DD272 Charging Algorithm	Bit Field Size: 4	Command Parameter: Optional
	DF52 Bit field bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
	0x00 = Trickle 0x01 = CVCC (Constant Voltage Constant Current) 0x02 = 2 Stage (No float) 0x03 = 3 Stage 0x04 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available		

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## Charger Configuration Status

**PGN: 127510**  
**hex: 1F216**

<b>7</b>	<b>Charger Mode</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>4</b>	<i>Command Parameter:</i>	Optional
<b>DD265</b>	Charger Mode		0x00 = Standalone, 0x01 = Primary, 0x02 = Secondary, 0x03 = Echo 0x04 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
Default is standalone. For installations where two or more chargers are charging the same battery bank, one charger is the primary and the others are secondary. Some chargers include a second, lower power echo charger for maintaining a second battery bank (e.g., start battery).					
<b>8</b>	<b>Estimated Battery Temp - When No Sensor Present</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>4</b>	<i>Command Parameter:</i>	Optional
<b>DD274</b>	Batt Temp - No Sensor		0x00 = Cold 0x01 = Warm 0x02 = Hot 0x03 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
If there is no battery temperature sensor or it is defective then the charger will use this field to determine the battery temperature.					
<b>9</b>	<b>Equalize One Time Enable/Disable</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
<b>DD003</b>	Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
Equalizing over charges the battery in an attempt to bring the battery's cells up to the same level of charge.					
<b>10</b>	<b>Over Charge Enable/Disable</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
<b>DD003</b>	Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
For chargers that support regular over charging, this field enables the feature.					
<b>11</b>	<b>Equalize Time</b>	<i>Byte Field Size:</i>	<b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
<b>DD268</b>	Time				
<b>DF98</b>	Time interval, medium, u	<b>uint16</b>	<i>Range:</i> 0 - 65,532 minutes	<i>Resolution:</i> 1 minute	

## Inverter Configuration Status

PGN: 127511

hex: 1F217

Any device capable of inverting DC to AC may transmit this message. If requested via the ISO Request, a separate message will be returned for each AC Instance connected to the device. The Complex Request/Command/Acknowledgement group function message can be used to set the following parameters. Note: While less than 8 bytes... we are anticipating that this message is expected to grow.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Inverter Instance	Byte Field Size: 1	Request Parameter: Required
	DD005 Generic numeric ID, short	Bit Field Size:	Command Parameter: Optional
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	Number of route, waypoint, event, mark, etc.		
2	AC Instance	Byte Field Size: 1	Request Parameter: Required
	DD005 Generic numeric ID, short	Bit Field Size:	Command Parameter: Optional
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	Number of route, waypoint, event, mark, etc.		
	The subsequent parameters pertain to this AC source.		
3	DC Instance	Byte Field Size: 1	Request Parameter: Optional
	DD005 Generic numeric ID, short	Bit Field Size:	Command Parameter: Optional
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	Number of route, waypoint, event, mark, etc.		
	The subsequent parameters pertain to this DC source.		
	Note: This maps to the Battery Instance field.		
4	Inverter Enable/Disable	Byte Field Size:	Request Parameter: Optional
	DD003 Generic command pair	Bit Field Size: 2	Command Parameter: Optional
		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action	
	DF52 Bit field bit(n)	Range: Variable Resolution: 1	Used to construct bit fields
5	Inverter Mode	Byte Field Size:	Request Parameter: Optional
	DD275 Inverter Mode	Bit Field Size: 4	Command Parameter: Optional
		0x00 = Standalone 0x01 = Series Master 0x02 = Series Slave 0x03 = Parallel Master 0x04 = Parallel Slave 0x05 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available	
	DF52 Bit field bit(n)	Range: Variable Resolution: 1	Used to construct bit fields

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## Inverter Configuration Status

PGN: 127511

hex: 1F217

6	Load Sense Enable/Disable		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Optional
	DD003	Generic command pair	00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Error, 03 = No action			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
7	Load Sense Power Threshold		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD276	Power, medium (watts)				
	DF28	Power	uint16	Range: 0 to 65,532 W	Resolution: 1 W	
	When load sensing is enabled and the inverter is in the standby state, a load requiring at least this amount of power must be applied to enter the inverting state.					
8	Load Sense Interval		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD036	Data transmit offset	Offset in transmit time from time of request command: 0x0 = transmit immediately 0xFFFF = Do not change offset.			
	DF66	Time interval, .01sec	uint16	Range: 0 to 655.32s	Resolution: 1x10E-2sec	
	When load sensing is enabled and the inverter is in the standby state, the inverter will periodically check for a load on this interval.					

## AGS Configuration Status

**PGN: 127512**  
**hex: 1F218**

Automatic Generator Starter Any device that is capable of starting/stopping a generator may transmit this message. The Complex Request/Command/Acknowledgement group function message can be used to set the following parameters. Note: While less than 8 bytes... we are anticipating that this message is expected to grow.

Single Frame: **No** Priority Default: **6** Default Update Rate: milliseconds Frequency: **NA** cycles per second

Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

1	AGS Instance			Byte Field Size: 1	Request Parameter: Required	
				Bit Field Size:	Command Parameter: Optional	
	DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
2	Generator Instance			Byte Field Size: 1	Request Parameter: Required	
				Bit Field Size:	Command Parameter: Optional	
	DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
3	AGS Mode			Byte Field Size:	Request Parameter: Optional	
				Bit Field Size: 4	Command Parameter: Optional	
	DD277	AGS Mode		0x00 = Off 0x01 = On 0x02 = Automatic 0x03 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
4	NMEA Reserved			Byte Field Size:	Request Parameter: Optional	
				Bit Field Size: resv 44	Command Parameter:	
	DD001	Reserved field		Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.					

## Battery Configuration Status

**PGN: 127513**  
**hex: 1F219**

Any device connected to a battery may transmit this message. If requested via the ISO Request, a separate message will be returned for each Battery Instance connected to the device. The Complex Request/Command/Acknowledgement group function message can be used to set the following parameters.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	<b>Battery Instance</b>	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	The subsequent parameters pertain to this DC source.		
2	<b>Battery Type</b>	Byte Field Size: Bit Field Size: 4	Request Parameter: Optional Command Parameter: Optional
	DD282 Battery Type	0x00 = Flooded 0x01 = GEL 0x02 = AGM 0x03 = Lithium 0x04 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	<b>Supports Equalization</b>	Byte Field Size: Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
	DD002 Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Indicates if the battery supports equalization.		
4	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: resv 2	Request Parameter: Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.		

## Battery Configuration Status

PGN: 127513  
hex: 1F219

5	Nominal Voltage			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	4	Command Parameter:	Optional
DD284	Nominal Voltage			0x00 = 6 Volts			
				0x01 = 12 Volts			
				0x02 = 24 Volts			
				0x03 = 32 Volts			
				0x04 = 36 Volts			
				0x05 = 42 Volts			
				0x06 = 48 Volts			
				0x07 = Reserved			
				thru			
				0x0D = Reserved			
				0x0E = Error			
				0x0F = Data Not Available			
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
6	Battery Chemistry			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	4	Command Parameter:	Optional
DD285	Battery Chemistry			0x00 = Lead Acid			
				0x01 = Lithium Ion			
				0x02 = NiCad			
				0x03 = ZnO			
				0x04 = NiMH			
				0x05 = Carbon Type			
				0x06 = Fuel Cell			
				0x07 = Battery Lead Crystal			
				0x08 = Reserved			
				0x09 = Reserved			
				thru			
				0x0D = Reserved			
				0x0E = Error			
				0x0F = Data Not Available			
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
7	Battery Capacity			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
DD283	Battery Capacity (Coulombs)						
DF100	Battery Capacity	uint16	Range:	0 - 235,915,200 Coulombs	Resolution:	3600 C	This maps directly into Ampere Hours (AH) where 3600C = 1AH.
8	Battery Temperature Coefficient			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
DD138	Generic percent of range						
DF30	Percent, Relative measure	int8	Range:	+/- 124%	Resolution:	1%	
9	Peukert Exponent			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
DD286	Peukert Exponent						
DF101	Peukert Exponent	uint8	Range:	1 - 1.5	Resolution:	2x10E-3	

10	Charge Efficiency Factor	Byte Field Size:	1	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional
DD138	Generic percent of range				
DF30	Percent, Relative measure	int8	Range: +/- 124%	Resolution:	1%

## AGS Status

**PGN: 127514**  
**hex: 1F21A**

Automatic Generator Starter Any device capable of starting/stopping a generator may transmit this message. Note: While less than 8 bytes... we are anticipating that this message is expected to grow.

Single Frame: **No** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>AGS Instance</b>		Byte Field Size: <b>1</b>	Request Parameter: <b>Required</b>
			Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD005</b> Generic numeric ID, short		Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
<b>2</b>	<b>Generator Instance</b>		Byte Field Size: <b>1</b>	Request Parameter: <b>Required</b>
			Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD005</b> Generic numeric ID, short		Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
<b>3</b>	<b>AGS Operating State</b>		Byte Field Size:	Request Parameter: <b>Optional</b>
			Bit Field Size: <b>4</b>	Command Parameter: <b>Optional</b>
	<b>DD278</b> AGS Operating State		0x00 = Quiet Time 0x01 = Auto On 0x02 = Auto Off 0x03 = Manual On 0x04 = Manual Off 0x05 = Generator Shutdown 0x06 = External Shutdown 0x07 = Fault 0x08 = Suspend 0x09 = Not Operating 0x0A = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available	
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields
<b>4</b>	<b>Generator State</b>		Byte Field Size:	Request Parameter: <b>Optional</b>
			Bit Field Size: <b>4</b>	Command Parameter: <b>Optional</b>
	<b>DD279</b> Generator State		0x00 = Preheating 0x01 = Start Delay 0x02 = Cranking 0x03 = Starter Cooling 0x04 = Warming Up 0x05 = Cooling Down 0x06 = Spinning Down 0x07 = Shutdown Bypass 0x08 = Stopping 0x09 = Running 0x0A = Stopped 0x0B = Crank Delay 0x0C = Reserved 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available	
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields

## AGS Status

**PGN: 127514**  
**hex: 1F21A**

### 5 Generator On Reason

Byte Field Size:

Bit Field Size: **8**

Request Parameter

Optional

Command Parameter:

Optional

**DD280** Generator On Reason

0x00 = Not On  
0x01 = DC Voltage Low  
0x02 = Battery State Of Charge Low  
0x03 = AC Current High  
0x04 = Contact Closed  
0x05 = Manual On  
0x06 = Exercise  
0x07 = Non Quiet Time  
0x08 = External On Via AGS  
0x09 = External On Via Generator  
0x0A = Unable to Stop  
0x0B = Reserved  
thru  
0xFD = Reserved  
0xFE = Error  
0xFF = Data Not Available

**DF52** Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

### 6 Generator Off Reason

Byte Field Size:

Bit Field Size: **8**

Request Parameter

Optional

Command Parameter:

Optional

**DD281** Generator Off Reason

0x00 = Not Off  
0x01 = DC Voltage High  
0x02 = Battery State Of Charge High  
0x03 = AC Current Low  
0x04 = Contact Opened  
0x05 = Reached Absorption  
0x06 = Reached Float  
0x07 = Manual Off  
0x08 = Max Run Time  
0x09 = Max Auto Cycle  
0x0A = Exercise Done  
0x0B = Quiet Time  
0x0C = External Off Via AGS  
0x0D = Safe Mode  
0x0E = External Off Via Generator  
0x0F = External Shutdown  
0x10 = Auto Off  
0x11 = Fault  
0x12 = Unable to Start  
0x13 = Reserved  
thru  
0xFD = Reserved  
0xFE = Error  
0xFF = Data Not Available

**DF52** Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

## AC Power / Current- Phase A

PGN: 127744  
hex: 1F300

The purpose of this PGN is to provide a common way to report Phase A AC Current / Power status. It provides a mechanism to report on a specified connection address and instance with precision to 0.1 amperes and a range from 0 - 6553.2 Amperes.

It can be requested by another device such as a logic controller (Command Source) or display and can be broadcast periodically or upon a status change. Using the SID, this status information can be combined with the current and voltage information of phase B and C to provide the total power of a three phase power connection (input or output). This PGN is part of the Distributed Power System / Architecture.

Note 1: If Query Support for this PGN is implemented, then manufacturers shall include support for queries that specify a value for Field 2. Note 2: If command support for this PGN is implemented, then each command shall include a value for Field 2, which shall identify the connection being commanded.

Single Frame: Y Priority Default: 6 Default Update Rate: 1500 milliseconds Frequency: .7 cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
	DD056 Sequence ID	Bit Field Size:	Command Parameter: Optional
	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.		
	0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)		
	253 - 254 = reserved for future use		
	255 = No binding provided. NMEA recommends using binding SID values whenever practical.		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
	For example, an identical Sequence ID in this field indicates simultaneous measurements for phases A, B and C.		
2	Connection Number	Byte Field Size: 1	Request Parameter: Note 1
	DD005 Generic numeric ID, short	Bit Field Size:	Command Parameter: Note 2
	Number of route, waypoint, event, mark, etc.		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
	Fixed instance within the source of this message, identifying the connection; the combination of the Connection Number and device sending the message is bus wide unique		
3	AC RMS Current	Byte Field Size: 2	Request Parameter: Optional
	DD269 Current, Electric, Unsigned	Bit Field Size:	Command Parameter: Optional
	DF95 Current, electric, high	uint16 Range: 0 - 6553.2 A	Resolution: 1x10E-1 A
4	Power	Byte Field Size: 4	Request Parameter: Optional
	DD349 Power- Extended Range	Bit Field Size:	Command Parameter: Optional
	+2,147,483,645 = Reserved +2,147,483,646 = Out of Range +2,147,483,647 = Data not available or Do not change		
	DF108 Power- Extended Range	int32 Range: -2,147,483,648 to +2,147,483,644 Watts	Resolution: 1W



## AC Power / Current- Phase B

PGN: 127745

hex: 1F301

The purpose of this PGN is to provide a common way to report Phase B AC Current / Power status. It provides a mechanism to report on a specified connection address and instance with precision to 0.1 amperes and a range from 0 - 6553.2 Amperes. It can be requested by another device such as a logic controller (Command Source) or display and can be broadcast periodically or upon a status change. Using the SID, this status information can be combined with the current and voltage information of phase A and C to provide the total power of a three phase power connection (input or output).

This PGN is part of the Distributed Power System / Architecture.

Note 1: If Query Support for this PGN is implemented, then manufacturers shall include support for queries that specify a value for Field 2.

Note 2: If command support for this PGN is implemented, then each command shall include a value for Field 2, which shall identify the connection being commanded.

Single Frame: **Y** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
		253 - 254 = reserved for future use	
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
For example, an identical Sequence ID in this field indicates simultaneous measurements for phases A, B and C.			
<b>2</b>	<b>Connection Number</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Note 1</b>
		Bit Field Size:	Command Parameter: <b>Note 2</b>
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
Fixed instance within the source of this message, identifying the connection; the combination of the Connection Number and device sending the message is bus wide unique			
<b>3</b>	<b>AC RMS Current</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
<b>DD269</b>	Current, Electric, Unsigned		
<b>DF95</b>	Current, electric, high	<b>uint16</b> Range: <b>0 - 6553.2 A</b>	Resolution: <b>1x10E-1 A</b>

4	Power	Byte Field Size:	4	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional
DD349	Power- Extended Range		+2,147,483,645 = Reserved +2,147,483,646 = Out of Range +2,147,483,647 = Data not available or Do not change		
DF108	Power- Extended Range	int32	Range:	-2,147,483,648 to +2,147,483,644 Watts	Resolution: 1W

## AC Power / Current- Phase C

PGN: 127746

hex: 1F302

The purpose of this PGN is to provide a common way to report Phase C AC Current / Power status. It provides a mechanism to report on a specified connection address and instance with precision to 0.1 amperes and a range from 0 - 6553.2 Amperes. It can be requested by another device such as a logic controller (Command Source) or display and can be broadcast periodically or upon a status change.

Using the SID, this status information can be combined with the current and voltage information of phase A and B to provide the total power of a three phase power connection (input or output). This PGN is part of the Distributed Power System / Architecture.

Note 1: If Query Support for this PGN is implemented, then manufacturers shall include support for queries that specify a value for Field 2.

Note 2: If command support for this PGN is implemented, then each command shall include a value for Field 2, which shall identify the connection being commanded.

Single Frame: **Y** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
		253 - 254 = reserved for future use	
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
For example, an identical Sequence ID in this field indicates simultaneous measurements for phases A, B and C.			
<b>2</b>	<b>Connection Number</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Note 1</b>
		Bit Field Size:	Command Parameter: <b>Note 2</b>
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
Fixed instance within the source of this message, identifying the connection; the combination of the Connection Number and device sending the message is bus wide unique			
<b>3</b>	<b>AC RMS Current</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
<b>DD269</b>	Current, Electric, Unsigned		
<b>DF95</b>	Current, electric, high	<b>uint16</b> Range: <b>0 - 6553.2 A</b>	Resolution: <b>1x10E-1 A</b>

4	Power	Byte Field Size:	4	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional
DD349	Power- Extended Range		+2,147,483,645 = Reserved +2,147,483,646 = Out of Range +2,147,483,647 = Data not available or Do not change		
DF108	Power- Extended Range	int32	Range:	-2,147,483,648 to +2,147,483,644 Watts	Resolution: 1W

## AC Voltage / Frequency-Phase A

PGN: 127747

hex: 1F303

This PGN is part of the Distributed Power System / Architecture.

The purpose of this PGN is to provide a common way to report Phase A AC Voltage/ Frequency status.

It provides a mechanism to report on a specified connection address and instance with precision to 0.1 Volts and a range from 0.1 to 6553.2 Volts. It can be requested by another device such as a logic controller (Command Source) or display and can be broadcast periodically or upon a status change.

Using the SID, this status information can be combined with the current and voltage information of phase B and C to provide the total power of a three phase power connection (input or output).

Note 1: If Query Support for this PGN is implemented, then manufacturers shall include support for queries that specify a value for Field 2.

Note 2: If command support for this PGN is implemented, then each command shall include a value for Field 2, which shall identify the connection being commanded.

Single Frame: **Y** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.  0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)  253 - 254 = reserved for future use  255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
For example, an identical Sequence ID in this field indicates simultaneous measurements for phases A, B and C.			
<b>2</b>	<b>Connection Number</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Note 1</b> Command Parameter: <b>Note 2</b>
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
Fixed instance within the source of this message, identifying the connection; the combination of the Connection Number and device sending the message is bus wide unique			
<b>3</b>	<b>AC RMS Voltage Line to Neutral</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD347</b>	Voltage, AC or DC, High Range	6553.3 = Reserved 6553.4 = Out of Range 6553.5 = Not Available or Do Not Change	
<b>DF106</b>	Voltage - High Range	<b>uint16</b> Range: <b>0 - 6553.2 V</b> Resolution: <b>0.1V</b>	

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## AC Voltage / Frequency-Phase A

PGN: 127747

hex: 1F303

## 4 AC RMS Voltage Line to Line

Byte Field Size: 2

Request Parameter Optional

Bit Field Size:

Command Parameter: Optional

DD347 Voltage, AC or DC, High Range

6553.3 = Reserved

6553.4 = Out of Range

6553.5 = Not Available or Do Not Change

DF106 Voltage - High Range

uint16

Range: 0 - 6553.2 V

Resolution: 0.1V

## 5 AC Frequency

Byte Field Size: 2

Request Parameter Optional

Bit Field Size:

Command Parameter: Optional

DD348 Frequency-Medium

6553.3 = Reserved

6553.4 = Out of Range

6553.5 = Not Available or Do Not Change

DF107 Frequency-Medium

uint16

Range: 0-6553.2 Hz

Resolution: 0.1 Hz

## AC Voltage / Frequency-Phase B

PGN: 127748

hex: 1F304

This PGN is part of the Distributed Power System / Architecture.

The purpose of this PGN is to provide a common way to report Phase B AC Voltage/ Frequency status.

It provides a mechanism to report on a specified connection address and instance with precision to 0.1 Volts and a range from 0.1 to 6553.2 Volts. It can be requested by another device such as a logic controller (Command Source) or display and can be broadcast periodically or upon a status change. Using the SID, this status information can be combined with the current and voltage information of phase A and C to provide the total power of a three phase power connection (input or output).

Note 1: If Query Support for this PGN is implemented, then manufacturers shall include support for queries that specify a value for Field 2.

Note 2: If command support for this PGN is implemented, then each command shall include a value for Field 2, which shall identify the connection being commanded.

Single Frame: **Y** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
For example, an identical Sequence ID in this field indicates simultaneous measurements for phases A, B and C.			
<b>2</b>	<b>Connection Number</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Note 1</b> Command Parameter: <b>Note 2</b>
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
Fixed instance within the source of this message, identifying the connection; the combination of the Connection Number and device sending the message is bus wide unique			
<b>3</b>	<b>AC RMS Voltage Line to Neutral</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD347</b>	Voltage, AC or DC, High Range	<p>6553.3 = Reserved</p> <p>6553.4 = Out of Range</p> <p>6553.5 = Not Available or Do Not Change</p>	
<b>DF106</b>	Voltage - High Range	<b>uint16</b> Range: <b>0 - 6553.2 V</b> Resolution: <b>0.1V</b>	

## AC Voltage / Frequency-Phase B

PGN: 127748

hex: 1F304

## 4 AC RMS Voltage Line to Line

Byte Field Size: 2

Request Parameter Optional

Bit Field Size:

Command Parameter: Optional

DD347 Voltage, AC or DC, High Range

6553.3 = Reserved

6553.4 = Out of Range

6553.5 = Not Available or Do Not Change

DF106 Voltage - High Range

uint16

Range: 0 - 6553.2 V

Resolution: 0.1V

## 5 AC Frequency

Byte Field Size: 2

Request Parameter Optional

Bit Field Size:

Command Parameter: Optional

DD348 Frequency-Medium

6553.3 = Reserved

6553.4 = Out of Range

6553.5 = Not Available or Do Not Change

DF107 Frequency-Medium

uint16

Range: 0-6553.2 Hz

Resolution: 0.1 Hz



## AC Voltage / Frequency-Phase C

PGN: 127749

hex: 1F305

This PGN is part of the Distributed Power System / Architecture.

The purpose of this PGN is to provide a common way to report Phase C AC Voltage/ Frequency status.

It provides a mechanism to report on a specified connection address and instance with precision to 0.1 Volts and a range from 0.1 to 6553.2 Volts.

It can be requested by another device such as a logic controller (Command Source) or display and can be broadcast periodically or upon a status change.

Using the SID, this status information can be combined with the current and voltage information of phase A and B to provide the total power of a three phase power connection (input or output).

Note 1: If Query Support for this PGN is implemented, then manufacturers shall include support for queries that specify a value for Field 2.

Note 2: If command support for this PGN is implemented, then each command shall include a value for Field 2, which shall identify the connection being commanded.

Single Frame: Y Priority Default: 6 Default Update Rate: 1500 milliseconds Frequency: .7 cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
	DD056 Sequence ID	Bit Field Size:	Command Parameter: Optional
	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.		
	0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)		
	253 - 254 = reserved for future use		
	255 = No binding provided. NMEA recommends using binding SID values whenever practical.		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
For example, an identical Sequence ID in this field indicates simultaneous measurements for phases A, B and C.			
2	Connection Number	Byte Field Size: 1	Request Parameter: Note 1
	DD005 Generic numeric ID, short	Bit Field Size:	Command Parameter: Note 2
	Number of route, waypoint, event, mark, etc.		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
Fixed instance within the source of this message, identifying the connection; the combination of the Connection Number and device sending the message is bus wide unique			
3	AC RMS Voltage Line to Neutral	Byte Field Size: 2	Request Parameter: Optional
	DD347 Voltage, AC or DC, High Range	Bit Field Size:	Command Parameter: Optional
	6553.3 = Reserved 6553.4 = Out of Range 6553.5 = Not Available or Do Not Change		
	DF106 Voltage - High Range	uint16 Range: 0 - 6553.2 V	Resolution: 0.1V

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## AC Voltage / Frequency-Phase C

PGN: 127749

hex: 1F305

## 4 AC RMS Voltage Line to Line

Byte Field Size: 2

Request Parameter Optional

Bit Field Size:

Command Parameter: Optional

DD347 Voltage, AC or DC, High Range

6553.3 = Reserved

6553.4 = Out of Range

6553.5 = Not Available or Do Not Change

DF106 Voltage - High Range

uint16

Range: 0 - 6553.2 V

Resolution: 0.1V

## 5 AC Frequency

Byte Field Size: 2

Request Parameter Optional

Bit Field Size:

Command Parameter: Optional

DD348 Frequency-Medium

6553.3 = Reserved

6553.4 = Out of Range

6553.5 = Not Available or Do Not Change

DF107 Frequency-Medium

uint16

Range: 0-6553.2 Hz

Resolution: 0.1 Hz

## Converter (Inverter/Charger) Status

PGN: 127750

hex: 1F306

Provides both state and status information about a Charger, Inverter or combined Inverter / Charger.

It provides a mechanism to broadcast the current state of a power Converter with single or multiple inputs and outputs/connections/pins/channels.

The values provided include the connection state and temperature.

This PGN also provides detailed status of the various characteristics of the connection(s) including: Low Power Mode, Fault, Bulk, Absorption, Float, Storage, Equalize, Pass-thru, Inverting, and Assisting

This PGN does not add 'On / Off' functionality for these devices/connection since they can be handled with other On/Off commands.

This PGN replaces PGN 127507 (Charger Status), which has been deprecated. This PGN can be used in conjunction with the DC Connection Status PGN to provide detailed information regarding the parameters of a Converter device and all of its connections from/to the power grid.

The use of the SID can assist in combining this PGN with similar PGN broadcasts to control or report power and other parameters for multiple connections of the Converter.

The recommended/default frequency is every 1500 ms.

This PGN is part of the Distributed Power System / Architecture.

Note 1: If Query Support for this PGN is implemented, then manufacturers shall include support for queries that specify a value for Field 2.

Note 2: If command support for this PGN is implemented, then each command shall include a value for Field 2, which shall identify the connection being commanded.

Single Frame: Y Priority Default: 6 Default Update Rate: 1500 milliseconds Frequency: .7 cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional

**DD056** Sequence ID

An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.

0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)

253 - 254 = reserved for future use

255 = No binding provided. NMEA recommends using binding SID values whenever practical.

**DF53** Integer, 8 bit unsigned **uint8** Range: 0 to 252 Resolution: 1 bit Unit-less number

Combine with other PGN's to provide detailed state and status of a Converter Device

## Converter (Inverter/Charger) Status

**PGN: 127750**  
**hex: 1F306**

<b>2</b>	<b>Connection Number</b>	<i>Byte Field Size:</i> <input type="text" value="1"/>	<i>Request Parameter:</i> Note 1
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> Note 2
	<b>DD005</b> Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> <i>Range:</i> <input type="text" value="0 to 252"/>	<i>Resolution:</i> <input type="text" value="1 bit"/> Unit-less number
	Fixed instance within the source of this message, identifying the DC connection; the combination of the Connection Number and node sending is bus wide unique.		
	Remark: This field references to a (DC) connection when the device is capable of independently charging several batteries. When a device only has a single state this field shall be set to 0xFF. The state then applies to all connections		
<b>3</b>	<b>Operating State</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <input type="text" value="8"/>	<i>Command Parameter:</i> Optional
	<b>DD342</b> Converter Operating State	0x0=Off, 0x1=Low Power Mode, 0x2=Fault, 0x3=Bulk, 0x4=Absorption, 0x5=Float, 0x6=Storage, 0x7=Equalize, 0x8=Pass thru, 0x9=Inverting, 0xA=Assisting, 0xB-0xFE=Reserved, 0xFF=Not Available	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <input type="text" value="Variable"/>	<i>Resolution:</i> <input type="text" value="1"/> Used to construct bit fields
<b>4</b>	<b>Temperature State</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <input type="text" value="2"/>	<i>Command Parameter:</i> Optional
	<b>DD343</b> Converter Temperature State	0x0=Ok, 0x1=Warning, 0x2=Over Temperature, 0x3=Not Available	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <input type="text" value="Variable"/>	<i>Resolution:</i> <input type="text" value="1"/> Used to construct bit fields
<b>5</b>	<b>Overload State</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <input type="text" value="2"/>	<i>Command Parameter:</i> Optional
	<b>DD344</b> Converter Overload State	0x0=Ok, 0x1=Warning, 0x2=Overload, 0x3=Not Available	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <input type="text" value="Variable"/>	<i>Resolution:</i> <input type="text" value="1"/> Used to construct bit fields
<b>6</b>	<b>Low DC Voltage State</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <input type="text" value="2"/>	<i>Command Parameter:</i> Optional
	<b>DD345</b> Converter Low DC Voltage State	0x0=Ok, 0x1=Warning, 0x2=DC voltage too low, 0x3=Not Available	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <input type="text" value="Variable"/>	<i>Resolution:</i> <input type="text" value="1"/> Used to construct bit fields

7	Ripple State	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD346	Converter Ripple State	0x0=Ok, 0x1=Ripple Warning, 0x2=Ripple Too High, 0x3=Not Available		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
8	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 32	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
Used to align subsequent data on byte boundary.				

## DC Voltage / Current

**PGN: 127751**  
**hex: 1F307**

The purpose of this PGN is to provide a common way to report an extended range of DC Voltage and DC Current status including high voltage / high power systems.

The use of the SID can assist in combining the Voltage and Current of multiple connections with similar PGN broadcasts to control or report power and other parameters.

The message shall be broadcasted periodically or upon request. The recommended/default frequency is every 1500 ms. We do not recommend a period lower than 500 ms or beyond 5000 ms to maintain system integrity and optimal performance.

This PGN can be used in conjunction with 127506, 127508, and 127510 to provide precision voltage and current status.

This PGN replaces 127509 (Inverter Status), which has been deprecated.

The connection identification is system wide unique and includes the device and instance number allowing multiple connections within a single device.

This PGN is part of the Distributed Power System / Architecture.

Note 1: If Query Support for this PGN is implemented, then manufacturers shall include support for queries that specify a value for Field 2.

Note 2: If command support for this PGN is implemented, then each command shall include a value for Field 2, which shall identify the connection being commanded.

Single Frame: **Y** Priority Default: **6** Default Update Rate: **1500** milliseconds Frequency: **.7** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.  0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)  253 - 254 = reserved for future use  255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
<b>DF53</b>	Integer, 8 bit unsigned To Report multiple connections at a single point in time	<b>uint8</b> Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
<b>2</b>	<b>Connection Number</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Note 1</b> Command Parameter: <b>Note 2</b>
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned Fixed instance within the source of this message, identifying the connection; the combination of the Connection Number and device sending the message is bus wide unique	<b>uint8</b> Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number

## DC Voltage / Current

**PGN: 127751**  
**hex: 1F307**

<b>3</b>	<b>DC Voltage</b>			<i>Byte Field Size:</i> <b>2</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD367</b>	Voltage, DC, High Range/Resolution			6553.3 = Reserved 6553.4 = Out of Range 6553.5 = Not Available or Do Not Change		
	<b>DF106</b>	Voltage - High Range	<b>uint16</b>	<i>Range:</i> <b>0 - 6553.2 V</b>		<i>Resolution:</i> <b>0.1V</b>	
<b>4</b>	<b>DC Current</b>			<i>Byte Field Size:</i> <b>3</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD368</b>	Current, DC, High Range/Resolution			83886.06 = Reserved 83886.07 = Out of Range 83886.08 = Not Available or Do Not Change		
	<b>DF114</b>	Current, DC, high range/r	<b>int24</b>	<i>Range:</i> <b>-83886.08 A to 83886.05 A</b>		<i>Resolution:</i> <b>0.01A</b>	
<b>5</b>	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i> <b>resv 8</b>		<i>Command Parameter:</i>	
	<b>DD001</b>	Reserved field			Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>		<i>Resolution:</i> <b>1</b>	Used to construct bit fields
		Used to align subsequent data on a byte boundary.					

## Nautical Leeway Angle

PGN: 128000

hex: 1F400

This PGN provides the Nautical Leeway Angle, which is defined as the angle between the vessel's heading (direction to which the vessel's bow points) and its course (direction of its motion (track) through the water).

The Nautical Leeway Angle is water referenced and does not account for slip due to current. This is commonly provided by dual-axis speed sensors.

Dual axis speed sensors are able to measure accurately the ship's speed in a longitudinal direction and a transverse direction. By measuring both speed components (i.e. the velocity vector), the Nautical Leeway Angle can be determined, and this angle can be used to optimize the vessel's course.

Note: This Nautical Leeway Angle is used primarily in the sailing segment of the maritime industry and may differ from oceanographic or scientific definitions of Leeway.

The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address. When no linkage exists, the value of the SID shall be set to 255.

Single Frame: Yes Priority Default: 4 Default Update Rate: 200 milliseconds Frequency: 5. cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: No

### Field # Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
	DD056 Sequence ID	Bit Field Size:	Command Parameter: Optional
	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.		
	0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)		
	253 - 254 = reserved for future use		
	255 = No binding provided. NMEA recommends using binding SID values whenever practical.		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
2	Nautical Leeway Angle	Byte Field Size: 2	Request Parameter: Optional
	DD438 Nautical Leeway Angle	Bit Field Size:	Command Parameter: Optional
	Positive angles indicate slippage to starboard, that is, the vessel is tracking to the right of its heading, and negative angles indicate slippage to port.		
	DF04 Angle, signed	int16 Range: +/-Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg
3	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 40	Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.		



# Vessel Acceleration

PGN: 128001

hex: 1F401

The Vessel Acceleration message transmits the acceleration of the vessel in all three axes, ahead/astern, port/starboard, and up/down. The acceleration values may be used for performance evaluation or crash detection. The acceleration values are measured using the ground as a reference.

Single Frame: **Y** Priority Default: **5** Default Update Rate: **100** milliseconds Frequency: **10.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Prohibited** ACK Rqmnts: **None**

## Field # Field Name

1	SID	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Prohibited</b>
	DD056 Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
	DF53 Integer, 8 bit unsigned	uint8 Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
2	Longitudinal Acceleration	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Prohibited</b>
	DD523 Acceleration	Acceleration, high	
	DF01 Acceleration	int16 Range: <b>+/- 327.64 m/s*s</b>	Resolution: <b>1x10E-2 m/s*s</b> 1G = 9.80665 m/s*s
	Acceleration of the vessel along the ahead/astern axis. Positive values represent acceleration in the forward direction.		
3	Transverse Acceleration	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Prohibited</b>
	DD523 Acceleration	Acceleration, high	
	DF01 Acceleration	int16 Range: <b>+/- 327.64 m/s*s</b>	Resolution: <b>1x10E-2 m/s*s</b> 1G = 9.80665 m/s*s
	Acceleration of the vessel along the port/starboard axis. Positive values represent acceleration in the starboard direction.		
4	Vertical Acceleration	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Prohibited</b>
	DD523 Acceleration	Acceleration, high	
	DF01 Acceleration	int16 Range: <b>+/- 327.64 m/s*s</b>	Resolution: <b>1x10E-2 m/s*s</b> 1G = 9.80665 m/s*s
	Acceleration of the vessel along the vertical axis. Positive values represent acceleration in the downward direction.		
5	NMEA Reseved	Byte Field Size: Bit Field Size: <b>resv 8</b>	Request Parameter: Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n) Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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## Electric Drive Status (Rapid Update)

PGN: 128002

hex: 1F402

This message provides the rapid status of an electric propulsion drive motor.

PGN update rate is not adjusted for communication between Motor and Inverter/Motor Controller. Intended use is for a HID.

Electrical input power of the 'motor-inverter-unit' can be calculated from DC voltage and current. Mechanical output power can be calculated from Rotational motor speed, motor torque and rotation direction.

Electrical motors for marine applications are constructed either with direct drive or with a gearbox but normally not with a shift gearbox (also no forward/reverse gear). Therefore motor, inverter and gearbox is considered as one unit = drive-unit or propulsion-unit.

Application examples are located in NMEA 2000 Appendix D.

Single Frame: **Yes** Priority Default: **5** Default Update Rate: **500** milliseconds Frequency: **2** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **Yes**

### Field # Field Name

<b>1</b>	<b>Inverter/Motor Controller</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
	<b>DD128</b> Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
	<b>DF53</b> Integer, 8 bit unsigned	uint8 Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Active Motor Mode</b>	Byte Field Size: Bit Field Size: <b>4</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD498</b> Active Motor Mode	0x0 = Neutral, 0x1 = Reverse, 0x2 = Forward, 0x3 = Reserved, 0x4 = Reserved, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available	
	<b>DF52</b> Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>3</b>	<b>Brake Mode</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD002</b> Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]	
	<b>DF52</b> Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Brake mode: free spinning of prop in neutral is prevented.			
<b>4</b>	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: <b>resv 2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"	
	<b>DF52</b> Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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## Electric Drive Status (Rapid Update)

PGN: 128002

hex: 1F402

5	Rotational Shaft Speed		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
DD129	Rate of rotation			
DF72	Rotational rate, unsigned	uint16	Range: 0-16,383 RPM	Resolution: 1/4 RPM
6	Motor DC Voltage		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
DD347	Voltage, AC or DC, High Range		6553.3 = Reserved 6553.4 = Out of Range 6553.5 = Not Available or Do Not Change	
DF106	Voltage - High Range	uint16	Range: 0 - 6553.2 V	Resolution: 0.1V
7	Motor DC Current		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
DD140	Current, Electric			
DF07	Current, electric, high	int16	Range: +/- 3,276.4 A	Resolution: 1x10E-1 A

## Electric Energy Storage Status (Rapid Update)

PGN: 128003

hex: 1F403

This message provides real-time information for Electric Energy Storage Systems.

The message transmit rate is 500ms.

This PGN is used to provide Electric Energy Storage on sources such as batteries.

The Instance Identifier field (Field 1) specifies which battery the PGN message relates to and all following data fields refer only to that source.

When a field is not supported, an output value of 'Data not available' shall be used

Application examples are located in NMEA 2000 Appendix D.

Single Frame: **Y** Priority Default: **5** Default Update Rate: **500** milliseconds Frequency: **2** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **No**

### Field # Field Name

<b>1</b>	<b>Energy Storage Identifier</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Required</b>
		Bit Field Size:	Command Parameter: <b>Required</b>
	<b>DD128</b> Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b> Unit-less number	
<b>2</b>	<b>Battery Status</b>	Byte Field Size:	Request Parameter: <b>Optional</b>
		Bit Field Size: <b>4</b>	Command Parameter: <b>Optional</b>
	<b>DD534</b> Energy Unit Status	0x0 = Normal Operation, 0x1 = PreCharge, 0x2 = Connected, 0x3 = Storage, 0x4 = Balancing, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available	
	<b>DF52</b> Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b> Used to construct bit fields	
<b>3</b>	<b>Isolation Status</b>	Byte Field Size:	Request Parameter: <b>Optional</b>
		Bit Field Size: <b>2</b>	Command Parameter: <b>Optional</b>
	<b>DD535</b> Isolation Status	0 = Normal 1 = Test Mode 2 = Error 3 = Data Not Available	
	<b>DF52</b> Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b> Used to construct bit fields	
	Primarily for high voltage applications		

## Electric Energy Storage Status (Rapid Update)

PGN: 128003

hex: 1F403

4	<b>Battery Error</b>		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Optional
	<b>DD536</b> Battery Error		0 = Normal Operation 1 = Error 2 = Reserved 3 = Data Not Available			
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range:	Variable	Resolution:	1
Indicates the presence of a fault or error. See Alert PGN for details						
5	<b>Battery Voltage</b>		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	<b>DD347</b> Voltage, AC or DC, High Range		6553.3 = Reserved 6553.4 = Out of Range 6553.5 = Not Available or Do Not Change			
	<b>DF106</b> Voltage - High Range	<b>uint16</b>	Range:	0 - 6553.2 V	Resolution:	0.1V
6	<b>Battery Current</b>		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	<b>DD140</b> Current, Electric					
	<b>DF07</b> Current, electric, high	<b>int16</b>	Range:	+/- 3,276.4 A	Resolution:	1x10E-1 A
(-) equals 'current consumed' equals 'charge' equals 'current flows into the battery' (+) equals 'current supplied' equals 'discharge' equals 'current flows out of the battery'						
7	<b>NMEA Reserved</b>		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 16	Command Parameter:	
	<b>DD001</b> Reserved field		Variable number of reserved bits, all set to logic "1"			
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range:	Variable	Resolution:	1
Used to construct bit fields						

## Thruster Control Status

**PGN: 128006**

**hex: 1F406**

This PGN is used to report status of thruster control and can be used with Command Group Function (PGN 126208) to command thruster equipment.

The Thruster Identifier Field (Field 2) specifies which thruster the PGN message is intended for, and all following data fields refer only to that thruster.

This PGN has several transmission rates dependent upon thruster operation: Static is 5s, Dynamic is 500ms, Control is 250ms. The message will be broadcasted periodically, but can also be requested as required. The default static update rate is 5 seconds to reduce bandwidth use when the thruster is not operating, this update rate is used when all control commands are OFF.

The default "dynamic" update rate is 500ms to provide the status of activity while the thruster is operated without use of the Command Group Function, through non-network manual means, by remote switches, etc. Control commands are transmitted using the Command Group Function (PGN 126208), with a default control update rate of 250ms.

The control commands are updated at a rapid rate to allow a safety mechanism to be implemented in the application logic, specifically the control functions can be turned OFF if continual command messages are not received within a timeout period.

This PGN can be used with PGN 128007 to provide the operating status, and PGN 128008 to provide the motor status of the thruster. The Sequence ID can be used to link the motor status PGN to the operating status PGN.

Fields output as "Not available" will be understood to be unsupported.

Begin Request Support:

A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for all thruster identifiers available. If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904).
- If the Request Group Function (PGN 126208) includes the Thruster Identifier then the response shall be filtered by this field and any other optional fields contained within this request resulting in one response.
- If all the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".
- If there are multiple request parameters and one or more but not all, are not valid, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x3 = Access denied".
- Beginning in Field 6 and for each request parameter, an appropriate value in the parameter error code field shall be provided.

End Request Support.

Begin Command Support:

- Every Command Group Function (PGN 126208) transmitted for this PGN shall contain a value for Thruster Identifier (Field 2).
- The value commanded shall identify which thruster the remaining commanded fields apply to. In addition to the required Acknowledge Group Function, this PGN shall be sent as response to any Command Group Function.

Note 1: The flags within Control Events may be manually reset by setting the flag bit value to 0 with the Command Group Function (PGN 126208).

End Command Support.

Single Frame: **Yes**    Priority Default: **2**    Default Update Rate: **5000** milliseconds    Frequency: **.2** cycles per second  
Destination: **Global/Multica**    Query Support: **Required**    Command Support: **Required**    ACK Rqmnts: **Yes**

Field #    Field Name

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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# Thruster Control Status

**PGN: 128006**  
**hex: 1F406**

<b>1</b>	<b>Sequence ID</b>	<i>Byte Field Size:</i> <input type="text" value="1"/>	<i>Request Parameter:</i> Prohibited
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> Prohibited
	<b>DD056</b> Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> <i>Range:</i> <input type="text" value="0 to 252"/>	<i>Resolution:</i> <input type="text" value="1 bit"/> Unit-less number
<b>2</b>	<b>Thruster Identifier</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Required
		<i>Bit Field Size:</i> <input type="text" value="8"/>	<i>Command Parameter:</i> Required
	<b>DD470</b> Identifier	<p>Unique Identifier of a function within a Virtual Device: 0 - 255</p>	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <input type="text" value="Variable"/>	<i>Resolution:</i> <input type="text" value="1"/> Used to construct bit fields
<b>3</b>	<b>Thruster Direction Control</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <input type="text" value="4"/>	<i>Command Parameter:</i> Required
	<b>DD473</b> Thruster Direction Control	<p>0 = OFF 1 = Thruster Ready 2 = Thruster to PORT 3 = Thruster to STARBOARD 4-15 = Reserved</p>	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <input type="text" value="Variable"/>	<i>Resolution:</i> <input type="text" value="1"/> Used to construct bit fields
For azimuth type thrusters, use Field 9 (Azimuth Control) to command the required angle			
<b>4</b>	<b>Power Enable</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <input type="text" value="2"/>	<i>Command Parameter:</i> Required
	<b>DD002</b> Generic status pair	<p>MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]</p>	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <input type="text" value="Variable"/>	<i>Resolution:</i> <input type="text" value="1"/> Used to construct bit fields
This field is used to enable the power supply to the thruster			
<b>5</b>	<b>Thruster Retract Control</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <input type="text" value="2"/>	<i>Command Parameter:</i> Optional
	<b>DD474</b> Thruster Retraction	<p>0 = OFF 1 = Extend 2 = Retract 3 = Reserved</p>	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <input type="text" value="Variable"/>	<i>Resolution:</i> <input type="text" value="1"/> Used to construct bit fields

## Thruster Control Status

PGN: 128006

hex: 1F406

6	Speed Control	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD485	Range, Restricted Percentage	0-100% 254 = Error 255 = Data Not Available	
DF120	Percent, Restricted Range	uint8 Range: 0 - 100% Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%
The speed is proportional to a control input device that can select variable speeds, for example proportional paddle switches, hall effect push buttons, or speed dials.			
7	Thruster Control Events	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 8	Command Parameter: Note 1
DD475	Thruster Control Events	0b00000000 = No errors /events present 0bxxxxxxx1 = Another device controlling thruster 0bxxxxxx1x = Boat speed too fast to safely use thruster 0bxxxxx1xx to 0b1xxxxxxx = Reserved	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Events are cleared when the condition is no longer true.			
8	Command Timeout	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD233	Time Value (Short resolution 5 msec)		
DF88	Time Interval, short	uint8 Range: 0 to 1.26 sec Resolution: 5x10E-3 sec	
If timeout elapses the thruster stops operating and reverts to static mode.			
9	Azimuth Control	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD486	Azimuth Angle, Signed	Angle, signed (+/-Pi rad 1x10E-4 rad int16)	
DF04	Angle, signed	int16 Range: +/-Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg
The angular direction control for azimuth capable thrusters. Relative to the bow, positive values are to starboard and negative values are to port.			



## Thruster Information

PGN: 128007

hex: 1F407

This PGN is used to provide information about thruster's operating specifications and ratings. The Thruster Identifier field (Field 2) specifies which thruster the PGN message relates to and all following data fields refer only to that thruster. The message will be sent upon request.

Begin Request Support:

A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for all thruster identifiers available. If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904).
- If the Request Group Function (PGN 126208) includes the Thruster Identifier then the response shall be filtered by this field and any other optional fields contained within this request resulting in one response.
- If all the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".
- If there are multiple request parameters and one or more but not all, are not valid, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x3 = Access denied". Beginning in Field 6 and for each request parameter, an appropriate value in the parameter error code field shall be provided.

End Request Support.

Revisions: Created 2019 message database version 2.200

Single Frame: Yes Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global/Multica Query Support: Required Command Support: Optional ACK Rqmnts: Yes

Field # Field Name

1	Thruster Identifier		Byte Field Size:		Request Parameter:	Required
			Bit Field Size:	8	Command Parameter:	Optional
	DD470	Identifier		Unique Identifier of a function within a Virtual Device: 0 - 255		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
2	Thruster Motor Type		Byte Field Size:		Request Parameter:	Optional
			Bit Field Size:	4	Command Parameter:	Optional
	DD487	Motor Power Type		0 = 12VDC 1 = 24VDC 2 = 48VDC 3 = 24VAC 4 = Hydraulic 5-15 = Reserved for future assignment		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	NMEA Reserved		Byte Field Size:		Request Parameter:	
			Bit Field Size:	resv 4	Command Parameter:	
	DD001	Reserved field		Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.					

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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## Thruster Information

**PGN: 128007**  
**hex: 1F407**

<b>4</b>	<b>Motor Power Rating</b>		<i>Byte Field Size:</i> <b>2</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD276</b> Power, medium (watts)					
	<b>DF28</b> Power	<b>uint16</b>	<i>Range:</i> 0 to 65,532 W	<i>Resolution:</i> 1 W		
<b>5</b>	<b>Maximum Motor Temperature Rating</b>		<i>Byte Field Size:</i> <b>2</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD043</b> Generic Temperature					
	<b>DF39</b> Temperature, low	<b>uint16</b>	<i>Range:</i> 0 to 655.32 deg K	<i>Resolution:</i> 1x10E-2 deg K		
<b>6</b>	<b>Maximum Rotational Speed</b>		<i>Byte Field Size:</i> <b>2</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD129</b> Rate of rotation					
	<b>DF72</b> Rotational rate, unsigned	<b>uint16</b>	<i>Range:</i> 0-16,383 RPM	<i>Resolution:</i> 1/4 RPM		

## Thruster Motor Status

**PGN: 128008**

**hex: 1F408**

This PGN is used to provide the motor status and data relevant to a specific thruster and can be used with Command Group Function (PGN 126208) to command thruster equipment.

The Thruster Identifier field (Field 2) specifies which thruster the PGN message relates to and all following data fields refer only to that thruster. This PGN has several transmission rates dependent upon thruster operation: Static is 5s, Dynamic is 500ms.

The message will be broadcasted periodically but can also be requested as required. The default static update rate is 5 seconds to reduce bandwidth use when the thruster is not operating.

The default dynamic update rate is 500ms to provide the status of activity while the thruster is operating.

This PGN can be used with PGN 128006 to provide the thruster control commands, and PGN 128007 to provide the operating status of the thruster.

The Sequence ID can be used to link the motor status PGN to the operating status PGN.

Fields output as "Data not available" will be understood to be unsupported.

Begin Request Support:

A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for all thruster identifiers available.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904).
- If the Request Group Function (PGN 126208) includes the Thruster Identifier, then the response shall be filtered by this field and any other optional fields contained within this request resulting in one response.
- If all the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".
- If there are multiple request parameters and one or more but not all, are not valid, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x3 = Access denied". Beginning in Field 6 and for each request parameter, an appropriate value in the parameter error code field shall be provided.

End Request Support.

Begin Command Support:

Every Command Group Function (PGN 126208) transmitted for this PGN shall contain a value for Thruster Identifier (Field 2) The value commanded shall identify which thruster the remaining commanded fields apply to.

Note 1: The flags within Thruster Motor Events may be manually reset by setting the flag bit value to 0 with the Command Group Function (PGN 126208). This command support is required.

Note 2: Total Motor Operating Time may be reset by setting its value to 0 with the Command Group Function (PGN 126208). This command support is required. End Command Support

Revisions: Created 2019 message database version 2.200

Single Frame: **Yes**    Priority Default: **2**    Default Update Rate: **5000** milliseconds    Frequency: **.2** cycles per second  
Destination: **Global/Multica**    Query Support: **Optional**    Command Support: **Required**    ACK Rqmnts: **Yes**

Field #    Field Name

# Thruster Motor Status

**PGN: 128008**  
**hex: 1F408**

1	Sequence ID			Byte Field Size: 1	Request Parameter: Prohibited
				Bit Field Size:	Command Parameter: Prohibited
	DD056 Sequence ID			An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
				0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
				253 - 254 = reserved for future use	
				255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
2	Thruster Identifier		Byte Field Size:	Request Parameter: Required	Required
			Bit Field Size: 8	Command Parameter: Required	Required
	DD470 Identifier			Unique Identifier of a function within a Virtual Device: 0 - 255	
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	Thruster Motor Events		Byte Field Size:	Request Parameter: Optional	Optional
			Bit Field Size: 8	Command Parameter: Note 1	Note 1
	DD471 Thruster Motor Events			0b0000 0000 = No errors present 0bxxxx xxx1 = Motor over temperature cutout 0bxxxx xx1x = Motor over current cutout 0bxxxx x1xx = Low oil level warning 0bxxxx 1xxx = Oil over temperature warning 0bxxx1 xxxx = Controller under voltage cutout 0bxxx1 xxxx = Manufacturer defined 0bx1xx xxxx = Reserved 0b1xxx xxxx = Data Not Available	
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Events are cleared when the condition is no longer true or by manually resetting using the Command Group Function (PGN 126208).				
4	Motor Current		Byte Field Size: 1	Request Parameter: Optional	Optional
			Bit Field Size:	Command Parameter: Prohibited	Prohibited
	DD491 Current, electric , medium unsigned				
	DF122 Current, electric, Medium	uint8	Range: 0-252	Resolution: 1 Amp	
	Load current of electric thruster motor.				
5	Motor Temperature		Byte Field Size: 2	Request Parameter: Optional	Optional
			Bit Field Size:	Command Parameter: Prohibited	Prohibited
	DD043 Generic Temperature				
	DF39 Temperature, low	uint16	Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K	

Thruster Motor Status

PGN: 128008  
hex: 1F408

6

Total Motor Operating Time

Byte Field Size: 2

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Note 2

DD268 Time

DF98 Time interval, medium, u uint16 Range: 0 - 65,532 minutes Resolution: 1 minute

Total time thruster has operated since last reset.

## Speed, Water Referenced

PGN: 128259

hex: 1F503

The purpose of this PGN is to provide a single transmission that describes the motion of a vessel over water. As of version 1.210 of this standard, the name of this PGN was changed from "Speed", field 4 "Speed Water Reference Type" was added, and field 3 "Speed Ground Referenced" was noted not for new designs. As of version 1.310 of this standard, field 5 "Speed Direction" was added to provide direction information. This reduced the reserved field (now field 6) from 16 bits to 12 bits.

Single Frame: **Yes** Priority Default: **2** Default Update Rate: **1000** milliseconds Frequency: **1** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Speed Water Referenced</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD044</b>	Generic Speed		
<b>DF35</b>	Speed	<b>uint16</b> Range: <b>0 to 655.32 m/s</b> Resolution: <b>1x10E-2 m/s</b>	1 Knot = 0.5144 m/s
<b>3</b>	<b>Speed Ground Referenced</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD044</b>	Generic Speed		
<b>DF35</b>	Speed	<b>uint16</b> Range: <b>0 to 655.32 m/s</b> Resolution: <b>1x10E-2 m/s</b>	1 Knot = 0.5144 m/s
Not for new designs. Value to be obtained from PGN 129026. Value to be set to Not Available.			
<b>4</b>	<b>Speed Water Referenced Type</b>	Byte Field Size: Bit Field Size: <b>8</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD293</b>	Speed Water Reference Type	<p>00 = Paddle Wheel 01 = Pitot Tube 02 = Doppler Log 03 = Correlation Log (Ultra-Sound) 04 = EM Log (Electro - Magnetic) 05 through 128 Reserved</p> <p>129 through 252 Generic Speed Sources other than those defined 253 = Not Supported 254 = Error 255 = Do Not Change/Not Available</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Added as of version 1.210. Previously was reserved			

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Speed, Water Referenced

PGN: 128259  
hex: 1F503

5	Speed Direction	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
DD356	Speed Direction	00 = Forward (Ahead) 01 = Astern (Backward) 02 through 14 Reserved 15 = Data Not Available		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
When provided, this field identifies the direction of the "Speed Water Referenced" value in field 2.				
6	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 12	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
Used to align subsequent data on byte boundary.				

## Water Depth

**PGN: 128267**  
**hex: 1F50B**

Water depth relative to the transducer and offset of the measuring transducer. Positive offset numbers provide the distance from the transducer to the waterline. Negative offset numbers provide the distance from the transducer to the part of the keel of interest.

Single Frame: **Yes** Priority Default: **3** Default Update Rate: **1000** milliseconds Frequency: **1.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Water Depth, Transducer</b>	Byte Field Size: <b>4</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD162</b>	Water Depth At Transducer	Depth relative to the transducer location. Range of value specified in "Maximum Depth Range" (field 4).	
<b>DF09</b>	Distance	<b>uint32</b> Range: <b>0 to ~4.295x10E+7 m</b> Resolution: <b>1x10E-2 m</b>	
<b>3</b>	<b>Offset</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD161</b>	Transducer Offset	Positive values represent distance from transducer to water line and negative values represent distance from the transducer to the keel.	
<b>DF46</b>	Distance, signed, medium	<b>int16</b> Range: <b>+/- 32.764 m</b> Resolution: <b>1x10E-3 m</b>	
<b>4</b>	<b>Maximum Depth Range</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD350</b>	Maximum Depth Range	<p>Device classification of the Maximum Range over which water depth can be measured.</p> <p>253 = Deeper than 2,520 meters</p> <p>254 = Error</p> <p>255 = Data Not Available</p>	
<b>DF109</b>	Distance, Rough Approx	<b>uint8</b> Range: <b>0 - 2,520 meters</b> Resolution: <b>10 meters</b>	



## Distance Log

**PGN: 128275**  
**hex: 1F513**

This PGN provides two distance values recorded from one log which measures speed through water. The UTC time of the last distance increment is captured as Measurement Date & Time (which will be near current time). The distance values are stored during power down and resume counting after power up. Total Cumulative Distance is normally set to zero when the log is installed and never reset after that. Note 1: Distance Since Last Reset may manually be set to zero at any suitable time. The "Distance Since Last Reset" is reset by setting its value to 0 with the "Command Group Function" PGN 126208.

Single Frame: **No** Priority Default: **6** Default Update Rate: **1000** milliseconds Frequency: **1.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Measurement Date</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD039</b> Generic date	Days since January 1, 1970, Date is relative to UTC Time.	
	<b>DF41</b> Date, day count	<b>uint16</b> Range: <b>0 to 65,532 days</b>	Resolution: <b>1 day</b> 0 = January 1, 1970, max = ~179 years
<b>2</b>	<b>Measurement Time</b>	Byte Field Size: <b>4</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD158</b> Generic time of day	24 hour clock, 0 = midnight, time is in UTC	
	<b>DF06</b> Time of day	<b>uint32</b> Range: <b>0 to 86,401 s</b>	Resolution: <b>1x10E-4 s</b> ~24 hours, 0 = midnight, range allows for up to two leap seconds per day
<b>3</b>	<b>Total Cumulative Distance</b>	Byte Field Size: <b>4</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD120</b> Distance, voyage		
	<b>DF11</b> Distance, long	<b>uint32</b> Range: <b>0 to ~4.295x10E+9 m</b>	Resolution: <b>1 m</b>
<b>4</b>	<b>Distance Since Last Reset</b>	Byte Field Size: <b>4</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Note 1</b>
	<b>DD120</b> Distance, voyage		
	<b>DF11</b> Distance, long	<b>uint32</b> Range: <b>0 to ~4.295x10E+9 m</b>	Resolution: <b>1 m</b>

## Tracked Target Data

PGN: 128520

hex: 1F608

Message for reporting status and target data from tracking radar external devices. The reporting interval will vary by the values for target status and quantity of track data files.

Single Frame: No Priority Default: 2 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Sequence ID	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD056	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
2	Target ID #	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
3	Track Status	Byte Field Size: 4 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
DD216	Track Status	<p>xx00 = Cancelled or Not Available, xx01 = Initial Acquisition Target, xx10 = Tracking Target, xx11 = Lost Target, x0xx = Reported Target No, x1xx = Reported Target Yes, 0xxx = Acquisition Manual, 1xxx = Acquisition Auto, where x = don't care</p>	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
4	Bearing Reference	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD218	Direction reference for target	<p>0 = True, 1 = Magnetic, 2 = Error, 3 = Relative</p>	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields

## Tracked Target Data

PGN: 128520

hex: 1F608

5	NMEA Reserved			Byte Field Size:		Request Parameter	
				Bit Field Size:	resv 2	Command Parameter:	
	DD001	Reserved field					Variable number of reserved bits, all set to logic "1"
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
							Used to align subsequent data on a byte boundary.
6	Bearing			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD127	Generic Direction -True					Degrees clockwise relative to True North.
	DF02	Angle	uint16	Range:	0 to 2Pi rad	Resolution:	1x10E-4 rad
							Resolution ~0.0057deg, 1 deg = .01745 rad
7	Distance			Byte Field Size:	4	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD115	Distance					
	DF15	Distance, signed	int32	Range:	+/-~2.147x10E+7 m	Resolution:	1x10E-2 m
8	Course			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD127	Generic Direction -True					Degrees clockwise relative to True North.
	DF02	Angle	uint16	Range:	0 to 2Pi rad	Resolution:	1x10E-4 rad
							Resolution ~0.0057deg, 1 deg = .01745 rad
9	Speed			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD044	Generic Speed					
	DF35	Speed	uint16	Range:	0 to 655.32 m/s	Resolution:	1x10E-2 m/s
							1 Knot = 0.5144 m/s
10	CPA			Byte Field Size:	4	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD115	Distance					
	DF15	Distance, signed	int32	Range:	+/-~2.147x10E+7 m	Resolution:	1x10E-2 m
11	TCPA			Byte Field Size:	4	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD034	Time-elapsed/Time-to-go					Time interval in milli-sec. "-" = time elapsed since event, "+" = time to go before event.
	DF40	Time interval, signed, sta	int32	Range:	+/- ~2.148x10E+6 s	Resolution:	1x10E-3 s
12	UTC of Fix			Byte Field Size:	4	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD158	Generic time of day					24 hour clock, 0 = midnight, time is in UTC
	DF06	Time of day	uint32	Range:	0 to 86,401 s	Resolution:	1x10E-4 s
							~24 hours, 0 = midnight, range allows for up to two leap seconds per day

## Tracked Target Data

PGN: 128520

hex: 1F608

13	Name	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
14	Reference Target	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields
15	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 6	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields
	Used to align subsequent data on a byte boundary.		

## Elevator Car Status

**PGN: 128538**  
**hex: 1F61A**

This PGN provides the status information of an elevator car. This includes the elevator car id and type, sensors for load and weight limits, smoke detection, door status, motor status, and brake status.

Also provided are weight and speed measurements, current and destination deck location, proximity switch status, inertial measurement unit status and Emergency button and buzzer status.

This PGN is generated at a high rate of 10 times a second due to the safety aspects of the elevator usage.

Begin Request Support:

Requests for this PGN using the NMEA Request Group Function (PGN 126208), shall be processed in the following manner:

- If no requested fields have been included with the Request Group Function (PGN 126208), then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 055904) described above for both addressed and global requests.
- If the Request Group Function (PGN 126208) includes the Elevator Car ID (Field 2), then the response shall be filtered by that value contained within this request resulting in:
- If the request is global or addressed and valid the response is this PGN.
- If the request is global and not valid, there is no response.
- If the request is addressed and not valid, the response is the Acknowledgement Group Function PGN (126208) indicating the appropriate error code(s). The Sequence ID field (SID) is used to bind this PGN to other related PGN's from the same source address.

This PGN may be requested or commanded using the NMEA Group Function (PGN 126208).

End Request Support.

Begin Command Support:

The NMEA Acknowledge Group Function (PGN 126208) shall be sent as the response to the NMEA Command Group Function indicating acceptance or rejection of the command.

If the command is accepted, the Elevator Car Status PGN shall be transmitted to confirm the actual settings.

When using the NMEA Command (PGN 126208), Elevator Car ID (Field 2), must be provided to indicate which Elevator is subject to the command. Requests for this PGN using the ISO Request (PGN 059904), shall be processed in the following manner:

- A device receiving a global ISO (PGN 059904) for this PGN (128538), shall respond by providing one or more of this PGN for each Elevator Car ID.
- A device receiving an addressed ISO (PGN 059904) for this PGN (128538), shall respond by providing one or more this PGN for each Elevator Car ID or an ISO Acknowledge PGN (059392) indicating a Negative Acknowledgement.

End Command Support.

The Sequence ID field (SID) is used to bind this PGN to other related PGN's from the same source address.

Revisions:

Created 2019 message database version 2.100

Single Frame: **N**    Priority Default: **6**    Default Update Rate: **100** milliseconds    Frequency: **10.** cycles per second  
Destination: **Global**    Query Support: **Required**    Command Support: **Optional**    ACK Rqmnts: **None**

Field #    Field Name

# Elevator Car Status

**PGN: 128538**  
**hex: 1F61A**

<b>1</b>	<b>Sequence ID</b>			<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter:</i> <b>Optional</b>	
				<i>Bit Field Size:</i>		<i>Command Parameter:</i> <b>Optional</b>	
	<b>DD056</b> Sequence ID						<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b>			Unit-less number
<b>2</b>	<b>Elevator Car ID</b>			<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter:</i> <b>Required</b>	
				<i>Bit Field Size:</i>		<i>Command Parameter:</i> <b>Optional</b>	
	<b>DD005</b> Generic numeric ID, short						Number of route, waypoint, event, mark, etc.
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b>			Unit-less number
<b>3</b>	<b>Elevator Car Usage</b>			<i>Byte Field Size:</i>		<i>Request Parameter:</i> <b>Optional</b>	
				<i>Bit Field Size:</i> <b>4</b>		<i>Command Parameter:</i> <b>Optional</b>	
	<b>DD416</b> Elevator Type						<p>0000 = Land</p> <p>0001 = Marine</p> <p>0010 - 1101 = Reserved</p> <p>1110 = Error</p> <p>1111 = Data Not Available</p>
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>			Used to construct bit fields
<b>4</b>	<b>Smoke Sensor Status</b>			<i>Byte Field Size:</i>		<i>Request Parameter:</i> <b>Optional</b>	
				<i>Bit Field Size:</i> <b>2</b>		<i>Command Parameter:</i> <b>Optional</b>	
	<b>DD426</b> Sensor Status						<p>00 = disabled</p> <p>01 = enabled</p> <p>10 = detected</p> <p>11 = fault</p>
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>			Used to construct bit fields
	Detected = smoke detected						
<b>5</b>	<b>Limit Switch Sensor Status</b>			<i>Byte Field Size:</i>		<i>Request Parameter:</i> <b>Optional</b>	
				<i>Bit Field Size:</i> <b>2</b>		<i>Command Parameter:</i> <b>Optional</b>	
	<b>DD426</b> Sensor Status						<p>00 = disabled</p> <p>01 = enabled</p> <p>10 = detected</p> <p>11 = fault</p>
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>			Used to construct bit fields
	Detected = limit detected						

## Elevator Car Status

**PGN: 128538**  
**hex: 1F61A**

<b>6</b>	<b>Proximity Switch Sensor Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<input type="text" value="2"/>	<i>Command Parameter:</i>	Optional
<b>DD426</b>	Sensor Status		00 = disabled 01 = enabled 10 = detected 11 = fault		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Detected = proximity detected				
<b>7</b>	<b>Inertial Measurement Unit (IMU) Sensor Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<input type="text" value="2"/>	<i>Command Parameter:</i>	Optional
<b>DD002</b>	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
<b>8</b>	<b>Elevator Load Limit Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<input type="text" value="2"/>	<i>Command Parameter:</i>	Optional
<b>DD427</b>	Load Limit		00 = load limit acceptable 01 = load limit exceeded 10 = reserved 11 = load limit unknown/error		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
<b>9</b>	<b>Elevator Load Balance Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<input type="text" value="2"/>	<i>Command Parameter:</i>	Optional
<b>DD428</b>	Load Balance		00 = load balanced 01 = load unbalanced 10 = Reserved 11 = load balance unknown/error		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
<b>10</b>	<b>Elevator Load Sensor 1 Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<input type="text" value="2"/>	<i>Command Parameter:</i>	Optional
<b>DD426</b>	Sensor Status		00 = disabled 01 = enabled 10 = detected 11 = fault		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Detected = load limit detected				
<b>11</b>	<b>Elevator Load Sensor 2 Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<input type="text" value="2"/>	<i>Command Parameter:</i>	Optional
<b>DD426</b>	Sensor Status		00 = disabled 01 = enabled 10 = detected 11 = fault		
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Detected = load limit detected				

## Elevator Car Status

**PGN: 128538**  
**hex: 1F61A**

<b>12</b>	<b>Elevator Load Sensor 3 Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD426</b> Sensor Status		00 = disabled 01 = enabled 10 = detected 11 = fault		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Detected = load limit detected				
<b>13</b>	<b>Elevator Load Sensor 4 Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD426</b> Sensor Status		00 = disabled 01 = enabled 10 = detected 11 = fault		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Detected = load limit detected				
<b>14</b>	<b>NMEA Reserved</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	
		<i>Bit Field Size:</i>	resv <b>2</b>	<i>Command Parameter:</i>	
	<b>DD001</b> Reserved field		Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.				
<b>15</b>	<b>Elevator Car Motion Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD435</b> Motion Status		00: Stop 01: Up 10: Down 11: unknown/error		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
<b>16</b>	<b>Elevator Car Door Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD429</b> Door Status		00 = Open 01 = Closed 10 = Error 11 = [Unavailable, Unknown]		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
<b>17</b>	<b>Elevator Car Emergency Button Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD002</b> Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields



# Elevator Car Status

PGN: 128538  
hex: 1F61A

18	Elevator Car Buzzer Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
19	Open Door Button Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
20	Close Door Button Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
21	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 2	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
	Used to align subsequent data on byte boundary.			
22	Current Deck Position of Elevator Car	Byte Field Size: 1	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD433	Floor/Deck Location	(-128) - (-1) = Below ground or main deck 0 = Ground or Main deck 1 - 124 = Over ground or over main deck 125 = Reserved 126 = Error 127 = Data Not Available		
DF57	Integer, 8 bit 2's complem	int8 Range: -128 to +124 Resolution: 1 bit	Unit-less number	
23	Destination Deck	Byte Field Size: 1	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD433	Floor/Deck Location	(-128) - (-1) = Below ground or main deck 0 = Ground or Main deck 1 - 124 = Over ground or over main deck 125 = Reserved 126 = Error 127 = Data Not Available		
DF57	Integer, 8 bit 2's complem	int8 Range: -128 to +124 Resolution: 1 bit	Unit-less number	

## Elevator Car Status

PGN: 128538

hex: 1F61A

24	<b>Total Number of Decks</b>			Byte Field Size: 1		Request Parameter: Optional	
				Bit Field Size:		Command Parameter: Optional	
	DD005	Generic numeric ID, short			Number of route, waypoint, event, mark, etc.		
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit		Unit-less number
25	<b>Weight of Elevator Car load cell No. 1</b>			Byte Field Size: 2		Request Parameter: Optional	
				Bit Field Size:		Command Parameter: Optional	
	DD436	Weight of Elevator Car					
	DF118	Mass, medium	uint16	Range: 0 – 65,532 kg	Resolution: 1 kg		
26	<b>Weight of Car Elevator load cell No. 2</b>			Byte Field Size: 2		Request Parameter: Optional	
				Bit Field Size:		Command Parameter: Optional	
	DD436	Weight of Elevator Car					
	DF118	Mass, medium	uint16	Range: 0 – 65,532 kg	Resolution: 1 kg		
27	<b>Weight of Elevator Car load cell No. 3</b>			Byte Field Size: 2		Request Parameter: Optional	
				Bit Field Size:		Command Parameter: Optional	
	DD436	Weight of Elevator Car					
	DF118	Mass, medium	uint16	Range: 0 – 65,532 kg	Resolution: 1 kg		
28	<b>Weight of Elevator Car load cell No. 4</b>			Byte Field Size: 2		Request Parameter: Optional	
				Bit Field Size:		Command Parameter: Optional	
	DD436	Weight of Elevator Car					
	DF118	Mass, medium	uint16	Range: 0 – 65,532 kg	Resolution: 1 kg		
29	<b>Speed of Elevator Car</b>			Byte Field Size: 1		Request Parameter: Optional	
				Bit Field Size:		Command Parameter: Optional	
	DD437	Speed of Elevator car					
	DF119	Speed, low	uint8	Range: 0 – 25.2 m/s	Resolution: 0.1 m/s		
30	<b>Elevator Brake Status</b>			Byte Field Size:		Request Parameter: Optional	
				Bit Field Size: 2		Command Parameter: Optional	
	DD002	Generic status pair			MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1		Used to construct bit fields
31	<b>Elevator Motor rotation control status</b>			Byte Field Size:		Request Parameter: Optional	
				Bit Field Size: 4		Command Parameter: Optional	
	DD430	Motor Control Status			00 = normal 01 = alarm 10 = reserved 11 = unknown/error		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1		Used to construct bit fields

32	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 2	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to align subsequent data on byte boundary.		Used to construct bit fields		

## Elevator Motor Control

**PGN: 128768**  
**hex: 1F700**

This PGN provides the status of an elevator motor controller.

Settings of the elevator motor controller may be changed using the NMEA Command Group Function.

This PGN is generated at the nominal of rate of 1 second and when state changes occur in Motor Rotation Control Statue (Field 5).

This PGN may be requested or commanded using the NMEA Group Function (PGN 126208).

Elevator Motor Control commands may be sent over the network by using the NMEA Command Group Function (PGN 126208) to change Motor Acceleration/Deceleration Profile Selection (Field 4) and Motor Rotation Control Status (Field 5).

The NMEA Acknowledge Group Function (PGN 126208) shall be sent as the response to the NMEA Command Group Function indicating acceptance or rejection of the command. If the command is accepted, the Elevator Motor Control PGN shall be transmitted to confirm the actual settings.

### Begin Request Support:

When using the NMEA Command (PGN 126208), Elevator Car ID (Field 2), must be provided to indicate which Elevator is subject to the command. Requests for this PGN using the ISO Request (PGN 059904), shall be processed in the following manner:

- A device receiving a global ISO (PGN 059904) for this PGN (128768), shall respond by providing one or more of this PGN for each Elevator Car ID.
- A device receiving an addressed ISO (PGN 059904) for this PGN (128768), shall respond by providing one or more this PGN for each Elevator Car ID or an ISO Acknowledge PGN (059392) indicating a Negative Acknowledgement.

Requests for this PGN using the NMEA Request Group Function (PGN 126208), shall be processed in the following manner:

- If no requested fields have been included with the Request Group Function (PGN 126208), then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 055904) described above for both addressed and global requests.
- If the Request Group Function (PGN 126208) includes the Elevator Car ID (Field 2), then the response shall be filtered by that value contained within this request resulting in:
  - If the request is global or addressed and valid, the response is this PGN.
  - If the request is global and not valid, there is no response.
  - If the request is addressed and not valid, the response is the Acknowledgement Group Function PGN (126208) indicating the appropriate error code(s). The Sequence ID field (SID) is used to bind this PGN to other related PGN's from the same source address.

### End Request Support.

Single Frame: **Yes**    Priority Default: **6**    Default Update Rate: **1000** milliseconds    Frequency: **1.** cycles per second  
Destination: **Global**    Query Support: **Required**    Command Support: **Required**    ACK Rqmnts: **No**

**Field #    Field Name**

# Elevator Motor Control

**PGN: 128768**  
**hex: 1F700**

<b>1</b>	<b>Sequence ID</b>			<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD056</b>	Sequence ID		<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>			
	<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b>	Unit-less number	
<b>2</b>	<b>Elevator Car ID</b>			<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i>	Required
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD005</b>	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.			
	<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b>	Unit-less number	
<b>3</b>	<b>Elevator car usage</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i> <b>4</b>		<i>Command Parameter:</i>	Optional
	<b>DD416</b>	Elevator Type		<p>0000 = Land</p> <p>0001 = Marine</p> <p>0010 - 1101 = Reserved</p> <p>1110 = Error</p> <p>1111 = Data Not Available</p>			
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>	Used to construct bit fields	
<b>4</b>	<b>Motor Acceleration/Deceleration profile selection</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i> <b>4</b>		<i>Command Parameter:</i>	Optional
	<b>DD432</b>	Acceleration/Deceleration Profile		<p>0000 = Not Used</p> <p>0001 = Profile 1</p> <p>0010 = Profile 2</p> <p>0011 - 1101 = Reserved</p> <p>1110 = Error</p> <p>1111 = Data Not Available</p>			
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>	Used to construct bit fields	
<b>5</b>	<b>Motor rotation control status</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i> <b>2</b>		<i>Command Parameter:</i>	Optional
	<b>DD431</b>	Elevator Motor Control		<p>00 = Stop</p> <p>01 = Up</p> <p>10 = Down</p> <p>11 = unknown/error</p>			
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>	Used to construct bit fields	

6	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 38	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to align subsequent data on byte boundary.		Used to construct bit fields		

## Elevator Deck Push Button

**PGN: 128769**

**hex: 1F701**

This PGN provides the status of an elevator call button.

This PGN is transmitted upon a change of state of Elevator Call Button Selection (Field 5).

This PGN may be requested using the NMEA Group Function (PGN 126208).

When using the NMEA Request Group Function (PGN 126208), Elevator Call Button ID, (Field 2) and Deck Button ID (Field 3) should be provided to indicate which Elevator Call Button ID (Field 2), and Deck Button ID (Field 3) is subject to the request.

Begin Request Support:

Requests for this PGN using the ISO Request (PGN 059904), shall be processed in the following manner:

- A device receiving a global ISO (PGN 059904) for this PGN (128769), shall respond by providing one or more of this PGN for each Elevator Call Button ID (Field 2) and Deck Button ID (Field 3) combination.
- A device receiving an addressed ISO (PGN 059904) for this PGN (128769), shall respond by providing one or more this PGN for each Elevator Call Button ID (Field 2) and Deck Button ID (Field 3) combination or an ISO Acknowledge PGN (059392) indicating a Negative Acknowledgement. Requests for this PGN using the NMEA Request Group Function (PGN 126208), shall be processed in the following manner:
  - If no requested fields have been included with the Request Group Function (PGN 126208), then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904) described above for both addressed and global requests.
  - If the Request Group Function (PGN 126208) includes Elevator Call Button ID (Field 2) and Deck Button ID (Field 3), then the response shall be filtered by the values contained within this request resulting in:
    - If the request is global or addressed and valid, the response is this PGN.
    - If the request is global and not valid, there is no response.
    - If the request is addressed and not valid, the response is the Acknowledgement Group Function PGN (126208) indicating the appropriate error code(s).

End Request Support.

The Sequence ID field (SID) is used to bind this PGN to other related PGN's from the same source address

Single Frame: **Yes** Priority Default: **6** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

Field # Field Name

# Elevator Deck Push Button

PGN: 128769

hex: 1F701

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD056 Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
2	Elevator Call Button ID	Byte Field Size: 1	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
3	Deck Button ID	Byte Field Size: 1	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD433 Floor/Deck Location	<p>(-128) - (-1) = Below ground or main deck</p> <p>0 = Ground or Main deck</p> <p>1 - 124 = Over ground or over main deck</p> <p>125 = Reserved</p> <p>126 = Error</p> <p>127 = Data Not Available</p>	
	DF57 Integer, 8 bit 2's complem	int8	Range: -128 to +124 Resolution: 1 bit Unit-less number
4	Elevator Car Usage	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 4	Command Parameter: Optional
	DD416 Elevator Type	<p>0000 = Land</p> <p>0001 = Marine</p> <p>0010 - 1101 = Reserved</p> <p>1110 = Error</p> <p>1111 = Data Not Available</p>	
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
5	Elevator Call Button Selection	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
	DD434 Status of Floor Call Button	<p>00: not pushed</p> <p>01: up</p> <p>10: down</p> <p>11 : call satisfied (turn off button illumination)</p>	
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields



6	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 34	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to align subsequent data on byte boundary.		Used to construct bit fields		

## Windlass Control Status

PGN: 128776

hex: 1F708

This PGN is used to report status of anchor windlass controls and can be used with Command Group Function (PGN 126208) to command the windlass and anchoring equipment.

The Windlass Identifier Field (Field 2) specifies which windlass the PGN message is intended for, and all following data fields refer only to that windlass.

This PGN has several transmission rates dependent upon windlass operation: Static is 5s, Dynamic is 500ms, Control is 250ms.

The message will be broadcasted periodically, but can also be requested as required.

The default static update rate is 5 seconds to reduce bandwidth use when the windlass is not operating, this update rate is used when all control commands are OFF.

The default dynamic update rate is 500ms to provide the status of activity while the anchor windlass is operating without use of the Command Group Function, through non-network manual means, by remote switches, etc.

Control commands are transmitted using the Command Group Function (PGN 126208), with a default control update rate of 250ms.

The control commands are updated at a rapid rate to allow a safety mechanism to be implemented in the application logic, specifically the control functions can be turned OFF if continual command messages are not received within a timeout period.

This PGN can be used with PGN 128777 to provide the operating status, and PGN 128778 to provide the monitoring status for windlasses.

The Sequence ID can be used to link the three windlass PGNs.

Fields output as "Unavailable" or "Data not available" will be understood to be unsupported.

Begin Request Support:

A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for all windlass identifiers available.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904).
- If the Request Group Function (PGN 126208) includes the Windlass Identifier then the response shall be filtered by this field and any other optional fields contained within this request resulting in one response.
- If all the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".
- If there are multiple request parameters and one or more but not all, are not valid, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x3 = Access denied". Beginning in Field 6 and for each request parameter, an appropriate value in the parameter error code field shall be provided.

End Request Support.

Begin Command Support:

- In addition to the required Acknowledge Group Function, this PGN shall be sent as response to any Command Group Function.
- Every Command Group Function (PGN 126208) transmitted for this PGN shall contain a value for Windlass Identifier (Field 2).
- The value commanded shall identify which windlass the remaining commanded fields apply to.
- Note 1: The flags within Control Events may be manually reset by setting the flag bit value to 0 with the Command Group Function (PGN 126208). This command support is required.

End Command Support.

Single Frame: Yes Priority Default: 4 Default Update Rate: 5000 milliseconds Frequency: .2 cycles per second  
Destination: Global/Multica Query Support: Optional Command Support: Required ACK Rqmnts: Yes

Field # Field Name

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

# Windlass Control Status

PGN: 128776

hex: 1F708

1	Sequence ID	Byte Field Size: 1	Request Parameter: Prohibited
		Bit Field Size:	Command Parameter: Prohibited
DD056	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
An upward counting number used to link this PGN to other related PGNs sent from the same source address.			
2	Windlass Identifier	Byte Field Size:	Request Parameter: Required
		Bit Field Size: 8	Command Parameter: Required
DD470	Identifier	<p>Unique Identifier of a function within a Virtual Device:</p> <p>0 - 255</p>	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
3	Windlass Direction Control	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Required
DD484	Windlass Direction Control	<p>0 = OFF (Status Only / cannot command)</p> <p>1 = DOWN</p> <p>2 = UP</p> <p>3 = Reserved</p>	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
4	Anchor Docking Control	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Required
DD002	Generic status pair	<p>MSB/LSB:</p> <p>00 = [No, Off, Disabled, Reset, "0"],</p> <p>01 = [Yes, On, Enabled, Set, "1"],</p> <p>10 = Error,</p> <p>11 = [Unavailable, Unknown]</p>	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
This control field can be used for various functions pertaining to anchor docking – these include a stowing mechanism if the windlass retracts into a hidden location in the bow, or if an automated two speed (fast-to-slow) changeover is to occur during anchor docking.			
5	Speed Control Type	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
DD488	Speed Type	<p>0 = Single Speed</p> <p>1 = Dual Speed</p> <p>2 = Proportional Speed</p> <p>3 = Data Not Available</p>	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## Windlass Control Status

PGN: 128776

hex: 1F708

6	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 2	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.					
7	Speed Control		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	8	Command Parameter:	Required
	DD489	Speed Control	Single speed: 0 = OFF 1-100 = ON  Dual speed: 0 = OFF 1-49 = SLOW 50-100 = FAST  Proportional speed: 0 = OFF 1-100 = Proportional speed			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
8	Power Enable		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Required
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to enable power supply to windlass.					
9	Mechanical Lock		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Required
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to disengage mechanical locks on the windlass. Where Enable is locked and Disable is unlocked.					
10	Deck and Anchor Wash		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Required
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to enable/disable the fresh water wash					

## Windlass Control Status

PGN: 128776

hex: 1F708

11	Anchor Light			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD002	Generic status pair		MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
12	Command Timeout			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD233	Time Value (Short resolution 5 msec)					
	DF88	Time Interval, short	uint8	Range:	0 to 1.26 sec	Resolution:	5x10E-3 sec
		If timeout elapses the thruster stops operating and reverts to static mode.					
13	Windlass Control Events			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	4	Command Parameter:	Note 1
	DD478	Windlass Control Events		0b0000 = No errors present			
				0bxxx1 = Another device controlling windlass			
				0bxx1x = Reserved			
				0bx1xx = Reserved			
				0b1xxx = Reserved			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
	Events are cleared when the condition is no longer true, or by manually resetting using the Command Group Function (PGN 126208).						
14	NMEA Reserved			Byte Field Size:		Request Parameter	
				Bit Field Size:	resv 4	Command Parameter:	
	DD001	Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
	Used to align subsequent data on byte boundary.						

## Anchor Windlass Operating Status

**PGN: 128777**

**hex: 1F709**

This PGN is used to provide the operating status and data relevant to a specific Anchor Windlass and can be used with Command Group Function (PGN 126208) to command windlass and anchoring equipment.

The Windlass Identifier (Field 2) specifies which windlass the PGN message relates to and all following data fields refer only to that windlass.

This PGN has several transmission rates dependent upon windlass operation: Static is 5s, Dynamic is 500ms.

The message will be broadcasted periodically, but can also be requested as required.

The default static update rate is 5 seconds to reduce bandwidth use when the windlass is not operating.

The default dynamic update rate is 500ms to provide the status of activity while the windlass is operating.

This PGN can be used with PGN 128776 to provide the windlass control status, and PGN 128778 to provide the monitoring status. The Sequence ID can be used to link the three windlass PGNs.

Fields 3, 4, and 8 output as "Unavailable" will be understood to be unsupported.

Begin Request Support:

A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for all windlass identifiers available.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904).
- If the Request Group Function (PGN 126208) includes the Windlass Identifier then the response shall be filtered by this field and any other optional fields contained within this request resulting in one response.
- If all the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".
- If there are multiple request parameters and one or more but not all, are not valid, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x3 = Access denied". Beginning in Field 6 and for each request parameter, an appropriate value in the parameter error code field shall be provided.

End Request Support.

Begin Command Support:

- Every Command Group Function (PGN 126208) transmitted for this PGN shall contain a value for Windlass Identifier (Field 2).
- The value commanded shall identify which windlass the remaining commanded fields apply to.
- Note 1: Rode Counter Value may be reset by setting its value to 0 with the Command Group Function (PGN 126208). Command support is required.
- Note 2: The flags within Windlass Operating Events may be manually reset by setting the flag bit value to 0 with the Command Group Function (PGN 126208).

End Command Support.

Single Frame: **Yes**    Priority Default: **4**    Default Update Rate: **5000** milliseconds    Frequency: **.2** cycles per second  
Destination: **Global/Multica**    Query Support: **Optional**    Command Support: **Required**    ACK Rqmnts: **Yes**

Field #    Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD056 Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
2	Windlass Identifier	Byte Field Size:	Request Parameter: Required
		Bit Field Size: 8	Command Parameter: Optional
	DD470 Identifier	Unique Identifier of a function within a Virtual Device: 0 - 255	
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
3	Windlass Motion Status	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
	DD480 Windlass Motion States	<p>0 = Windlass stopped</p> <p>1 = Deployment occurring</p> <p>2 = Retrieval occurring</p> <p>3 = Unavailable</p>	
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
	Indicates current physical state of windlass movement.		
4	Rode Type Status	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
	DD481 Rode Type States	<p>0 = Chain presently detected</p> <p>1 = Rope presently detected</p> <p>2 = Error</p> <p>3 = Unavailable</p>	
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
	Indicates whether chain or rope is currently being deployed or retrieved.		
5	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 4	Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
	Used to align subsequent data on byte boundary.		

# Anchor Windlass Operating Status

PGN: 128777

hex: 1F709

6	<b>Rode Counter Value</b>	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Note 1
	<b>DD194</b> Distance, medium	Dependent upon PG Field definition.	
	<b>DF75</b> Distance, Medium	uint16	Range: 0 to 6553.2 m Resolution: 1x10E-1 m
	Distance of rode deployed.		
7	<b>Windlass Line Speed</b>	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	<b>DD044</b> Generic Speed		
	<b>DF35</b> Speed	uint16	Range: 0 to 655.32 m/s Resolution: 1x10E-2 m/s 1 Knot = 0.5144 m/s
	Amount of rode deployed or retrieved per minute.		
8	<b>Anchor Docking Status</b>	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
	<b>DD482</b> Anchor Docking States	0 = Not docked 1 = Fully docked 2 = Error 3 = Data not available	
	<b>DF52</b> Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
	Indicates current physical state of anchor docking. Used in automatic docking situations to report when the anchor has been fully docked.		
9	<b>Windlass Operating Events</b>	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 6	Command Parameter: Note 2
	<b>DD483</b> Windlass Operating Events	0b000000 = No errors / events present 0bxxxxx1 = System error 0bxxxx1x = Sensor error 0bxxx1xx = No windlass motion detected 0bxx1xxx = Retrieval docking distance reached (retrieving anchor is nearing the boat, so more care can be taken to complete docking) 0bx1xxxx = End of rode reached (rode has been fully deployed) 0b1xxxxx = Reserved	
	<b>DF52</b> Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields



## Anchor Windlass Monitoring Status

**PGN: 128778**  
**hex: 1F70A**

This PGN is used to provide the monitoring status and data relevant to a specific Anchor Windlass and can be used with Command Group Function (PGN 126208) to command windlass and anchoring equipment.

The Windlass Identifier Field (Field 2) specifies which windlass the PGN message relates to and all following data fields refer only to that windlass.

This PGN has several transmission rates dependent upon windlass operation: Static is 5s, Dynamic is 500ms. The message will be broadcasted periodically, but can also be requested as required. The default static update rate is 5 seconds to reduce bandwidth use when the windlass is not operating.

The default dynamic update rate is 500ms to provide the status of activity while the windlass is operating.

This PGN can be used with PGN 128776 to provide the windlass control status, and PGN 128777 to provide the operating status. The Sequence ID can be used to link the three windlass PGNs.

Fields output as "Unavailable" will be understood to be unsupported. Begin Request Support: A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for all windlass identifiers available. If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904).
- If the Request Group Function (PGN 126208) includes the Windlass Identifier then the response shall be filtered by this field and any other optional fields contained within this request resulting in one response.
- If all the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".
- If there are multiple request parameters and one or more but not all, are not valid, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x3 = Access denied".

Beginning in Field 6 and for each request parameter, an appropriate value in the parameter error code field shall be provided.

End Request Support.

Begin Command Support: Every Command Group Function (PGN 126208) transmitted for this PGN shall contain a value for Windlass Identifier (Field 2). The value commanded shall identify which windlass the remaining commanded fields apply to.

Note 1: The flags within Windlass Monitoring Events (Field 3) may be manually reset by setting the flag bit value to 0 with the Command Group Function (PGN 126208). This command support is required.

End Command Support

Single Frame: **Yes**    Priority Default: **4**    Default Update Rate: **5000** milliseconds    Frequency: **.2** cycles per second  
Destination: **Global/Multica**    Query Support: **Optional**    Command Support: **Required**    ACK Rqmnts: **Yes**

Field #    Field Name

# Anchor Windlass Monitoring Status

**PGN: 128778**  
**hex: 1F70A**

<b>1</b>	<b>Sequence ID</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Prohibited</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Prohibited</b>
	<b>DD056</b> Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> <i>Range:</i> <b>0 to 252</b> <i>Resolution:</i> <b>1 bit</b>	Unit-less number
	An upward counting number used to link this PGN to other related PGNs sent from the same source address.		
<b>2</b>	<b>Windlass Identifier</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i> <b>Required</b>
		<i>Bit Field Size:</i> <b>8</b>	<i>Command Parameter:</i> <b>Required</b>
	<b>DD470</b> Identifier	Unique Identifier of a function within a Virtual Device: 0 - 255	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <b>Variable</b> <i>Resolution:</i> <b>1</b>	Used to construct bit fields
<b>3</b>	<b>Windlass Monitoring Events</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i> <b>8</b>	<i>Command Parameter:</i> <b>Note 1</b>
	<b>DD477</b> Windlass Monitoring Events	<p>0b0000 0000 = No errors present            0bxxxx xxx1 = Controller under voltage cut-out            0bxxxx xx1x = Controller over current cut-out            0bxxxx x1xx = Controller over temperature cut-out            0bxxxx 1xxx = Manufacturer defined</p> <p>0bxxxx1xxx to 0b1xxxxxxx 0bxxx1xxxx to 0b1xxx xxxx = Reserved</p>	
	<b>DF52</b> Bit field	<b>bit(n)</b> <i>Range:</i> <b>Variable</b> <i>Resolution:</i> <b>1</b>	Used to construct bit fields
	Events are cleared when the condition is no longer true, or by manually resetting using the Command Group Function (PGN 126208).		
<b>4</b>	<b>Controller Voltage</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
	<b>DD490</b> Controller Voltage		
	<b>DF121</b> Voltage Medium, unsigned	<b>uint8</b> <i>Range:</i> <b>0 – 50.4</b> <i>Resolution:</i> <b>0.2 Volts</b>	
	Supply voltage of electronic windlass controller.		
<b>5</b>	<b>Motor Current</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
	<b>DD491</b> Current, electric , medium unsigned		
	<b>DF122</b> Current, electric, Medium	<b>uint8</b> <i>Range:</i> <b>0-252</b> <i>Resolution:</i> <b>1 Amp</b>	
	Load current of electric windlass motor.		

**PGN: 128778**  
**hex: 1F70A**

6	Total Motor Time		Byte Field Size:	2	Request Parameter	Optional Required
			Bit Field Size:		Command Parameter:	
DD268 Time						
	DF98	Time interval, medium, u	uint16	Range: 0 - 65,532 minutes	Resolution: 1 minute	
Total time windlass has operated since last reset.						
7	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 8	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.						

## Linear Actuator Control/Status

**PGN: 128780**  
**hex: 1F70C**

This PGN is used to report the status of a device being controlled by an actuator.

Actuator is a broad description of any device that embodies moving an object between two fixed limits, such as raising or lowering an outboard engine assembly. In the context of this PGN, the word "Device" refers to the object being moved. In the case of multiple Actuators per controller, the Actuator Identifier field specifies which Actuator the PGN message is intended for, and all following data fields refer only to that Actuator. This PGN supports manufacturer calibrated systems and retrofit systems where it is impractical for the installer to enter the Maximum Travel distance of the device.

This PGN has several transmission rates dependent upon Actuator operation: Static (No Movement) is 5s, Dynamic (Movement) is 200ms, Control is 200ms.

The message will be broadcasted periodically and can be requested as required. The default update rate when the Actuator is not operating is 5 seconds to reduce device bandwidth; this update rate can be used to provide Linear Actuator device status to a Human Interface Device (HID).

The default update rate while the Actuator is operating is 200ms to provide increased status of position while the Actuator is operated.

The Actuator may be controlled or configured using the Command Group Function PGN (PGN 126208). Two methods of actuator control is possible, either continuous transmission of the Direction of Travel (Field 5) every 200ms or a single transmission of the Commanded Device Position (Field 2).

When using the continuous transmission of the Direction of Travel (Field 5) control method, the Command Group Function PGN (PGN 126208) must be repeated every 200ms. This rapid update rate allows a safety mechanism to be implemented in the application logic if continual command messages are not received within a suitable timeout period (for example 250ms).

Begin Request Support:

This PGN may be Requested with ISO Request 059904 or with NMEA request group function (126208). An ISO Request will result in a Status response PGN for each Actuator managed by the controller.

Response to a Request Group Function without an Actuator Identifier field will be the same as an ISO Request.

End Request Support.

Begin Command Support:

Command parameter support is required for Field 1 (Actuator Identifier).

- If actuator position control is implemented using Command Group Function (PGN 126208), then Field 2 (Commanded Device Position) and Field 5 (Direction of Travel) also require Command parameter support.
- The Acknowledge Group Function (PGN 126208) shall be sent in response to each Command Group Function (PGN 126208) indicating acceptance or rejection of the command.
- If the Command Group Function (PGN 126208) does not contain Field 1 (Actuator Identifier), then the appropriate response is the Acknowledge Group Function PGN (126208), containing PGN error code "0x4 = Request or Command is not supported".

There are two available methods for control: specific direction or specific position.

Note 1: To move an Actuator in a specific direction, the Command Group Function (PGN 126208) shall contain a value for Field 1 (Actuator Identifier) and the value for Field 5 (Direction of Travel). The Command Group Function shall be sent every 200ms until the required extension of the Actuator is reached.

Note 2: To move an Actuator to a specified position, the Command Group Function (PGN 126208) shall contain a value for Field 1 (Actuator Identifier) and Field 2 (Commanded Device Position). A subsequent command to stop the Actuator before the specified position is reached shall cause the Actuator to stop immediately.

This PGN shall be sent in response to each Command Group Function providing status of the Linear Actuator.

## Linear Actuator Control/Status

PGN: 128780

hex: 1F70C

End Command Support.

Refer to Class and Function codes for Linear Actuator Types. Application examples are located in NMEA 2000 Appendix D.

Single Frame: **Y** Priority Default: **5** Default Update Rate: **5000** milliseconds Frequency: **.2** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Actuator Identifier</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Required</b>
	<b>DD128</b> Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
	For one or more Actuators the value 0x00 is always used for the first or a single Actuator.		
<b>2</b>	<b>Commanded Device Position</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Note 2</b>
	<b>DD485</b> Range, Restricted Percentage	0-100% 254 = Error 255 = Data Not Available	
	<b>DF120</b> Percent, Restricted Range	<b>uint8</b> Range: <b>0 - 100%</b> Resolution: <b>5x10E-1</b>	0 = 0%, 100 = 50%, 200 = 100%
	This is the relative position where 0% is stowed and 100% is fully deployed		
<b>3</b>	<b>Device Position</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD485</b> Range, Restricted Percentage	0-100% 254 = Error 255 = Data Not Available	
	<b>DF120</b> Percent, Restricted Range	<b>uint8</b> Range: <b>0 - 100%</b> Resolution: <b>5x10E-1</b>	0 = 0%, 100 = 50%, 200 = 100%
	This is the relative position where 0% is stowed and 100% is fully deployed .		
<b>4</b>	<b>Maximum Device Travel</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD517</b> Depth, Short, Precise		
	<b>DF126</b> Distance Short, Precise	<b>uint16</b> Range: <b>0 to 65.532m</b> Resolution: <b>1x10E-3</b>	
	This is the maximum distance the device controlled by the actuator may be extended in meters. This field shall default to "Data Not Available" when not configured.		

5	Direction of Travel	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Note 1
DD516	Direction of Travel	0 = Stow/Stowing, 1 = Deploy/Deploying, 2 = Stop/Stopped, 3 = Data not available		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
Used by HID to command a controller which direction to move the actuator.				
6	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 22	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
Used to align subsequent data on a byte boundry				

## Position, Rapid Update

**PGN: 129025**  
**hex: 1F801**

This PGN provides latitude and longitude referenced to WGS84. Being defined as single frame message, as opposed to other PGNs that include latitude and longitude and are defined as fast or multi-packet, this PGN lends itself to being transmitted more frequently without using up excessive bandwidth on the bus for the benefit of receiving equipment that may require rapid position updates.

Single Frame: **Yes**    Priority Default: **2**    Default Update Rate: **100** milliseconds    Frequency: **10.** cycles per second  
Destination: **Global**    Query Support: **Optional**    Command Support: **Optional**    ACK Rqmnts: **None**

### Field #    Field Name

<b>1</b>	<b>Latitude</b>	Byte Field Size: <b>4</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD022</b> Latitude, WGS-84	Latitude referenced to WGS-84.	
	<b>DF23</b> Latitude	<b>int32</b> Range: <b>+/- 90 deg</b> Resolution: <b>1x10E-7 deg</b>	"-" = South, resolution ~1.1 cm
<b>2</b>	<b>Longitude</b>	Byte Field Size: <b>4</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD023</b> Longitude, WGS-84	Longitude referenced to WGS-84.	
	<b>DF25</b> Longitude	<b>int32</b> Range: <b>+/- 180 deg</b> Resolution: <b>1x10E-7 deg</b>	"-" = West, resolution ~1.1 cm

# COG & SOG, Rapid Update

PGN: 129026  
hex: 1F802

This PGN is a single frame PGN that provides Course Over Ground (COG) and Speed Over Ground (SOG). Being a single frame message, as opposed to other PGNs that include COG and SOG and are defined as multi-packet, this PGN lends itself to being transmitted more frequently, without using up excessive bandwidth on the bus. This may be of benefit to receiving equipment requiring rapid COG and SOG updates.

Single Frame: Yes Priority Default: 2 Default Update Rate: 250 milliseconds Frequency: 4 cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Sequence ID	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD056	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.  0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)  253 - 254 = reserved for future use  255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
2	COG Reference	Byte Field Size: Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
DD117	Direction reference	0 = True, 1 = Magnetic, 2 = Error, 3 = Null	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	NMEA Reserved	Byte Field Size: Bit Field Size: resv 6	Request Parameter: Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.			
4	Course Over Ground	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD165	Course-Over-Ground (COG)	The direction of the path over ground actually followed by a vessel.	
DF02	Angle	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
5	Speed Over Ground	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD044	Generic Speed		
DF35	Speed	uint16 Range: 0 to 655.32 m/s Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s



6	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv16	Command Parameter:	
	DD001	Reserved field		Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.					

## Position Delta, High Precision Rapid Update

PGN: 129027

hex: 1F803

The "Position Delta, High Precision Rapid Update" Parameter Group is intended for applications where very high precision and very fast update rates are needed for position data. This PGN can provide delta position changes down to 1 millimeter with a delta time period accurate to 5 milliseconds. One example application for this PGN is high precision positioning and guidance of automated machinery such as tractor implements utilized in the agriculture industry. Similar high precision positioning needs in the marine industry may be satisfied with this parameter Group. This PGN only has meaning when it is associated (via the Sequence ID field) with another PGN such as the GNSS Position Data Parameter Group. Association with the "Altitude Delta, High Precision Rapid Update" PGN is needed for a complete 3D position update.

Single Frame: **Yes** Priority Default: **2** Default Update Rate: **100** milliseconds Frequency: **10.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>			Byte Field Size: <b>1</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD056</b>	Sequence ID		An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.			
				0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)			
				253 - 254 = reserved for future use			
				255 = No binding provided. NMEA recommends using binding SID values whenever practical.			
	<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b>	Unit-less number	
<b>2</b>	<b>Time Delta</b>			Byte Field Size: <b>1</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD233</b>	Time Value (Short resolution 5 msec)					
	<b>DF88</b>	Time Interval, short	<b>uint8</b>	Range: <b>0 to 1.26 sec</b>	Resolution: <b>5x10E-3 sec</b>		
<b>3</b>	<b>Latitude Delta</b>			Byte Field Size: <b>3</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD234</b>	Latitude					
	<b>DF89</b>	Latitude, 24 bit	<b>int24</b>	Range: <b>+/-83 sec (")</b>	Resolution: <b>1x10E-5 sec(")</b>		
<b>4</b>	<b>Longitude Delta</b>			Byte Field Size: <b>3</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD235</b>	Longitude					
	<b>DF90</b>	Longitude, 24 bit	<b>int24</b>	Range: <b>+/-83 sec (")</b>	Resolution: <b>1x10E-5 sec(")</b>		

## Altitude Delta, High Precision Rapid Update

PGN: 129028

hex: 1F804

The "Altitude Delta, High Precision Rapid Update" Parameter Group is intended for applications where very high precision and very fast update rates are needed for altitude and course over ground data. This PGN can provide delta altitude changes down to 1 millimeter, a change in direction as small as 0.0057 degrees, and with a delta time period accurate to 5 milliseconds. One example application for this PGN is high precision positioning and guidance of automated machinery such as tractor implements utilized in the agriculture industry. Similar high precision positioning needs in the marine industry may be satisfied with this parameter Group. This PGN only has meaning when it is associated (via the Sequence ID field) with another PGN such as the GNSS Position Data Parameter Group. Association with the "Position Delta, High Precision Rapid Update" PGN is needed for a complete 3D position update.

Single Frame: **Yes** Priority Default: **2** Default Update Rate: **100** milliseconds Frequency: **10.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Time Delta</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD233</b>	Time Value (Short resolution 5 msec)		
<b>DF88</b>	Time Interval, short	<b>uint8</b> Range: <b>0 to 1.26 sec</b> Resolution: <b>5x10E-3 sec</b>	
<b>3</b>	<b>GNSS Quality</b>	Byte Field Size: Bit Field Size: <b>4</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD067</b>	Quality, GNSS	<p>0 = No GNSS Fix, 1 = GNSS fix, 2 = DGNSS fix, 3 = Precise GNSS*, 4 = RTK Fixed Integer, 5 = RTK Float, 6 = Estimated (DR) mode, 7 = Manual Input, 8 = Simulate mode, 9-13 = Reserved, 14 = Error, 15 = Null.</p> <p>*Precise GNSS means no deliberate degradation (such as SA) and higher resolution code (P-code), and 2 frequencies are used to correct atmospheric delays.</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields

## Altitude Delta, High Precision Rapid Update

PGN: 129028  
hex: 1F804

4	Direction		Byte Field Size:	<div>2</div>	Request Parameter	Optional
	DD117 Direction reference		Bit Field Size:	<div>2</div>	Command Parameter:	Optional
0 = True, 1 = Magnetic, 2 = Error, 3 = Null						
	DF52 Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields
5	NMEA Reserved		Byte Field Size:		Request Parameter	
	DD001 Reserved field		Bit Field Size:	<div>resv</div> <div>2</div>	Command Parameter:	
Variable number of reserved bits, all set to logic "1"						
	DF52 Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields
Used to align subsequent data on a byte boundary.						
6	Course Over Ground		Byte Field Size:	<div>2</div>	Request Parameter	Optional
	DD165 Course-Over-Ground (COG)		Bit Field Size:		Command Parameter:	Optional
The direction of the path over ground actually followed by a vessel.						
	DF02 Angle	uint16	Range:	0 to 2Pi rad	Resolution:	1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
7	Altitude Delta		Byte Field Size:	<div>3</div>	Request Parameter	Optional
	DD236 Altitude		Bit Field Size:		Command Parameter:	Optional
	DF91 Altitude, 24 bit	int24	Range:	+/-8,388m	Resolution:	1x10E-3m

# GNSS Position Data

PGN: 129029

hex: 1F805

This PGN conveys a comprehensive set of Global Navigation Satellite System (GNSS) parameters, including position information. Equipment transmitting this PGN would typically also transmit PGN 129025 (Position – Rapid Update).

The Sequence ID may be used to synchronize the data with data from other PGNs originating from the same source. For example, a GPS chart plotter with an integrated depth finder might output both PGN 129025 (Position, Rapid Update) and PGN 128267 (Water Depth) for each position.

Single Frame:	No	Priority Default:	3	Default Update Rate:	1000 milliseconds	Frequency:	1. cycles per second
Destination:	Global	Query Support:	Optional	Command Support:	Optional	ACK Rqmnts:	None
Field #	Field Name	Original Reference ID # 19					
1	Sequence ID	Byte Field Size:	1	Request Parameter	Optional	Bit Field Size:	Command Parameter: Optional
DD056	Sequence ID	An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 252 for valid position fixes.					
DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit	Unit-less number
2	Position date	Byte Field Size:	2	Request Parameter	Optional	Bit Field Size:	Command Parameter: Optional
DD039	Generic date	Days since January 1, 1970, Date is relative to UTC Time.					
DF41	Date, day count	uint16	Range:	0 to 65,532 days	Resolution:	1 day	0 = January 1, 1970, max = ~179 years
3	Position time	Byte Field Size:	4	Request Parameter	Optional	Bit Field Size:	Command Parameter: Optional
DD158	Generic time of day	24 hour clock, 0 = midnight, time is in UTC					
DF06	Time of day	uint32	Range:	0 to 86,401 s	Resolution:	1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
4	Latitude	Byte Field Size:	8	Request Parameter	Optional	Bit Field Size:	Command Parameter: Optional
DD202	Latitude (Extended Resolution)	Latitude referenced to WGS-84					
DF76	Latitude (Extended)	int64	Range:	+/- 90 deg	Resolution:	1x10E-16 deg	"-" = South, resolution ~.01 nanometer
5	Longitude	Byte Field Size:	8	Request Parameter	Optional	Bit Field Size:	Command Parameter: Optional
DD203	Longitude (Extended Resolution)	Longitude referenced to WGS-84					
DF77	Longitude (Extended)	int64	Range:	+/- 180 deg	Resolution:	1x10E-16 deg	"-" = West, resolution ~.01 nanometer
6	Altitude	Byte Field Size:	8	Request Parameter	Optional	Bit Field Size:	Command Parameter: Optional
DD204	Altitude (Extended Resolution)	Altitude referenced to WGS-84					
DF78	Distance (Extended)	int64	Range:	+/-~9.223x10E+12 m	Resolution:	1x10E-6 m	

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GNSS Position Data

PGN: 129029

## GNSS Position Data

PGN: 129029

hex: 1F805

7	Type of System	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
	DD207 Type of System	0x0 = GPS 0x1 = GLONASS 0x2 = GPS+GLONASS 0x3 = GPS+SBAS(WAAS) 0x4 = GPS+SBAS+GLONASS 0x5 - 0xF = Reserved for future combinations		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
8	Method, GNSS	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
	DD067 Quality, GNSS	0 = no GPS, 1 = GNSS fix, 2 = DGNSS fix, 3 = Precise GNSS*, 4 = RTK Fixed Integer, 5 = RTK Float, 6 = Estimated (DR) mode, 7 = Manual Input, 8 = Simulate mode, 9-13 = Reserved, 14 = Error, 15 = Null. *Precise GNSS means no deliberate degradation (such as SA) and higher resolution code (P-code), and 2 frequencies are used to correct atmospheric delays.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
	Position Fixed Method			
9	Integrity	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
	DD209 GNSS Integrity	0 = No Integrity checking,* 1 = Safe, 2 = Caution, 3 = Unsafe * means the receiver does not have this capability		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
10	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 6	Command Parameter:	
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
	Used to align subsequent data on a byte boundary.			
11	Number of SVs	Byte Field Size: 1	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
	DD006 Generic counter, short	Numeric count, event counter, sequence counter		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit		Unit-less number

## GNSS Position Data

PGN: 129029

hex: 1F805

12	HDOP			Byte Field Size: 2	Request Parameter: Optional
				Bit Field Size:	Command Parameter: Optional
DD055	DOP			Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).	
DF69	Ratio, Relative measure, small	int16	Range: +/-327.64	Resolution: 1x10E-2	Unit-less number
13	PDOP			Byte Field Size: 2	Request Parameter: Optional
				Bit Field Size:	Command Parameter: Optional
DD055	DOP			Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).	
DF69	Ratio, Relative measure, small	int16	Range: +/-327.64	Resolution: 1x10E-2	Unit-less number
14	Geoidal Separation			Byte Field Size: 4	Request Parameter: Optional
				Bit Field Size:	Command Parameter: Optional
DD069	Geoidal Separation			The difference between the earth ellipsoid and mean-sea-level (geoid) defined by the reference datum used in the position solution, "-" = mean-sea-level below ellipsoid. Reference datum is defined in this packet.	
DF15	Distance, signed	int32	Range: +/-~2.147x10E+7 m	Resolution: 1x10E-2 m	
15	Number of Reference Stations			Byte Field Size: 1	Request Parameter: Optional
				Bit Field Size:	Command Parameter: Optional
DD006	Generic counter, short			Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
16	Reference Station Type"1"			Byte Field Size:	Request Parameter: Optional
				Bit Field Size: 4	Command Parameter: Optional
DD070	Ref Station Type			Reference Station Type. 0x0=GPS; 0x1=GLONASS; 0x2 to 0xD=Reserved; 0XE=Error; 0XF=Null	
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
17	Reference Station ID"1"			Byte Field Size:	Request Parameter: Optional
				Bit Field Size: 12	Command Parameter: Optional
DD071	Ref Station			Reference Station ID. Reference Station number as provided by the Service Provider.[Reference document required]	
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

## GNSS Position Data

PGN: 129029

hex: 1F805

18	Age of DGNSS Corrections "1"	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
	DD060 Differential Age	Age of Differential corrections		
	DF66 Time interval, .01sec	uint16	Range: 0 to 655.32s	Resolution: 1x10E-2sec
19	Reference Station Type "n"	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
	DD070 Ref Station Type	Reference Station Type. 0x0=GPS; 0x1=GLONASS; 0x2 to 0xD=Reserved; 0XE=Error; 0XF=Null		
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1
	Used to construct bit fields			
	Variable Number of fields, Field number 18 repeated			
20	Reference Station ID "n"	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 12	Command Parameter:	Optional
	DD071 Ref Station	Reference Station ID. Reference Station number as provided by the Service Provider.[Reference document required]		
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1
	Used to construct bit fields			
	Variable Number of fields, Field number 19 repeated			
21	Age of DGNSS Reference Station "n"	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
	DD060 Differential Age	Age of Differential corrections		
	DF66 Time interval, .01sec	uint16	Range: 0 to 655.32s	Resolution: 1x10E-2sec
	Variable Number of fields, Field number 20 repeated			



## GNSS Position Data

PGN: 129029

hex: 1F805

## 19 Reference Station Type "n"

Byte Field Size:

Bit Field Size: 4

Request Parameter

Optional

Command Parameter:

Optional

DD070 Ref Station Type

Reference Station Type.

0x0=GPS;

0x1=GLONASS;

0x2 = Galileo

0x3 = BDS (BeiDou)

0x4 = QZSS

0x5 = NavIC (IRNSS)

0x6 to 0xD=Reserved;

0XE=Error;

0XF=NULL

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Variable Number of fields, Field number 16 repeated

## 20 Reference Station ID "n"

Byte Field Size:

Bit Field Size: 12

Request Parameter

Optional

Command Parameter:

Optional

DD071 Ref Station

Reference Station ID. Reference Station number as provided by the Service Provider.[Reference document required]

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Variable Number of fields, Field number 17 repeated

## 21 Age of DGNSS Reference Station "n"

Byte Field Size:

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

DD060 Differential Age

Age of Differential corrections

DF66 Time interval, .01sec

uint16

Range: 0 to 655.32s

Resolution: 1x10E-2sec

Variable Number of fields, Field number 18 repeated

## Local Time Offset

PGN: 129033

hex: 1F809

This PGN is used for the purpose of identifying the local time offset from UTC. It shall be transmitted on request or when the local offset is changed. The Time and Date Fields represent the current time. Current time is transmitted periodically using System Time PGN (126992). In Versions 1.301 and prior, the title of this PGN was "Time & Date". The default update rate was set at 1 second. The 1 second interval is not recommended for new designs. The description of this PGN was changed to clarify how and when it should be used.

Single Frame: **Yes** Priority Default: **3** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Date</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD039</b> Generic date	Days since January 1, 1970, Date is relative to UTC Time.	
	<b>DF41</b> Date, day count	<b>uint16</b> Range: <b>0 to 65,532 days</b>	Resolution: <b>1 day</b> 0 = January 1, 1970, max = ~179 years
<b>2</b>	<b>Time</b>	Byte Field Size: <b>4</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD158</b> Generic time of day	24 hour clock, 0 = midnight, time is in UTC	
	<b>DF06</b> Time of day	<b>uint32</b> Range: <b>0 to 86,401 s</b>	Resolution: <b>1x10E-4 s</b> ~24 hours, 0 = midnight, range allows for up to two leap seconds per day
<b>3</b>	<b>Local Offset, Minutes</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD121</b> Time, Local Offset	Local offset from UTC to obtain Local Time. This value includes Time Zone, daylight Savings Time, etc.	
	<b>DF71</b> Time interval, medium	<b>int16</b> Range: <b>+/-32,764 minutes</b>	Resolution: <b>1.0 minute</b>

## AIS Class A Position Report

**PGN: 129038**  
**hex: 1F80E**

This parameter group provides data associated with the ITU-R M.1371 Messages 1, 2, and 3 Position Reports, autonomous, assigned, and response to interrogation.

An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 1, 2, or 3 (see ITU-R M.1371 for additional information), or upon a device's own transmission of a Message 1, 2, or 3.

Command Support Requirement for Rebroadcasting of Messages 1, 2, and 3 by an AIS Base Station:

Only AIS Base Stations shall accept the Command Group Function PGN 126208 with this PGN for Messages 1, 2, and 3. All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

The AIS Station commanded to rebroadcast an AIS Message 1, 2, or 3 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved fields, Communication State, and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Command Support Requirement for Relay of "Man Over Board" information by an AIS Class A Station:

This Command Support is required for AIS Class A Stations and is an additional requirement beyond the minimum requirements of IEC 61993-2. This supports external shipboard Man Over Board systems with the capability to utilize the own ship AIS Class A Station to relay an appropriate AIS Message 1 indicating Man Over Board, for both Active and Test conditions.

The MOB relays should be commanded no more than once per minute while the MOB is active.

Performing the MOB relay requires an additional Message 14 with each MOB AIS Message 1. Both messages shall be used under active and test conditions. See the AIS Safety Related Broadcast Message (PGN 129802)

The following fields shall be commanded when performing the AIS Message 1 MOB relay:

Message ID shall be set to a value of 1

Note 1: The Repeat Indicator Command Parameter is "Required". Repeat Indicator shall be set to a value of 1  
User ID shall be set to a value of 97099xxxx, where xxxx has a range from 0000 to 9999 and is intended to identify individual MOB's being reported.

Longitude and Latitude may be commanded with the position of the MOB if known, otherwise they should not be commanded. When not command, the Class A Station will use its current position.

Navigational Status shall be set to a value 14 for an Active MOB or a value of 15 for a Test MOB.

Note 2: The AIS Transceiver Information Command Parameter is "Required". AIS Transceiver Information shall be set to a value of 31.

All other PGN data fields (except for NMEA Reserved field(s), Sequence ID) shall be commanded with an appropriate value if known. If appropriate values are unknown, the fields should be commanded to their default values. If no default value is defined for a specific field, the field shall be commanded to the Data Type's "Data not available" value.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions:

June 2017 – New description, new notes in field 12, and new command support requirements. Expanded states in DD246 for AIS Transceiver Information and DD183 for Navigational Status fields.

## NMEA 2000 Appendix B.1 - Parameter Groups Report

**Version 3.002 - 09-Feb-23**

# AIS Class A Position Report

PGN: 129038  
hex: 1F80E

Single Frame: No Priority Default: 4 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

## Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 6	Command Parameter:	Required	
DD188	AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
1 = Autonomously Scheduled Position Report Message, 2 = Assigned Scheduled Position Report Message, 3 = Special (response to interrogation) Position Report Message.					
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Note 1	
DD185	AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	User ID	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 4	Command Parameter:	Required	
DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
MMSI number of mobile station reporting its position.					
4	Longitude	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 4	Command Parameter:	Required	
DD023	Longitude, WGS-84	Longitude referenced to WGS-84.			
DF25	Longitude	int32	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
Longitude of mobile station reporting its position.					
5	Latitude	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 4	Command Parameter:	Required	
DD022	Latitude, WGS-84	Latitude referenced to WGS-84.			
DF23	Latitude	int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
Latitude of mobile station reporting its position.					

PGN: 129038  
hex: 1F80E

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# AIS Class A Position Report

PGN: 129038  
hex: 1F80E

## 12 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Note 2

### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 13 True Heading

Byte Field Size: 2

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

### DD127 Generic Direction -True

Degrees clockwise relative to True North.

DF02 Angle

uint16

Range: 0 to 2Pi rad

Resolution: 1x10E-4 rad

Resolution ~0.0057deg, 1 deg = .01745 rad

True Heading of mobile station reporting its position.

## 14 Rate of Turn

Byte Field Size: 2

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

### DD150 Rate of Turn

+ = Bow turning to starboard, 1 deg/min = .00029 rad/sec

DF73 Angular rate, signed

int16

Range: +/-1.0 rad/s

Resolution: 1/32 x 10E-3 rad/s

Resolution 0.1 deg/min

Rate of turn of mobile station reporting its position.

# AIS Class A Position Report

PGN: 129038  
hex: 1F80E

## 15 Navigational Status

Byte Field Size:

Bit Field Size: 4

Request Parameter

Optional

Command Parameter:

Required

DD183 AIS Navigational Status

0 = under way using engine,  
1 = at anchor,  
2 = not under command,  
3 = restricted manoeuvrability,  
4 = constrained by her draught,  
5 = moored,  
6 = aground,  
7 = engaged in fishing,  
8 = under way sailing,  
9 = reserved for future amendment of navigational status for ships carrying DG, HS, or MP, or IMO hazard or pollutant category C, high speed craft (HSC),  
10 = reserved for future amendment of navigational status for ships carrying dangerous goods (DG), harmful substances (HS) or marine pollutants (MP), or IMO hazard or pollutant category A, wing in ground (WIG);  
11 = power driven vessel towing astern (regional use),  
12 = power driven vessel pushing ahead or towing alongside (regional use),  
13 = reserved for future use,  
14 = AIS-SART (active), MOB-AIS, EPIRB-AIS  
15 = not defined (default), (also used by AIS-SART, MOB-AIS, EPIRB-AIS under test)

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 16 Special Maneuver Indicator

Byte Field Size:

Bit Field Size: 2

Request Parameter

Optional

Command Parameter:

Required

DD310 Special Maneuver Indicator

0 = not available (default)  
1 = not engaged in special Maneuver  
2 = engaged in special Maneuver (i.e.: regional passing arrangement on Inland Waterway)  
3 = reserved

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 17 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 2

Request Parameter

Command Parameter:

DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on a byte boundary.

## 18 AIS Spare

Byte Field Size:

Bit Field Size: resv 3

Request Parameter

Optional

Command Parameter:

Required

DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zer

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

# AIS Class A Position Report

PGN: 129038  
hex: 1F80E

19	NMEA Reserved			Byte Field Size:		Request Parameter	
				Bit Field Size:	resv 5	Command Parameter:	
	DD001	Reserved field					Variable number of reserved bits, all set to logic "1"
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
							Used to align subsequent data on byte boundary.
20	Sequence ID			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD056	Sequence ID					An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.
							0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)
							253 - 254 = reserved for future use
							255 = No binding provided. NMEA recommends using binding SID values whenever practical.
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit
							Unit-less number



## AIS Class B Position Report

PGN: 129039

hex: 1F80F

This parameter group provides data associated with the ITU-R M.1371 Messages 18 Standard Class B Equipment Position Report.

An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 18 (see ITU-R M.1371 for additional information), or upon a device's own transmission of a Message 18.

Command Support Requirement for Rebroadcasting of Messages 18 by an AIS Base Station:

Only AIS Base Stations shall accept the Command Group Function PGN 126208 with this PGN for Messages 18. All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

The AIS Station commanded to rebroadcast an AIS Message 18 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel. All data fields (except for NMEA Reserved fields, Communication State, and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions:

June 2017 – New description, new notes in fields 11 and 22, renamed fields 14 and 15 to "AIS Spare", and new command support requirements.

Single Frame: No Priority Default: 4 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

### Field # Field Name

Field #	Field Name	Byte Field Size:	Request Parameter	Command Parameter:
1	Message ID	Bit Field Size: 6	Optional	Required
	DD188 AIS Message Identifier	Message Identifier (range of 0 to 63).		
		See the latest version of ITU-R M.1371 for more information.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
	18 = Standard Class B Equipment Position Report Message			
2	Repeat Indicator	Byte Field Size: Bit Field Size: 2	Request Parameter: Optional	Command Parameter: Note 1
	DD185 AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).		
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission		
		See the latest version of ITU-R M.1371 for more information.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

# AIS Class B Position Report

PGN: 129039  
hex: 1F80F

3	User ID	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsigned	uint32 Range: 0 to 4,294,967,292 Resolution: 1 bit	Unit-less number
	MMSI number of mobile station reporting position.		
4	Longitude	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD023 Longitude, WGS-84	Longitude referenced to WGS-84.	
	DF25 Longitude	int32 Range: +/- 180 deg Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
	Longitude of mobile station reporting position.		
5	Latitude	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD022 Latitude, WGS-84	Latitude referenced to WGS-84.	
	DF23 Latitude	int32 Range: +/- 90 deg Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
	Latitude of mobile station reporting position.		
6	Position Accuracy	Byte Field Size: Bit Field Size: 1	Request Parameter: Optional Command Parameter: Required
	DD184 AIS Position Accuracy	0 = low accuracy > 10m such as nondifferential GNSS (default), 1 = high accuracy < 10m such as DGNSS	
		See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
7	RAIM-flag	Byte Field Size: Bit Field Size: 1	Request Parameter: Optional Command Parameter: Required
	DD189 AIS RAIM-flag	0 = RAIM not in use (default), 1 = RAIM in use	
		See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
8	Time Stamp	Byte Field Size: Bit Field Size: 6	Request Parameter: Optional Command Parameter: Required
	DD186 AIS Time Stamp	0-59 = UTC second when the report was generated, 60 = time stamp not available (default), 61 = positioning system is in manual input mode, 62 = Electronic position fixing system operates in estimated (dead reckoning) mode, 63 = positioning system is inoperative	
		See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields

# AIS Class B Position Report

PGN: 129039  
hex: 1F80F

9	COG	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
DD165	Course-Over-Ground (COG)	The direction of the path over ground actually followed by a vessel.	
DF02	Angle COG of mobile station reporting position.	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
10	SOG	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
DD044	Generic Speed		
DF35	Speed SOG of mobile station reporting position.	uint16 Range: 0 to 655.32 m/s Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s
11	Communication State	Byte Field Size: Bit Field Size: 19	Request Parameter: Optional Command Parameter: Prohibited
DD187	AIS Communication State	The Communication State contains information used by the various TDMA slot allocation algorithms and synchronization information	
		See the latest version of ITU-R M.1371 for more information.	
DF52	Bit field For Class B "CS" this field should be filled with the following value: 1100000000000000110	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
12	AIS Transceiver Information	Byte Field Size: Bit Field Size: 5	Request Parameter: Optional Command Parameter: Note 2
DD246	AIS Transceiver Information	0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5 = Channels A & B VDL transmission 6 = Channel C (VHF Channel 75) reception, 7 = Channel D (VHF Channel 76) reception, 8 = Channel C (VHF Channel 75) transmission, 9 = Channel D (VHF Channel 76) transmission, 10 - 30 = Reserved 31 = AIS device determines channel for Transmission	
		The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.	
		The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.	
		The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.	
		The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields

# AIS Class B Position Report

PGN: 129039  
hex: 1F80F

13	True Heading	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
DD167	Heading	The horizontal direction in which a ship actually points or heads at any instant, expressed in angular units from a reference direction, usually from 000 at the reference direction clockwise through 359 degrees.	
DF02	Angle	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
True heading of mobile station reporting position. A value of 65535 indicates that data is not available.			
14	AIS Spare	Byte Field Size: Bit Field Size: resv 8	Request Parameter: Optional Command Parameter: Required
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.	
DF115	Bit field defaulting to zero	bit0(n) Range: N2KUnitless Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.			
15	AIS Spare	Byte Field Size: Bit Field Size: resv 2	Request Parameter: Optional Command Parameter: Required
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.	
DF115	Bit field defaulting to zero	bit0(n) Range: N2KUnitless Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.			
16	Class B unit flag	Byte Field Size: Bit Field Size: 1	Request Parameter: Optional Command Parameter: Required
DD294	AIS ClassB Unit Flag	0 = Class B SOTDMA unit 1 = Class B "CS" unit  See the latest version of ITU-R M.1371 for more information.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
17	Class B Display Flag	Byte Field Size: Bit Field Size: 1	Request Parameter: Optional Command Parameter: Required
DD295	AIS Class B Display Flag	0 = No display available; not capable of displaying ITU-R M.1371 Messages 12 and 14 1 = Equipped with integrated display displaying ITU-R M.1371 Messages 12 and 14  See the latest version of ITU-R M.1371 for more information.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields

# AIS Class B Position Report

PGN: 129039

hex: 1F80F

18	Class B DSC Flag		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Required
DD296	AIS Class B DSC Flag		0 = Not equipped with DSC function 1 = Equipped with DSC function (dedicated or time-shared)			
	See the latest version of ITU-R M.1371 for more information.					
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields

19	Class B Band Flag		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Required
DD297	AIS Class B Band Flag		0 = Capable of operating over the upper 525 kHz band of the marine band 1 = Capable of operating over the whole marine band (irrelevant if “Class B Message 22 flag” is 0)			
	See the latest version of ITU-R M.1371 for more information.					
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields

20	Class B Msg 22 Flag		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Required
DD298	AIS Class B Msg 22 Flag		0 = No frequency management via Message 22 , operating on AIS1 and AIS2 only 1 = Frequency management via Message 22			
	See the latest version of ITU-R M.1371 for more information.					
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields

21	Mode Flag		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Required
DD299	AIS Mode Flag		0 = Station operating in autonomous mode (default) 1 = Station operating in assigned mode			
	See the latest version of ITU-R M.1371 for more information.					
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields

22	Communication State Selector Flag		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Required
DD245	AIS Communication State Selector Flag		0=SOTDMA communication state, 1=ITDMA communication state follows.			
	See the latest version of ITU-R M.1371 for more information.					
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields
Always a value of 1 for Class-B “CS”						

23	NMEA Reserved		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	resv 7	Command Parameter:	Optional
DD001	Reserved field		Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields
Used to align subsequent data on byte boundary.						

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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24	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD056	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number

# AIS Class B Extended Position Report

PGN: 129040

hex: 1F810

This parameter group provides data associated with the ITU-R M.1371 AIS Message 19 AIS Class B Extended Position Report. An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 19, upon receipt of an ISO or NMEA request PGN, in response to an accepted NMEA Command Group Function, or upon a device's own transmission of a Message 19.

The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address. When no linkage exists, the value of the SID shall be set to 255.

ITU-R M.1371-5 dated (02/2014) deprecated use of Message 19 for future equipment. For future equipment: this AIS message is not needed and should not be used. All content is covered by Message 18, Message 24A and 24B.

Legacy AIS equipment may still transmit Message 19 and new AIS equipment should support this PGN for the reception of Message 19.

No Command support is necessary for this PGN as that functionality is provided by Message 24A and 24B.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions:

June 2017 – New description, renamed fields 11 and 12 to "AIS Spare".

Single Frame: No Priority Default: 4 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 6	Command Parameter:	Optional
DD188	AIS Message Identifier	Message Identifier (range of 0 to 63).		
		See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to construct bit fields				
19 = Extended Class B Equipment Position Report				
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD185	AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).		
		0 = Default		
		1 = First retransmission		
		2 = Second retransmission		
		3 = Final retransmission		
		See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to construct bit fields				
3	User ID	Byte Field Size: 4	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.		
DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit
Unit-less number				
MMSI number of mobile station reporting position.				

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# AIS Class B Extended Position Report

PGN: 129040

hex: 1F810

4	Longitude		Byte Field Size: 4	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Optional
DD023	Longitude, WGS-84		Longitude referenced to WGS-84.		
DF25	Longitude	int32	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
	Longitude of mobile station reporting position.				
5	Latitude		Byte Field Size: 4	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Optional
DD022	Latitude, WGS-84		Latitude referenced to WGS-84.		
DF23	Latitude	int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
	Latitude of mobile station reporting position.				
6	Position Accuracy		Byte Field Size:	Request Parameter	Optional
			Bit Field Size: 1	Command Parameter:	Optional
DD184	AIS Position Accuracy		0 = low accuracy > 10m such as nondifferential GNSS (default), 1 = high accuracy < 10m such as DGNSS		
	See the latest version of ITU-R M.1371 for more information.				
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
7	RAIM-flag		Byte Field Size:	Request Parameter	Optional
			Bit Field Size: 1	Command Parameter:	Optional
DD189	AIS RAIM-flag		0 = RAIM not in use (default), 1 = RAIM in use		
	See the latest version of ITU-R M.1371 for more information.				
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
8	Time Stamp		Byte Field Size:	Request Parameter	Optional
			Bit Field Size: 6	Command Parameter:	Optional
DD186	AIS Time Stamp		0-59 = UTC second when the report was generated, 60 = time stamp not available (default), 61 = positioning system is in manual input mode, 62 = Electronic position fixing system operates in estimated (dead reckoning) mode, 63 = positioning system is inoperative		
	See the latest version of ITU-R M.1371 for more information.				
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
9	COG		Byte Field Size: 2	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Optional
DD165	Course-Over-Ground (COG)		The direction of the path over ground actually followed by a vessel.		
DF02	Angle	uint16	Range: 0 to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
	COG of mobile station reporting position.				

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# AIS Class B Extended Position Report

PGN: 129040  
hex: 1F810

10	SOG	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD044	Generic Speed	
	DF35	Speed	uint16 Range: 0 to 655.32 m/s Resolution: 1x10E-2 m/s 1 Knot = 0.5144 m/s
	SOG of mobile station reporting position.		
11	AIS Spare	Byte Field Size: Bit Field Size: resv 8	Request Parameter: Command Parameter:
	DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.
	DF115	Bit field defaulting to zero bit0(n) Range: N2KUnitless Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
12	AIS Spare	Byte Field Size: Bit Field Size: resv 4	Request Parameter: Command Parameter:
	DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.
	DF115	Bit field defaulting to zero bit0(n) Range: N2KUnitless Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
13	NMEA Reserved	Byte Field Size: Bit Field Size: resv 4	Request Parameter: Command Parameter:
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"
	DF52	Bit field bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.		
14	Ship/Cargo Type	Byte Field Size: Bit Field Size: 8	Request Parameter: Optional Command Parameter: Optional
	DD193	Ship/Cargo Type	0=Not Available or no ship (default), 1-99= See the latest version of ITU-R M.1371, 100-199=Reserved for Regional (See the latest version of ITU-R M.1371), 200-255=Reserved for future (See the latest version of ITU-R M.1371).
	DF52	Bit field bit(n) Range: Variable Resolution: 1	Used to construct bit fields

# AIS Class B Extended Position Report

PGN: 129040  
hex: 1F810

15	True Heading	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD165 Course-Over-Ground (COG)	The direction of the path over ground actually followed by a vessel.	
	DF02 Angle	uint16 Range: 0 to 2Pi rad	Resolution: 1x10E-4 rad
	True Heading of mobile station reporting its position.		Resolution ~0.0057deg, 1 deg = .01745 rad
16	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 4	Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1
	Used to align subsequent data on byte boundary.		
17	Type of Electronic Positioning Device	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 4	Command Parameter: Optional
	DD191 AIS Electronic Positioning Device Type	0 = Undefined (default) 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Integrated Navigation System 7 = Surveyed; For fixed AtoN and virtual AtoN, the charted position should be used. The accurate position enhances its function as a radar reference target 8 = Galileo 9-14 = Reserved for future use 15 = Internal GNSS See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1
	Used to construct bit fields		
18	Ship Length	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD194 Distance, medium	Dependent upon PG Field definition.	
	DF75 Distance, Medium	uint16 Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
	Length of mobile station reporting its position. A value of 65535 indicates that data is not available.		
19	Ship Beam	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD194 Distance, medium	Dependent upon PG Field definition.	
	DF75 Distance, Medium	uint16 Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
	Beam of mobile station reporting its position. A value of 65535 indicates that data is not available.		
20	Position Reference Point from Starboard	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD194 Distance, medium	Dependent upon PG Field definition.	
	DF75 Distance, Medium	uint16 Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
	Position reference point from starboard side of mobile station reporting its position. A value of 65535 indicates that data is not available.		

# AIS Class B Extended Position Report

PGN: 129040  
hex: 1F810

21	Position Reference Point aft of Ship's Bow		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
DD194	Distance, medium		Dependent upon PG Field definition.	
DF75	Distance, Medium	uint16	Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
Position reference point from aft of ship's bow of mobile station reporting its position. A value of 65535 indicates that data is not available.				
22	Name		Byte Field Size: char	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
DD192	Generic String, ASCII, Fixed length		Length specified by PGN field definition.	
DF63	String, fixed	char8(n)	Range: 0 to 1,785 characters	Resolution: 1 char
This is a 20 character string, see ITU-R M.1371-1 for more information.		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.		
23	Data Terminal Equipment (DTE)		Byte Field Size:	Request Parameter: Optional
			Bit Field Size: 1	Command Parameter: Optional
DD242	Data Terminal Equipment (DTE)		0=Available, 1=not available.	
See the latest version of ITU-R M.1371 for more information.				
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to construct bit fields				
24	Mode Flag		Byte Field Size:	Request Parameter: Optional
			Bit Field Size: 1	Command Parameter: Optional
DD299	AIS Mode Flag		0 = Station operating in autonomous mode (default) 1 = Station operating in assigned mode	
See the latest version of ITU-R M.1371 for more information.				
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to construct bit fields				
25	AIS Spare		Byte Field Size:	Request Parameter:
			Bit Field Size: resv 4	Command Parameter:
DD311	AIS Spare Field		Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.	
DF115	Bit field defaulting to zero	bit0(n)	Range: N2KUnitless	Resolution: 1
This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use		

# AIS Class B Extended Position Report

PGN: 129040

hex: 1F810

## 26 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Optional

### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 27 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 5

Request Parameter

Command Parameter:

### DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on byte boundary.

## 28 Sequence ID

Byte Field Size: 1

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

### DD056 Sequence ID

An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.

0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)

253 - 254 = reserved for future use

255 = No binding provided. NMEA recommends using binding SID values whenever practical.

DF53 Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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## AIS Aids to Navigation (AtoN) Report

PGN: 129041

hex: 1F811

This parameter group provides data associated with the ITU-R M.1371 AIS Message 21 Aids to Navigation (AtoN) Report Message for AtoN AIS units.

An AIS device may generate this parameter group either upon VHF data link receptions of a Message 21, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 21.

Command Support Requirement for Rebroadcasting of Messages 21 by an AIS Base Station:

Only AIS Base Stations shall accept the Command Group Function PGN 126208 with this PGN for Message 21. All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

The AIS Station commanded to rebroadcast a Message 21 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s) and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Configuring an AtoN Station and scheduling the transmission of a AIS Message 21 is done with PGN(s) (To be developed).

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions:

June 2017 – New description, new notes identifying Synthetic AtoNs in fields 2 and 15, and new command support requirements.

Single Frame: **N** Priority Default: **4** Default Update Rate: **N/A** milliseconds Frequency: **#Type!** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Required** ACK Rqmnts: **None**

### Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional Required	
		Bit Field Size: 6	Command Parameter:		
	DD188	AIS Message Identifier	Message Identifier (range of 0 to 63).		
			See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
21 = AIS Aids to Navigation (AtoN) Report					

21 = AIS Aids to Navigation (AtoN) Report

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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# AIS Aids to Navigation (AtoN) Report

PGN: 129041  
hex: 1F811

## 2 Repeat Indicator

Byte Field Size:

Bit Field Size: 2

Request Parameter

Optional

Command Parameter:

Note 1

DD185 AIS Repeater Indicator

Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).

0 = Default

1 = First retransmission

2 = Second retransmission

3 = Final retransmission

See the latest version of ITU-R M.1371 for more information.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Synthetic AtoNs are identified when the Repeat Indicator in field 2 is a "1" and the Virtual AtoN Flag in field 15 is a "0".

## 3 ID

Byte Field Size:

4

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Required

DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI number of AtoN station reporting position

## 4 Longitude

Byte Field Size:

4

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Required

DD023 Longitude, WGS-84

Longitude referenced to WGS-84.

DF25 Longitude

int32

Range: +/- 180 deg

Resolution: 1x10E-7 deg

"-" = West, resolution ~1.1 cm

## 5 Latitude

Byte Field Size:

4

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Required

DD022 Latitude, WGS-84

Latitude referenced to WGS-84.

DF23 Latitude

int32

Range: +/- 90 deg

Resolution: 1x10E-7 deg

"-" = South, resolution ~1.1 cm

## 6 Position Accuracy

Byte Field Size:

1

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Required

DD184 AIS Position Accuracy

0 = low accuracy > 10m such as nondifferential GNSS (default),  
1 = high accuracy < 10m such as DGNSS

See the latest version of ITU-R M.1371 for more information.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 7 RAIM Flag

Byte Field Size:

1

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Required

DD189 AIS RAIM-flag

0 = RAIM not in use (default),  
1 = RAIM in use

See the latest version of ITU-R M.1371 for more information.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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# AIS Aids to Navigation (AtoN) Report

PGN: 129041

hex: 1F811

8	Time Stamp			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	6	Command Parameter:	Required
	DD186 AIS Time Stamp			0-59 = UTC second when the report was generated, 60 = time stamp not available (default), 61 = positioning system is in manual input mode, 62 = Electronic position fixing system operates in estimated (dead reckoning) mode, 63 = positioning system is inoperative  See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
9	AtoN Structure Length/Diameter			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Required
	DD194 Distance, medium			Dependent upon PG Field definition.			
	DF75 Distance, Medium	uint16	Range:	0 to 6553.2 m	Resolution:	1x10E-1 m	
	See Message 21 Dimension/reference for position data field and notes for interpretation of these values in the latest version of ITU-R M.1371.						
10	AtoN Structure Beam/Diameter			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Required
	dd194 Distance, medium			Dependent upon PG Field definition.			
	DF75 Distance, Medium	uint16	Range:	0 to 6553.2 m	Resolution:	1x10E-1 m	
	See Message 21 Dimension/reference for position data field and notes for interpretation of these values in the latest version of ITU-R M.1371.						
11	Position Reference Point from Starboard Structure Edge/Radius			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Required
	DD194 Distance, medium			Dependent upon PG Field definition.			
	DF75 Distance, Medium	uint16	Range:	0 to 6553.2 m	Resolution:	1x10E-1 m	
	See Message 21 Dimension/reference for position data field and notes for interpretation of these values in the latest version of ITU-R M.1371.						
12	Position Reference Point from True North facing Structure Edge/Radius			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Required
	DD194 Distance, medium			Dependent upon PG Field definition.			
	DF75 Distance, Medium	uint16	Range:	0 to 6553.2 m	Resolution:	1x10E-1 m	
	See Message 21 Dimension/reference for position data field and notes for interpretation of these values in the latest version of ITU-R M.1371.						

13	Aid to Navigation (AtoN) Type	Byte Field Size: Bit Field Size: 5	Request Parameter Command Parameter:	Optional Required
DD305	AIS Aids to Navigation Type	<div>0 = Type of AtoN not specified (default)</div> <div>1 = Reference point</div> <div>2 = RACON</div> <div>3 = Fixed structures off-shore, such as oil platforms, wind farms; This code identifies an obstruction that is fitted with an AtoN AIS station</div> <div>4 = Spare, Reserved for future use</div> <div>Fixed AtoN:</div> <div>5 = Light, without sectors</div> <div>6 = Light, with sectors</div> <div>7 = Leading Light Front</div> <div>8 = Leading Light Rear</div> <div>9 = Beacon, Cardinal N</div> <div>10 = Beacon, Cardinal E</div> <div>11 = Beacon, Cardinal S</div> <div>12 = Beacon, Cardinal W</div> <div>13 = Beacon, Port hand</div> <div>14 = Beacon, Starboard hand</div> <div>15 = Beacon, Preferred Channel port hand</div> <div>16 = Beacon, Preferred Channel starboard hand</div> <div>17 = Beacon, Isolated danger</div> <div>18 = Beacon, Safe water</div> <div>19 = Beacon, Special mark</div> <div>Floating AtoN:</div> <div>20 = Cardinal Mark N</div> <div>21 = Cardinal Mark E</div> <div>22 = Cardinal Mark S</div> <div>23 = Cardinal Mark W</div> <div>24 = Port hand Mark</div> <div>25 = Starboard hand Mark</div> <div>26 = Preferred Channel Port hand</div> <div>27 = Preferred Channel Starboard hand</div> <div>28 = Isolated danger</div> <div>29 = Safe Water</div> <div>30 = Special Mark</div> <div>31 = Light Vessel/LANBY/Rigs</div> <div>NOTE 1: The types of aids to navigation listed above are based on the IALA Maritime Buoyage System, where applicable.</div> <div>NOTE 2: There is potential for confusion when deciding whether an aid is lighted or unlighted. Competent authorities may wish to use the regional/local section of the message to indicate this.</div> <div>See Latest version of ITU-R M.1371 for more information.</div>		
DF52	Bit field	bit(n) Range: Variable	Resolution: 1	Used to construct bit fields



# AIS Aids to Navigation (AtoN) Report

PGN: 129041  
hex: 1F811

## 14 Off Position Indicator

Byte Field Size:

Bit Field Size: 1

Request Parameter

Optional

Command Parameter:

Required

DD306 Off position indicator

For floating AtoN, only:

0 = on position

1 = off position

NOTE 1: This flag should only be considered valid by receiving station, if the AtoN is a floating aid, and if time stamp is equal to or below 59. For floating AtoN the guard zone parameters should be set on installation.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 15 Virtual AtoN Flag

Byte Field Size:

Bit Field Size: 1

Request Parameter

Optional

Command Parameter:

Required

DD307 Virtual AtoN Flag

0 = real AtoN at indicated position (default)

1 = virtual AtoN, does not physically exist

See note 2 of MSG 21 in ITU-R M.1371 for more information.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Synthetic AtoNs are identified when the Virtual AtoN Flag in field 15 is a "0" and the Repeat Indicator in field 2 is a "1".

## 16 Assigned Mode Flag

Byte Field Size:

Bit Field Size: 1

Request Parameter

Optional

Command Parameter:

Required

DD308 AIS Assigned Mode Flag

0 = Station operating in autonomous and continuous mode (default)

1 = Station operating in assigned mode

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 17 AIS Spare

Byte Field Size:

Bit Field Size: resv 1

Request Parameter

Optional

Command Parameter:

Required

DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zero

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

# AIS Aids to Navigation (AtoN) Report

PGN: 129041  
hex: 1F811

18	Electronic Fixing Position Fixing Device Type	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Required
DD191	AIS Electronic Positioning Device Type	0 = Undefined (default) 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Integrated Navigation System 7 = Surveyed; For fixed AtoN and virtual AtoN, the charted position should be used. The accurate position enhances its function as a radar reference target 8 = Galileo 9-14 = Reserved for future use 15 = Internal GNSS See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
				Used to construct bit fields
19	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 3	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
				Used to construct bit fields
	Used to align subsequent data on byte boundary.			
20	AtoN Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 8	Command Parameter:	Required
DD309	AtoN Status	Reserved for indicating AtoN Status; Only defined value is 00000000 (default).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
				Used to construct bit fields

# AIS Aids to Navigation (AtoN) Report

PGN: 129041

hex: 1F811

## 21 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Required

### DD246 AIS Transceiver Information

- 0 = Channel A VDL reception,
- 1 = Channel B VDL reception,
- 2 = Channel A VDL transmission,
- 3 = Channel B VDL transmission,
- 4 = Own information not broadcast,
- 5 = Channels A & B VDL transmission
- 6 = Channel C (VHF Channel 75) reception,
- 7 = Channel D (VHF Channel 76) reception,
- 8 = Channel C (VHF Channel 75) transmission,
- 9 = Channel D (VHF Channel 76) transmission,
- 10 - 30 = Reserved
- 31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

## 22 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 3

Request Parameter

Command Parameter:

### DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on byte boundary

23	Aid to Navigation (AtoN) Name	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n)Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
This field is always transmitted using ASCII and combines two fields from ITU-R M.1371 message 21. 'Name of Aids-to- Navigation' is a fixed 20 ASCII character field that is always present, and 'Name of Aid-to-Navigation Extension' is an optional field of up to 14 ASCII characters. The total length of this yield is variable and will be from 20 to 34 ASCII characters.		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
See ITU-R M.1371 for more information.			

## Datum

PGN: 129044

hex: 1F814

Local geodetic datum and datum offsets from a reference datum. This PGN is used to define the datum to which a position location output by the same device in other PGNs is referenced. This PGN will normally be requested as needed.

Single Frame: No Priority Default: 6 Default Update Rate: 10000 milliseconds Frequency: .1 cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Local Datum	Byte Field Size: char 4	Request Parameter: Optional
	DD068 Datum	Bit Field Size: Command Parameter: Optional	
	DF63 String, fixed	char8(n) Range: 0 to 1,785 characters Resolution: 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.
2	Delta Latitude	Byte Field Size: 4	Request Parameter: Optional
	DD106 Latitude, Offset	Bit Field Size: Command Parameter: Optional	
	DF23 Latitude '+' is North	int32 Range: +/- 90 deg Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
3	Delta Longitude	Byte Field Size: 4	Request Parameter: Optional
	DD107 Longitude, Offset	Bit Field Size: Command Parameter: Optional	
	DF25 Longitude '+' is East	int32 Range: +/- 180 deg Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
4	Delta Altitude	Byte Field Size: 4	Request Parameter: Optional
	DD115 Distance	Bit Field Size: Command Parameter: Optional	
	DF15 Distance, signed '+' is Up	int32 Range: +/-~2.147x10E+7 m Resolution: 1x10E-2 m	

5	Reference Datum	Byte Field Size: char4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD068	Datum	4-character code for the datum currently being output for the position solution. The datum's are defined in the IHO Publication S-60, Appendices B and C. The first three characters are the datum ID as per the IHO tables. The fourth character is the local datum subdivision code. A null character indicates the datum or subdivision code is unknown or not used.	
DF63	String, fixed	char8(n) Range: 0 to 1,785 characters Resolution: 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.

## User Datum Settings

**PGN: 129045**  
**hex: 1F815**

Transformation parameters for converting from WGS-84 to other Datums. This PGN will normally be requested as needed.

Single Frame: **No** Priority Default: **6** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Delta X</b>			Byte Field Size: <b>4</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD108</b> Axis Delta shift				Delta Shift in X, Y, or Z axis from WGS 84.		
	<b>DF15</b> Distance, signed	<b>int32</b>	Range: <b>+/-~2.147x10E+7 m</b>		Resolution: <b>1x10E-2 m</b>		
<b>2</b>	<b>Delta Y</b>			Byte Field Size: <b>4</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD108</b> Axis Delta shift				Delta Shift in X, Y, or Z axis from WGS 84.		
	<b>DF15</b> Distance, signed	<b>int32</b>	Range: <b>+/-~2.147x10E+7 m</b>		Resolution: <b>1x10E-2 m</b>		
<b>3</b>	<b>Delta Z</b>			Byte Field Size: <b>4</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD108</b> Axis Delta shift				Delta Shift in X, Y, or Z axis from WGS 84.		
	<b>DF15</b> Distance, signed	<b>int32</b>	Range: <b>+/-~2.147x10E+7 m</b>		Resolution: <b>1x10E-2 m</b>		
<b>4</b>	<b>Rotation in X</b>			Byte Field Size: <b>4</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD109</b> Axis Rotational shift				Rotational shift in X, Y, or Z axis from WGS 84. Rotations presented use the geodetic sign convention. When looking along the positive axis towards the origin, counter-clockwise rotations are positive.		
	<b>DF70</b> Angle, tiny	<b>float32</b>	Range: <b>Variable radians</b>		Resolution: <b>Floats, radian</b>		
<b>5</b>	<b>Rotation in Y</b>			Byte Field Size: <b>4</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD109</b> Axis Rotational shift				Rotational shift in X, Y, or Z axis from WGS 84. Rotations presented use the geodetic sign convention. When looking along the positive axis towards the origin, counter-clockwise rotations are positive.		
	<b>DF70</b> Angle, tiny	<b>float32</b>	Range: <b>Variable radians</b>		Resolution: <b>Floats, radian</b>		
<b>6</b>	<b>Rotation in Z</b>			Byte Field Size: <b>4</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD109</b> Axis Rotational shift				Rotational shift in X, Y, or Z axis from WGS 84. Rotations presented use the geodetic sign convention. When looking along the positive axis towards the origin, counter-clockwise rotations are positive.		
	<b>DF70</b> Angle, tiny	<b>float32</b>	Range: <b>Variable radians</b>		Resolution: <b>Floats, radian</b>		
<b>7</b>	<b>Scale</b>			Byte Field Size: <b>4</b>		Request Parameter: <b>Optional</b>	
				Bit Field Size:		Command Parameter: <b>Optional</b>	
	<b>DD110</b> Scale				Scale factor expressed in parts-per-million		
	<b>DF49</b> Ratio, Relative measure	<b>float32</b>	Range: <b>Variable</b>		Resolution: <b>Floats</b>	Unit-less number	

## User Datum Settings

PGN: 129045

hex: 1F815

8	Ellipsoid Semi-major Axis		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
DD111	Ellipsoid Semi-major Axis		Semi-major axis (a) of the User Datum ellipsoid.	
DF15	Distance, signed	int32	Range: +/-~2.147x10E+7 m	Resolution: 1x10E-2 m
9	Ellipsoid Flattening Inverse		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
DD112	Ellipsoid Flattening Inverse		Flattening (1/f) of the user Datum ellipsoid.	
DF49	Ratio, Relative measure	float32	Range: Variable	Resolution: Floats Unit-less number
10	Datum Name		Byte Field Size: char 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
DD068	Datum		4-character code for the datum currently being output for the position solution. The datum's are defined in the IHO Publication S-60, Appendices B and C. The first three characters are the datum ID as per the IHO tables. The fourth character is the local datum subdivision code. A null character indicates the datum or subdivision code is unknown or not used.	
DF63	String, fixed	char8(n)	Range: 0 to 1,785 characters	Resolution: 1 char 0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.



## Cross Track Error

**PGN: 129283**  
**hex: 1F903**

This PGN provides the magnitude of position error perpendicular to the desired course.

Single Frame: **Yes** Priority Default: **3** Default Update Rate: **1000** milliseconds Frequency: **1.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>XTE Mode</b>	Byte Field Size: Bit Field Size: <b>4</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD025</b>	Mode, Data	<p>0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>3</b>	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: <b>resv 2</b>	Request Parameter: Command Parameter:
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Used to align subsequent data on a byte boundary.			

## Cross Track Error

PGN: 129283

hex: 1F903

### 4 Navigation Terminated

Byte Field Size:

Bit Field Size: 2

Request Parameter

Optional

Command Parameter:

Optional

DD002 Generic status pair

MSB/LSB:

00 = [No, Off, Disabled, Reset, "0"],

01 = [Yes, On, Enabled, Set, "1"],

10 = Error,

11 = [Unavailable, Unknown]

DF52 Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

Flag should be set as follows:

NO - when Navigation is running normally,

YES - In the last PGN when Navigation was Terminated (manually or automatically),

ERROR - in case of a navigation error,

UNAVAIL - if flag is not supported.

### 5 XTE

Byte Field Size:

4

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Optional

DD114 XTE

Cross-track-error of a route. "-" = Left of track, need to steer right

DF15 Distance, signed

int32

Range:

+/-~2.147x10E+7 m

Resolution:

1x10E-2 m

### 6 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 16

Request Parameter

Command Parameter:

DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on a byte boundary.

## Navigation Data

**PGN: 129284**  
**hex: 1F904**

This PGN provides essential navigation data for following a route. Transmissions will originate from products that can create and manage routes using waypoints. This information is intended for navigational repeaters. Transmission intervals should be aligned to latitude and longitude update rates

Single Frame: **No** Priority Default: **3** Default Update Rate: **1000** milliseconds Frequency: **1.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Distance to Destination Waypoint</b>	Byte Field Size: <b>4</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD199</b>	Distance, Unsigned		
<b>DF09</b>	Distance	<b>uint32</b> Range: <b>0 to ~4.295x10E+7 m</b> Resolution: <b>1x10E-2 m</b>	
<b>3</b>	<b>Course/Bearing Ref.</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD117</b>	Direction reference	<p>0 = True, 1 = Magnetic, 2 = Error, 3 = Null</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>4</b>	<b>Perpendicular Crossed</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD002</b>	Generic status pair	<p>MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields

## Navigation Data

**PGN: 129284**  
**hex: 1F904**

<b>5</b>	<b>Arrival Circle Entered</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD002</b> Generic status pair			MSB/LSB:			
				00 = [No, Off, Disabled, Reset, "0"],			
				01 = [Yes, On, Enabled, Set, "1"],			
				10 = Error,			
				11 = [Unavailable, Unknown]			
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
<b>6</b>	<b>Calculation Type</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD119</b> Calculation Type			0 = Great Circle calculations,			
				1 = Rhumb Line calculations,			
				2 = Error,			
				3 = Null			
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
<b>7</b>	<b>ETA Time</b>			<i>Byte Field Size:</i>	<b>4</b>	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD158</b> Generic time of day			24 hour clock, 0 = midnight, time is in UTC			
	<b>DF06</b> Time of day	<b>uint32</b>	<i>Range:</i>	0 to 86,401 s	<i>Resolution:</i>	1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
<b>8</b>	<b>ETA Date</b>			<i>Byte Field Size:</i>	<b>2</b>	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD039</b> Generic date			Days since January 1, 1970, Date is relative to UTC Time.			
	<b>DF41</b> Date, day count	<b>uint16</b>	<i>Range:</i>	0 to 65,532 days	<i>Resolution:</i>	1 day	0 = January 1, 1970, max = ~179 years
<b>9</b>	<b>Bearing, Origin To Destination Waypoint</b>			<i>Byte Field Size:</i>	<b>2</b>	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD164</b> Bearing			The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction, measured from 000 at the reference direction clockwise through 359 degrees.			
	<b>DF02</b> Angle	<b>uint16</b>	<i>Range:</i>	0 to 2Pi rad	<i>Resolution:</i>	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
<b>10</b>	<b>Bearing, Position To Destination Waypoint</b>			<i>Byte Field Size:</i>	<b>2</b>	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD164</b> Bearing			The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction, measured from 000 at the reference direction clockwise through 359 degrees.			
	<b>DF02</b> Angle	<b>uint16</b>	<i>Range:</i>	0 to 2Pi rad	<i>Resolution:</i>	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad

## Navigation Data

**PGN: 129284**  
**hex: 1F904**

<b>11</b>	<b>Origin Waypoint Number</b>	<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD010</b> Generic numeric ID, large	Number of route, waypoint, event, mark, etc.		
	<b>DF55</b> Integer, 32 bit unsigned	<b>uint32</b>	<i>Range:</i> 0 to 4,294,967,292	<i>Resolution:</i> 1 bit Unit-less number
	Applies to current route and at this time is limited to 16 bits			
<b>12</b>	<b>Destination Waypoint Number</b>	<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD010</b> Generic numeric ID, large	Number of route, waypoint, event, mark, etc.		
	<b>DF55</b> Integer, 32 bit unsigned	<b>uint32</b>	<i>Range:</i> 0 to 4,294,967,292	<i>Resolution:</i> 1 bit Unit-less number
	Applies to current route and at this time is limited to 16 bits			
<b>13</b>	<b>Destination Wpt Latitude</b>	<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD022</b> Latitude, WGS-84	Latitude referenced to WGS-84.		
	<b>DF23</b> Latitude	<b>int32</b>	<i>Range:</i> +/- 90 deg	<i>Resolution:</i> 1x10E-7 deg "-" = South, resolution ~1.1 cm
<b>14</b>	<b>Destination Wpt Longitude</b>	<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD023</b> Longitude, WGS-84	Longitude referenced to WGS-84.		
	<b>DF25</b> Longitude	<b>int32</b>	<i>Range:</i> +/- 180 deg	<i>Resolution:</i> 1x10E-7 deg "-" = West, resolution ~1.1 cm
<b>15</b>	<b>Waypoint Closing Velocity</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD228</b> Generic speed, signed - large	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.		
	<b>DF87</b> Speed, signed - large	<b>int16</b>	<i>Range:</i> +/- 327.66 m/s (+/- 636 knots)	<i>Resolution:</i> 1x10E-2 m/s
	Positive value indicates approaching Wpt, negative indicates moving away from Wpt			

## Navigation - Route/WP information

PGN: 129285

hex: 1F905

This PGN shall return Route and WP data ahead in the Active Route. It can be requested or may be transmitted without a request, typically at each Waypoint advance. When navigating the Route in Forward direction, the Waypoints shall be included in the order of increasing RPS#. When navigating in Reverse direction the order shall be decreasing RPS#. The first Waypoint shall be the origin WP. When navigating towards a single WP or when the first WP of the Route is not yet passed, the origin RPS# shall be 65535 (NA). The WP Name and Position may optionally be filled with the name and position where the navigation started, or it shall be set to NA. ISO request for this PGN shall return origin and destination WP, next WP may be added - but it is not required. For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Start RPS#	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	Route Point Sequence Number (RPS#) of the Origin Waypoint. Set to 65535 (NA) if the origin WP is not defined.		
2	nItems	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	n RPS#'s requested/sent. If not specified in the request, the default is n = 2.		
3	Database ID	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
4	Route ID	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
5	Navigation direction in route	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 3	Command Parameter: Optional
	DD241 Navigation Direction	0=Forward, 1=Reverse, 2-5 Reserved, 6= Error, 7=NULL (info not available)	
	DF52 Bit field bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
	Forward=increasing Route Point Sequence Number (RPS#)		

## Navigation - Route/WP information

**PGN: 129285**  
**hex: 1F905**

<b>6</b>	<b>Supplementary Route/WP data available</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD002</b> Generic status pair	MSB/LSB:	00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	YES=there are supplementary data available The Database ID, Route ID, WPID/RPS# may be used to request other "Route and WP Service" PGNs with supplementary data.				
<b>7</b>	<b>NMEA Reserved</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	
		<i>Bit Field Size:</i>	<b>resv 3</b>	<i>Command Parameter:</i>	
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"			
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.				
<b>8</b>	<b>Route Name</b>	<i>Byte Field Size:</i>	<b>8 or 16 n</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD004</b> Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.			
	<b>DF50</b> String, variable, short	<b>ch8or16(n)</b>	<i>Range:</i> 0 to 250 ASCII or 0 to 125 Unicode Characters	<i>Resolution:</i> 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	Max 30 ASCII or Unicode Characters				
<b>9</b>	<b>NMEA Reserved</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	
		<i>Bit Field Size:</i>	<b>resv 8</b>	<i>Command Parameter:</i>	
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"			
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.				

## Navigation - Route/WP information

**PGN: 129285**  
**hex: 1F905**

<b>10</b>	<b>WPID</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned	<b>uint16</b> Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	Shall have valid data if the Waypoint exists in the WP-List.		
	The waypoints shall be included in the order of appearance in the Navigation Direction.		
<b>11</b>	<b>WP Name</b>	Byte Field Size: <b>8 or 16   n</b> Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	<b>DD004</b> Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
	<b>DF50</b> String, variable, short	<b>ch8or16(n)</b> Range: 0 to 250 ASCII or 0 to 125 Unicode Characters Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	Max. 30 ASCII or Unicode Characters		
<b>12</b>	<b>WP Latitude</b>	Byte Field Size: <b>4</b> Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	<b>DD022</b> Latitude, WGS-84	Latitude referenced to WGS-84.	
	<b>DF23</b> Latitude	<b>int32</b> Range: +/- 90 deg Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
<b>13</b>	<b>WP Longitude</b>	Byte Field Size: <b>4</b> Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	<b>DD023</b> Longitude, WGS-84	Longitude referenced to WGS-84.	
	<b>DF25</b> Longitude	<b>int32</b> Range: +/- 180 deg Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
<b>14</b>	<b>Fields 10 thru 13 repeat as needed</b>	Byte Field Size: <b>?</b> Bit Field Size: <b>n</b>	Request Parameter: Optional Command Parameter: Optional
	<b>DD000</b> Undefined		
	<b>DF00</b> Undefined	<b>Undefined</b> Range: undefined Resolution: undefined	Application specific, defined at time of use.



## Set & Drift, Rapid Update

**PGN: 129291**  
**hex: 1F90B**

The Set and Drift effect on the Vessel is the direction and the speed of a current. The Course & Speed (through water) vector added to the Set & Drift vector is the COG & SOG vector. The bearings may be True or Magnetic referenced. When Set & Drift is calculated from data from a GPS, a compass and a speed log, the Set & Drift estimate will be influenced by current, weather and anything that sets the ship off from the intended Course. The Sequence ID may be used to tie the data to time, position, sample number.

Single Frame: **Yes** Priority Default: **3** Default Update Rate: **1000** milliseconds Frequency: **1** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	uint8 Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Set Reference</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD117</b>	Direction reference	<p>0 = True, 1 = Magnetic, 2 = Error, 3 = Null</p>	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>3</b>	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: <b>resv 6</b>	Request Parameter: Command Parameter:
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Used to align subsequent data on a byte boundary.			
<b>4</b>	<b>Set</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD048</b>	Current flow direction	Direction towards which current flows. Degrees relative to True North.	
<b>DF02</b>	Angle	uint16 Range: <b>0 to 2Pi rad</b> Resolution: <b>1x10E-4 rad</b>	Resolution ~0.0057deg, 1 deg = .01745 rad
<b>5</b>	<b>Drift</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD044</b>	Generic Speed		
<b>DF35</b>	Speed	uint16 Range: <b>0 to 655.32 m/s</b> Resolution: <b>1x10E-2 m/s</b>	1 Knot = 0.5144 m/s

6	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv16	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to align subsequent data on a byte boundary.		Used to construct bit fields		

## Time to/from Mark

**PGN: 129301**  
**hex: 1F915**

Time to go to or elapsed from a generic mark, that may be non-fixed. The mark is not generally a specific geographic point but may vary continuously and is most often determined by calculation (the recommended turning or tacking point for sailing vessels, the wheel-over point for vessels making turns, a predicted collision point, etc.)

Single Frame: **No** Priority Default: **3** Default Update Rate: **1000** milliseconds Frequency: **1.** cycles per second

Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>		Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
			Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD056</b> Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.		
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)		
		253 - 254 = reserved for future use		
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
<b>2</b>	<b>Time elapsed (from) or to-go to mark</b>		Byte Field Size: <b>4</b>	Request Parameter: <b>Optional</b>
			Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD034</b> Time-elapsed/Time-to-go	Time interval in milli-sec. "-" = time elapsed since event, "+" = time to go before event.		
	<b>DF40</b> Time interval, signed, sta	<b>int32</b>	Range: <b>+/- ~2.148x10E+6 s</b>	Resolution: <b>1x10E-3 s</b>
<b>3</b>	<b>Mark Type</b>		Byte Field Size:	Request Parameter: <b>Optional</b>
			Bit Field Size: <b>4</b>	Command Parameter: <b>Optional</b>
	<b>DD122</b> Mark Type	0 = Collision, 1 = Turning Point, 2 = Reference (general), 3 = Wheelover, 4 = Waypoint, 5-13 = Reserved, 14 = Error, 15 = Null		
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields
<b>4</b>	<b>NMEA Reserved</b>		Byte Field Size:	Request Parameter:
			Bit Field Size: <b>resv 4</b>	Command Parameter:
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields
	Used to align subsequent data on a byte boundary.			
<b>5</b>	<b>Mark ID</b>		Byte Field Size: <b>4</b>	Request Parameter: <b>Optional</b>
			Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD010</b> Generic numeric ID, large	Number of route, waypoint, event, mark, etc.		
	<b>DF55</b> Integer, 32 bit unsigned	<b>uint32</b>	Range: <b>0 to 4,294,967,292</b>	Resolution: <b>1 bit</b> Unit-less number

## Bearing and Distance between two Marks

**PGN: 129302**  
**hex: 1F916**

Bearing and distance from the origin mark to the destination mark, calculated at the origin mark, for any two arbitrary generic marks. The calculation type (Rhumb Line, Great Circle) is specified, as well as the bearing reference (Mag, True). This PGN will normally be requested as needed.

Single Frame: **No** Priority Default: **6** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	uint8 Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Bearing Ref.</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD117</b>	Direction reference	<p>0 = True, 1 = Magnetic, 2 = Error, 3 = Null</p>	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>3</b>	<b>Calculation Type</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD119</b>	Calculation Type	<p>0 = Great Circle calculations, 1 = Rhumb Line calculations, 2 = Error, 3 = Null</p>	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>4</b>	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: <b>resv 4</b>	Request Parameter: Command Parameter:
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
Used to align subsequent data on a byte boundary.			

## Bearing and Distance between two Marks

PGN: 129302

hex: 1F916

5	Bearing, Origin To Destination	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD164	Bearing	The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction, measured from 000 at the reference direction clockwise through 359 degrees.	
DF02	Angle	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
6	Distance	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD199	Distance, Unsigned		
DF09	Distance	uint32 Range: 0 to ~4.295x10E+7 m Resolution: 1x10E-2 m	
7	Origin Mark Type	Byte Field Size: Bit Field Size: 4	Request Parameter: Optional Command Parameter: Optional
DD122	Mark Type	0 = Collision, 1 = Turning Point, 2 = Reference (general), 3 = Wheelover, 4 = Waypoint, 5-13 = Reserved, 14 = Error, 15 = Null	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
8	Destination Mark Type	Byte Field Size: Bit Field Size: 4	Request Parameter: Optional Command Parameter: Optional
DD122	Mark Type	0 = Collision, 1 = Turning Point, 2 = Reference (general), 3 = Wheelover, 4 = Waypoint, 5-13 = Reserved, 14 = Error, 15 = Null	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
9	Origin Mark Id	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
DF55	Integer, 32 bit unsigned	uint32 Range: 0 to 4,294,967,292 Resolution: 1 bit	Unit-less number
10	Destination Mark ID	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
DF55	Integer, 32 bit unsigned	uint32 Range: 0 to 4,294,967,292 Resolution: 1 bit	Unit-less number

# GNSS Control Status

**PGN: 129538**  
**hex: 1FA02**

GNSS common satellite receiver parameter status. This PGN will be requested as needed.

Single Frame: **No**    Priority Default: **6**    Default Update Rate:    milliseconds    Frequency: **NA** cycles per second  
Destination: **Global**    Query Support: **Optional**    Command Support: **Optional**    ACK Rqmnts: **None**

## Field #    Field Name

<b>1</b>	<b>SV Elevation Mask</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD054</b> Elevation	Angle above or below the horizon. -90° to +90°; negative below the horizon	
	<b>DF04</b> Angle, signed	<b>int16</b> Range: <b>+/-Pi rad</b>	Resolution: <b>1x10E-4 rad</b> Resolution ~0.0057deg
	Do not use satellites below this value.		
<b>2</b>	<b>PDOP Mask</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD055</b> DOP	Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).	
	<b>DF69</b> Ratio, Relative measure,	<b>int16</b> Range: <b>+/-327.64</b>	Resolution: <b>1x10E-2</b> Unit-less number
	When exceeded, GNSS Receiver shall indicate No GNSS fix or DR Mode in PGN 129029		
<b>3</b>	<b>PDOP Switch</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD055</b> DOP	Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).	
	<b>DF69</b> Ratio, Relative measure,	<b>int16</b> Range: <b>+/-327.64</b>	Resolution: <b>1x10E-2</b> Unit-less number
	When exceeded GNSS Receiver shall switch from 3D to 2D mode		
<b>4</b>	<b>SNR Mask</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD057</b> SNR Value	SNR expressed in C/No	
	<b>DF31</b> dB, relative measure	<b>int16</b> Range: <b>+/- 327.64 dB</b>	Resolution: <b>1x10E-2 dB</b>
	Do not use satellites below this value.		
<b>5</b>	<b>GNSS Mode</b>	Byte Field Size:	Request Parameter: <b>Optional</b>
		Bit Field Size: <b>3</b>	Command Parameter: <b>Optional</b>
	<b>DD058</b> Mode, GNSS	0 = 1D, 1 = 2D, 2 = 3D, 3 = Auto, 4-5 = Reserved, 6 = Error, 7 = Null	
	<b>DF52</b> Bit field	<b>bit(n)</b> Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields

## GNSS Control Status

PGN: 129538

hex: 1FA02

6	DGNSS Mode			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	3	Command Parameter:	Optional
	DD059	Mode, DGNSS			0 = Off 1 = Auto 2 = Code Differential Corrections 3 = SBAS Corrections 4 = Phase Differential Corrections (RTK) 5 = PPP Corrections		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
7	Position / Velocity Filter			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Optional
	DD002	Generic status pair			MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
8	Max Correction Age			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD060	Differential Age			Age of Differential corrections		
	DF66	Time interval, .01sec	uint16	Range:	0 to 655.32s	Resolution:	1x10E-2sec
9	Antenna Altitude for 2D Mode			Byte Field Size:	4	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD024	Altitude, WGS-84			Altitude referenced to WGS-84		
	DF15	Distance, signed	int32	Range:	+/-~2.147x10E+7 m	Resolution:	1x10E-2 m
10	Use Antenna Altitude for 2D Mode			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Optional
	DD002	Generic status pair			MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
					00 = Use last good calculated Altitude for 2D mode.		
11	Reserved			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	resv 6	Command Parameter:	Optional
	DD001	Reserved field			Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields

## GNSS DOPs

PGN: 129539

hex: 1FA03

This PGN provides a single transmission containing GNSS status and dilution of precision components (DOP) that indicate the contribution of satellite geometry to the overall positioning error. There are three DOP parameters reported, horizontal (HDOP), Vertical (VDOP) and time (TDOP).

Single Frame: Yes Priority Default: 6 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second

Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD056	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
2	Set Mode	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 3	Command Parameter: Optional
DD058	Mode, GNSS	<p>0 = 1D, 1 = 2D, 2 = 3D, 3 = Auto, 4-5 = Reserved, 6 = Error, 7 = Null</p>	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
3	Op Mode	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 3	Command Parameter: Optional
DD058	Mode, GNSS	<p>0 = 1D, 1 = 2D, 2 = 3D, 3 = Auto, 4-5 = Reserved, 6 = Error, 7 = Null</p>	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
4	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 2	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
Used to align subsequent data on a byte boundary.			

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23



## GNSS DOPs

PGN: 129539

hex: 1FA03

5	HDOP			Byte Field Size: 2	Request Parameter: Optional
				Bit Field Size:	Command Parameter: Optional
	DD055	DOP		Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).	
	DF69	Ratio, Relative measure,	int16	Range: +/-327.64	Resolution: 1x10E-2 Unit-less number
6	VDOP			Byte Field Size: 2	Request Parameter: Optional
				Bit Field Size:	Command Parameter: Optional
	DD055	DOP		Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).	
	DF69	Ratio, Relative measure,	int16	Range: +/-327.64	Resolution: 1x10E-2 Unit-less number
7	TDOP			Byte Field Size: 2	Request Parameter: Optional
				Bit Field Size:	Command Parameter: Optional
	DD055	DOP		Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).	
	DF69	Ratio, Relative measure,	int16	Range: +/-327.64	Resolution: 1x10E-2 Unit-less number

## GNSS Sats in View

PGN: 129540

hex: 1FA04

GNSS information on current satellites in view tagged by sequence ID. Information includes PRN, elevation, azimuth, and SNR. Field 4 defines the number of satellites. Fields 5 thru 11 define the satellite number and the information. These fields sequentially repeated for each satellite to be transmitted as indicated by "n" in fields 12 thru 18.

Single Frame: No Priority Default: 6 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second

Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

Field # Field Name Original Reference ID # 23

1 Sequence ID Byte Field Size: 1 Request Parameter: Optional  
Bit Field Size: Command Parameter: Optional

**DD056** Sequence ID An upward counting number used to tie related information together between different PGNs. For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 252 for valid position fixes.

**DF53** Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

2 Mode Byte Field Size: Request Parameter: Optional  
Bit Field Size: 2 Command Parameter: Optional

**DD072** Range Residual Mode Range Residual used in position calculation or range residuals were calculated after the position.  
0=range residuals were used to calculate data;  
1=range residuals were calculated after the position.,  
2=Error,  
3=Null

**DF52** Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields

3 NMEA Reserved Byte Field Size: Request Parameter:  
Bit Field Size: resv 6 Command Parameter:

**DD001** Reserved field Variable number of reserved bits, all set to logic "1"

**DF52** Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields

Used to align subsequent data on a byte boundary.

4 Number of SVs Byte Field Size: 1 Request Parameter: Optional  
Bit Field Size: Command Parameter: Optional

**DD006** Generic counter, short Numeric count, event counter, sequence counter

**DF53** Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

5 PRN "1" Byte Field Size: 1 Request Parameter: Optional  
Bit Field Size: Command Parameter: Optional

**DD074** Satellite ID Number  
0 = value not used,  
1-32 = GPS,  
33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS)  
65-96 = GLONASS.  
For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.

**DF53** Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

## GNSS Sats in View

PGN: 129540

hex: 1FA04

6	Elevation "1"	Byte Field Size: 2	Request Parameter: Optional
	DD054 Elevation	Bit Field Size:	Command Parameter: Optional
	DF04 Angle, signed	int16	Range: +/-Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg
	Angle above or below the horizon. -90° to +90°; negative below the horizon		
7	Azimuth "1"	Byte Field Size: 2	Request Parameter: Optional
	DD127 Generic Direction -True	Bit Field Size:	Command Parameter: Optional
	DF02 Angle	uint16	Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
	Degrees clockwise relative to True North.		
8	SNR "1"	Byte Field Size: 2	Request Parameter: Optional
	DD057 SNR Value	Bit Field Size:	Command Parameter: Optional
	DF31 dB, relative measure	int16	Range: +/- 327.64 dB Resolution: 1x10E-2 dB
	SNR expressed in C/No		
9	Range Residuals 1	Byte Field Size: 4	Request Parameter: Optional
	DD073 Range Residuals	Bit Field Size:	Command Parameter: Optional
	DF79 Distance signed fine	int32	Range: +/-~2.147x10E+4 m Resolution: 1x10E-5 m
	Range Residual value in meters		
10	PRN Status "1"	Byte Field Size:	Request Parameter: Optional
	DD124 PRN Usage Status	Bit Field Size: 4	Command Parameter: Optional
	0 = Not Tracked, 1 = Tracked but not used in solution, 2 = Used in solution without Differential corrections, 3 = Differential Corrections available, 4 = Tracked with Differential Corrections, 5 = used with Differential Corrections, 6-13 =Reserved, 14 = Error, 15 = No Selection		
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
11	NMEA Reserved	Byte Field Size:	Request Parameter:
	DD001 Reserved field	Bit Field Size: resv 4	Command Parameter:
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
	Variable number of reserved bits, all set to logic "1"		
	Used to align subsequent data on a byte boundary.		

## GNSS Sats in View

PGN: 129540

hex: 1FA04

12	PRN "n"	Byte Field Size: 1	Request Parameter: Optional
	DD074 Satellite ID Number	Bit Field Size:	Command Parameter: Optional
	0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.		
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
Variable Number of fields, Field number 5 repeated			
13	Elevation "n"	Byte Field Size: 2	Request Parameter: Optional
	DD054 Elevation	Bit Field Size:	Command Parameter: Optional
	Angle above or below the horizon. -90° to +90°; negative below the horizon		
	DF04 Angle, signed	int16	Range: +/-Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg
Variable Number of fields, Field number 6 repeated			
14	Azimuth "n"	Byte Field Size: 2	Request Parameter: Optional
	DD127 Generic Direction -True	Bit Field Size:	Command Parameter: Optional
	Degrees clockwise relative to True North.		
	DF02 Angle	uint16	Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
Variable Number of fields, Field number 7 repeated			
15	SNR "n"	Byte Field Size: 2	Request Parameter: Optional
	DD057 SNR Value	Bit Field Size:	Command Parameter: Optional
	SNR expressed in C/No		
	DF31 dB, relative measure	int16	Range: +/- 327.64 dB Resolution: 1x10E-2 dB
Variable Number of fields, Field number 8 repeated			
16	Range Residuals "n"	Byte Field Size: 4	Request Parameter: Optional
	DD073 Range Residuals	Bit Field Size:	Command Parameter: Optional
	Range Residual value in meters		
	DF79 Distance signed fine	int32	Range: +/-~2.147x10E+4 m Resolution: 1x10E-5 m
Variable number of fields, Filed Number 9 repeated			

17PRN Status "n"

Byte Field Size:  
Bit Field Size: 4

Request Parameter  
Command Parameter:

Optional  
Optional

- DD124PRN Usage Status
- 0 = Not Tracked,  
1 = Tracked but not used in solution,  
2 = Used in solution without Differential corrections,  
3 = Differential Corrections available,  
4 = Tracked with Differential Corrections,  
5 = used with Differential Corrections,  
6-13 =Reserved,  
14 = Error,  
15 = No Selection

DF52Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Variable Number of fields, Field number 10 repeated

18NMEA Reserved

Byte Field Size:  
Bit Field Size: resv 4

Request Parameter  
Command Parameter:

- DD001Reserved field
- Variable number of reserved bits, all set to logic "1"

DF52Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Variable Number of fields, Field number 11 repeated

## GNSS Sats in View

PGN: 129540  
hex: 1FA04

12	PRN "n"	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD074	Satellite ID Number	<p>For GPS: 1 - 99 1 - 32 are reserved for GPS 33 - 64 is reserved for SBAS 65 - 99 is undefined</p> <p>For GLONASS: 1 - 99 33 - 64 is reserved for SBAS 65 - 99 is reserved for GLONASS</p> <p>For Galileo: 1 - 99 1 - 36 is reserved for Galileo 37 - 64 is reserved for Galileo SBAS 65 - 99 is undefined</p> <p>For BDS (BeiDou): 1 - 99 1-64 is reserved for BDS 65 - 99 is undefined</p> <p>For QZSS: 1-99 1-10 is reserved for QZSS Satellites* 55-63 is reserved for QZSS SBAS* 64-99 is undefined</p> <p>*Satellite ID shall be 6 LSBs of the 8bit PRN Number (i.e. Satellite ID of PRN 193 is 1).</p> <p>For NavIC (IRNSS): 1 - 99 1-15 are reserved for NavIC (IRNSS) 16-32 Undefined 33 - 64 is reserved for SBAS 65-99 is undefined</p>	
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
See GNSS System ID "n" field 18 to determine what GNSS the satellite ID belongs to.			
13	Elevation "n"	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD054	Elevation	Angle above or below the horizon. -90° to +90°; negative below the horizon	
DF04	Angle, signed	int16	Range: +/-Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg
Variable Number of fields, Field number 6 repeated			
14	Azimuth "n"	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD127	Generic Direction -True	Degrees clockwise relative to True North.	
DF02	Angle	uint16	Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
Variable Number of fields, Field number 7 repeated			
15	SNR "n"	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD057	SNR Value	SNR expressed in C/No	
DF31	dB, relative measure	int16	Range: +/- 327.64 dB Resolution: 1x10E-2 dB
Variable Number of fields, Field number 8 repeated			

## GNSS Sats in View

PGN: 129540

hex: 1FA04

## 16 Range Residuals "n"

Byte Field Size: 4

Request Parameter Optional

Bit Field Size:

Command Parameter: Optional

DD073 Range Residuals

Range Residual value in meters

DF79 Distance signed fine

int32

Range: +/-~2.147x10E+4 m Resolution: 1x10E-5 m

Variable number of fields, Filed Number 9 repeated

## 17 PRN Status "n"

Byte Field Size:

Request Parameter Optional

Bit Field Size: 4

Command Parameter: Optional

DD124 PRN Usage Status

0 = Not Tracked,  
1 = Tracked but not used in solution,  
2 = Used in solution without Differential corrections,  
3 = Differential Corrections available,  
4 = Tracked with Differential Corrections,  
5 = used with Differential Corrections,  
6-13 =Reserved,  
14 = Error,  
15 = No Selection

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Variable Number of fields, Field number 10 repeated

## 18 GNSS System ID "n"

Byte Field Size:

Request Parameter

Bit Field Size: 4

Command Parameter:

DD503 GNSS System ID

0x1=GPS;  
0x2=GLONASS;  
0x3 = Galileo  
0x4 = BDS (BeiDou)  
0x5 = QZSS  
0x6 = NavIC (IRNSS)  
0x7 to 0xD=Reserved;  
0XE=Error;  
0XF=Null

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

# GPS Almanac Data

PGN: 129541

hex: 1FA05

This PGN provides a single transmission that contains relevant almanac data for GPS products. The almanac contains satellite vehicle course orbital parameters. This information is not considered precise and is only valid for several months at a time. GPS products receive almanac data directly from the satellites.

This information would either be transmitted to and from GPS products for update, or system interrogation.

This information would generally be transmitted upon request, during calibration or installation, but not at regular intervals.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None  
Field # Field Name Original Reference ID # 24

1	PRN	Byte Field Size: 1	Request Parameter: Optional
	DD074 Satellite ID Number	Bit Field Size: 1	Command Parameter: Optional
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
2	GPS Week number	Byte Field Size: 2	Request Parameter: Optional
	DD082 GPS Week Number	Bit Field Size: 2	Command Parameter: Optional
	DF54 Integer, 16 bit unsigned	uint16	Range: 0 to 65,532 Resolution: 1 bit Unit-less number
3	SV Health Bits	Byte Field Size: 8	Request Parameter: Optional
	DD083 SV Health Bits	Bit Field Size: 8	Command Parameter: Optional
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
4	Eccentricity	Byte Field Size: 16	Request Parameter: Optional
	DD084 Eccentricity, e	Bit Field Size: 16	Command Parameter: Optional
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
5	Almanac Reference Time	Byte Field Size: 8	Request Parameter: Optional
	DD085 Almanac Reference Time, toa	Bit Field Size: 8	Command Parameter: Optional
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields



## GPS Almanac Data

PGN: 129541

hex: 1FA05

6	<b>Inclination Angle</b>	Byte Field Size: Bit Field Size: 16	Request Parameter Command Parameter:	Optional Optional
	DD086 Almanac parameter, (sigma)I	Inclination angle. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
7	<b>Rate of Right Ascension</b>	Byte Field Size: Bit Field Size: 16	Request Parameter Command Parameter:	Optional Optional
	DD087 Almanac parameter, OMEGADOT	Rate of right ascension, OMEGADOT. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
8	<b>Root of Semi-major Axis</b>	Byte Field Size: Bit Field Size: 24	Request Parameter Command Parameter:	Optional Optional
	DD088 Almanac parameter, (A)1/2	Root of semi-major axis. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
9	<b>Argument of Perigee</b>	Byte Field Size: Bit Field Size: 24	Request Parameter Command Parameter:	Optional Optional
	DD089 Almanac parameter, (omega)	Argument of Perigee. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
10	<b>Longitude of Ascension Node</b>	Byte Field Size: Bit Field Size: 24	Request Parameter Command Parameter:	Optional Optional
	DD090 Almanac parameter, (omega)0	Longitude of ascension node. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
11	<b>Mean Anomaly</b>	Byte Field Size: Bit Field Size: 24	Request Parameter Command Parameter:	Optional Optional
	DD091 Almanac parameter, M0	Mean anomaly. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
12	<b>Clock Parameter 1</b>	Byte Field Size: Bit Field Size: 11	Request Parameter Command Parameter:	Optional Optional
	DD092 Almanac parameter, af0	Clock Parameter 1. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
13	<b>Clock Parameter 2</b>	Byte Field Size: Bit Field Size: 11	Request Parameter Command Parameter:	Optional Optional
	DD093 Almanac parameter, af1	Clock Parameter 2. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	

GPS Almanac Data					PGN: 129541	
					hex: 1FA05	
14	NMEA Reserved	Byte Field Size:		Request Parameter		
		Bit Field Size:	<div>resv</div> <div>2</div>	Command Parameter:		
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"				
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
					Used to construct bit fields	
Used to align subsequent data on a byte boundary.						

13	Clock Parameter 2		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	11	Command Parameter:	Optional
	DD093	Almanac parameter, afl	Clock Parameter 2. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
14	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 2	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.						

# GNSS Pseudorange Noise Statistics

PGN: 129542

hex: 1FA06

GNSS pseudorange measurement noise statistics can be translated in the position domain in order to give statistical measures of the quality of the position solution. Intended for use with a Receiver Autonomous Integrity Monitoring (RAIM) application.

Single Frame: No Priority Default: 6 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

Field # Field Name

Original Reference ID # 26

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
	DD056 Sequence ID	Bit Field Size:	Command Parameter: Optional
	An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 252 for valid position fixes.		
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
2	RMS of Position Uncertainty	Byte Field Size: 2	Request Parameter: Optional
	DD075 Error Distances	Bit Field Size:	Command Parameter: Optional
	Error distances expressed in meters.		
	DF13 Distance, short	uint16	Range: 0 to 655.32 m Resolution: 1x10E-2 m
3	STD of Major axis	Byte Field Size: 2	Request Parameter: Optional
	DD075 Error Distances	Bit Field Size:	Command Parameter: Optional
	Error distances expressed in meters.		
	DF13 Distance, short	uint16	Range: 0 to 655.32 m Resolution: 1x10E-2 m
4	STD of Minor axis	Byte Field Size: 2	Request Parameter: Optional
	DD075 Error Distances	Bit Field Size:	Command Parameter: Optional
	Error distances expressed in meters.		
	DF13 Distance, short	uint16	Range: 0 to 655.32 m Resolution: 1x10E-2 m
5	Orientation of Major axis	Byte Field Size: 2	Request Parameter: Optional
	DD127 Generic Direction -True	Bit Field Size:	Command Parameter: Optional
	Degrees clockwise relative to True North.		
	DF02 Angle	uint16	Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
6	STD of Lat Error	Byte Field Size: 2	Request Parameter: Optional
	DD075 Error Distances	Bit Field Size:	Command Parameter: Optional
	Error distances expressed in meters.		
	DF13 Distance, short	uint16	Range: 0 to 655.32 m Resolution: 1x10E-2 m
7	STD of Lon Error	Byte Field Size: 2	Request Parameter: Optional
	DD075 Error Distances	Bit Field Size:	Command Parameter: Optional
	Error distances expressed in meters.		
	DF13 Distance, short	uint16	Range: 0 to 655.32 m Resolution: 1x10E-2 m

GNSS Pseudorange Noise Statistics

PGN: 129542  
hex: 1FA06

8

STD of Alt Error

Byte Field Size: 2  
Bit Field Size:

Request Parameter  
Command Parameter:

Optional  
Optional

DD075

Error Distances

Error distances expressed in meters.

DF13

Distance, short

uint16

Range: 0 to 655.32 m

Resolution: 1x10E-2 m

# GNSS RAIM Output

PGN: 129545

hex: 1FA09

This PGN is used to provide the output from a GNSS Receiver's Receiver Autonomous Integrity Monitoring (RAIM) process. The Integrity field value is based upon the parameters set in PGN 130059 GNS RAIM Settings.

Single Frame:	No	Priority Default:	6	Default Update Rate:	milliseconds	Frequency:	NA	cycles per second
Destination:	Global	Query Support:	Optional	Command Support:	Optional	ACK Rqmnts:	None	
Field #	Field Name	Original Reference ID # 84						
1	Sequence ID	Byte Field Size:	1	Request Parameter:	Optional	Command Parameter:	Optional	
	DD056 Sequence ID	Bit Field Size:		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 252 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit	Unit-less number	
2	Integrity Flag	Byte Field Size:		Request Parameter:	Optional	Command Parameter:	Optional	
	DD209 GNSS Integrity	Bit Field Size:	2	0 = No Integrity checking,* 1 = Safe, 2 = Caution, 3 = Unsafe * means the receiver does not have this capability				
	DF52 Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields	
3	NMEA Reserved	Byte Field Size:		Request Parameter:		Command Parameter:		
	DD001 Reserved field	Bit Field Size:	resv 6	Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields	
Used to align subsequent data on a byte boundary.								
4	Latitude expected error	Byte Field Size:	2	Request Parameter:	Optional	Command Parameter:	Optional	
	DD220 Measure	Bit Field Size:						
	DF14 Distance, short, signed	int16	Range:	+/-327.64 m	Resolution:	1x10E-2 m		
5	Longitude expected error	Byte Field Size:	2	Request Parameter:	Optional	Command Parameter:	Optional	
	DD220 Measure	Bit Field Size:						
	DF14 Distance, short, signed	int16	Range:	+/-327.64 m	Resolution:	1x10E-2 m		
6	Altitude expected error	Byte Field Size:	2	Request Parameter:	Optional	Command Parameter:	Optional	
	DD220 Measure	Bit Field Size:						
	DF14 Distance, short, signed	int16	Range:	+/-327.64 m	Resolution:	1x10E-2 m		

7	SV ID of most likely failed sat			Byte Field Size: 1		Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD074	Satellite ID Number		0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.			
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number	
8	Probability of missed detection			Byte Field Size: 2		Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD220	Measure					
	DF14	Distance, short, signed	int16	Range: +/-327.64 m	Resolution: 1x10E-2 m		
9	Estimate of pseudorange bias			Byte Field Size: 2		Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD220	Measure					
	DF14	Distance, short, signed	int16	Range: +/-327.64 m	Resolution: 1x10E-2 m		
10	Std Deviation of bias			Byte Field Size: 2		Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD220	Measure					
	DF14	Distance, short, signed	int16	Range: +/-327.64 m	Resolution: 1x10E-2 m		

## GNSS RAIM Output

PGN: 129545  
hex: 1FA09

7	SV ID of most likely failed sat	Byte Field Size: 1	Request Parameter: Optional
	DD074 Satellite ID Number	Bit Field Size:	Command Parameter: Optional
	<p>For GPS: 1 - 99 1 - 32 are reserved for GPS 33 - 64 is reserved for SBAS 65 - 99 is undefined</p> <p>For GLONASS: 1 - 99 33 - 64 is reserved for SBAS 65 - 99 is reserved for GLONASS</p> <p>For Galileo: 1 - 99 1 - 36 is reserved for Galileo 37 - 64 is reserved for Galileo SBAS 65 - 99 is undefined</p> <p>For BDS (BeiDou): 1 - 99 1-64 is reserved for BDS 65 - 99 is undefined</p> <p>For QZSS: 1-99 1-10 is reserved for QZSS Satellites* 55-63 is reserved for QZSS SBAS* 64-99 is undefined</p> <p>*Satellite ID shall be 6 LSBs of the 8bit PRN Number (i.e. Satellite ID of PRN 193 is 1).</p> <p>For NavIC (IRNSS): 1 - 99 1-15 are reserved for NavIC (IRNSS) 16-32 Undefined 33 - 64 is reserved for SBAS 65-99 is undefined</p>		
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
	See GNSS System ID "1" field number TBD (either a new field at end of PGN or in place of reserved bits in field 3) to determine what GNSS the satellite ID belongs to.		
8	Probability of missed detection	Byte Field Size: 2	Request Parameter: Optional
	DD220 Measure	Bit Field Size:	Command Parameter: Optional
	DF14 Distance, short, signed	int16	Range: +/-327.64 m Resolution: 1x10E-2 m
9	Estimate of pseudorange bias	Byte Field Size: 2	Request Parameter: Optional
	DD220 Measure	Bit Field Size:	Command Parameter: Optional
	DF14 Distance, short, signed	int16	Range: +/-327.64 m Resolution: 1x10E-2 m
10	Std Deviation of bias	Byte Field Size: 2	Request Parameter: Optional
	DD220 Measure	Bit Field Size:	Command Parameter: Optional
	DF14 Distance, short, signed	int16	Range: +/-327.64 m Resolution: 1x10E-2 m



# GNSS RAIM Settings

PGN: 129546

hex: 1FA0A

This PGN is used to report the control parameters for a GNSS Receiver Autonomous Integrity Monitoring (RAIM) process. The Command Group Function PGN 126208 provides the means to set these values over the network.

Single Frame: Yes Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
 Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None  
 Field # Field Name Original Reference ID # 85

1	Radial Position Error Maximum threshold	Byte Field Size: 2	Request Parameter: Optional
	DD075 Error Distances	Bit Field Size:	Command Parameter: Optional
	DF13 Distance, short	uint16	Range: 0 to 655.32 m Resolution: 1x10E-2 m
2	Probability of False Alarm	Byte Field Size: 1	Request Parameter: Optional
	DD138 Generic percent of range	Bit Field Size:	Command Parameter: Optional
	DF30 Percent, Relative measure	int8	Range: +/- 124% Resolution: 1%
3	Probability of Missed Detection	Byte Field Size: 1	Request Parameter: Optional
	DD138 Generic percent of range	Bit Field Size:	Command Parameter: Optional
	DF30 Percent, Relative measure	int8	Range: +/- 124% Resolution: 1%
4	Pseudorange Residual Filtering Time Constant	Byte Field Size: 2	Request Parameter: Optional
	DD210 Time Value, resolution 1 sec	Bit Field Size:	Command Parameter: Optional
	DF80 Time, 1sec	uint16	Range: 0 to 65532 seconds Resolution: 1 second
5	NMEA Reserved	Byte Field Size:	Request Parameter:
	DD001 Reserved field	Bit Field Size: resv 16	Command Parameter:
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
	Used to align subsequent data on a byte boundary.		

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## GNSS RAIM Settings

PGN: 129546  
hex: 1FA0A

4	<b>Pseudorange Residual Filtering Time Constant</b>		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
	<b>DD210</b>	Time Value, resolution 1 sec	Time in seconds			
	<b>DF80</b>	Time, 1sec	uint16	Range: 0 to 65532 seconds	Resolution: 1 second	
5	<b>NMEA Reserved</b>		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 16	Command Parameter:	
	<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"			
	<b>DF52</b>	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.					

# GNSS Pseudorange Error Statistics

PGN: 129547

hex: 1FA0B

This parameter group is used to support Receiver Autonomous Integrity Monitoring (RAIM). Pseudorange measurement error statistics can be translated in the position domain in order to give statistical measures of the quality of the position solution.

Single Frame:	No	Priority Default:	6	Default Update Rate:	milliseconds	Frequency:	NA	cycles per second
Destination:	Global	Query Support:	Optional	Command Support:	Optional	ACK Rqmnts:	None	
Field #	Field Name	Original Reference ID # 89						
1	Sequence ID	Byte Field Size: 1		Request Parameter		Optional		
		Bit Field Size:		Command Parameter:		Optional		
DD056	Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 252 for valid position fixes.					
DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit	Unit-less number	
2	RMS Std Dev of Range Inputs	Byte Field Size: 2		Request Parameter		Optional		
		Bit Field Size:		Command Parameter:		Optional		
DD219	Standard Deviation							
DF13	Distance, short	uint16	Range:	0 to 655.32 m	Resolution:	1x10E-2 m		
RMS value of the standard deviation of the range inputs to the navigation process. Range inputs include pseudoranges & DGNSS corrections.								
3	Std Dev major error ellipse	Byte Field Size: 2		Request Parameter		Optional		
		Bit Field Size:		Command Parameter:		Optional		
DD219	Standard Deviation							
DF13	Distance, short	uint16	Range:	0 to 655.32 m	Resolution:	1x10E-2 m		
Standard deviation of the semi-major axis of error ellipse (meters)								
4	Std Dev minor error ellipse	Byte Field Size: 2		Request Parameter		Optional		
		Bit Field Size:		Command Parameter:		Optional		
DD219	Standard Deviation							
DF13	Distance, short	uint16	Range:	0 to 655.32 m	Resolution:	1x10E-2 m		
Standard deviation of the semi-minor axis of error ellipse (meters).								
5	Orientation of error ellipse	Byte Field Size: 2		Request Parameter		Optional		
		Bit Field Size:		Command Parameter:		Optional		
DD127	Generic Direction -True		Degrees clockwise relative to True North.					
DF02	Angle	uint16	Range:	0 to 2Pi rad	Resolution:	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
Orientation of semi-major axis of error ellipse (from true north)								
6	Std Dev Latitude error	Byte Field Size: 2		Request Parameter		Optional		
		Bit Field Size:		Command Parameter:		Optional		
DD219	Standard Deviation							
DF13	Distance, short	uint16	Range:	0 to 655.32 m	Resolution:	1x10E-2 m		
Standard deviation of Latitude error (meters)								

# GNSS Pseudorange Error Statistics

PGN: 129547  
hex: 1FA0B

7	Std Dev Longitude error	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
	DD219 Standard Deviation			
	DF13 Distance, short	uint16	Range: 0 to 655.32 m	Resolution: 1x10E-2 m
	Standard deviation of Longitude error (meters)			
8	Std Dev Altitude error	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
	DD219 Standard Deviation			
	DF13 Distance, short	uint16	Range: 0 to 655.32 m	Resolution: 1x10E-2 m
	Standard deviation of altitude error (meters)			

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## DGNSS Corrections

PGN: 129549

hex: 1FA0D

This PGN provides a means to pass differential GNSS corrections between NMEA devices. Passing DGNSS data this way allows for more flexibility than traditional methods. One differential correction receiver could supply multiple GNSS receivers. Multiple differential correction receivers or data streams could be connected to a GNSS receiver allowing for network DGNSS approaches. This PGN can accommodate DGPS and DGLONASS corrections. Future systems can be indicated by allocation of the reserved states in field 3. These corrections can be related to the position solution and to time through proper application of the sequence ID field.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second

Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

Field # Field Name Original Reference ID # 86

1 Sequence ID Byte Field Size: 1 Request Parameter: Optional  
Bit Field Size: Command Parameter: Optional

DD056 Sequence ID An upward counting number used to tie related information together between different PGNs. For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 252 for valid position fixes.

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

2 Reference Station ID Byte Field Size: Request Parameter: Optional  
Bit Field Size: 12 Command Parameter: Optional

DD071 Ref Station Reference Station ID. Reference Station number as provided by the Service Provider.[Reference document required]

DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields

3 Reference Station Type Byte Field Size: Request Parameter: Optional  
Bit Field Size: 4 Command Parameter: Optional

DD070 Ref Station Type Reference Station Type.  
0x0=GPS;  
0x1=GLONASS;  
0x2 to 0xD=Reserved;  
0xE=Error;  
0xF=Null

DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields

4 Time of corrections Byte Field Size: 2 Request Parameter: Optional  
Bit Field Size: Command Parameter: Optional

DD211 Time Value, resolution 0.1 sec Time in seconds

DF81 Time, 0.1sec uint16 Range: 0 to 6553.2 seconds Resolution: 1x10E-1 sec

5 Station Health Byte Field Size: Request Parameter: Optional  
Bit Field Size: 4 Command Parameter: Optional

DD212 Station Health 0x00 = Not Working,  
0x01 = Unmonitored,  
0x02 = Healthy & Operational,  
0x03 = Healthy & in Test Mode,  
0x04 = In Test Mode - DO NOT USE,  
0x05 - 0x15 = Reserved

DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields

# DGNSS Corrections

PGN: 129549

hex: 1FA0D

6	NMEA Reserved			Byte Field Size:		Request Parameter	
				Bit Field Size:	resv 4	Command Parameter:	
	DD001	Reserved field					Variable number of reserved bits, all set to logic "1"
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields
							Used to align subsequent data on a byte boundary.
7	Satellite ID			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD074	Satellite ID Number					0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit Unit-less number
8	PRC			Byte Field Size:	4	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD213	Distance, int 32 4dp					
	DF83	Distance, signed 4dp	int32	Range:	+/-~2.147x10E+5 m	Resolution:	1x10E-4 m
9	RRC			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD214	Generic Speed					
	DF82	Speed, signed 4dpt	int16	Range:	+/-3.2764 m/s	Resolution:	1x10E-4 m/s
10	UDRE			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD195	Distance, short					Dependent upon PG Field definition.
	DF13	Distance, short	uint16	Range:	0 to 655.32 m	Resolution:	1x10E-2 m
							value 655.32 (all 1's) indicates satellite invalid do not use or stop using immediately.
11	IOD			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD005	Generic numeric ID, short					Number of route, waypoint, event, mark, etc.
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit Unit-less number

## DGNSS Corrections

PGN: 129549

hex: 1FA0D

7	Satellite ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD074	Satellite ID Number	<p>For GPS: 1 - 99 1 - 32 are reserved for GPS 33 - 64 is reserved for SBAS 65 - 99 is undefined</p> <p>For GLONASS: 1 - 99 33 - 64 is reserved for SBAS 65 - 99 is reserved for GLONASS</p> <p>For Galileo: 1 - 99 1 - 36 is reserved for Galileo 37 - 64 is reserved for Galileo SBAS 65 - 99 is undefined</p> <p>For BDS (BeiDou): 1 - 99 1-64 is reserved for BDS 65 - 99 is undefined</p> <p>For QZSS: 1-99 1-10 is reserved for QZSS Satellites* 55-63 is reserved for QZSS SBAS* 64-99 is undefined</p> <p>*Satellite ID shall be 6 LSBs of the 8bit PRN Number (i.e. Satellite ID of PRN 193 is 1).</p> <p>For NavIC (IRNSS): 1 - 99 1-15 are reserved for NavIC (IRNSS) 16-32 Undefined 33 - 64 is reserved for SBAS 65-99 is undefined</p>	
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
	See GNSS System ID field 6 to determine what GNSS the satellite ID belongs to.		
8	PRC	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD213	Distance, int 32 4dp		
DF83	Distance, signed 4dp	int32	Range: +/-2.147x10E+5 m Resolution: 1x10E-4 m
9	RRC	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD214	Generic Speed		
DF82	Speed, signed 4dpt	int16	Range: +/-3.2764 m/s Resolution: 1x10E-4 m/s
10	UDRE	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD195	Distance, short	Dependent upon PG Field definition.	
DF13	Distance, short	uint16	Range: 0 to 655.32 m Resolution: 1x10E-2 m
	value 655.32 (all 1's) indicates satellite invalid do not use or stop using immediately.		

11	IOD		Byte Field Size: 1	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Optional
	DD005	Generic numeric ID, short			
					Number of route, waypoint, event, mark, etc.
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit
					Unit-less number



## GNSS Differential Correction Receiver Interface

PGN: 129550

hex: 1FA0E

GNSS common differential correction receiver parameter status.

Single Frame: **Yes** Priority Default: **6** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
 Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

Field # Field Name Original Reference ID # 27

1	Channel	Byte Field Size: 1	Request Parameter: Optional
	DD076 Receiver channel number	Bit Field Size:	Command Parameter: Optional
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
2	Frequency	Byte Field Size: 4	Request Parameter: Optional
	DD077 Differential Correction Receiver frequency	Bit Field Size:	Command Parameter: Optional
	DF21 Frequency	uint32 Range: 0 to ~4.295x10E+10 Hz	Resolution: 10 Hz
3	Serial Interface Bit Rate	Byte Field Size:	Request Parameter: Optional
	DD078 Differential Correction Broadcast Bit Rate	Bit Field Size: 5	Command Parameter: Optional
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields
4	Serial Interface Detection Mode	Byte Field Size:	Request Parameter: Optional
	DD079 Mode, Bit Rate	Bit Field Size: 3	Command Parameter: Optional
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields

# GNSS Differential Correction Receiver Interface

PGN: 129550

hex: 1FA0E

5	Differential Source	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
DD125	Differential Source	0 = Auto Select, 1 = Loran Communications 2 = MSK Beacon, 3 = FM Subcarrier, 4 = AIS (Automatic Identification System), 5 = Other Ground-based Radio, 6 = SBAS (Satellite Based Augmentation System), 7 = Other Satellite, 8-13 = Reserved, 14 = Error, 15 = No Selection		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
6	Differential Operation Mode	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
DD126	Differential Operating Mode	0 = Manual, 1 = Auto Power, 2 = Auto Range, 3-13 = Reserved, 14 = Error, 15 = No Selection		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
7	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 8	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
Used to align subsequent data on a byte boundary.				

6	Differential Operation Mode		Byte Field Size:		Request Parameter	Optional	
			Bit Field Size:	4	Command Parameter:	Optional	
DD126	Differential Operating Mode			0 = Manual, 1 = Auto Power, 2 = Auto Range, 3-13 = Reserved, 14 = Error, 15 = No Selection			
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields

7	NMEA Reserved		Byte Field Size:		Request Parameter		
			Bit Field Size:	resv 8	Command Parameter:		
DD001	Reserved field			Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields

Used to align subsequent data on a byte boundary.

# GNSS Differential Correction Receiver Signal

PGN: 129551

hex: 1FA0F

GNSS differential correction receiver status tagged by sequence ID. Status information includes frequency, SNR, and use as a correction source.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

Field # Field Name Original Reference ID # 28

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
	DD056 Sequence ID	Bit Field Size:	Command Parameter: Optional
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
2	Channel	Byte Field Size: 1	Request Parameter: Optional
	DD076 Receiver channel number	Bit Field Size:	Command Parameter: Optional
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
3	Signal Strength	Byte Field Size: 4	Request Parameter: Optional
	DD080 Correction Receiver Signal Strength	Bit Field Size:	Command Parameter: Optional
	DF16 Electric field	int32	Range: +/-327.64 dB re: uV/m Resolution: 1x10E-2 dB re: uV/m
4	Signal SNR	Byte Field Size: 2	Request Parameter: Optional
	DD081 SNR Value	Bit Field Size:	Command Parameter: Optional
	DF31 dB, relative measure	int16	Range: +/- 327.64 dB Resolution: 1x10E-2 dB
5	Frequency	Byte Field Size: 4	Request Parameter: Optional
	DD077 Differential Correction Receiver frequency	Bit Field Size:	Command Parameter: Optional
	DF21 Frequency	uint32	Range: 0 to ~4.295x10E+10 Hz Resolution: 10 Hz
6	Station Type	Byte Field Size:	Request Parameter: Optional
	DD070 Ref Station Type	Bit Field Size: 4	Command Parameter: Optional
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields

# GNSS Differential Correction Receiver Signal

PGN: 129551

hex: 1FA0F

7	Station ID	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 12	Command Parameter:	Optional
	DD071 Ref Station	Reference Station ID. Reference Station number as provided by the Service Provider.[Reference document required]		
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
8	Differential Signal Bit Rate	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 5	Command Parameter:	Optional
	DD078 Differential Correction Broadcast Bit Rate	This is the bit rate of the correction receiver. 0 = 25bps, 1 = 50bps, 2 = 100bps, 3 = 200bps, 4 = 300bps, 5 = 500bps, 6 = 1200bps, 7 = 2400bps, 8 = 4800bps, 9 = 9600bps, 10 = 19200bps, 11 = 38400bps, 12 = 57600bps, 13-29 = Reserved, 30 = Error, 31 = Null		
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
9	Differential Signal Detection Mode	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 3	Command Parameter:	Optional
	DD079 Mode, Bit Rate	This is the mode of operation for the correction receiver. 0 = Auto bit rate set, 1 = Manual bit rate set, 2-5 = Reserved 6 = Error, 7 = Null.		
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
10	Used as Correction Source	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
	DD002 Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
11	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 2	Command Parameter:	
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"		
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
Used to align subsequent data on a byte boundary.				

# GNSS Differential Correction Receiver Signal

PGN: 129551  
hex: 1FA0F

12	Differential Source			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	4	Command Parameter:	Optional
	DD125	Differential Source					
					0 = Auto Select, 1 = Loran Communications 2 = MSK Beacon, 3 = FM Subcarrier, 4 = AIS (Automatic Identification System), 5 = Other Ground-based Radio, 6 = SBAS (Satellite Based Augmentation System), 7 = Other Satellite, 8-13 = Reserved, 14 = Error, 15 = No Selection		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields
13	Time Since Last Sat Differential Sync			Byte Field Size:	2	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD060	Differential Age					
					Age of Differential corrections		
	DF66	Time interval, .01sec	uint16	Range:	0 to 655.32s	Resolution:	1x10E-2sec
14	Satellite Service ID No.			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	16	Command Parameter:	Optional
	DD143	Satellite Service ID					
					Satellite Service ID number as provided by the Service Provider.[Reference document required]		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
							Used to construct bit fields

## GNSS Differential Correction Receiver Signal

PGN: 129551

hex: 1FA0F

12	Differential Source		Byte Field Size: 4		Request Parameter: Optional	
	DD125 Differential Source		0 = Auto Select, 1 = Loran Communications 2 = MSK Beacon, 3 = FM Subcarrier, 4 = AIS (Automatic Identification System), 5 = Other Ground-based Radio, 6 = SBAS (Satellite Based Augmentation System), 7 = Other Satellite, 8 = Satellite 9 = NTRP 10 -13 = Reserved, 14 = Error, 15 = No Selection			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
13	Time Since Last Sat Differential Sync		Byte Field Size: 2		Request Parameter: Optional	
			Bit Field Size:		Command Parameter: Optional	
	DD060 Differential Age		Age of Differential corrections			
	DF66	Time interval, .01sec	uint16	Range: 0 to 655.32s	Resolution: 1x10E-2sec	
14	Satellite Service ID No.		Byte Field Size:		Request Parameter: Optional	
			Bit Field Size: 16		Command Parameter: Optional	
	DD143 Satellite Service ID		Satellite Service ID number as provided by the Service Provider.[Reference document required]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

# GLONASS Almanac Data

PGN: 129556

hex: 1FA14

This PGN provides a single transmission that contains relevant almanac data for Glonass products. The almanac contains satellite vehicle course orbital parameters. This information is not considered precise and is only valid for several months at a time. Glonass products receive almanac data directly from the satellites.

This information would either be transmitted to and from Glonass products for update, or system interrogation.

This information would generally be transmitted upon request, during calibration or installation, but not at regular intervals.

Single Frame: **No** Priority Default: **6** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**  
Field # Field Name Original Reference ID # 30

1	PRN	Byte Field Size: 1	Request Parameter: Optional
	DD074 Satellite ID Number	Bit Field Size: 0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.	Command Parameter: Optional
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
2	NA	Byte Field Size: 2	Request Parameter: Optional
	DD094 Almanac parameter, NA	Bit Field Size: Calendar day count within the four year period beginning with the previous leap year	Command Parameter: Optional
	DF54 Integer, 16 bit unsigned	uint16 Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
3	NMEA Reserved	Byte Field Size: resv 2	Request Parameter: Command Parameter:
	DD001 Reserved field	Bit Field Size: Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.		
4	CnA	Byte Field Size: 1	Request Parameter: Optional
	DD095 Almanac parameter, CnA	Bit Field Size: Generalized health of the Satellite, reference GLONASS ICD.	Command Parameter: Optional
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
5	HnA	Byte Field Size: 5	Request Parameter: Optional
	DD096 Almanac parameter, HnA	Bit Field Size: Carrier frequency number respectively, reference GLONASS ICD.	Command Parameter: Optional
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields



# GLONASS Almanac Data

PGN: 129556

hex: 1FA14

6	(epsilon)nA	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 16	Command Parameter:	Optional
DD097	Almanac parameter, (epsilon)nA	Eccentricity, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
7	(deltaTnA)DOT	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 8	Command Parameter:	Optional
DD098	Almanac parameter, (deltaTnA)DOT	Rate of change of the draconitic circling time, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
8	(omega)nA	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 16	Command Parameter:	Optional
DD099	Almanac parameter, (omega)nA	Argument of Perigee, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
9	(delta)TnA	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 24	Command Parameter:	Optional
DD100	Almanac parameter, (delta)TnA	Correction to the average value of the draconitic circling time, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
10	tnA	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 24	Command Parameter:	Optional
DD101	Almanac parameter, tnA	Time of the ascension node, almanac reference time, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
11	(lambda)nA	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 24	Command Parameter:	Optional
DD102	Almanac parameter, (lambda)nA	Greenwich longitude of the ascension node, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
12	(delta)inA	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 24	Command Parameter:	Optional
DD103	Almanac parameter, (delta)inA	Correction to the average value of the inclination angle, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
13	tcA	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 28	Command Parameter:	Optional
DD104	Almanac parameter, (tau)cA	System time scale correction, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields

14	tnA	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 12	Command Parameter:	Optional
DD105	Almanac parameter, (tau)nA	Course value of the time scale shift, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
		Used to construct bit fields		

13	tcA	Byte Field Size:		Request Parameter		Optional	
		Bit Field Size:		Command Parameter:		Optional	
DD104	Almanac parameter, (tau)cA	System time scale correction, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).					
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
14	tnA	Byte Field Size:		Request Parameter		Optional	
		Bit Field Size:		Command Parameter:		Optional	
DD105	Almanac parameter, (tau)nA	Course value of the time scale shift, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).					
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields

# AIS DGNSS Broadcast Binary Message

PGN: 129792

hex: 1FB00

This parameter group provides data associated with the ITU-R M.1371 Message 17 GNSS Broadcast Binary Message containing DGNSS corrections from a base station. An AIS device may generate this parameter group either upon receiving a VHF data link message 17, or upon receipt of an ISO or NMEA request PGN (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

## Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 6	Command Parameter:	Required	
	DD188 AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	17 = GNSS Broadcast Binary Message				
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Note 1	
	DD185 AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	Source ID	Byte Field Size: 4	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Required	
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
	MMSI number of base station reporting DGNSS information.				
4	NMEA Reserved	Byte Field Size:	Request Parameter		
		Bit Field Size: resv 1	Command Parameter:		
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.				

# AIS DGNSS Broadcast Binary Message

**PGN: 129792**  
**hex: 1FB00**

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: **5**

Request Parameter

Optional

Command Parameter:

Note 2

**DD246** AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

**DF52** Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 AIS Spare

Byte Field Size:

Bit Field Size: **resv 2**

Request Parameter

Optional

Command Parameter:

Required

**DD311** AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

**DF115** Bit field defaulting to zero

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## 7 Longitude

Byte Field Size:

**4**

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

**DD023** Longitude, WGS-84

Longitude referenced to WGS-84.

**DF25** Longitude

int32

Range: +/- 180 deg

Resolution: 1x10E-7 deg

"-" = West, resolution ~1.1 cm

Longitude of base station reporting DGNSS information.

# AIS DGNSS Broadcast Binary Message

PGN: 129792  
hex: 1FB00

8	Latitude	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD022	Latitude, WGS-84	Latitude referenced to WGS-84.	
DF23	Latitude	int32 Range: +/- 90 deg Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
	Latitude of base station reporting DGNSS information.		
9	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 3	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.		
10	AIS Spare	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: resv 5	Command Parameter: Required
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.	
DF115	Bit field defaulting to zero	bit0(n) Range: N2KUnitless Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
11	Number of Bits in Binary Data Field	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	Indicates the number of binary data bits that are contained within the Binary Data field.		
12	Binary Data	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Required
DD142	Binary Bit Field	Binary data bit field.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	See ITU-R M.1371		

## AIS UTC and Date Report

**PGN: 129793**  
**hex: 1FB01**

This parameter group provides data associated with the ITU-R M.1371 AIS Message 4 Base Station Report and AIS Message 11 UTC/Date Response.

An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 4 or Message 11, upon receipt of an ISO or NMEA request PGN, in response to an accepted NMEA Command Group Function, or upon a device's own transmission of a Message 4 or 11.

The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address. When no linkage exists, the value of the SID shall be set to 255.

Scheduling the transmission of an AIS Message 4 Base Station Report by an AIS Base Station is done with PGN (To be developed).

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

### Revisions:

June 2017 – New description, renamed fields 9 – Position Time to UTC Time and field 12 – Position Date to UTC Date, and redefined 1 of 10 AIS Spare bits into Field 16 – “Transmission Control for Long Range Broadcast Message” with new DD named “AIS Long Range Broadcast Control”.

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Required	
		Bit Field Size: 6	Command Parameter:	Optional	
	DD188 AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	4 = Base Station Report				
	11 = UTC and Date Response				
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Optional	
	DD185 AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default			
		1 = First retransmission			
		2 = Second retransmission			
		3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	User ID	Byte Field Size: 4	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Optional	
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
	MMSI number of station reporting its UTC and date.				

# AIS UTC and Date Report

PGN: 129793  
hex: 1FB01

4	Longitude		Byte Field Size: 4	Request Parameter: Optional	
			Bit Field Size:	Command Parameter: Optional	
DD023	Longitude, WGS-84		Longitude referenced to WGS-84.		
DF25	Longitude	int32	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
Longitude of station reporting its UTC and date.					
5	Latitude		Byte Field Size: 4	Request Parameter: Optional	
			Bit Field Size:	Command Parameter: Optional	
DD022	Latitude, WGS-84		Latitude referenced to WGS-84.		
DF23	Latitude	int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
Latitude of station reporting its UTC and date.					
6	Position accuracy		Byte Field Size:	Request Parameter: Optional	
			Bit Field Size: 1	Command Parameter: Optional	
DD184	AIS Position Accuracy		0 = low accuracy > 10m such as nondifferential GNSS (default), 1 = high accuracy < 10m such as DGNSS		
See the latest version of ITU-R M.1371 for more information.					
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
7	RAIM-flag		Byte Field Size:	Request Parameter: Optional	
			Bit Field Size: 1	Command Parameter: Optional	
DD189	AIS RAIM-flag		0 = RAIM not in use (default), 1 = RAIM in use		
See the latest version of ITU-R M.1371 for more information.					
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
8	NMEA Reserved		Byte Field Size:	Request Parameter: Optional	
			Bit Field Size: resv 6	Command Parameter: Optional	
DD001	Reserved field		Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.					
9	UTC Time		Byte Field Size: 4	Request Parameter: Optional	
			Bit Field Size:	Command Parameter: Optional	
DD158	Generic time of day		24 hour clock, 0 = midnight, time is in UTC		
DF06	Time of day	uint32	Range: 0 to 86,401 s	Resolution: 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day



## AIS UTC and Date Report

PGN: 129793

hex: 1FB01

10	Communication State	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 19	Command Parameter:	Optional
DD187	AIS Communication State	The Communication State contains information used by the various TDMA slot allocation algorithms and synchronization information		
		See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
				Used to construct bit fields
11	AIS Transceiver Information	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 5	Command Parameter:	Optional
DD246	AIS Transceiver Information	0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5 = Channels A & B VDL transmission 6 = Channel C (VHF Channel 75) reception, 7 = Channel D (VHF Channel 76) reception, 8 = Channel C (VHF Channel 75) transmission, 9 = Channel D (VHF Channel 76) transmission, 10 - 30 = Reserved 31 = AIS device determines channel for Transmission		
		The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.		
		The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.		
		The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.		
		The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
				Used to construct bit fields
12	UTC Date	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD039	Generic date	Days since January 1, 1970, Date is relative to UTC Time.		
DF41	Date, day count	uint16	Range: 0 to 65,532 days	Resolution: 1 day
				0 = January 1, 1970, max = ~179 years
13	NMEA Reserved	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: resv 4	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
				Used to align subsequent data on byte boundary.

## NMEA 2000 Appendix B.1 - Parameter Groups Report

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## AIS UTC and Date Report

PGN: 129793

hex: 1FB01

14	Type of Electronic Positioning Device		Byte Field Size:		Request Parameter		Optional
			Bit Field Size: 4		Command Parameter:		Optional
DD191	AIS Electronic Positioning Device Type		0 = Undefined (default) 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Integrated Navigation System 7 = Surveyed; For fixed AtoN and virtual AtoN, the charted position should be used. The accurate position enhances its function as a radar reference target 8 = Galileo 9-14 = Reserved for future use 15 = Internal GNSS See the latest version of ITU-R M.1371 for more information.				
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
15	AIS Spare		Byte Field Size:		Request Parameter		
			Bit Field Size: resv 9		Command Parameter:		
DD311	AIS Spare Field		Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.				
DF115	Bit field defaulting to zer	bit0(n)	Range:	N2KUnitless	Resolution:	1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Netowrk Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							
16	Transmission Control for Long Range Broadcast Message		Byte Field Size:		Request Parameter		Optional
			Bit Field Size: 1		Command Parameter:		Optional
DD443	AIS Long Range Broadcast Control		0 = default – Class-A AIS station stops transmission of Message 27 within an AIS base station coverage area.  1 = Request Class-A station to transmit Message 27 within an AIS base station coverage area.  Base station coverage area should be defined by Message 23; If Message 23 is not received, the AIS station which is allowed to transmit on CH75 and 76 (see ITU-R M.1371-5 3.2, Annex 4) should ignore this bit and transmit Message 27.				
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
17	NMEA Reserved		Byte Field Size:		Request Parameter		
			Bit Field Size: resv 6		Command Parameter:		
DD001	Reserved field		Variable number of reserved bits, all set to logic "1"				
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
Used to align subsequent data on byte boundary.							

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

18	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD056	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number

This parameter group provides data associated with the ITU-R M.1371 AIS Message 5 Ship Static and Voyage Related Data Message.

An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 5, upon receipt of an ISO or NMEA request PGN, in response to an accepted NMEA Command Group Function, or upon a device's own transmission of a Message 5.

The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address. When no linkage exists, the value of the SID shall be set to 255.

#### Request Support Requirement:

Reception of an ISO Request (PGN 059904) for this PGN shall respond by providing as many of these PGNs as necessary. The minimum response is at least one PGN providing the AIS device's own information. Additional response PGN(s) may be provided containing information from AIS Message 5(s) received over the VHF Data Link.

Reception of a Request Group Function (PGN 126208) with no request parameters shall result in the same response as the ISO Request. All providers of this PGN shall accept and process requests based upon the requested value of Field #3, User ID. This provides a means to request information about a single User ID, including your own.

If the User ID requested is not considered a valid User ID by the receiving device, then the appropriate response depends on how the request was transmitted:

A global request would result in no response.

An addressed request would result in the Acknowledge Group PGN (126208), containing the error state for the requested User ID field of "0x3 = Request or command parameter out-of-range."

#### General Command Support:

Command Support is required differently for each of two types of AIS Stations. AIS Base Stations require Command Support on all Fields for rebroadcast as indicated in the Command Parameters within the PGN below. AIS Class A Stations require Command Support for voyage related data configuration on five fields as listed below in this description.

#### Command Support Requirement for Rebroadcasting of Messages 5 by an AIS Base Station:

Only AIS Base Stations shall accept the Command Group Function PGN 126208 with this PGN for Message 5. All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

The AIS Station commanded to rebroadcast an AIS Message 5 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

Note 2: The AIS Transceiver Information Command Parameter is "Required". When commanding this PGN to cause the transmission of Message 5 from an AIS Base Station, the only values that can be commanded are: 2, 3, 5, or 31.

All data fields (except for NMEA Reserved field(s), and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

#### Command Support Requirement for Configuring Voyage Related Data of an AIS Class A Station:

Only AIS Class A Stations shall accept the Command Group Function PGN 126208 with this PGN to configure Voyage related data settings for Message 5. All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

The following PGN fields may be command: 12 – "Estimated Date of Arrival", 13 – "Estimated Time of Arrival", 14 – "Draft", and 15 – "Destination". In addition, field 20 – "AIS Transceiver Information" must be set to a value of 4 when performing a configuration command of any of the above four fields.

# AIS Class A Static and Voyage Related Data

PGN: 129794  
hex: 1FB02

Note 2: Upon receiving this Command Group Function 126208, the AIS Station shall respond with this PGN reporting its current settings with field 20 – “AIS Transceiver Information” containing a value of 4.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

June 2017 – New description, new notes in field 20, and new command support requirements.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Required ACK Rqmnts: None

## Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 6	Command Parameter:	Required	
	DD188 AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	5 = Ship Static and Voyage Related Data Message.				
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Note 1	
	DD185 AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	User ID	Byte Field Size:	Request Parameter	Required	
		Bit Field Size:	Command Parameter:	Required	
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
	MMSI number of mobile station reporting its static and voyage related data.				
4	IMO	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Required	
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
	IMO number of mobile station reporting its static and voyage related data.				

# AIS Class A Static and Voyage Related Data

PGN: 129794

hex: 1FB02

5	Call Sign	Byte Field Size: char	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD192	Generic String, ASCII, Fixed length	Length specified by PGN field definition.	
DF63	String, fixed	char8(n) Range: 0 to 1,785 characters	Resolution: 1 char
This is a 7 character string, see ITU-R M.1371-1 for more information.		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.	
6	Name	Byte Field Size: char	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD192	Generic String, ASCII, Fixed length	Length specified by PGN field definition.	
DF63	String, fixed	char8(n) Range: 0 to 1,785 characters	Resolution: 1 char
This is a 20 character string, see ITU-R M.1371-1 for more information.		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.	
7	Ship/Cargo Type	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 8	Command Parameter: Required
DD193	Ship/Cargo Type	0=Not Available or no ship (default), 1-99= See the latest version of ITU-R M.1371, 100-199=Reserved for Regional (See the latest version of ITU-R M.1371), 200-255=Reserved for future (See the latest version of ITU-R M.1371).	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1
		Used to construct bit fields	
8	Ship Length	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD194	Distance, medium	Dependent upon PG Field definition.	
DF75	Distance, Medium	uint16 Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
Length of mobile station reporting its static and voyage related data. A value of 65535 indicates that data is not available.			
9	Ship Beam	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD194	Distance, medium	Dependent upon PG Field definition.	
DF75	Distance, Medium	uint16 Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
Beam of mobile station reporting its static and voyage related data. A value of 65535 indicates that data is not available.			
10	Position Reference Point from Starboard	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD194	Distance, medium	Dependent upon PG Field definition.	
DF75	Distance, Medium	uint16 Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
Position reference point from starboard side of mobile station reporting its static and voyage related data. A value of 65535 indicates that data is not available.			

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

# AIS Class A Static and Voyage Related Data

PGN: 129794  
hex: 1FB02

11	Position Reference Point aft of Ship's Bow	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD194 Distance, medium	Dependent upon PG Field definition.	
	DF75 Distance, Medium	uint16 Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
	Position reference point from aft of ship's bow of mobile station reporting its static and voyage related data. A value of 65535 indicates that data is not available.		
12	Estimated Date of Arrival	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD039 Generic date	Days since January 1, 1970, Date is relative to UTC Time.	
	DF41 Date, day count	uint16 Range: 0 to 65,532 days	Resolution: 1 day
	EDA of mobile station reporting its static and voyage related data.		
		0 = January 1, 1970, max = ~179 years	
13	Estimated Time of Arrival	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD158 Generic time of day	24 hour clock, 0 = midnight, time is in UTC	
	DF06 Time of day	uint32 Range: 0 to 86,401 s	Resolution: 1x10E-4 s
	ETA of mobile station reporting its static and voyage related data.		
		~24 hours, 0 = midnight, range allows for up to two leap seconds per day	
14	Draft	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD196 Draft	The depth of a ship in the water. The vertical distance between the waterline and the keel.	
	DF13 Distance, short	uint16 Range: 0 to 655.32 m	Resolution: 1x10E-2 m
15	Destination	Byte Field Size: char Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD192 Generic String, ASCII, Fixed length	Length specified by PGN field definition.	
	DF63 String, fixed	char8(n) Range: 0 to 1,785 characters	Resolution: 1 char
	This is a 20 character string, see ITU-R M.1371-1 for more information.		
		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.	
16	AIS Version	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD304 AIS Version Indicator	0 = Station compliant with AIS edition 0 1-3 = Station compliant with AIS editions 1, 2, and 3	
		See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1
		Used to construct bit fields	

# AIS Class A Static and Voyage Related Data

PGN: 129794  
hex: 1FB02

17	Type of Electronic Positioning Device	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Required
DD191	AIS Electronic Positioning Device Type	0 = Undefined (default) 1 = GPS 2 = GLONASS 3 = Combined GPS/GLONASS 4 = Loran-C 5 = Chayka 6 = Integrated Navigation System 7 = Surveyed; For fixed AtoN and virtual AtoN, the charted position should be used. The accurate position enhances its function as a radar reference target 8 = Galileo 9-14 = Reserved for future use 15 = Internal GNSS See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
			Used to construct bit fields	
18	Data Terminal Equipment (DTE)	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 1	Command Parameter:	Required
DD242	Data Terminal Equipment (DTE)	0=Available, 1=not available.  See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
			Used to construct bit fields	
19	AIS Spare	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: resv 1	Command Parameter:	Required
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
DF115	Bit field defaulting to zer	bit0(n)	Range: N2KUnitless	Resolution: 1
This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use		



# AIS Class A Static and Voyage Related Data

PGN: 129794

hex: 1FB02

## 20 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Note 2

### DD246 AIS Transceiver Information

- 0 = Channel A VDL reception,
- 1 = Channel B VDL reception,
- 2 = Channel A VDL transmission,
- 3 = Channel B VDL transmission,
- 4 = Own information not broadcast,
- 5 = Channels A & B VDL transmission
- 6 = Channel C (VHF Channel 75) reception,
- 7 = Channel D (VHF Channel 76) reception,
- 8 = Channel C (VHF Channel 75) transmission,
- 9 = Channel D (VHF Channel 76) transmission,
- 10 - 30 = Reserved
- 31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 21 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 3

Request Parameter

Command Parameter:

### DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on byte boundary.

## 22 Sequence ID

Byte Field Size: 1

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

### DD056 Sequence ID

An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.

0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)

253 - 254 = reserved for future use

255 = No binding provided. NMEA recommends using binding SID values whenever practical.

DF53 Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

AIS Addressed Binary Message

PGN: 129795  
hex: 1FB03

This parameter group provides data associated with the ITU-R M.1371 AIS Message 6 Addressed Binary Message supporting addressed communication of binary data.

An AIS device may generate this parameter group either upon receiving a VHF data link Message 6, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 6.

Command Support Requirement:

The Command Group Function PGN 126208 shall be used with this PGN to initiate a transmission of this AIS Message.

Only AIS Class A, Class B-SO, Base Station, Aton Station, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN for Message 6. All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

Command Support Requirement for Transmission of Message 6 by all allowed AIS Stations as listed above:

The AIS Station commanded to transmit a Message 6 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

To verify that the remote addressed AIS Station has received this transmission of a Message 6, a Message 7 with the same AIS sequence number as used in the Message 6 and within a time span of 30 seconds or less, should be received in the AIS Acknowledge PGN 129816.

All data fields (except for NMEA Reserved field(s), Sequence ID, Repeat Indicator, and Source ID) must be commanded when using the Command Group Function (PGN 126208) for Transmission of Message 6.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Command Support Requirement for Rebroadcasting of Message 6 by an AIS Base Station:

The AIS Base Station commanded to rebroadcast a Message 6 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s), and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required" only for rebroadcasting an Message 6 from an AIS Base Station. The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

June 2017 – New description, new notes in field 5, and new command support requirements.

Single Frame: No

Priority Default: 5

Default Update Rate:

milliseconds

Frequency: NA

cycles per second

Destination: Global

Query Support: Optional

Command Support: Required

ACK Rqmnts: None

Field #Field Name

# AIS Addressed Binary Message

PGN: 129795

hex: 1FB03

1	Message ID		Byte Field Size:		Request Parameter		Optional Required	
			Bit Field Size: 6		Command Parameter:			
	DD188	AIS Message Identifier	Message Identifier (range of 0 to 63).					
	See the latest version of ITU-R M.1371 for more information.							
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields		
6 = Addressed Binary Message.								
2	Repeat Indicator		Byte Field Size:		Request Parameter		Optional Note 1	
			Bit Field Size: 2		Command Parameter:			
	DD185	AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).					
	0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission							
	See the latest version of ITU-R M.1371 for more information.							
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields		
3	Source ID		Byte Field Size: 4		Request Parameter		Optional Required	
			Bit Field Size:		Command Parameter:			
	DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.					
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number		
MMSI number of source station.								
4	NMEA Reserved		Byte Field Size:		Request Parameter			
			Bit Field Size: resv 1		Command Parameter:			
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"					
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields		
Used to align subsequent data on byte boundary.								

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Note 2

## DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
 1 = Channel B VDL reception,  
 2 = Channel A VDL transmission,  
 3 = Channel B VDL transmission,  
 4 = Own information not broadcast,  
 5 = Channels A & B VDL transmission  
 6 = Channel C (VHF Channel 75) reception,  
 7 = Channel D (VHF Channel 76) reception,  
 8 = Channel C (VHF Channel 75) transmission,  
 9 = Channel D (VHF Channel 76) transmission,  
 10 - 30 = Reserved  
 31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 Sequence Number

Byte Field Size:

Bit Field Size: 2

Request Parameter

Optional

Command Parameter:

Required

## DD243 AIS Sequence Number

Range 0-3

See the latest version of ITU-R M.1371 for more information.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 7 Destination ID

Byte Field Size:

4

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

## DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI Number of destination station.

## 8 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 6

Request Parameter

Command Parameter:

## DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on byte boundary.

# AIS Addressed Binary Message

**PGN: 129795**  
**hex: 1FB03**

<b>9</b>	<b>Retransmit Flag</b>		<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>	1	<i>Command Parameter:</i>	Required
	<b>DD244</b>	AIS Retransmit Flag		0=No retransmission, 1=retransmitted.		
				See the latest version of ITU-R M.1371 for more information.		
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
<b>10</b>	<b>AIS Spare</b>		<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>	resv 1	<i>Command Parameter:</i>	Required
	<b>DD311</b>	AIS Spare Field		Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
	<b>DF115</b>	Bit field defaulting to zero	<b>bit0(n)</b>	<i>Range:</i> N2KUnitless	<i>Resolution:</i> 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
		This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.				
<b>11</b>	<b>Number of Bits in Binary Data Field</b>		<i>Byte Field Size:</i>	2	<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD007</b>	Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.		
	<b>DF54</b>	Integer, 16 bit unsigned	<b>uint16</b>	<i>Range:</i> 0 to 65,532	<i>Resolution:</i> 1 bit	Unit-less number
		Indicates the number of binary data bits that are contained within the Binary Data field.				
<b>12</b>	<b>Binary Data</b>		<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>	n	<i>Command Parameter:</i>	Required
	<b>DD142</b>	Binary Bit Field		Binary data bit field.		
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
		Application specific data.				

## AIS Acknowledge - DEPRECATED

PGN: 129796

hex: 1FB04

This PGN has been deprecated (as of NMEA PGN Message Database version 2.100) and is not recommended for new designs. However, support of the deprecated PGN 129796 is strongly recommended to ensure compatibility with legacy equipment.

The PGN description at the time of deprecation was as follows: This parameter group provides data associated with the ITU-R M.1371 Messages 7 Binary Acknowledge Message and 13 Safety Related Acknowledge Message.

Message 7 acknowledges receipt of message 6 while message 13 acknowledges receipt of message 14.

An AIS device may generate this parameter group either upon receiving a VHF data link message 7 or 13, or upon receipt of an ISO or NMEA request PGN (see ITU-R M.1371-1 for additional information).

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Required	
		Bit Field Size: 6	Command Parameter:	Optional	
DD188	AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
7 = Binary Acknowledge Message, 13 = Safety Related Acknowledge Message.					
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Optional	
DD185	AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	Source ID	Byte Field Size: 4	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Optional	
DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
MMSI number of source station for this acknowledge.					
4	NMEA Reserved	Byte Field Size:	Request Parameter		
		Bit Field Size: resv 1	Command Parameter:		
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.					

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

# AIS Acknowledge - DEPRECATED

PGN: 129796

hex: 1FB04

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Optional

### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 AIS Spare

Byte Field Size:

Bit Field Size: resv 2

Request Parameter

Command Parameter:

### DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zer

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## 7 Destination ID"1"

Byte Field Size: 4

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

### DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI number of first destination for this acknowledge.



# AIS Acknowledge - DEPRECATED

PGN: 129796  
hex: 1FB04

8	NMEA Reserved		Byte Field Size:	resv 6	Request Parameter	
			Bit Field Size:		Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.					
9	Sequence Number for ID"1"		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Optional
	DD243	AIS Sequence Number	Range 0-3			
	See the latest version of ITU-R M.1371 for more information.					
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Sequence number of message to be acknowledged, range 0-3.					
10	Destination ID"n"		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
	Variable Number of fields, Field number 7 repeated.					
11	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 6	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Variable Number of fields, Field number 8 repeated.					
12	Sequence Number for ID"n"		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Optional
	DD243	AIS Sequence Number	Range 0-3			
	See the latest version of ITU-R M.1371 for more information.					
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Variable Number of fields, Field number 9 repeated.					
13	Sequence ID		Byte Field Size:	1	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD056	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.			
	0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)					
	253 - 254 = reserved for future use					
	255 = No binding provided. NMEA recommends using binding SID values whenever practical.					
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number



## AIS Binary Broadcast Message

**PGN: 129797**

**hex: 1FB05**

This parameter group provides data associated with the ITU-R M.1371 AIS Message 8 Binary Broadcast Message supporting broadcast communication of binary data. An AIS device may generate this parameter group either upon VHF Data Link reception of a Message 8, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 8.

### Command Support Requirement:

The Command Group Function PGN 126208 shall be used with this PGN to initiate a transmission of this AIS Message. Only AIS Class A, Class B-SO, Base Station, Aton Station, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN for Message 8. All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

### Command Support Requirement for Transmission of Message 8 by all allowed AIS Stations as listed above:

The AIS Station commanded to transmit an AIS Message transmission shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s), Sequence ID, Repeat Indicator, and Source ID) must be commanded when using the Command Group Function (PGN 126208) for Transmission of Message 8.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

### Command Support Requirement for Rebroadcasting of Message 8 by an AIS Base Station:

The AIS Station commanded to rebroadcast a Message 8 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s), and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required" only for rebroadcasting an Message 8 from an AIS Base Station. The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

June 2017 – New description, new notes in field 5, and new command support requirements.

Single Frame: No    Priority Default: 5    Default Update Rate: milliseconds    Frequency: NA cycles per second  
Destination: Global    Query Support: Optional    Command Support: Required    ACK Rqmnts: None

Field #    Field Name

# AIS Binary Broadcast Message

**PGN: 129797**  
**hex: 1FB05**

<b>1</b>	<b>Message ID</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	6	<i>Command Parameter:</i>	Required
	<b>DD188</b>	AIS Message Identifier					
							Message Identifier (range of 0 to 63).
							See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
		8 = Binary Broadcast Message.					Used to construct bit fields
<b>2</b>	<b>Repeat Indicator</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	2	<i>Command Parameter:</i>	Note: 1
	<b>DD185</b>	AIS Repeater Indicator					
							Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).
							0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission
							See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
							Used to construct bit fields
<b>3</b>	<b>Source ID</b>			<i>Byte Field Size:</i>	4	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD010</b>	Generic numeric ID, large					Number of route, waypoint, event, mark, etc.
	<b>DF55</b>	Integer, 32 bit unsigned	uint32	<i>Range:</i>	0 to 4,294,967,292	<i>Resolution:</i>	1 bit
		MMSI number of source station.					Unit-less number
<b>4</b>	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i>	resv 1	<i>Command Parameter:</i>	
	<b>DD001</b>	Reserved field					Variable number of reserved bits, all set to logic "1"
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
		Used to align subsequent data on byte boundary.					Used to construct bit fields

# AIS Binary Broadcast Message

**PGN: 129797**  
**hex: 1FB05**

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: **5**

Request Parameter

Optional

Command Parameter:

Note 2

### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 AIS Spare

Byte Field Size:

Bit Field Size: **resv 2**

Request Parameter

Optional

Command Parameter:

Required

### DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zero

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## 7 Number of Bits in Binary Data Field

Byte Field Size:

**2**

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

### DD007 Generic numeric ID, medium

Number of route, waypoint, event, mark, etc.

DF54 Integer, 16 bit unsigned

uint16

Range: 0 to 65,532

Resolution: 1 bit

Unit-less number

Indicates the number of binary data bits that are contained within the Binary Data field.

8	Binary Data	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: <div>n</div>	Command Parameter:	Required
	DD142 Binary Bit Field	Binary data bit field.		
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1
	Used to construct bit fields			
	Application specific data.			

## AIS SAR Aircraft Position Report

PGN: 129798

hex: 1FB06

This parameter group provides data associated with the ITU-R M.1371 AIS Message 9 SAR Aircraft Position Report Message for Airborne AIS units conducting Search and Rescue operations.

An AIS device may generate this parameter group either upon VHF data link receptions of a Message 9, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 9.

Command Support Requirement for Rebroadcasting of Messages 9 by an AIS Base Station:

Only AIS Base Stations shall accept the Command Group Function PGN 126208 with this PGN for Message 9. All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

The AIS Station commanded to rebroadcast an Message 9 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s), Communication State, and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

### Revisions:

June 2017 – New description, new notes in field 12, renamed field 14 and reallocated unused bits to AIS Spare bits in field 15, reallocated AIS Spare bits in field 17 to create fields 18 and 19 per ITU-R M.1371-5, renumbered the last two fields, and new command support requirements.

Single Frame: No Priority Default: 4 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional Required	
		Bit Field Size: 6	Command Parameter:		
	DD188	AIS Message Identifier	Message Identifier (range of 0 to 63).		
			See the latest version of ITU-R M.1371 for more information.		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
9 = SAR Aircraft Position Report Message					

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

# AIS SAR Aircraft Position Report

PGN: 129798  
hex: 1FB06

2	Repeat Indicator		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Note 1
	DD185	AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
			0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
			See the latest version of ITU-R M.1371 for more information.			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	User ID		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
	DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
		MMSI number of SAR aircraft reporting position.				
4	Longitude		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
	DD023	Longitude, WGS-84	Longitude referenced to WGS-84.			
	DF25	Longitude	int32	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
		Longitude of SAR aircraft reporting position.				
5	Latitude		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
	DD022	Latitude, WGS-84	Latitude referenced to WGS-84.			
	DF23	Latitude	int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
		Latitude of SAR aircraft reporting position.				
6	Position Accuracy		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Required
	DD184	AIS Position Accuracy	0 = low accuracy > 10m such as nondifferential GNSS (default), 1 = high accuracy < 10m such as DGNSS			
			See the latest version of ITU-R M.1371 for more information.			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
7	RAIM-Flag		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Required
	DD189	AIS RAIM-flag	0 = RAIM not in use (default), 1 = RAIM in use			
			See the latest version of ITU-R M.1371 for more information.			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

**PGN: 129798**  
**hex: 1FB06**

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## 12 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Note 2

## DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
 1 = Channel B VDL reception,  
 2 = Channel A VDL transmission,  
 3 = Channel B VDL transmission,  
 4 = Own information not broadcast,  
 5 = Channels A & B VDL transmission  
 6 = Channel C (VHF Channel 75) reception,  
 7 = Channel D (VHF Channel 76) reception,  
 8 = Channel C (VHF Channel 75) transmission,  
 9 = Channel D (VHF Channel 76) transmission,  
 10 - 30 = Reserved  
 31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 13 Altitude

Byte Field Size: 4

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

## DD115 Distance

DF15 Distance, signed

int32

Range: +/-2.147x10E+7 m

Resolution: 1x10E-2 m

Altitude of SAR aircraft reporting position.

## 14 Altitude Sensor

Byte Field Size:

Bit Field Size: 1

Request Parameter

Optional

Command Parameter:

Required

## DD439 Altitude Sensor

0 = GNSS

1 = barometric source

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields



# AIS SAR Aircraft Position Report

PGN: 129798  
hex: 1FB06

15	AIS Spare	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: resv 7	Command Parameter:	Required
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
DF115	Bit field defaulting to zer	bit0(n) Range: N2KUnitless	Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
16	Data Terminal Equipment (DTE)	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 1	Command Parameter:	Required
DD242	Data Terminal Equipment (DTE)	0=Available, 1=not available.		
		See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n) Range: Variable	Resolution: 1	Used to construct bit fields
17	AIS Spare	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: resv 3	Command Parameter:	Required
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
DF115	Bit field defaulting to zer	bit0(n) Range: N2KUnitless	Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.			
18	Assigned mode Flag	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 1	Command Parameter:	Required
DD440	Assigned mode Flag	0 = Station operating in autonomous and continuous mode = default 1 = Station operating in assigned mode		
DF52	Bit field	bit(n) Range: Variable	Resolution: 1	Used to construct bit fields
19	Communication state selector flag	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 1	Command Parameter:	Required
DD441	Communication state selector Flag	0 = SOTDMA communication state follows 1 = ITDMA communication state follows		
DF52	Bit field	bit(n) Range: Variable	Resolution: 1	Used to construct bit fields

# AIS SAR Aircraft Position Report

PGN: 129798  
hex: 1FB06

20	NMEA Reserved			Byte Field Size:		Request Parameter	
				Bit Field Size:	resv 2	Command Parameter:	
	DD001	Reserved field					Variable number of reserved bits, all set to logic "1"
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields
							Used to align subsequent data on byte boundary.
21	Sequence ID			Byte Field Size:	1	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD056	Sequence ID					An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.
							0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)
							253 - 254 = reserved for future use
							255 = No binding provided. NMEA recommends using binding SID values whenever practical.
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit Unit-less number

# Radio Frequency/Mode/Power

PGN: 129799

hex: 1FB07

This PGN provides status and control for a Radiotelephone, connected to a NMEA network. The Radiotelephone will transmit and receive status along with remote control and repeater products.

This information will either need to be transmitted on change, by request or on a low duty cycle.

Single Frame: No Priority Default: 3 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Rx Frequency	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD016	Radio Tx or Rx Frequency		
DF21	Frequency	uint32 Range: 0 to ~4.295x10E+10 Hz Resolution: 10 Hz	
2	Tx Frequency	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD016	Radio Tx or Rx Frequency		
DF21	Frequency	uint32 Range: 0 to ~4.295x10E+10 Hz Resolution: 10 Hz	
3	Radio Channel	Byte Field Size: char 6 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD017	Radio Tx or Rx Channel	MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have the first digit 9 followed by zero. The next number is "1" indicating the ship station's transmit frequency is being used as a simplex channel frequency, or "2" indicating the coast station's transmit frequency is being used as a simplex channel frequency, "0" otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.	
DF63	String, fixed	char8(n) Range: 0 to 1,785 characters Resolution: 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.
It is not necessary to supply both RX/TX frequency and channel but if both are present, frequency takes priority in case of mismatch.			
4	Tx Power	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD018	Radio Tx Power		
DF28	Power	uint16 Range: 0 to 65,532 W Resolution: 1 W	
If equipment has insufficient resolution to apply a commanded power, the next lower available power setting should be used.			

## Radio Frequency/Mode/Power

PGN: 129799

hex: 1FB07

## 5 Mode

Byte Field Size:

Bit Field Size: 8

Request Parameter

Optional

Command Parameter:

Optional

DD019 Mode, Radiotelephone

Radiotelephone mode settings:

0 = F3E/G3E simplex, telephone;

1 = F3E/G3E duplex, telephone;

2 = J3E, telephone;

3 = H3E, telephone;

4 = F1B/J2B FEC NBDP, telex/teleprinter;

5 = F1B/J2B ARQ NBDP, telex/teleprinter;

6 = F1B/J2B receive only, teleprinter/DSC;

7 = F1B/J2B, teleprinter/DSC;

8 = A1A Morse, tape recorder;

9 = A1A Morse, Morse key/head set;

10 = F1C/F2C/F3C, FAX-machine;

11-253 = reserved;

254 = error;

255 = unavailable/do not change

DF52 Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

## 6 Channel Bandwidth

Byte Field Size:

Bit Field Size: 2

Request Parameter

Optional

Command Parameter:

Optional

DD020 Radio Channel Bandwidth

DF26 Frequency, mid

uint16

Range:

0 to 65,532 Hz

Resolution: 1 Hz

If equipment has insufficient resolution to apply a commanded bandwidth, the closest available setting should be used.

## AIS UTC/Date Inquiry

PGN: 129800

hex: 1FB08

This parameter group provides data associated with the ITU-R M.1371 Message 10 UTC and Date Inquiry Message used to request current UTC and date. An AIS device may generate this parameter group either upon receiving a VHF data link message 10, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure parameters such as the Destination ID (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Message ID		Byte Field Size:	6	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
	DD188	AIS Message Identifier			Message Identifier (range of 0 to 63).	
					See the latest version of ITU-R M.1371 for more information.	
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
		10 = AIS UTC and Date Inquiry Message				
2	Repeat Indicator		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Note 1
	DD185	AIS Repeater Indicator			Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).	
					0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission	
					See the latest version of ITU-R M.1371 for more information.	
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	Source ID		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
	DD010	Generic numeric ID, large			Number of route, waypoint, event, mark, etc.	
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
		MMSI number of station which inquires UTC.				
4	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 1	Command Parameter:	
	DD001	Reserved field			Variable number of reserved bits, all set to logic "1"	
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
		Used to align subsequent data on byte boundary.				

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Note 2

## DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
 1 = Channel B VDL reception,  
 2 = Channel A VDL transmission,  
 3 = Channel B VDL transmission,  
 4 = Own information not broadcast,  
 5 = Channels A & B VDL transmission  
 6 = Channel C (VHF Channel 75) reception,  
 7 = Channel D (VHF Channel 76) reception,  
 8 = Channel C (VHF Channel 75) transmission,  
 9 = Channel D (VHF Channel 76) transmission,  
 10 - 30 = Reserved  
 31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 AIS Spare

Byte Field Size:

Bit Field Size: resv 2

Request Parameter

Command Parameter: Required

## DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zero

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## 7 Destination ID

Byte Field Size: 4

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

## DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI number of station which is inquired.

## 8 AIS Spare

Byte Field Size:

Bit Field Size: **resv** 2

Request Parameter

Command Parameter: **Required**

## DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zero

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## 9 NMEA Reserved

Byte Field Size:

Bit Field Size: **resv** 6

Request Parameter

Command Parameter:

## DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to align subsequent data on byte boundary.

Used to construct bit fields

## 10 Sequence ID

Byte Field Size:

1

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Optional

## DD056 Sequence ID

An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.

0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)

253 - 254 = reserved for future use

255 = No binding provided. NMEA recommends using binding SID values whenever practical.

DF53 Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

## AIS Addressed Safety Related Message

**PGN: 129801**  
**hex: 1FB09**

This parameter group provides data associated with the ITU-R M.1371 AIS Message 12 Addressed Safety Related Message supporting addressed communication of safety related data.

An AIS device may generate this parameter group either upon VHF Data Link receptions of a Message 12, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 12.

### Command Support Requirement:

The Command Group Function PGN 126208 shall be used with this PGN to initiate a transmission of Message 12. Only AIS Class A, Base Station, Aton Stations, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN for Message 12. All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

### Command Support Requirement for Transmission of Message 12 by all allowed AIS Stations as listed above:

The AIS Station commanded to transmit a Message 12 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

To verify that the remote addressed AIS Station has received this transmission of Message 12, a Message 13 with the same AIS sequence number as used in the Message 12 and within a time span of 30 seconds or less, should be received in the AIS Acknowledge PGN 129816.

All data fields (except for NMEA Reserved field(s), Sequence ID, Repeat Indicator, and Source ID) must be commanded when using the Command Group Function (PGN 126208) for Transmission of Message 12.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

### Command Support Requirement for Rebroadcasting of Message 12 by an AIS Base Station:

The AIS Station commanded to rebroadcast a Message 12 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel. All data fields (except for NMEA Reserved field(s) and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required" only for rebroadcasting a Message 12 from an AIS Base Station. The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

### Revisions:

June 2017 – New description, new notes in field 5, and new command support requirements.

Single Frame: No Priority Default: 5 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

Field # Field Name



# AIS Addressed Safety Related Message

**PGN: 129801**  
**hex: 1FB09**

<b>1</b>	<b>Message ID</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	6	<i>Command Parameter:</i>	Required
	<b>DD188</b>	AIS Message Identifier					
							Message Identifier (range of 0 to 63).
							See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i>	Variable	<i>Resolution:</i>	1
		12 = Addressed Safety Related Message					Used to construct bit fields
<b>2</b>	<b>Repeat Indicator</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	2	<i>Command Parameter:</i>	Note 1
	<b>DD185</b>	AIS Repeater Indicator					
							Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).
							0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission
							See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i>	Variable	<i>Resolution:</i>	1
							Used to construct bit fields
<b>3</b>	<b>Source ID</b>			<i>Byte Field Size:</i>	4	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD010</b>	Generic numeric ID, large					Number of route, waypoint, event, mark, etc.
	<b>DF55</b>	Integer, 32 bit unsigned	<b>uint32</b>	<i>Range:</i>	0 to 4,294,967,292	<i>Resolution:</i>	1 bit
		MMSI number of station which is the source of the message.					Unit-less number
<b>4</b>	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i>	resv 1	<i>Command Parameter:</i>	
	<b>DD001</b>	Reserved field					Variable number of reserved bits, all set to logic "1"
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i>	Variable	<i>Resolution:</i>	1
		Used to align subsequent data on byte boundary.					Used to construct bit fields

# AIS Addressed Safety Related Message

**PGN: 129801**  
**hex: 1FB09**

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: **5**

Request Parameter

Optional

Command Parameter:

Note 2

**DD246** AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

**DF52** Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 Sequence Number

Byte Field Size:

Bit Field Size: **2**

Request Parameter

Optional

Command Parameter:

Required

**DD243** AIS Sequence Number

Range 0-3

See the latest version of ITU-R M.1371 for more information.

**DF52** Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 7 Destination ID

Byte Field Size:

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

**DD010** Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

**DF55** Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI number of station which is the destination of this message.

## 8 NMEA Reserved

Byte Field Size:

Bit Field Size: **resv 6**

Request Parameter

Command Parameter:

**DD001** Reserved field

Variable number of reserved bits, all set to logic "1"

**DF52** Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on byte boundary.

# AIS Addressed Safety Related Message

PGN: 129801  
hex: 1FB09

9	Retransmit Flag	Byte Field Size:	<div>1</div>	Request Parameter:	Optional
		Bit Field Size:	<div>1</div>	Command Parameter:	Required
DD244	AIS Retransmit Flag	0=No retransmission, 1=retransmitted.			
See the latest version of ITU-R M.1371 for more information.					
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

10	AIS Spare	Byte Field Size:		Request Parameter:	Optional
		Bit Field Size:	<div>resv 1</div>	Command Parameter:	Required
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.			
DF115	Bit field defaulting to zero	bit0(n)	Range: N2KUnitless	Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.					

11	Safety Related Text	Byte Field Size:	<div>8 or 16 n</div>	Request Parameter:	Optional
		Bit Field Size:		Command Parameter:	Required
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.			
DF50	String, variable, short	ch8or16(n)	Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
Maximum size is 156 8-bit ASCII characters.					

12	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD056	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number

## AIS Safety Related Broadcast Message

**PGN: 129802**

**hex: 1FB0A**

This parameter group provides data associated with the ITU-R M.1371 AIS Message 14 Safety Related Broadcast Message supporting broadcast communication of safety related data.

An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 14, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 14.

Command Support Requirement:

The Command Group Function PGN 126208 shall be used with this PGN to initiate a transmission of this AIS Message. Only AIS Class A, Base Station, Aton Stations, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN for Message 14. All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

Command Support Requirement for Transmission of Message 14 by all allowed AIS Stations as listed above:

The AIS Station commanded to transmit a Message 14 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s), Sequence ID, Repeat Indicator, and Source ID) must be commanded when using the Command Group Function (PGN 126208) for Transmission of Message 14.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Command Support Requirement for Rebroadcasting of Message 14 by an AIS Base Station:

The AIS Station commanded to rebroadcast a Message 14 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s) and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required" only for rebroadcasting a Message 14 from an AIS Base Station. The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Command Support Requirement for Relay of "Man Over Board" information by an AIS Class A Station:

This Command Support is required for AIS Class A Stations and is an additional requirement beyond the minimum requirements of IEC 61993-2.

This supports external shipboard Man Over Board systems with the capability to utilize the own ship AIS Class A Station to relay an appropriate Message 14 indicating Man Over Board, for both Active and Test conditions. The MOB relays should be commanded no more than once per minute while the MOB is active.

Performing the MOB relay requires an additional Message 14 with each MOB AIS Message 1. Both messages shall be used under active and test conditions.

See the AIS Class A Position Report (PGN 129038). All data fields (except for NMEA Reserved field(s), Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for Message 14.

The following fields shall be commanded:  
Message ID shall be set to a value of 14

## AIS Safety Related Broadcast Message

PGN: 129802

hex: 1FB0A

Note 1: The Repeat Indicator Command Parameter is "Required". Repeat Indicator shall be set to a value of 1

Source ID shall be set to a value of 97099xxxx, where xxxx has a range from 0000 to 9999 and is intended to identify individual MOB's being reported.

Safety Related Text shall be set as follows:

For the active MOB, the text should be "MOB ACTIVE".

For the MOB test mode, the text should be "MOB TEST".

Note 2: The AIS Transceiver Information Command Parameter is "Required". AIS Transceiver Information shall be set to a value of 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions: June 2017 – New description, new notes in field 5, and new command support requirements.

Single Frame: No Priority Default: 5 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 6	Command Parameter:	Required	
	DD188 AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	14 = Safety Related Broadcast Message.				
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Note 1	
	DD185 AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	Source ID	Byte Field Size: 4	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Required	
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
	MMSI number of station which is the source of the message.				

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

# AIS Safety Related Broadcast Message

**PGN: 129802**  
**hex: 1FB0A**

<b>4</b>	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i>	resv 1	<i>Command Parameter:</i>	
	<b>DD001</b>	Reserved field					Variable number of reserved bits, all set to logic "1"
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields
							Used to align subsequent data on byte boundary.
<b>5</b>	<b>AIS Transceiver Information</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	5	<i>Command Parameter:</i>	Note 2
	<b>DD246</b>	AIS Transceiver Information					<p>0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5 = Channels A &amp; B VDL transmission 6 = Channel C (VHF Channel 75) reception, 7 = Channel D (VHF Channel 76) reception, 8 = Channel C (VHF Channel 75) transmission, 9 = Channel D (VHF Channel 76) transmission, 10 - 30 = Reserved 31 = AIS device determines channel for Transmission</p> <p>The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.</p> <p>The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.</p> <p>The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.</p> <p>The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.</p>
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields
<b>6</b>	<b>AIS Spare</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	resv 2	<i>Command Parameter:</i>	Required
	<b>DD311</b>	AIS Spare Field					Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.
	<b>DF115</b>	Bit field defaulting to zer	bit0(n)	<i>Range:</i>	N2KUnitless	<i>Resolution:</i>	1 Special data format
		This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.					applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

# AIS Safety Related Broadcast Message

**PGN: 129802**  
**hex: 1FB0A**

## 7 Safety Related Text

Byte Field Size: 8 or 16 n  
Bit Field Size:

Request Parameter: Optional  
Command Parameter: Required

**DD004** Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

**DF50** String, variable, short

**ch8or16(n)** Range: 0 to 250 ASCII or 0 to 125 Unicode Characters

Resolution: 1 ASCII or 1 Unicode Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

Maximum size is 163 8-bit ASCII characters.

## 8 Sequence ID

Byte Field Size: 1  
Bit Field Size:

Request Parameter: Optional  
Command Parameter: Optional

**DD056** Sequence ID

An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.

0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)

253 - 254 = reserved for future use

255 = No binding provided. NMEA recommends using binding SID values whenever practical.

**DF53** Integer, 8 bit unsigned

**uint8** Range: 0 to 252

Resolution: 1 bit

Unit-less number



This parameter group provides data associated with the ITU-R M.1371 AIS Message 15 Interrogation Message used to request a specific ITU-R M.1371 message resulting in responses from one or more AIS mobile units.

An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 15, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 15.

Command Support Requirement:

The Command Group Function PGN 126208 shall be used with this PGN to initiate a transmission of this Message 15.

Only AIS Class A, Base Station, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN for Message 15. All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

Command Support Requirement for Transmission of Message 15 by AIS Class A and future SAR Airborne Stations:

The AIS Station commanded to transmit a Message 15 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

The following data fields are not commanded with the Command Group Function: NMEA Reserved field(s), Sequence ID, Repeat Indicator, Source ID, "Reply Slot 1.1, 1.2, 2.1" for Transmission of Message 15.

There are multiple interrogation fields. At a minimum, the first set (Destination ID 1 and Message ID 1.1) shall be commanded. The Remaining interrogation fields may also be commanded with the Command Group Function for transmission of Message 15.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

All the remaining fields not listed above must be commanded with the Command Group Function for Transmission of Message 15.

Command Support Requirement for Transmission of Message 15 by AIS Base Stations:

The AIS Station commanded to transmit a Message 15 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

The following data fields are not commanded with the Command Group Function: NMEA Reserved field(s), Sequence ID, Repeat Indicator, and Source ID for Transmission of Message 15.

There are multiple interrogation fields. At a minimum, the first set (Destination ID 1 and Message ID 1.1) shall be commanded. The Remaining interrogation fields may also be commanded with the Command Group Function for transmission of Message 15.

The following data fields are may be commanded with the Command Group Function: "Reply Slot 1.1", Message ID 1.2", "Reply Slot 1.2", "Destination ID 2", "Message ID 2.1", and "Reply Slot 2.1" for Transmission of Message 15.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note 3: The Reply Slot fields Command Parameter is "Required". When commanding this PGN to a Base Station, the values provided in the Reply Slot fields 10, 13, and 19, shall represent the actual Start Slot number for the responses. The Base Station will use the commanded Reply Slot number to compute the actual Slot Offset field contents used in the Message 15 transmission, based upon when the Base Station is able to schedule the transmission.

All the remaining fields not listed above must be commanded with the Command Group Function for Transmission of Message 15.

Command Support Requirement for Rebroadcasting of Message 15 by an AIS Base Station:

The AIS Base Station commanded to rebroadcast a Message 15 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s), Sequence ID, and Reply Slot 1.1, 1.2, 2.1) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required" only for rebroadcasting a Message 15 from an AIS Base Station. The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions:

June 2017 – New description, new notes in field 5, 10, 13, 19, renamed fields 10, 13, 19, and new command support requirements.

# AIS Interrogation

**PGN: 129803**  
**hex: 1FB0B**

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Required** ACK Rqmnts: **None**

## Field # Field Name

<b>1</b>	<b>Message ID</b>		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	<b>6</b>	Command Parameter:	Required
	<b>DD188</b> AIS Message Identifier					Message Identifier (range of 0 to 63).
						See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range:	Variable	Resolution:	1 Used to construct bit fields
	15 = Interrogation Message					
<b>2</b>	<b>Repeat Indicator</b>		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	<b>2</b>	Command Parameter:	Note 1
	<b>DD185</b> AIS Repeater Indicator					Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).
						0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission
						See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range:	Variable	Resolution:	1 Used to construct bit fields
<b>3</b>	<b>Source ID</b>		Byte Field Size:	<b>4</b>	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
	<b>DD010</b> Generic numeric ID, large					Number of route, waypoint, event, mark, etc.
	<b>DF55</b> Integer, 32 bit unsigned	<b>uint32</b>	Range:	0 to 4,294,967,292	Resolution:	1 bit Unit-less number
	MMSI number of interrogating station.					
<b>4</b>	<b>NMEA Reserved</b>		Byte Field Size:		Request Parameter	
			Bit Field Size:	<b>resv 1</b>	Command Parameter:	
	<b>DD001</b> Reserved field					Variable number of reserved bits, all set to logic "1"
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range:	Variable	Resolution:	1 Used to construct bit fields
	Used to align subsequent data on byte boundary.					

# AIS Interrogation

PGN: 129803

hex: 1FB0B

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Note 2

### DD246 AIS Transceiver Information

- 0 = Channel A VDL reception,
- 1 = Channel B VDL reception,
- 2 = Channel A VDL transmission,
- 3 = Channel B VDL transmission,
- 4 = Own information not broadcast,
- 5 = Channels A & B VDL transmission
- 6 = Channel C (VHF Channel 75) reception,
- 7 = Channel D (VHF Channel 76) reception,
- 8 = Channel C (VHF Channel 75) transmission,
- 9 = Channel D (VHF Channel 76) transmission,
- 10 - 30 = Reserved
- 31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 AIS Spare

Byte Field Size:

Bit Field Size: resv 2

Request Parameter

Optional

Command Parameter:

Required

### DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zero

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## 7 Destination ID 1

Byte Field Size: 4

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

### DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI number of first interrogated station.

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## AIS Interrogation

**PGN: 129803**  
**hex: 1FB0B**

8	NMEA Reserved			Byte Field Size:	resv 2	Request Parameter		
				Bit Field Size:		Command Parameter:		
	DD001	Reserved field				Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
	Used to align subsequent data on byte boundary.							
9	Message ID 1.1			Byte Field Size:		Request Parameter	Optional	
				Bit Field Size:	6	Command Parameter:	Required	
	DD188	AIS Message Identifier				Message Identifier (range of 0 to 63).		
						See the latest version of ITU-R M.1371 for more information.		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
	First Requested message type from first interrogated station.							
10	Reply Slot 1.1			Byte Field Size:	2	Request Parameter	Optional	
				Bit Field Size:		Command Parameter:	Note 3	
	DD007	Generic numeric ID, medium				Number of route, waypoint, event, mark, etc.		
	DF54	Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolution:	1 bit	Unit-less number
	This field contains the absolute VHF data link slot number. The AIS device translates this slot number to the Slot Offset value, received or transmitted in ITU-R M.1371 Message 15.							
11	AIS Spare			Byte Field Size:		Request Parameter	Optional	
				Bit Field Size:	resv 2	Command Parameter:	Required	
	DD311	AIS Spare Field				Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
	DF115	Bit field defaulting to zer	bit0(n)	Range:	N2KUnitless	Resolution:	1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							
12	Message ID 1.2			Byte Field Size:		Request Parameter	Optional	
				Bit Field Size:	6	Command Parameter:	Required	
	DD188	AIS Message Identifier				Message Identifier (range of 0 to 63).		
						See the latest version of ITU-R M.1371 for more information.		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
	Second requested message type from first interrogated station.							
13	Reply Slot 1.2			Byte Field Size:	2	Request Parameter	Optional	
				Bit Field Size:		Command Parameter:	Note 3	
	DD007	Generic numeric ID, medium				Number of route, waypoint, event, mark, etc.		
	DF54	Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolution:	1 bit	Unit-less number
	This field contains the absolute VHF data link slot number. The AIS device translates this slot number to the Slot Offset value, received or transmitted in ITU-R M.1371 Message 15.							

## AIS Interrogation

**PGN: 129803**  
**hex: 1FB0B**

<b>14</b>	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i>	resv 6	<i>Command Parameter:</i>	
	<b>DD001</b>	Reserved field					Variable number of reserved bits, all set to logic "1"
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields
							Used to align subsequent data on byte boundary.
<b>15</b>	<b>AIS Spare</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	resv 2	<i>Command Parameter:</i>	Required
	<b>DD311</b>	AIS Spare Field					Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.
	<b>DF115</b>	Bit field defaulting to zero	bit0(n)	<i>Range:</i>	N2KUnitless	<i>Resolution:</i>	1 Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
		This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.					
<b>16</b>	<b>Destination ID 2</b>			<i>Byte Field Size:</i>	4	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD010</b>	Generic numeric ID, large					Number of route, waypoint, event, mark, etc.
	<b>DF55</b>	Integer, 32 bit unsigned	uint32	<i>Range:</i>	0 to 4,294,967,292	<i>Resolution:</i>	1 bit Unit-less number
		MMSI number of second interrogated station.					
<b>17</b>	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i>	resv 2	<i>Command Parameter:</i>	
	<b>DD001</b>	Reserved field					Variable number of reserved bits, all set to logic "1"
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields
							Used to align subsequent data on byte boundary.
<b>18</b>	<b>Message ID 2.1</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	6	<i>Command Parameter:</i>	Required
	<b>DD188</b>	AIS Message Identifier					Message Identifier (range of 0 to 63).
							See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields
		Requested message type from second interrogated station.					
<b>19</b>	<b>Reply Slot 2.1</b>			<i>Byte Field Size:</i>	2	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Note 3
	<b>DD007</b>	Generic numeric ID, medium					Number of route, waypoint, event, mark, etc.
	<b>DF54</b>	Integer, 16 bit unsigned	uint16	<i>Range:</i>	0 to 65,532	<i>Resolution:</i>	1 bit Unit-less number
		This field contains the absolute VHF data link slot number. The AIS device translates this slot number to the Slot Offset value, received or transmitted in ITU-R M.1371 Message 15.					

# AIS Interrogation

PGN: 129803

hex: 1FB0B

## 20 AIS Spare

Byte Field Size:

Bit Field Size: **resv** **2**

Request Parameter

Optional

Command Parameter:

Required

### DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zer

bit0(n)

Range:

N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## 21 NMEA Reserved

Byte Field Size:

Bit Field Size: **resv** **6**

Request Parameter

Command Parameter:

### DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to align subsequent data on byte boundary.

Used to construct bit fields

## 22 Sequence ID

Byte Field Size:

**1**

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Optional

### DD056 Sequence ID

An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.

0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)

253 - 254 = reserved for future use

255 = No binding provided. NMEA recommends using binding SID values whenever practical.

DF53 Integer, 8 bit unsigned

uint8

Range:

0 to 252

Resolution: 1 bit

Unit-less number



## AIS Assignment Mode Command

**PGN: 129804**  
**hex: 1FB0C**

This parameter group provides data associated with the ITU-R M.1371 AIS Message 16 Assigned Mode Command Message for assigning specific behavior by a competent authority.

An AIS device may generate this parameter group either upon a VHF Data Link reception of a Message 16, or upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 16.

Command Support Requirement:

The Command Group Function PGN 126208 shall be used with this PGN to initiate a transmission of this Message 16. Only Base Stations shall accept the Command Group Function PGN 126208 with this PGN for Message 16. All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

Command Support Requirement for Transmission of Message 16 by AIS Base Stations:

The AIS Base Station commanded to transmit a Message 16 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

The following data fields are not commanded with the Command Group Function: NMEA Reserved field(s), Sequence ID, Repeat Indicator, and Source ID for Transmission of Message 16.

The following data fields are may be commanded with the Command Group Function: Destination ID B, Offset B, Increment B, and Reporting Rate B for Transmission of Message 16.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note 3: When commanding this PGN to a Base Station, the values provided in the Start Slot fields 8, 11 shall represent the actual Start Slot of the assigned reporting rate. The Base Station will use the commanded Start Slot number to compute the actual Offset field contents for the Message 16 transmission, based upon when the Base Station is able to schedule the transmission.

All the remaining fields not listed above must be commanded with the Command Group Function for Transmission of Message 16.

Command Support Requirement for Rebroadcasting of Message 16 by an AIS Base Station:

The AIS Base Station commanded to rebroadcast a Message 16 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s), Sequence ID, Start Slot A, and Start Slot B) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions:

June 2017 – New description, new notes in field 5, 8, 9, 11, 12, New fields 16 and 17, and new command support requirements.

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Required** ACK Rqmnts: **None**

### Field # Field Name

Field #	Field Name	Byte Field Size:	Request Parameter	Command Parameter:
1	Message ID	Bit Field Size: <b>6</b>	Optional	Required
DD188	AIS Message Identifier	Message Identifier (range of 0 to 63).		
		See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n) Range: Variable Resolution: 1		Used to construct bit fields
16 = Assigned Mode Command Message				

# AIS Assignment Mode Command

PGN: 129804  
hex: 1FB0C

## 2 Repeat Indicator

Byte Field Size:

Bit Field Size: 2

Request Parameter

Optional

Command Parameter:

Note 1

DD185 AIS Repeater Indicator

Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).

0 = Default

1 = First retransmission

2 = Second retransmission

3 = Final retransmission

See the latest version of ITU-R M.1371 for more information.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 3 Source ID

Byte Field Size:

4

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Required

DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI number of assigning station.

## 4 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 1

Request Parameter

Command Parameter:

DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on byte boundary.



# AIS Assignment Mode Command

**PGN: 129804**  
**hex: 1FB0C**

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: **5**

Request Parameter

Optional

Command Parameter:

Note 2

### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 AIS Spare

Byte Field Size:

Bit Field Size: **resv 2**

Request Parameter

Optional

Command Parameter:

Required

### DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zer

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## 7 Destination ID A

Byte Field Size:

**4**

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Required

### DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI number of destination station A.

# AIS Assignment Mode Command

PGN: 129804  
hex: 1FB0C

8	Start Slot A	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Note 3
DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
This field contains the absolute VHF data link slot number. The AIS device translates this slot number to the Slot Offset value, received or transmitted in ITU-R M.1371 Message 16.			
9	Increment A	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD442	AIS Slot Increment	Valid Values: 0, 45, 75, 125, 225, 375, and 1125	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
When Increment A has a value of 0 (when commanded or received) the reporting rate is provided in field 16 Reporting Rate A (when commanded or received) and field 8 Start Slot A should be set to a value indicating "Data not available" and should be ignored (when commanded or received).			
When Increment A has a valid value greater than 0 (when commanded or received) the Start Slot is provided in field 8 Start Slot A (when commanded or received) and field 16 Reporting Rate A should be set to a value indicating "Data not available" and should be ignored (when commanded or received).			
10	Destination ID B	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
DF55	Integer, 32 bit unsigned	uint32 Range: 0 to 4,294,967,292	Resolution: 1 bit Unit-less number
MMSI number of destination station B.			
11	Start Slot B	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Note 3
DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
This field contains the absolute VHF data link slot number. The AIS device translates this slot number to the Slot Offset value, received or transmitted in ITU-R M.1371 Message 16.			
12	Increment B	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD442	AIS Slot Increment	Valid Values: 0, 45, 75, 125, 225, 375, and 1125	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
When Increment B has a value of 0 (when commanded or received) the reporting rate is provided in field 17 Reporting Rate B (when commanded or received) and field 11 Start Slot B should be set to a value indicating "Data not available" and should be ignored (when commanded or received).			
When Increment B has a valid value greater than 0 (when commanded or received) the Start Slot is provided in field 11 Start Slot B (when commanded or received) and field 17 Reporting Rate B should be set to a value indicating "Data not available" and should be ignored (when commanded or received).			

# AIS Assignment Mode Command

**PGN: 129804**  
**hex: 1FB0C**

13	AIS Spare		Byte Field Size:			Request Parameter		Optional
			Bit Field Size:		resv 4	Command Parameter:		Required
	DD311	AIS Spare Field		Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.				
	DF115	Bit field defaulting to zero	bit0(n)	Range:	N2KUnitless	Resolution:	1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							
14	NMEA Reserved		Byte Field Size:			Request Parameter		
			Bit Field Size:		resv 4	Command Parameter:		
	DD001	Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
	Used to align subsequent data on byte boundary.							
15	Sequence ID		Byte Field Size:		1	Request Parameter		Optional
			Bit Field Size:			Command Parameter:		Optional
	DD056	Sequence ID		An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.				
	0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)							
	253 - 254 = reserved for future use							
	255 = No binding provided. NMEA recommends using binding SID values whenever practical.							
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit	Unit-less number
16	Reporting Rate A		Byte Field Size:		2	Request Parameter		Optional
			Bit Field Size:			Command Parameter:		Required
	DD007	Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54	Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolution:	1 bit	Unit-less number
	This contains the number of reports scheduled for a 10 minute period. The value shall only be in multiples of 20, with a range between 20 and 600. If a mobile station received a value which is not a multiple of 20 but below 600, it should use the next higher multiple of 20. If a mobile station receives a value greater than 600 it should use 600.							
17	Reporting Rate B		Byte Field Size:		2	Request Parameter		Optional
			Bit Field Size:			Command Parameter:		Required
	DD007	Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54	Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolution:	1 bit	Unit-less number
	This contains the number of reports scheduled for a 10 minute period. The value shall only be in multiples of 20, with a range between 20 and 600. If a mobile station received a value which is not a multiple of 20 but below 600, it should use the next higher multiple of 20. If a mobile station receives a value greater than 600 it should use 600.							

# AIS Data Link Management Message

PGN: 129805

hex: 1FB0D

This parameter group provides data associated with the ITU-R M.1371 Message 20 Data Link Management Message for reserving slots for base stations. An AIS device may generate this parameter group either upon receiving a VHF data link message 20, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 shall be used with this PGN to configure base station data link management parameters (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Required ACK Rqmnts: None

## Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 6	Command Parameter:	Required	
DD188	AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
20 = Data Link Management Message					
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Optional	
DD185	AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	Source Station ID	Byte Field Size: 4	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Required	
DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
MMSI number of base station transmitting management message.					
4	NMEA Reserved	Byte Field Size:	Request Parameter		
		Bit Field Size: resv 1	Command Parameter:		
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.					

# AIS Data Link Management Message

**PGN: 129805**  
**hex: 1FB0D**

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: **5**

Request Parameter

Optional

Command Parameter:

Note 2

### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 AIS Spare

Byte Field Size:

Bit Field Size: **resv 2**

Request Parameter

Optional

Command Parameter:

Optional

### DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zer

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## 7 Offset Number 1

Byte Field Size:

**2**

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

### DD007 Generic numeric ID, medium

Number of route, waypoint, event, mark, etc.

DF54 Integer, 16 bit unsigned

uint16

Range: 0 to 65,532

Resolution: 1 bit

Unit-less number

1-4095=reserved offset number.  
See ITU-R M.1371 for more information.

# AIS Data Link Management Message

PGN: 129805

hex: 1FB0D

8	Number of Slots 1	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	1-15=respectve number of reserved consecutive slots. See ITU-R M.1371 for more information.		
9	Time Out 1	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	1-7=respectve time-out value in minutes. See ITU-R M.1371 for more information.		
10	Increment 1	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	1-2047=respectve increment to repeat reservation block. See ITU-R M.1371 for more information.		
11	Offset Number 2	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	1-4095=respectve reserved offset number. See ITU-R M.1371 for more information.		
12	Number of Slots 2	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	1-15=respectve number of reserved consecutive slots. See ITU-R M.1371 for more information.		
13	Time Out 2	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	1-7=respectve time-out value in minutes. See ITU-R M.1371 for more information.		
14	Increment 2	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	1-2047=respectve increment to repeat reservation block. See ITU-R M.1371 for more information.		

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

# AIS Data Link Management Message

PGN: 129805  
hex: 1FB0D

15	Offset Number 3	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	1-4095=reserved reserved offset number. See ITU-R M.1371 for more information.		
16	Number of Slots 3	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	1-15=reserved number of reserved consecutive slots. See ITU-R M.1371 for more information.		
17	Time Out 3	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	1-7=reserved time-out value in minutes. See ITU-R M.1371 for more information.		
18	Increment 3	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	1-2047=reserved increment to repeat reservation block. See ITU-R M.1371 for more information.		
19	Offset Number 4	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	1-4095=reserved reserved offset number. See ITU-R M.1371 for more information.		
20	Number of Slots 4	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	1-15=reserved number of reserved consecutive slots. See ITU-R M.1371 for more information.		
21	Time Out 4	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252 Resolution: 1 bit	Unit-less number
	1-7=reserved time-out value in minutes. See ITU-R M.1371 for more information.		



# AIS Data Link Management Message

PGN: 129805  
hex: 1FB0D

22	Increment 4	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	1-2047=respective increment to repeat reservation block. See ITU-R M.1371 for more information.		
23	AIS Spare	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: resv 6	Command Parameter: Optional
	DD311 AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.	
	DF115 Bit field defaulting to zero	bit0(n) Range: N2KUnitless	Resolution: 1
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
		Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use	
24	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 2	Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1
	Used to align subsequent data on byte boundary.		
25	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD056 Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
		253 - 254 = reserved for future use	
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number



## AIS Channel Management

**PGN: 129806**  
**hex: 1FB0E**

This parameter group provides data associated with the ITU-R M.1371 Message 22 Channel Management Message supporting management of transceiver modes and channels by a base station. An AIS device may generate this parameter group either upon receiving a VHF data link message 5, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN126208 shall be used with this PGN to configure channel management parameters (see ITU-R M.1371 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

### Response to Request:

The response to either an ISO request PGN 059904 or NMEA Request Group Function 126208 for this PGN 129806 shall be the same. The AIS unit shall provide this PGN 129806 for each and every channel management geographical region currently stored in memory.

The latitude and longitude fields 11, 12, 13, 14 in this PGN are only used at a truncated precision to 1/10 of a minute.

The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address. When no linkage exists, the value of the SID shall be set to 255.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 6	Command Parameter:	Required	
	DD188 AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	22 = Channel Management Message.				
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Note 1	
	DD185 AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	Station ID	Byte Field Size: 4	Request Parameter	Required	
		Bit Field Size:	Command Parameter:	Required	
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
	MMSI number of base station.				
4	NMEA Reserved	Byte Field Size:	Request Parameter		
		Bit Field Size: resv 1	Command Parameter:		
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.				

## AIS Channel Management

**PGN: 129806**  
**hex: 1FB0E**

### 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: **5**

Request Parameter

Optional

Command Parameter:

Note 2

#### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

### 6 AIS Spare

Byte Field Size:

Bit Field Size: **resv 2**

Request Parameter

Optional

Command Parameter:

Required

#### DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zero

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

### 7 Channel A

Byte Field Size:

**2**

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Required

#### DD007 Generic numeric ID, medium

Number of route, waypoint, event, mark, etc.

DF54 Integer, 16 bit unsigned

uint16

Range: 0 to 65,532

Resolution: 1 bit

Unit-less number

Channel number according to recommendation ITU-R M.1084, Annex 4.

# AIS Channel Management

PGN: 129806  
hex: 1FB0E

8	Channel B	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	Channel number according to recommendation ITU-R M.1084, Annex 4.		
9	Source Identifier	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 3	Command Parameter: Optional
DD353	AIS Channel Management Source	Source identifiers: 1 = ITU-R M.1371 message 22: Channel Management addressed message 2 = ITU-R M.1371 message 22: Channel Management broadcast geographical area message 3 = NMEA 0183 ACA Sentence or NMEA Network PGN # 129806 4 = DSC Channel 70 Telecommand 5 = Operator manual input 6 thru 7 = Reserved for future use	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
10	Power	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 1	Command Parameter: Required
DD252	AIS Power	0=High (default), 1=low.	
	See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
11	Tx/Rx Mode	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 4	Command Parameter: Required
DD253	AIS Tx/Rx Mode	0=Tx A/Tx B, Rx A/Rx B (default), 1=Tx A, Rx A/Rx B, 2=Tx B, Rx A/Rx B, 3-15=not used.	
	See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
12	North East Longitude Corner 1	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD023	Longitude, WGS-84	Longitude referenced to WGS-84.	
DF25	Longitude	int32 Range: +/- 180 deg Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
	North East longitude corner of geographic area designated in this message. The precision of the latitude and longitude fields shall be limited to 1 decimal place of minutes (1/10 of a minute). If a higher precision is provided to an AIS unit, the receiving AIS unit shall truncate the value to a precision of 1/10 of a minute.		
13	North East Latitude Corner 1	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD022	Latitude, WGS-84	Latitude referenced to WGS-84.	
DF23	Latitude	int32 Range: +/- 90 deg Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
	North East latitude corner of geographic area designated in this message. The precision of the latitude and longitude fields shall be limited to 1 decimal place of minutes (1/10 of a minute). If a higher precision is provided to an AIS unit, the receiving AIS unit shall truncate the value to a precision of 1/10 of a minute.		

# AIS Channel Management

PGN: 129806  
hex: 1FB0E

14	South West Longitude Corner 2	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
DD023	Longitude, WGS-84	Longitude referenced to WGS-84.	
DF25	Longitude	int32 Range: +/- 180 deg Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
South West longitude corner of geographic area designated in this message. The precision of the latitude and longitude fields shall be limited to 1 decimal place of minutes (1/10 of a minute). If a higher precision is provided to an AIS unit, the receiving AIS unit shall truncate the value to a precision of 1/10 of a minute.			
15	South West Latitude Corner 2	Byte Field Size: 4 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
DD022	Latitude, WGS-84	Latitude referenced to WGS-84.	
DF23	Latitude	int32 Range: +/- 90 deg Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
South West latitude corner of geographic area designated in this message. The precision of the latitude and longitude fields shall be limited to 1 decimal place of minutes (1/10 of a minute). If a higher precision is provided to an AIS unit, the receiving AIS unit shall truncate the value to a precision of 1/10 of a minute.			
16	NMEA Reserved	Byte Field Size: Bit Field Size: resv 1	Request Parameter: Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.			
17	Addressed or Broadcast Message Indicator	Byte Field Size: Bit Field Size: 1	Request Parameter: Optional Command Parameter: Required
DD254	AIS Addressed or Broadcast Message Indicator	0=Broadcast geographical area message (default), 1=addressed message (to individual station(s)).  See the latest version of ITU-R M.1371 for more information.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
18	Channel A Bandwidth	Byte Field Size: Bit Field Size: 1	Request Parameter: Optional Command Parameter: Required
DD255	AIS Channel Bandwidth	0=default (as specified by channel number), 1=12.5 kHz bandwidth.  See the latest version of ITU-R M.1371 for more information.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
When sent from an AIS unit: A value of 0 indicates that bandwidth is specified by channel number, see ITU-R M.1084, Annex 4 For AIS equipment designed to ITU-R M.1371-1 and 1371-2, a value of 1, bandwidth is 12.5 kHz . For AIS equipment designed to ITU-R M.1371-3 and later, this value is always set to 0.			

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19	Channel B Bandwidth	Byte Field Size:	Request Parameter:	Optional	
		Bit Field Size:	Command Parameter:	Required	
DD255	AIS Channel Bandwidth	0=default (as specified by channel number), 1=12.5 kHz bandwidth.			
See the latest version of ITU-R M.1371 for more information.					
DF52	Bit field	bit(n)	Range:	Resolution: 1	Used to construct bit fields
When sent to an AIS unit: A value of 0 corresponds to the bandwidth as specified by channel number, see ITU-R M.1084, Annex 4 For AIS equipment designed to ITU-R M.1371-1 and 1371-2, a value of 1, bandwidth is 12.5 kHz . For AIS equipment designed to ITU-R M.1371-3 and 1371-4, this value is ignored. When sent from an AIS unit: A value of 0 indicates that bandwidth is specified by channel number, see ITU-R M.1084, Annex 4 For AIS equipment designed to ITU-R M.1371-1 and 1371-2, a value of 1, bandwidth is 12.5 kHz . For AIS equipment designed to ITU-R M.1371-3 and 1371-4, this value is always set to 0.					

20	NMEA Reserved	Byte Field Size:	Request Parameter:		
		Bit Field Size:	Command Parameter:		
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range:	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.					

21	Transitional Zone Size	Byte Field Size:	Request Parameter:	Optional	
		Bit Field Size:	Command Parameter:	Required	
DD256	AIS Transitional Zone Size	See the latest version of ITU-R M.1371 for more information.			
DF52	Bit field	bit(n)	Range:	Resolution: 1	Used to construct bit fields

22	AIS Spare	Byte Field Size:	Request Parameter:	Optional	
		Bit Field Size:	Command Parameter:	Required	
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.			
DF115	Bit field defaulting to zero	bit0(n)	Range:	Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.					

23	NMEA Reserved	Byte Field Size:	Request Parameter:		
		Bit Field Size:	Command Parameter:		
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range:	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.					

# AIS Channel Management

**PGN: 129806**  
**hex: 1FB0E**

<b>24</b>	<b>In-Use Flag</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
<b>DD354</b>	AIS Channel Management Parameters Usage	0 = "Not in use" when this PGN is sent from an AIS unit or when commanded with PGN 126208 to a AIS Base Station 1 = "In use" when this PGN is sent from an AIS unit or when commanded with PGN 126208 to an AIS Base Station 2 - 3 = Reserved for future use  AIS Mobile units shall not accept commands on this field with PGN 126208.			
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
This value is set to indicate that the other parameters in this PGN are "in-use" by an AIS unit at the time that the AIS unit sends this PGN.					
<b>25</b>	<b>NMEA Reserved</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	
		<i>Bit Field Size:</i>	resv 6	<i>Command Parameter:</i>	
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"			
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
Used to align subsequent data on byte boundary.					
<b>26</b>	<b>Time of in-use Flag Change</b>	<i>Byte Field Size:</i>	<b>4</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
<b>DD158</b>	Generic time of day	24 hour clock, 0 = midnight, time is in UTC			
<b>DF06</b>	Time of day	<b>uint32</b>	<i>Range:</i> 0 to 86,401 s	<i>Resolution:</i> 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
This is the UTC time that the "in-use-flag" field changed to the indicated state. AIS units shall not accept commands on this field with PGN 126208.					
<b>27</b>	<b>Sequence ID</b>	<i>Byte Field Size:</i>	<b>1</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
<b>DD056</b>	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.  0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)  253 - 254 = reserved for future use  255 = No binding provided. NMEA recommends using binding SID values whenever practical.			
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252	<i>Resolution:</i> 1 bit	Unit-less number
<b>28</b>	<b>Destination ID 1</b>	<i>Byte Field Size:</i>	<b>4</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
<b>DD010</b>	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
<b>DF55</b>	Integer, 32 bit unsigned	<b>uint32</b>	<i>Range:</i> 0 to 4,294,967,292	<i>Resolution:</i> 1 bit	Unit-less number
MMSI number of addressed station.					

# AIS Channel Management

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29	Destination ID 2		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Required
	DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
	DF55	Integer, 32 bit unsigned	uint32 Range: 0 to 4,294,967,292	Resolution: 1 bit
		MMSI number of addressed station.		Unit-less number
30	Base Station Region Management		Byte Field Size:	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Required
	DD444	AIS Region Management Control	0 = Delete Matching Region (Only used with Command Group Function for AIS Base Stations) 1 = Create Region (Only used with Command Group Function) 2 = No Action (Not used with Command Group Function, Used in PGN when reporting Region information) 3 = Reserved When deleting a region, the Latitude / Longitude values provided must be an exact match of the values in the stored region.	
	DF52	Bit field	bit(n) Range: Variable	Resolution: 1
				Used to construct bit fields
31	Channel Management Reception Time		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Required
	DD158	Generic time of day	24 hour clock, 0 = midnight, time is in UTC	
	DF06	Time of day	uint32 Range: 0 to 86,401 s	Resolution: 1x10E-4 s
				~24 hours, 0 = midnight, range allows for up to two leap seconds per day
32	Channel Management Reception Date		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Required
	DD039	Generic date	Days since January 1, 1970, Date is relative to UTC Time.	
	DF41	Date, day count	uint16 Range: 0 to 65,532 days	Resolution: 1 day
				0 = January 1, 1970, max = ~179 years



## AIS Group Assignment

PGN: 129807

hex: 1FB0F

The Group Assignment Command is transmitted by a base station when operating as a controlling entity for AIS Stations. ITU-R M.1371 Message 23 contains three criteria (position, ship and cargo type, and station type) that are used by each station that receives the message to determine if the message content applies to that station.

Application of all data fields is dependent upon the latest version of ITU-R M.1371.

Use of the NMEA Command Group Function (PGN 126208) with this PGN is only applicable to AIS base stations.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 6	Command Parameter:	Required	
	DD188 AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	23 = Group Assignment Command for AIS				
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Note 1	
	DD185 AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	Source ID	Byte Field Size: 4	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Required	
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
	MMSI number of base station				
4	AIS Spare	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: resv 2	Command Parameter:	Required	
	DD311 AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.			
	DF115 Bit field defaulting to zer	bit0(n)	Range: N2KUnitless	Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.				

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23



## AIS Group Assignment

PGN: 129807  
hex: 1FB0F

5	Tx/Rx Mode		Byte Field Size: 4		Request Parameter: Optional	
	DD253 AIS Tx/Rx Mode		Bit Field Size: 4		Command Parameter: Required	
	0=Tx A/Tx B, Rx A/Rx B (default), 1=Tx A, Rx A/Rx B, 2=Tx B, Rx A/Rx B, 3-15=not used.					
See the latest version of ITU-R M.1371 for more information.						
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
6	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size: resv 2		Command Parameter:	
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary						
7	North East Longitude Corner 1		Byte Field Size: 4		Request Parameter: Optional	
			Bit Field Size:		Command Parameter: Required	
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84.			
	DF25	Longitude	int32	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
North East Longitude corner of geographic area designated in this message. Longitude referenced to WGS-84. The resolution of the latitude and longitude fields shall be fixed at 1 decimal place of minutes (1/10 of a minute). If a higher resolution is provided to an AIS unit, the receiving AIS unit shall truncate to 1/10's of minute.						
8	North East Latitude Corner 1		Byte Field Size: 4		Request Parameter: Optional	
			Bit Field Size:		Command Parameter: Required	
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84.			
	DF23	Latitude	int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
North East Latitude corner of geographic area designated in this message. Longitude referenced to WGS-84. The resolution of the latitude and longitude fields shall be fixed at 1 decimal place of minutes (1/10 of a minute). If a higher resolution is provided to an AIS unit, the receiving AIS unit shall truncate to 1/10's of minute.						
9	South West Longitude Corner 2		Byte Field Size: 4		Request Parameter: Optional	
			Bit Field Size:		Command Parameter: Required	
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84.			
	DF25	Longitude	int32	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
South West Longitude corner of geographic area designated in this message. Longitude referenced to WGS-84. The resolution of the latitude and longitude fields shall be fixed at 1 decimal place of minutes (1/10 of a minute). If a higher resolution is provided to an AIS unit, the receiving AIS unit shall truncate to 1/10's of minute.						
10	South West Latitude Corner 2		Byte Field Size: 4		Request Parameter: Optional	
			Bit Field Size:		Command Parameter: Required	
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84.			
	DF23	Latitude	int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
South West Latitude corner of geographic area designated in this message. Longitude referenced to WGS-84. The resolution of the latitude and longitude fields shall be fixed at 1 decimal place of minutes (1/10 of a minute). If a higher resolution is provided to an AIS unit, the receiving AIS unit shall truncate to 1/10's of minute.						

# AIS Group Assignment

**PGN: 129807**  
**hex: 1FB0F**

<b>11</b>	<b>Station Type</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i>	<b>Optional</b>
		<i>Bit Field Size:</i> <b>4</b>	<i>Command Parameter:</i>	<b>Required</b>
	<b>DD301</b> AIS Station Type	0 = All types of mobiles (default) 1 = Reserved for future use 2 = All types of Class B mobile stations 3 = SAR airborne mobile station 4 = AtoN station 5 = Class B "CS" shipborne mobile station only 6 = Inland waterways 7 to 9 = Reserved for regional use 10 = This sentence defines a Base Station coverage area with respect to ITU Message 27 broadcasts for Class A and Class B "SO" mobile stations (See ITU 1371 Message 4 and Message 27) 11 to 15 = Reserved for future use  See the latest version of ITU-R M.1371 for more information.		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b> Used to construct bit fields
	Specifies type of AIS Station this is intended for.			
<b>12</b>	<b>NMEA Reserved</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i>	
		<i>Bit Field Size:</i> <b>resv 4</b>	<i>Command Parameter:</i>	
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b> Used to construct bit fields
	Used to align subsequent data on byte boundary			
<b>13</b>	<b>Ship and Cargo Filter</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i>	<b>Optional</b>
		<i>Bit Field Size:</i> <b>8</b>	<i>Command Parameter:</i>	<b>Required</b>
	<b>DD300</b> Ship/Cargo Filter	0 = all types (default) 1 - 99 - See ITU-R M.1371 Table "Identifiers to be used by ships to report their type" 100 - 199 = Reserved for regional use 200 - 255 = Reserved for future use  See the latest version of ITU-R M.1371 for more information.		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b> Used to construct bit fields
<b>14</b>	<b>AIS Spare</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i>	<b>Optional</b>
		<i>Bit Field Size:</i> <b>resv 22</b>	<i>Command Parameter:</i>	<b>Required</b>
	<b>DD311</b> AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
	<b>DF115</b> Bit field defaulting to zer	<b>bit0(n)</b>	<i>Range:</i> <b>N2KUnitless</b>	<i>Resolution:</i> <b>1</b> Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's			

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15	NMEA Reserved			Byte Field Size:	Request Parameter	
				Bit Field Size:	Command Parameter:	
	DD001	Reserved field				Variable number of reserved bits, all set to logic "1"
	DF52	Bit field	bit(n)	Range:	Resolution:	Used to construct bit fields
				Variable	1	Used to align subsequent data on byte boundary
16	Reporting Interval			Byte Field Size:	Request Parameter	Optional
				Bit Field Size:	Command Parameter:	Required
	DD302	AIS Reporting Interval for Class B				0 = As given by the autonomous mode 1 = 10 min 2 = 6 min 3 = 3 min 4 = 1 min 5 = 30 sec 6 = 15 sec 7 = 10 sec 8 = 5 sec 9 = Next shorter reporting interval (only applicable if in autonomous mode) 10 = Next longer reporting interval (only applicable if in autonomous mode) 11 = 2 sec (not applicable to the Class B "CS" and Class B "SO" 12 - 15 = Reserved for future use  See the latest version of ITU-R M.1371 for more information.
	DF52	Bit field	bit(n)	Range:	Resolution:	Used to construct bit fields
				Variable	1	Specifies how often the position report is transmitted. When in dual channel mode (see field 5) the transmission rate is maintained by alternating transmissions between channels, each channel transmitting half the required reports. When in single channel mode the single selected channel transmits all the required reports.
17	Quiet Time			Byte Field Size:	Request Parameter	Optional
				Bit Field Size:	Command Parameter:	Required
	DD303	AIS Quiet Time				0 = No quiet time commanded 1-15 = Quiet time of 1 to 15 min  See the latest version of ITU-R M.1371 for more information.
	DF52	Bit field	bit(n)	Range:	Resolution:	Used to construct bit fields
				Variable	1	
18	AIS Spare			Byte Field Size:	Request Parameter	Optional
				Bit Field Size:	Command Parameter:	Required
	DD311	AIS Spare Field				Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.
	DF115	Bit field defaulting to zer	bit0(n)	Range:	Resolution:	Special data format
				N2KUnitless	1	applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
		This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's				

## AIS Group Assignment

**PGN: 129807**  
**hex: 1FB0F**

19	NMEA Reserved			Byte Field Size:	resv 2	Request Parameter	
				Bit Field Size:		Command Parameter:	
	DD001	Reserved field				Variable number of reserved bits, all set to logic "1"	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields
	Used to align subsequent data on byte boundary.						
20	AIS Transceiver Information			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	5	Command Parameter:	Required
	DD246	AIS Transceiver Information		0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5 = Channels A & B VDL transmission 6 = Channel C (VHF Channel 75) reception, 7 = Channel D (VHF Channel 76) reception, 8 = Channel C (VHF Channel 75) transmission, 9 = Channel D (VHF Channel 76) transmission, 10 - 30 = Reserved 31 = AIS device determines channel for Transmission			
	The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.						
	The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.						
	The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.						
	The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.						
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields
21	NMEA Reserved			Byte Field Size:		Request Parameter	
				Bit Field Size:	resv 3	Command Parameter:	
	DD001	Reserved field				Variable number of reserved bits, all set to logic "1"	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1 Used to construct bit fields
	Used to align subsequent data on byte boundary.						

22	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD056	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number

## DSC Call Information

**PGN: 129808**  
**hex: 1FB10**

This PGN provides Digital Selective Calling (DSC) data according to ITU M.493-9 with optional expansion according to ITU M.821-1. DSC is a paging system that is used to automate distress alerts sent over terrestrial communication systems such as VHF, MF and HF marine radio systems. DSC provides a mechanism to report significantly more information regarding a distress call rather than just the distress itself. Products equipped with DSC will transmit and receive this information. This PGN will be transmitted as and when required. Calls to be transmitted should generally use the command Group Function Message (PGN 126208) in conjunction with this parameter group to ensure that the correct transmitter is selected.

Single Frame: **No** Priority Default: **4** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>DSC Format Symbol</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD011</b>	DSC Symbol Definitions	Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>DSC Category Symbol</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD011</b>	DSC Symbol Definitions	Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>3</b>	<b>DSC Message Address</b>	Byte Field Size: <b>char 5</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD012</b>	DSC Address or Geographic Area	Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code the address or geographic area as defined in ITU-R M.493-9 Section 5. This may represent an individual MMSI, a group MMSI, or a geographic area.	
<b>DF63</b>	String, fixed	<b>char8(n)</b> Range: <b>0 to 1,785 characters</b> Resolution: <b>1 char</b>	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.
<b>4</b>	<b>Nature Of Distress or 1st Telecommand</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD011</b>	DSC Symbol Definitions	Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>5</b>	<b>Subsequent Communication Mode or 2nd Telecommand</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD011</b>	DSC Symbol Definitions	Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number

## DSC Call Information

PGN: 129808  
hex: 1FB10

## 6 Proposed Rx Frequency / Channel

Byte Field Size: char 6  
Bit Field Size:Request Parameter: Optional  
Command Parameter: Optional

DD017 Radio Tx or Rx Channel

MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have the first digit 9 followed by zero. The next number is "1" indicating the ship station's transmit frequency is being used as a simplex channel frequency, or "2" indicating the coast station's transmit frequency is being used as a simplex channel frequency, "0" otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.

DF63 String, fixed

char8(n) Range: 0 to 1,785 characters Resolution: 1 char 0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.

## 7 Proposed Tx Frequency / Channel

Byte Field Size: char 6  
Bit Field Size:Request Parameter: Optional  
Command Parameter: Optional

DD017 Radio Tx or Rx Channel

MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have the first digit 9 followed by zero. The next number is "1" indicating the ship station's transmit frequency is being used as a simplex channel frequency, or "2" indicating the coast station's transmit frequency is being used as a simplex channel frequency, "0" otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.

DF63 String, fixed

char8(n) Range: 0 to 1,785 characters Resolution: 1 char 0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.

## DSC Call Information

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**hex: 1FB10**

<b>8</b>	<b>Telephone Number</b>		<i>Byte Field Size:</i> <b>8 or 16</b> <b>n</b>	<i>Request Parameter</i> <b>Required</b>	
			<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>	
	<b>DD015</b> DSC Symbol String		Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code: Telephone number as defined by ITU-R M.493 Section 8.2.3; DSC Expansion Data as defined by ITU-R M.821 Section 2.		
	<b>DF50</b> String, variable, short	<b>ch8or16(n)</b>	<i>Range:</i> <b>0 to 250 ASCII or 0 to 125 Unicode Characters</b>	<i>Resolution:</i> <b>1 ASCII or 1 Unicode Character</b>	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	16 ASCII characters maximum, no Unicode				
<b>9</b>	<b>Latitude of Vessel Reported</b>		<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i> <b>Optional</b>	
			<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>	
	<b>DD022</b> Latitude, WGS-84		Latitude referenced to WGS-84.		
	<b>DF23</b> Latitude	<b>int32</b>	<i>Range:</i> <b>+/- 90 deg</b>	<i>Resolution:</i> <b>1x10E-7 deg</b>	"-" = South, resolution ~1.1 cm
<b>10</b>	<b>Longitude of Vessel Reported</b>		<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i> <b>Optional</b>	
			<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>	
	<b>DD023</b> Longitude, WGS-84		Longitude referenced to WGS-84.		
	<b>DF25</b> Longitude	<b>int32</b>	<i>Range:</i> <b>+/- 180 deg</b>	<i>Resolution:</i> <b>1x10E-7 deg</b>	"-" = West, resolution ~1.1 cm
<b>11</b>	<b>Time of Position</b>		<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i> <b>Optional</b>	
			<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>	
	<b>DD158</b> Generic time of day		24 hour clock, 0 = midnight, time is in UTC		
	<b>DF06</b> Time of day	<b>uint32</b>	<i>Range:</i> <b>0 to 86,401 s</b>	<i>Resolution:</i> <b>1x10E-4 s</b>	~24 hours, 0 = midnight, range allows for up to two leap seconds per day



## DSC Call Information

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hex: 1FB10

12	MMSI Of Ship In Distress	Byte Field Size: char 5	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD012	DSC Address or Geographic Area	Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code the address or geographic area as defined in ITU-R M.493-9 Section 5. This may represent an individual MMSI, a group MMSI, or a geographic area.	
DF63	String, fixed	char8(n) Range: 0 to 1,785 characters Resolution: 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.
13	DSC EOS Symbol	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD011	DSC Symbol Definitions	Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
14	Expansion Enabled	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
15	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 6	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.			

## DSC Call Information

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<b>16</b>	<b>Calling Rx Frequency/Channel</b>	<i>Byte Field Size:</i> <b>char</b> <b>6</b>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
<b>DD017</b>	Radio Tx or Rx Channel	MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have the first digit 9 followed by zero. The next number is "1" indicating the ship station's transmit frequency is being used as a simplex channel frequency, or "2" indicating the coast station's transmit frequency is being used as a simplex channel frequency, "0" otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.	
<b>DF63</b>	String, fixed	<b>char8(n)</b> <i>Range:</i> 0 to 1,785 characters	<i>Resolution:</i> 1 char 0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.
<b>17</b>	<b>Calling Tx Frequency/Channel</b>	<i>Byte Field Size:</i> <b>char</b> <b>6</b>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
<b>DD017</b>	Radio Tx or Rx Channel	MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have the first digit 9 followed by zero. The next number is "1" indicating the ship station's transmit frequency is being used as a simplex channel frequency, or "2" indicating the coast station's transmit frequency is being used as a simplex channel frequency, "0" otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.	
<b>DF63</b>	String, fixed	<b>char8(n)</b> <i>Range:</i> 0 to 1,785 characters	<i>Resolution:</i> 1 char 0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.
<b>18</b>	<b>Time of Receipt/Transmission</b>	<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
<b>DD158</b>	Generic time of day	24 hour clock, 0 = midnight, time is in UTC	
<b>DF06</b>	Time of day	<b>uint32</b> <i>Range:</i> 0 to 86,401 s	<i>Resolution:</i> 1x10E-4 s ~24 hours, 0 = midnight, range allows for up to two leap seconds per day
<b>19</b>	<b>Date of Receipt/Transmission</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
<b>DD039</b>	Generic date	Days since January 1, 1970, Date is relative to UTC Time.	
<b>DF41</b>	Date, day count	<b>uint16</b> <i>Range:</i> 0 to 65,532 days	<i>Resolution:</i> 1 day 0 = January 1, 1970, max = ~179 years

## DSC Call Information

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<b>20</b>	<b>DSC Equipment Assigned Message ID</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i> <b>Required</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	<i>Range:</i> <b>0 to 65,532</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will with the current ID. Otherwise if this field is specified only the units with a matching ID will respond with this PGN.		
<b>21</b>	<b>DSC Expansion Field Symbol</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
	<b>DD014</b> DSC Expansion Symbol Definitions	Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.821 Table 1.	
	<b>DF53</b> Integer, 8 bit unsigned <b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number
<b>22</b>	<b>DSC Expansion Field Data</b>	<i>Byte Field Size:</i> <b>8 or 16 n</b>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
	<b>DD015</b> DSC Symbol String	Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code: Telephone number as defined by ITU-R M.493 Section 8.2.3; DSC Expansion Data as defined by ITU-R M.821 Section 2.	
	<b>DF50</b> String, variable, short <b>ch8or16(n)</b>	<i>Range:</i> <b>0 to 250 ASCII or 0 to 125 Unicode Characters</b>	<i>Resolution:</i> <b>1 ASCII or 1 Unicode Character</b> 2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	The meaning and size of this field is determined by the DSC Expansion symbol in field 23. String length 38 ASCII characters maximum, no Unicode.		
<b>23</b>	<b>Variable Number Of Fields, Field 21 Repeated, Expansion Field Type</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Optional</b>
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
	<b>DD014</b> DSC Expansion Symbol Definitions	Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.821 Table 1.	
	<b>DF53</b> Integer, 8 bit unsigned <b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b> Unit-less number

24	Variable Number Of Fields, Field 22 Repeated, Expansion Field Data	Byte Field Size: 8 or 16 n	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD015	DSC Symbol String	Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code: Telephone number as defined by ITU-R M.493 Section 8.2.3; DSC Expansion Data as defined by ITU-R M.821 Section 2.		
DF50	String, variable, short	ch8or16(n)Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
The meaning and size of this field is determined by the DSC Expansion symbol in field 24. String length 38 ASCII characters maximum, no Unicode.				

This parameter group provides data associated with the ITU-R M.1371 AIS Message 24A AIS Static Data Report, Part A. An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 24A, upon receipt of an ISO or NMEA request PGN, in response to an accepted NMEA Command Group Function, or upon a device's own transmission of a Message 24A.

The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address. When no linkage exists, the value of the SID shall be set to 255. Request Support Requirement: Reception of an ISO Request (PGN 059904) for this PGN shall respond by providing as many of these PGNs as necessary.

The minimum response is at least one PGN providing the AIS device's own information.

Additional response PGN(s) may be provided containing information from AIS Message 24A(s) received over the VHF Data Link.

Reception of a Request Group Function (PGN 126208) with no request parameters shall result in the same response as the ISO Request.

All providers of this PGN shall accept and process requests based upon the requested value of Field #3, User ID. This provides a means to request information about a single User ID, including your own.

If the User ID requested is not considered a valid User ID by the receiving device, then the appropriate response depends on how the request was transmitted:

- A global request would result in no response. An addressed request would result in the Acknowledge Group PGN (126208), containing the error state for the requested User ID field of "0x3 = Request or command parameter out-of-range."
- General Command Support: Only AIS Class A, Class B-SO, Class B-CS, Base Station, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN for Message 24A.
- All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

Command Support Requirement for Rebroadcasting of Messages 24A by an AIS Base Station:

- Only AIS Base Stations shall accept the Command Group Function PGN 126208 with this PGN for Message 24A.
- All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".
- The AIS Station commanded to rebroadcast an AIS Message 24A shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3).
- If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

Note 2: The AIS Transceiver Information Command Parameter is "Required".

When commanding this PGN to cause the transmission of Message 24A from an AIS Base Station, the only values that can be commanded are: 2, 3, 5, or 31. All data fields (except for NMEA Reserved field(s), and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Command Support Requirement for Configuring Static Data of an AIS Station:

- Only AIS Class A, Class B-SO, Class B-CS, Base Station, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN to configure Static data settings for Message 24A.
- 
- All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".
- The PGN field 4 - "Name" may be commanded. In addition, field 5 - "AIS Transceiver Information" must be set to a value of 4

# AIS Static Data Report, Part A

PGN: 129809  
hex: 1FB11

when performing this configuration command.

Note 2: Upon receiving this Command Group Function 126208, the AIS Station shall respond with this PGN reporting its current settings with field 5 – “AIS Transceiver Information” containing a value of 4. Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions: June 2017 – New PGN Name, new description, and new command support requirements.

Single Frame: No Priority Default: 6 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Required ACK Rqmnts: None

## Field # Field Name

1	Message ID	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 6	Command Parameter:	Required	
DD188	AIS Message Identifier	Message Identifier (range of 0 to 63).			
		See the latest version of ITU-R M.1371 for more information.			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
24 = AIS Class B Static Data Part A					
2	Repeat Indicator	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Note 1	
DD185	AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
		0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
		See the latest version of ITU-R M.1371 for more information.			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
3	User ID	Byte Field Size: 4	Request Parameter	Required	
		Bit Field Size:	Command Parameter:	Required	
DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
MMSI number of mobile station reporting its static information					
4	Name	Byte Field Size: char	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Required	
DD192	Generic String, ASCII, Fixed length	Length specified by PGN field definition.			
DF63	String, fixed	char8(n)	Range: 0 to 1,785 characters	Resolution: 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available
20 character string, default value is "@@@@@@@@@@@@@@@@@@" = not available					

## 5 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Note 2

## DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
 1 = Channel B VDL reception,  
 2 = Channel A VDL transmission,  
 3 = Channel B VDL transmission,  
 4 = Own information not broadcast,  
 5 = Channels A & B VDL transmission  
 6 = Channel C (VHF Channel 75) reception,  
 7 = Channel D (VHF Channel 76) reception,  
 8 = Channel C (VHF Channel 75) transmission,  
 9 = Channel D (VHF Channel 76) transmission,  
 10 - 30 = Reserved  
 31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 3

Request Parameter

Command Parameter:

## DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on byte boundary.

## 7 Sequence ID

Byte Field Size: 1

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

## DD056 Sequence ID

An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.

0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)

253 - 254 = reserved for future use

255 = No binding provided. NMEA recommends using binding SID values whenever practical.

DF53 Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number



This parameter group provides data associated with the ITU-R M.1371 AIS Message 24B AIS Static Data Report, Part A. An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 24B, upon receipt of an ISO or NMEA request PGN, in response to an accepted NMEA Command Group Function, or upon a device's own transmission of a Message 24B.

The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address. When no linkage exists, the value of the SID shall be set to 255.

Request Support Requirement:

Reception of an ISO Request (PGN 059904) for this PGN shall respond by providing as many of these PGNs as necessary. The minimum response is at least one PGN providing the AIS device's own information. Additional response PGN(s) may be provided containing information from AIS Message 24B(s) received over the VHF Data Link.

- Reception of a Request Group Function (PGN 126208) with no request parameters shall result in the same response as the ISO Request.
- All providers of this PGN shall accept and process requests based upon the requested value of Field #3, User ID.
- This provides a means to request information about a single User ID, including your own.

If the User ID requested is not considered a valid User ID by the receiving device, then the appropriate response depends on how the request was transmitted:

- A global request would result in no response. An addressed request would result in the Acknowledge Group PGN (126208), containing the error state for the requested User ID field of "0x3 = Request or command parameter out-of-range."

General Command Support: Only AIS Class A, Class B-SO, Class B-CS, Base Station, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN for Message 24B. All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

Command Support Requirement for Rebroadcasting of Messages 24B by an AIS Base Station:

- Only AIS Base Stations shall accept the Command Group Function PGN 126208 with this PGN for Message 24B.
- All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".
- The AIS Station commanded to rebroadcast an AIS Message 24B shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3).
- If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.  
Note 2: The AIS Transceiver Information Command Parameter is "Required".
- When commanding this PGN to cause the transmission of Message 24B from an AIS Base Station, the only values that can be commanded are: 2, 3, 5, or 31.
- All data fields (except for NMEA Reserved field(s), Sequence ID, and Mother Ship MMSI) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required".

The value should reflect the number of previous transmissions for this specific AIS Message.

The AIS Base Station will increment this field accordingly prior to transmission. Command Support Requirement for Configuring Static Data of an AIS Station: Only AIS Class A, Class B-SO, Class B-CS, Base Station, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN to configure Static data settings for Message 24B.



## AIS Static Data Report, Part B

**PGN: 129810**  
**hex: 1FB12**

All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

The following PGN fields may be command:

- 4 – "Type of Ship and Cargo",
- 5 – "Vendor ID", 6 – "Call Sign",
- 7 – "Ship Length",
- 8 – "Ship Beam",
- 9 – "Reference Point Position from Starboard",
- 10 – "Reference Point Position Aft of Bow".

In addition, field 14 – "AIS Transceiver Information" must be set to a value of 4 when performing a configuration command of any of the above seven fields. Note 2: Upon receiving this Command Group Function 126208, the AIS Station shall respond with this PGN reporting its current settings with field 14 – "AIS Transceiver Information" containing a value of 4.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions: June 2017 – New PGN Name, new description, new command support requirements, field 11 Mother Ship MMSI usage has been deprecated in ITU-R M.1371-5 dated (02/2014), and added new field 14 Type of Electronic Position Fixing Device using 4 of the 6 AIS Spare bits from Field 13.

Single Frame: **No** Priority Default: **6** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts: **None**

### Field # Field Name

1	<b>Message ID</b>		<i>Byte Field Size:</i>	<div>6</div>	<i>Request Parameter</i>	Optional	
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required	
	<b>DD188</b> AIS Message Identifier					Message Identifier (range of 0 to 63).	
						See the latest version of ITU-R M.1371 for more information.	
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
	24 = AIS Class B static data Part B						
2	<b>Repeat Indicator</b>		<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional	
			<i>Bit Field Size:</i>	<div>2</div>	<i>Command Parameter:</i>	Note 1	
	<b>DD185</b> AIS Repeater Indicator					Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).	
						0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission	
						See the latest version of ITU-R M.1371 for more information.	
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i>	Variable	<i>Resolution:</i>	1	Used to construct bit fields
3	<b>User ID</b>		<i>Byte Field Size:</i>	<div>4</div>	<i>Request Parameter</i>	Required	
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required	
	<b>DD010</b> Generic numeric ID, large					Number of route, waypoint, event, mark, etc.	
	<b>DF55</b> Integer, 32 bit unsigned	<b>uint32</b>	<i>Range:</i>	0 to 4,294,967,292	<i>Resolution:</i>	1 bit	Unit-less number
	MMSI number of mobile station reporting its static information						

# AIS Static Data Report, Part B

PGN: 129810  
hex: 1FB12

4	Type of Ship and Cargo	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 8	Command Parameter:	Required
DD193	Ship/Cargo Type	0=Not Available or no ship (default), 1-99= See the latest version of ITU-R M.1371, 100-199=Reserved for Regional (See the latest version of ITU-R M.1371), 200-255=Reserved for future (See the latest version of ITU-R M.1371).		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
			Used to construct bit fields	
5	Vendor ID	Byte Field Size: char	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Required
DD192	Generic String, ASCII, Fixed length	Length specified by PGN field definition.		
DF63	String, fixed	char8(n)	Range: 0 to 1,785 characters	Resolution: 1 char
	7 character string - Unique identification of the unit by a number as defined by the manufacturer; ("@@@@@@" = not available = default)			0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.
6	Call Sign	Byte Field Size: char	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Required
DD192	Generic String, ASCII, Fixed length	Length specified by PGN field definition.		
DF63	String, fixed	char8(n)	Range: 0 to 1,785 characters	Resolution: 1 char
	7 character string - See the latest version of ITU-R M.1371 for more information; ("@@@@@@" = not available = default)			0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.
7	Ship Length	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Required
DD194	Distance, medium	Dependent upon PG Field definition.		
DF75	Distance, Medium	uint16	Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
	Length of mobile station reporting its static data; Valid range = 0-1022, and must be greater than or equal to field 10 "Reference Point Position Aft of Bow", a value of 65535 indicates that data is not available. For more information, see IMO Circular 227 Section 5.3 Ships Dimensions or NMEA 0400 Section 19.3.2 Vessel Reference Point (This field is valid only if field 3 "User ID" contains a value <= 999999999)			
8	Ship Beam	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Required
DD194	Distance, medium	Dependent upon PG Field definition.		
DF75	Distance, Medium	uint16	Range: 0 to 6553.2 m	Resolution: 1x10E-1 m
	Beam of mobile station reporting its static data; A value of 65535 indicates that data is not available (This field is valid only if field 3 "User ID" contains a value <= 999999999)			

## 9 Reference Point Position from Starboard

Byte Field Size: 2

Bit Field Size:

Request Parameter Optional

Command Parameter: Required

DD194 Distance, medium

Dependent upon PG Field definition.

DF75 Distance, Medium

uint16 Range: 0 to 6553.2 m Resolution: 1x10E-1 m

Distance to reference point measured from the starboard side of mobile station reporting its static data; Valid range = 0-63, a value of 65535 indicates that data is not available. For more information, see IMO Circular 227 Section 5.3 Ships Dimensions or NMEA 0400 Section 19.3.2 Vessel Reference Point (This field is valid only if field 3 "User ID" contains a value <= 999999999)

## 10 Reference Point Position Aft of Bow

Byte Field Size: 2

Bit Field Size:

Request Parameter Optional

Command Parameter: Required

DD194 Distance, medium

Dependent upon PG Field definition.

DF75 Distance, Medium

uint16 Range: 0 to 6553.2 m Resolution: 1x10E-1 m

Distance to reference point measured aft from the bow of mobile station reporting its static position; Valid range = 0-511, a value of 65535 indicates that data is not available. For more information, see IMO Circular 227 Section 5.3 Ships Dimensions or NMEA 0400 Section 19.3.2 Vessel Reference Point (This field is valid only if field 3 "User ID" contains a value <= 999999999)

## 11 Mother Ship MMSI

Byte Field Size: 4

Bit Field Size:

Request Parameter Optional

Command Parameter: Optional

DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32 Range: 0 to 4,294,967,292 Resolution: 1 bit Unit-less number

This data field is no longer supported by AIS Message 24B and should be set to 4,294,967,295 = Data not available.

## 12 AIS Spare

Byte Field Size:

Bit Field Size: resv 2

Request Parameter

Command Parameter: Required

DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zero

bit0(n) Range: N2KUnitless Resolution: 1

This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

## AIS Static Data Report, Part B

PGN: 129810

hex: 1FB12

## 13 Type of Electronic Position Fixing Device

Byte Field Size:

Bit Field Size: 4

Request Parameter

Optional

Command Parameter:

Required

## DD191 AIS Electronic Positioning Device Type

0 = Undefined (default)  
 1 = GPS  
 2 = GLONASS  
 3 = Combined GPS/GLONASS  
 4 = Loran-C  
 5 = Chayka  
 6 = Integrated Navigation System  
 7 = Surveyed; For fixed AtoN and virtual AtoN, the charted position should be used. The accurate position enhances its function as a radar reference target  
 8 = Galileo  
 9-14 = Reserved for future use  
 15 = Internal GNSS  
 See the latest version of ITU-R M.1371 for more information.

DF52 Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

## 14 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Note 2

## DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
 1 = Channel B VDL reception,  
 2 = Channel A VDL transmission,  
 3 = Channel B VDL transmission,  
 4 = Own information not broadcast,  
 5 = Channels A & B VDL transmission  
 6 = Channel C (VHF Channel 75) reception,  
 7 = Channel D (VHF Channel 76) reception,  
 8 = Channel C (VHF Channel 75) transmission,  
 9 = Channel D (VHF Channel 76) transmission,  
 10 - 30 = Reserved  
 31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

## 15 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 5

Request Parameter

Command Parameter:

## DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on byte boundary.

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

16	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD056	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number

# AIS Single Slot Binary Message - DEPRECATED

**PGN: 129811**  
**hex: 1FB13**

This PGN has been deprecated (as of NMEA PGN Message Database version 2.100) and is not recommended for new designs.

However, support of the deprecated PGN 129811 is strongly recommended to ensure compatibility with legacy equipment.

The PGN description at the time of deprecation was as follows: This parameter group provides data associated with the ITU-R M.1371 Message 25 Single Slot Binary Message supporting both addressed and broadcast communication of binary data.

An AIS device may generate this parameter group either upon receiving a VHF Data Link Message 25, or upon receipt of ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure parameters such as the binary data (see ITU-R M.1371-5 Message 25 for additional information).

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: **N** Priority Default: **5** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

## Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD056</b> Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
		253 - 254 = reserved for future use	
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b> Unit-less number	
<b>2</b>	<b>Message ID</b>	Byte Field Size:	Request Parameter: <b>Optional</b>
		Bit Field Size: <b>6</b>	Command Parameter: <b>Optional</b>
	<b>DD188</b> AIS Message Identifier	Message Identifier (range of 0 to 63).	
		See the latest version of ITU-R M.1371 for more information.	
	<b>DF52</b> Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b> Used to construct bit fields	
	25 equals Single Slot Binary Message		

# AIS Single Slot Binary Message - DEPRECATED

PGN: 129811

hex: 1FB13

## 3 Repeat Indicator

Byte Field Size:

Bit Field Size: 2

Request Parameter

Optional

Command Parameter:

Optional

DD185 AIS Repeater Indicator

Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).

0 = Default

1 = First retransmission

2 = Second retransmission

3 = Final retransmission

See the latest version of ITU-R M.1371 for more information.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 4 Source ID

Byte Field Size:

4

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Optional

DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI Number of source station.

## 5 Destination Indicator

Byte Field Size:

Bit Field Size: 1

Request Parameter

Optional

Command Parameter:

Optional

DD387 AIS Destination Indicator

0 = Broadcast (no Destination ID field used)

1 = Addressed ( Destination ID field uses 30 data bits for MMSI

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 Binary data flag

Byte Field Size:

Bit Field Size: 1

Request Parameter

Optional

Command Parameter:

Optional

DD386 AIS Binary Structure

0 = unstructured binary data (no Application Identifier bits used)

1 = binary data coded as defined by using the 16-bit Application Identifier

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 7 AIS Spare

Byte Field Size:

Bit Field Size: resv 1

Request Parameter

Command Parameter:

DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zer

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "spare" bit field found within the corresponding AIS message, such that future definition within the AIS message can also be accommodated within this field.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

# AIS Single Slot Binary Message - DEPRECATED

PGN: 129811

hex: 1FB13

## 8 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Optional

### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 9 Destination ID

Byte Field Size:

4

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Optional

### DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI Number of destination station.

## 10 Number of bits in Binary Data Field

Byte Field Size:

1

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Optional

### DD006 Generic counter, short

Numeric count, event counter, sequence counter

DF53 Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

Indicates the number of binary of data bits that are contained within the binary data field

## 11 Binary Data

Byte Field Size:

Bit Field Size: n

Request Parameter

Optional

Command Parameter:

Optional

### DD142 Binary Bit Field

Binary data bit field.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Application specific data



## AIS Multi Slot Binary Message - DEPRECATED

PGN: 129812

hex: 1FB14

This PGN has been deprecated (as of NMEA PGN Message Database version 2.100) and is not recommended for new designs. However, support of the deprecated PGN 129812 is strongly recommended to ensure compatibility with legacy equipment.

The PGN description at the time of deprecation was as follows: This parameter group provides data associated with the ITU-R M.1371 Message 26 Multi Slot Binary Message with Communication State supporting both addressed and broadcast communication of binary data.

This message is primarily intended for scheduled binary transmissions by application of the SOTDMA or ITDMA access scheme. An AIS device may generate this parameter group either upon receiving a VHF Data Link Message 26, or upon receipt of ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure parameters such as the binary data (see ITU-R M.1371-5 Message 26 for additional information).

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

This PGN is variable length and provides binary data from 1 to 5 slots. Fields 21 through 24 only exist when there is binary data in the related slot. For example; with a 3 slot binary message, the last field of this PGN is Field 22.

Due to variable length fields at the end of the message, all unused bits in the last byte (of the last field) shall be set to 1.

Single Frame: **N** Priority Default: **5** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

1	Sequence ID	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD056</b> Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
		253 - 254 = reserved for future use	
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
2	Message ID	Byte Field Size:	Request Parameter: <b>Optional</b>
		Bit Field Size: <b>6</b>	Command Parameter: <b>Optional</b>
	<b>DD188</b> AIS Message Identifier	Message Identifier (range of 0 to 63).	
		See the latest version of ITU-R M.1371 for more information.	
	<b>DF52</b> Bit field	<b>bit(n)</b> Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields
	26 equals Multi Slot Binary Message with communications state.		

# AIS Multi Slot Binary Message - DEPRECATED

PGN: 129812

hex: 1FB14

3	Repeat Indicator		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Optional
	DD185	AIS Repeater Indicator	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).			
			0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission			
			See the latest version of ITU-R M.1371 for more information.			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
4	Source ID		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
		MMSI Number of source station.				
5	Destination Indicator		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Optional
	DD387	AIS Destination Indicator	0 = Broadcast (no Destination ID field used) 1 = Addressed ( Destination ID field uses 30 data bits for MMSI)			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
6	Binary data flag		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Optional
	DD386	AIS Binary Structure	0 = unstructured binary data (no Application Identifier bits used) 1 = binary data coded as defined by using the 16-bit Application Identifier			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
7	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 1	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.					

# AIS Multi Slot Binary Message - DEPRECATED

PGN: 129812

hex: 1FB14

## 8 AIS Transceiver Information

Byte Field Size:

Bit Field Size: 5

Request Parameter

Optional

Command Parameter:

Optional

### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 9 Destination ID

Byte Field Size: 4

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

### DD010 Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

MMSI Number of destination station.

## 10 AIS Spare

Byte Field Size:

Bit Field Size: resv 2

Request Parameter

Command Parameter:

### DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zer

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "spare" bit field found within the corresponding AIS message, such that future definition within the AIS message can also be accommodated within this field.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

# AIS Multi Slot Binary Message - DEPRECATED

PGN: 129812  
hex: 1FB14

11	Communication state selector flag	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 1	Command Parameter:	Optional
DD245	AIS Communication State Selector Flag	0=SOTDMA communication state, 1=ITDMA communication state follows.		
		See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n) Range: Variable	Resolution: 1	Used to construct bit fields
12	Communication state	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 19	Command Parameter:	Optional
DD187	AIS Communication State	The Communication State contains information used by the various TDMA slot allocation algorithms and synchronization information		
		See the latest version of ITU-R M.1371 for more information.		
DF52	Bit field	bit(n) Range: Variable	Resolution: 1	Used to construct bit fields
13	AIS Spare	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 4	Command Parameter:	
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
DF115	Bit field defaulting to zero	bit0(n) Range: N2KUnitless	Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "spare" bit field found within the corresponding AIS message, such that future definition within the AIS message can also be accommodated within this field.			
14	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 6	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n) Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.			
15	Number of Bits in Binary Data Field – 1st slot	Byte Field Size: 1	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter		
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit	Unit-less number
	Indicates the number of data bits that are contained within the binary data field for 1st slot			
16	Number of Bits in Binary Data Field – 2nd slot	Byte Field Size: 1	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter		
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit	Unit-less number
	Indicates the number of data bits that are contained within the binary data field for 2nd slot			

# AIS Multi Slot Binary Message - DEPRECATED

**PGN: 129812**  
**hex: 1FB14**

17	Number of Bits in Binary Data Field – 3rd slot	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
Indicates the number of data bits that are contained within the binary data field for 3rd slot			
18	Number of Bits in Binary Data Field – 4th slot	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
Indicates the number of data bits that are contained within the binary data field for 4th slot			
19	Number of Bits in Binary Data Field – 5th slot	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD006	Generic counter, short	Numeric count, event counter, sequence counter	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
Indicates the number of data bits that are contained within the binary data field for 5th slot			
20	Binary Data – 1st slot	Byte Field Size: Bit Field Size: n	Request Parameter: Optional Command Parameter: Optional
DD142	Binary Bit Field	Binary data bit field.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Application specific data for the 1st slot			
21	Binary Data – 2nd slot	Byte Field Size: Bit Field Size: n	Request Parameter: Optional Command Parameter: Optional
DD142	Binary Bit Field	Binary data bit field.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Application specific data for the 2nd slot. When the “Number of Bits in Binary Data Field – 2nd slot” equals 0 this field and subsequent binary data fields are not included in the PGN.			
22	Binary Data – 3rd slot	Byte Field Size: Bit Field Size: n	Request Parameter: Optional Command Parameter: Optional
DD142	Binary Bit Field	Binary data bit field.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Application specific data for the 3rd slot. When the “Number of Bits in Binary Data Field – 3rd slot” equals 0 this field and subsequent binary data fields are not included in the PGN.			
23	Binary Data – 4th slot	Byte Field Size: Bit Field Size: n	Request Parameter: Optional Command Parameter: Optional
DD142	Binary Bit Field	Binary data bit field.	
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
Application specific data for the 4th slot. When the “Number of Bits in Binary Data Field - 4th slot” equals 0 this field and subsequent binary data fields are not included in the PGN.			

24	Binary Data – 5th slot	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: <div>n</div>	Command Parameter:	Optional
DD142	Binary Bit Field	Binary data bit field.		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to construct bit fields				
Application specific data for the 5th slot.				
When the “Number of Bits in Binary Data Field - 5th slot” equals 0 this field is not included in the PGN.				

## AIS Long-Range Broadcast Message

**PGN: 129813**  
**hex: 1FB15**

This parameter group provides data associated with the ITU-R M.1371 AIS Message 27 AIS Long-Range Broadcast Message. This message is primarily intended for long-range detection of AIS Class A and Class B "SO" mobile stations by satellite. This message has similar content to Messages 1, 2 and 3.

An AIS device may generate this parameter group either upon a VHF Data Link reception of Message 27, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 27.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard. Revisions: June 2017 – New description and new AIS Transceiver Information data field 14.

Single Frame: **N** Priority Default: **5** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	uint8	Range: <b>0 to 252</b> Resolution: <b>1 bit</b> Unit-less number
<b>2</b>	<b>Message ID</b>	Byte Field Size: Bit Field Size: <b>6</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD188</b>	AIS Message Identifier	<p>Message Identifier (range of 0 to 63).</p> <p>See the latest version of ITU-R M.1371 for more information.</p>	
<b>DF52</b>	Bit field	bit(n)	Range: <b>Variable</b> Resolution: <b>1</b> Used to construct bit fields
27 equals Long-Range AIS Broadcast Message			
<b>3</b>	<b>Repeat Indicator</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD185</b>	AIS Repeater Indicator	<p>Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).</p> <p>0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission</p> <p>See the latest version of ITU-R M.1371 for more information.</p>	
<b>DF52</b>	Bit field	bit(n)	Range: <b>Variable</b> Resolution: <b>1</b> Used to construct bit fields

# AIS Long-Range Broadcast Message

PGN: 129813  
hex: 1FB15

4	User ID	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsigned	uint32 Range: 0 to 4,294,967,292 Resolution: 1 bit	Unit-less number
	MMSI Number of mobile station reporting its position.		
5	Longitude	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD023 Longitude, WGS-84	Longitude referenced to WGS-84.	
	DF25 Longitude	int32 Range: +/- 180 deg Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
6	Latitude	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD022 Latitude, WGS-84	Latitude referenced to WGS-84.	
	DF23 Latitude	int32 Range: +/- 90 deg Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
7	Position Accuracy	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 1	Command Parameter: Optional
	DD184 AIS Position Accuracy	0 = low accuracy > 10m such as nondifferential GNSS (default), 1 = high accuracy < 10m such as DGNSS	
		See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
8	Raim Flag	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 1	Command Parameter: Optional
	DD189 AIS RAIM-flag	0 = RAIM not in use (default), 1 = RAIM in use	
		See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields



# AIS Long-Range Broadcast Message

PGN: 129813  
hex: 1FB15

9	Navigation Status	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 4	Command Parameter:	Optional	
DD183	AIS Navigational Status	0 = under way using engine, 1 = at anchor, 2 = not under command, 3 = restricted manoeuvrability, 4 = constrained by her draught, 5 = moored, 6 = aground, 7 = engaged in fishing, 8 = under way sailing, 9 = reserved for future amendment of navigational status for ships carrying DG, HS, or MP, or IMO hazard or pollutant category C, high speed craft (HSC), 10 = reserved for future amendment of navigational status for ships carrying dangerous goods (DG), harmful substances (HS) or marine pollutants (MP), or IMO hazard or pollutant category A, wing in ground (WIG); 11 = power driven vessel towing astern (regional use), 12 = power driven vessel pushing ahead or towing alongside (regional use), 13 = reserved for future use, 14 = AIS-SART (active), MOB-AIS, EPIRB-AIS 15 = not defined (default), (also used by AIS-SART, MOB-AIS, EPIRB-AIS under test)			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
10	Position Latency	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 1	Command Parameter:	Optional	
DD388	AIS Position Latency Flag	0 = reported position latency is less than 5 seconds 1 = reported position latency is greater than 5 seconds = default			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
11	AIS Spare	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: resv 1	Command Parameter:	Optional	
DD311	AIS Spare Field	Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.			
DF115	Bit field defaulting to zero	bit0(n)	Range: N2KUnitless	Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
This field mirrors the "spare" bit field found within the corresponding AIS message, such that future definition within the AIS message can also be accommodated within this field.					
12	Speed Over Ground	Byte Field Size: 2	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Optional	
DD044	Generic Speed				
DF35	Speed	uint16	Range: 0 to 655.32 m/s	Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s

# AIS Long-Range Broadcast Message

PGN: 129813

hex: 1FB15

13	Course Over Ground	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional

DD165 Course-Over-Ground (COG)

The direction of the path over ground actually followed by a vessel.

DF02	Angle	uint16	Range: 0 to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
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14	AIS Transceiver Information	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 5	Command Parameter: Optional

DD246 AIS Transceiver Information

- 0 = Channel A VDL reception,
- 1 = Channel B VDL reception,
- 2 = Channel A VDL transmission,
- 3 = Channel B VDL transmission,
- 4 = Own information not broadcast,
- 5 = Channels A & B VDL transmission
- 6 = Channel C (VHF Channel 75) reception,
- 7 = Channel D (VHF Channel 76) reception,
- 8 = Channel C (VHF Channel 75) transmission,
- 9 = Channel D (VHF Channel 76) transmission,
- 10 - 30 = Reserved
- 31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
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15	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 3	Command Parameter:

DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
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Used to align subsequent data on byte boundry

## AIS Single Slot Binary Message

PGN: 129814

hex: 1FB16

This parameter group provides data associated with the ITU-R M.1371 AIS Message 25 AIS Single Slot Binary Message.

An AIS device may generate this parameter group either upon a VHF Data Link reception of a Message 25, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 25.

Command Support Requirement:

The Command Group Function PGN 126208 shall be used with this PGN to initiate a transmission of this AIS Message.

Only AIS Class A, Class B-SO, Base Station, Aton Station, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN for Message 25. All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

Command Support Requirement for Transmission of Message 25 by all allowed AIS Stations as listed above:

The AIS Station commanded to transmit an AIS Message transmission shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s), Sequence ID, Repeat Indicator, and Source ID) must be commanded when using the Command Group Function (PGN 126208) for Transmission of Message 25.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Command Support Requirement for Rebroadcasting of Message 25 by an AIS Base Station:

The AIS Station commanded to rebroadcast a Message 25 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s) and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions:

June 2017 – New description, new notes in field 9, and command support requirements. This PGN 129814 created to replace PGN 129811 due to addition of the AIS Transceiver Information data field.

Single Frame: No Priority Default: 5 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

### Field # Field Name

Field #	Field Name	Byte Field Size:	Request Parameter	Command Parameter:
1	Sequence ID	1	Optional	Optional
DD056	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.		
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)		
		253 - 254 = reserved for future use		
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.		
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

# AIS Single Slot Binary Message

**PGN: 129814**  
**hex: 1FB16**

<b>2</b>	<b>Message ID</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	6	<i>Command Parameter:</i>	Required
	<b>DD188</b>	AIS Message Identifier					
							Message Identifier (range of 0 to 63).
							See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
		25 equals Single Slot Binary Message					Used to construct bit fields
<b>3</b>	<b>Repeat Indicator</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	2	<i>Command Parameter:</i>	Note 1
	<b>DD185</b>	AIS Repeater Indicator					
							Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).
							0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission
							See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
							Used to construct bit fields
<b>4</b>	<b>Source ID</b>			<i>Byte Field Size:</i>	4	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD010</b>	Generic numeric ID, large					Number of route, waypoint, event, mark, etc.
	<b>DF55</b>	Integer, 32 bit unsigned	uint32	<i>Range:</i>	0 to 4,294,967,292	<i>Resolution:</i>	1 bit
		MMSI Number of source station.					Unit-less number
<b>5</b>	<b>Destination Indicator</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	1	<i>Command Parameter:</i>	Required
	<b>DD387</b>	AIS Destination Indicator					0 = Broadcast (no Destination ID field used) 1 = Addressed ( Destination ID field uses 30 data bits for MMSI)
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
							Used to construct bit fields
<b>6</b>	<b>Binary data flag</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	1	<i>Command Parameter:</i>	Required
	<b>DD386</b>	AIS Binary Structure					0 = unstructured binary data (no Application Identifier bits used) 1 = binary data coded as defined by using the 16-bit Application Identifier
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
							Used to construct bit fields
<b>7</b>	<b>AIS Spare</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	resv 2	<i>Command Parameter:</i>	Required
	<b>DD311</b>	AIS Spare Field					Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.
	<b>DF115</b>	Bit field defaulting to zero	bit0(n)	<i>Range:</i>	N2KUnitless	<i>Resolution:</i>	1
		This field mirrors the "spare" bit field found within the corresponding AIS message, such that future definition within the AIS message can also be accommodated within this field.					Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

# AIS Single Slot Binary Message

**PGN: 129814**  
**hex: 1FB16**

8	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 7	Command Parameter:	
DD001		Reserved field	Variable number of reserved bits, all set to logic "1"			
DF52		Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.						
9	AIS Transceiver Information		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	5	Command Parameter:	Note 2
DD246		AIS Transceiver Information	0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5 = Channels A & B VDL transmission 6 = Channel C (VHF Channel 75) reception, 7 = Channel D (VHF Channel 76) reception, 8 = Channel C (VHF Channel 75) transmission, 9 = Channel D (VHF Channel 76) transmission, 10 - 30 = Reserved 31 = AIS device determines channel for Transmission			
The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.						
The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.						
The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.						
The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.						
DF52		Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
10	Destination ID		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
DD010		Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
DF55		Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
MMSI Number of destination station.						
11	Number of bits in Binary Data Field		Byte Field Size:	1	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
DD006		Generic counter, short	Numeric count, event counter, sequence counter			
DF53		Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
Indicates the number of binary of data bits that are contained within the binary data field						

12	Binary Data	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: <div>n</div>	Command Parameter:	Required
	DD142 Binary Bit Field	Binary data bit field.		
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1
	Application specific data			
				Used to construct bit fields

## AIS Multi Slot Binary Message

**PGN: 129815**  
**hex: 1FB17**

This parameter group provides data associated with the ITU-R M.1371 AIS Message 26 AIS Multi Slot Binary Message.

An AIS device may generate this parameter group either upon a VHF Data Link reception of a Message 26, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 26.

### Command Support Requirement:

The Command Group Function PGN 126208 shall be used with this PGN to initiate a transmission of this AIS Message. Only AIS Class A, Class B-SO, Base Station, Aton Station, and future SAR Airborne stations shall accept the Command Group Function PGN 126208 with this PGN for Message 26.

All other types of AIS devices not listed above shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported". Command Support Requirement for Transmission of Message 26 by all allowed AIS Stations as listed above:

The AIS Station commanded to transmit an AIS Message transmission shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3).

If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved field(s), Sequence ID, Repeat Indicator, and Source ID) must be commanded when using the Command Group Function (PGN 126208) for Transmission of Message 26. Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

### Command Support Requirement for Rebroadcasting of Message 26 by an AIS Base Station:

The AIS Station commanded to rebroadcast a Message 26 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3).

If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel. All data fields (except for NMEA Reserved field(s), Communication State, and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Revisions: June 2017 – New description and command support requirements. This PGN 129815 created to replace PGN 129812 due to addition of the AIS Transceiver Information data field and consolidation of the five binary bit fields into a single binary bit field.

Single Frame: No Priority Default: 5 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

Field # Field Name

# AIS Multi Slot Binary Message

**PGN: 129815**  
**hex: 1FB17**

<b>1</b>	<b>Sequence ID</b>			<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i> <b>Optional</b>
				<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Optional</b>
	<b>DD056</b> Sequence ID			<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Message ID</b>			<i>Byte Field Size:</i>	<i>Request Parameter</i> <b>Optional</b>
				<i>Bit Field Size:</i> <b>6</b>	<i>Command Parameter:</i> <b>Required</b>
	<b>DD188</b> AIS Message Identifier			<p>Message Identifier (range of 0 to 63).</p> <p>See the latest version of ITU-R M.1371 for more information.</p>	
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>	Used to construct bit fields
	26 equals Multi Slot Binary Message with communications state.				
<b>3</b>	<b>Repeat Indicator</b>			<i>Byte Field Size:</i>	<i>Request Parameter</i> <b>Optional</b>
				<i>Bit Field Size:</i> <b>2</b>	<i>Command Parameter:</i> <b>Note 1</b>
	<b>DD185</b> AIS Repeater Indicator			<p>Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).</p> <p>0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission</p> <p>See the latest version of ITU-R M.1371 for more information.</p>	
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>	Used to construct bit fields
<b>4</b>	<b>Source ID</b>			<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i> <b>Optional</b>
				<i>Bit Field Size:</i>	<i>Command Parameter:</i> <b>Required</b>
	<b>DD010</b> Generic numeric ID, large			Number of route, waypoint, event, mark, etc.	
	<b>DF55</b> Integer, 32 bit unsigned	<b>uint32</b>	<i>Range:</i> <b>0 to 4,294,967,292</b>	<i>Resolution:</i> <b>1 bit</b>	Unit-less number
	MMSI Number of source station.				
<b>5</b>	<b>Destination Indicator</b>			<i>Byte Field Size:</i>	<i>Request Parameter</i> <b>Optional</b>
				<i>Bit Field Size:</i> <b>1</b>	<i>Command Parameter:</i> <b>Required</b>
	<b>DD387</b> AIS Destination Indicator			<p>0 = Broadcast (no Destination ID field used) 1 = Addressed ( Destination ID field uses 30 data bits for MMSI)</p>	
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>	Used to construct bit fields



# AIS Multi Slot Binary Message

PGN: 129815  
hex: 1FB17

6	Binary data flag		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Required
	DD386	AIS Binary Structure		0 = unstructured binary data (no Application Identifier bits used) 1 = binary data coded as defined by using the 16-bit Application Identifier		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
7	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 6	Command Parameter:	
	DD001	Reserved field		Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
		Used to align subsequent data on byte boundary.				
8	Destination ID		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
	DD010	Generic numeric ID, large		Number of route, waypoint, event, mark, etc.		
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
		MMSI Number of destination station.				
9	AIS Spare		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	resv 2	Command Parameter:	Required
	DD311	AIS Spare Field		Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.		
	DF115	Bit field defaulting to zero	bit0(n)	Range: N2KUnitless	Resolution: 1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
		This field mirrors the "spare" bit field found within the corresponding AIS message, such that future definition within the AIS message can also be accommodated within this field.				
10	Communication state selector flag		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	1	Command Parameter:	Required
	DD245	AIS Communication State Selector Flag		0=SOTDMA communication state, 1=ITDMA communication state follows.		
		See the latest version of ITU-R M.1371 for more information.				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
11	Communication state		Byte Field Size:		Request Parameter	Prohibited
			Bit Field Size:	19	Command Parameter:	Prohibited
	DD187	AIS Communication State		The Communication State contains information used by the various TDMA slot allocation algorithms and synchronization information		
		See the latest version of ITU-R M.1371 for more information.				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

# AIS Multi Slot Binary Message

**PGN: 129815**  
**hex: 1FB17**

12	AIS Spare	Byte Field Size:	Request Parameter	Optional				
		Bit Field Size:	Command Parameter:	Required				
	DD311	AIS Spare Field			Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.			
	DF115	Bit field defaulting to zero	bit0(n)	Range:	N2KUnitless	Resolution:	1	Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use
	This field mirrors the "spare" bit field found within the corresponding AIS message, such that future definition within the AIS message can also be accommodated within this field.							
13	AIS Transceiver Information	Byte Field Size:	Request Parameter	Optional				
		Bit Field Size:	Command Parameter:	Note 2				
	DD246	AIS Transceiver Information			0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5 = Channels A & B VDL transmission 6 = Channel C (VHF Channel 75) reception, 7 = Channel D (VHF Channel 76) reception, 8 = Channel C (VHF Channel 75) transmission, 9 = Channel D (VHF Channel 76) transmission, 10 - 30 = Reserved 31 = AIS device determines channel for Transmission			
	The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.							
	The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.							
	The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.							
	The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.							
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
14	NMEA Reserved	Byte Field Size:	Request Parameter					
		Bit Field Size:	Command Parameter:					
	DD001	Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
	Used to align subsequent data on byte boundary.							

15	Number of Bits in Binary Data Field	Byte Field Size: 2	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Required
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.		
	DF54 Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
	Indicates the number of binary data bits that are contained within the Binary Data field.			
16	Binary Data	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: n	Command Parameter:	Required
	DD142 Binary Bit Field	Binary data bit field.		
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1	Used to construct bit fields
	Application specific data.			

## AIS Acknowledge

PGN: 129816

hex: 1FB18

This parameter group provides data associated with the ITU-R M.1371 AIS Messages 7 Binary Acknowledge Message and 13 Safety Related Acknowledge Message. Message 7 acknowledges receipt of message 6 while message 13 acknowledges receipt of message 12.

An AIS device may generate this parameter group either upon receiving a VHF data link message 7 or 13, upon receipt of an ISO or NMEA request PGN, or upon a device's own transmission of a Message 7 or 13.  
Command Support Requirement for Rebroadcasting of Messages 7 and 13 by an AIS Base Station:

Only AIS Base Stations shall accept the Command Group Function PGN 126208 with this PGN for Messages 7 and 13. All other types of AIS devices shall respond with an Acknowledge Group Function with the PGN Error Code field set to "0x4 = Request or Command is not supported".

The AIS Station commanded to rebroadcast a Message 7 or 13 shall generate this PGN as a consequence of a successful transmission, with the "AIS Transceiver Information" data field indicating the channel of transmission (value of 2 or 3). If the AIS message was transmitted on both channels, two PGNs shall be generated, one for each transmission channel.

All data fields (except for NMEA Reserved fields and Sequence ID) must be commanded when using the Command Group Function (PGN 126208) for rebroadcasting.

Note 1: The Repeat Indicator Command Parameter is "Required". The value should reflect the number of previous transmissions for this specific AIS Message. The AIS Base Station will increment this field accordingly prior to transmission.

Note 2: The AIS Transceiver Information Command Parameter is "Required". The only values that can be commanded are: 2, 3, 5, or 31.

Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

June 2017 – New description and command support requirements. This PGN 129816 created to replace PGN 129796 due to missing counter for repeating fields and relocation of Sequence ID field prior to repeating fields.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

### Field # Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
DD056	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
		253 - 254 = reserved for future use	
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## AIS Acknowledge

**PGN: 129816**  
**hex: 1FB18**

<b>2</b>	<b>Message ID</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	6	<i>Command Parameter:</i>	Required
	<b>DD188</b>	AIS Message Identifier					
							Message Identifier (range of 0 to 63).
							See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
		6 = Addressed Binary Message.					Used to construct bit fields
<b>3</b>	<b>Repeat Indicator</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	2	<i>Command Parameter:</i>	Note 1
	<b>DD185</b>	AIS Repeater Indicator					
							Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).
							0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission
							See the latest version of ITU-R M.1371 for more information.
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
							Used to construct bit fields
<b>4</b>	<b>Source ID</b>			<i>Byte Field Size:</i>	4	<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD010</b>	Generic numeric ID, large					Number of route, waypoint, event, mark, etc.
	<b>DF55</b>	Integer, 32 bit unsigned	uint32	<i>Range:</i>	0 to 4,294,967,292	<i>Resolution:</i>	1 bit
		MMSI number of source station.					Unit-less number
<b>5</b>	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i>	resv 1	<i>Command Parameter:</i>	
	<b>DD001</b>	Reserved field					Variable number of reserved bits, all set to logic "1"
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1
		Used to align subsequent data on byte boundary.					Used to construct bit fields

## AIS Acknowledge

**PGN: 129816**  
**hex: 1FB18**

### 6 AIS Transceiver Information

Byte Field Size:

Bit Field Size: **5**

Request Parameter

Optional

Command Parameter:

Note 2

#### DD246 AIS Transceiver Information

0 = Channel A VDL reception,  
1 = Channel B VDL reception,  
2 = Channel A VDL transmission,  
3 = Channel B VDL transmission,  
4 = Own information not broadcast,  
5 = Channels A & B VDL transmission  
6 = Channel C (VHF Channel 75) reception,  
7 = Channel D (VHF Channel 76) reception,  
8 = Channel C (VHF Channel 75) transmission,  
9 = Channel D (VHF Channel 76) transmission,  
10 - 30 = Reserved  
31 = AIS device determines channel for Transmission

The AIS transceiver Information field (values 0, 1, 6, 7) identifies the reception channel of an AIS message that was received and placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDM sentence to report a received AIS Message.

The AIS transceiver Information field (values 2, 3, 8, 9) identifies the transmission channel of an AIS message that was transmitted and then placed into the appropriate AIS PGN. This corresponds to the same mechanism used in the NMEA 0183 VDO sentence to report a transmitted AIS Message.

The AIS transceiver Information field (value 4) identifies an AIS message that was not transmitted and then placed into the appropriate AIS PGN. This is provided by AIS Mobile Stations at a 1hz rate to report to other shipboard systems its current dynamic navigation data.

The AIS transceiver Information field (values 5 and 31) are only used with the Command Group Function PGN 126208.

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

### 7 AIS Spare

Byte Field Size:

Bit Field Size: **resv 2**

Request Parameter

Optional

Command Parameter:

Required

#### DD311 AIS Spare Field

Variable number of reserved bits, all set to logic "0". Normally, spare or reserved bits in NMEA network messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

DF115 Bit field defaulting to zero

bit0(n)

Range: N2KUnitless

Resolution: 1

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accommodated within this field. Normally, spare or reserved bits in NMEA Network Messages are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Special data format applicable to AIS field that must be set to zero for a NULL data condition or when unused - applies to AIS spare fields and AIS fields that are for future use

### 8 Number of Acknowledgments

Byte Field Size:

Bit Field Size: **n 3**

Request Parameter

Optional

Command Parameter:

Required

#### DD137 Generic variable bit field

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Identifies the number of sets of fields (Destination ID, NMEA Reserved, and Sequence Number)

## AIS Acknowledge

PGN: 129816  
hex: 1FB18

9	NMEA Reserved			Byte Field Size:		Request Parameter	
				Bit Field Size:	resv 5	Command Parameter:	
	DD001	Reserved field			Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
		Used to align subsequent data on byte boundary.					Used to construct bit fields
10	Destination ID "1"			Byte Field Size:	4	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Required
	DD010	Generic numeric ID, large			Number of route, waypoint, event, mark, etc.		
	DF55	Integer, 32 bit unsigned	uint32	Range:	0 to 4,294,967,292	Resolution:	1 bit
		MMSI number of first destination for this acknowledge.					Unit-less number
11	NMEA Reserved			Byte Field Size:		Request Parameter	
				Bit Field Size:	resv 1	Command Parameter:	
	DD001	Reserved field			Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
		Used to align subsequent data on byte boundary.					Used to construct bit fields
12	Sequence Number for ID "1"			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD243	AIS Sequence Number			Range 0-3		
		See the latest version of ITU-R M.1371 for more information.					
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
		Sequence number of message to be acknowledged, range 0-3.					Used to construct bit fields
13	Destination ID "n"			Byte Field Size:	4	Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Required
	DD010	Generic numeric ID, large			Number of route, waypoint, event, mark, etc.		
	DF55	Integer, 32 bit unsigned	uint32	Range:	0 to 4,294,967,292	Resolution:	1 bit
		Variable Number of fields, Field number 10 repeated.					Unit-less number
14	NMEA Reserved			Byte Field Size:		Request Parameter	
				Bit Field Size:	resv 1	Command Parameter:	
	DD001	Reserved field			Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
		Variable Number of fields, Field number 11 repeated.					Used to construct bit fields
15	Sequence Number for ID "n"			Byte Field Size:		Request Parameter	Optional
				Bit Field Size:	2	Command Parameter:	Required
	DD243	AIS Sequence Number			Range 0-3		
		See the latest version of ITU-R M.1371 for more information.					
	DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
		Variable Number of fields, Field number 12 repeated.					Used to construct bit fields

## Loran-C TD Data

**PGN: 130052**  
**hex: 1FC04**

This provides Time Difference (TD) lines of position of Loran-C signals relative to a single Group Repetition Interval.

Field #1, Group Repetition Interval (GRI), is identified as a request parameter for this Parameter Group. All providers of this PGN shall accept and process requests based upon the requested value of Field #1. A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for every GRI that has associated data fields. If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Complex Request, then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904) described above.
- If the Complex Request (PGN 126208) includes the GRI field, then the response shall be filtered by the field (Field #1) and field value (GRI #) contained within the request.

For example, if the Complex Request for this PGN contained a value of 9960 for field 1, the Group Repetition Interval (GRI), and this was a GRI that the device was operating with or had information about, then the device would respond by providing a single PGN with Time Difference measurement data associated with the 9960 GRI value requested.

If the GRI requested is considered valid by the device, but the device was not operating on that GRI, or had no data associated with the GRI requested, there are two possible responses:

- 1 - The device responds with the PGN containing the GRI requested and all other fields set to the value indicating "Data not available".
- 2 - The device responds with the Acknowledge Group PGN (126208) containing the error state of "0x2 = Temporarily unable to comply".

If the request was global no response would be required. If the request was addressed to the device, then either response 1 or 2 would apply.

If the GRI requested is not considered a valid GRI by the receiving device, then the appropriate response would be the Acknowledge Group PGN (126208), containing the error state for the requested GRI field of "0x3 = Request or command parameter out-of-range;".

Single Frame: **No**    Priority Default: **3**    Default Update Rate: **1000** milliseconds    Frequency: **1.** cycles per second  
Destination: **Global**    Query Support: **Required**    Command Support: **Optional**    ACK Rqmnts: **None**

### Field #    Field Name

<b>1</b>	<b>Group Repetition Interval (GRI)</b>	Byte Field Size: <b>4</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
<b>DD027</b>	Loran-C GRI	Group Repetition Interval (GRI) in nano-sec. Often cited in units of 10 micro-sec. (i.e., 9960 = 99,600,000 ns)	
<b>DF45</b>	Time interval, precise	<b>int32</b> Range: <b>+/- 2.14 s</b> Resolution: <b>1x10E-9 s</b>	
<b>2</b>	<b>Master Range</b>	Byte Field Size: <b>4</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD029</b>	Loran - Range (Time)	The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.	
<b>DF45</b>	Time interval, precise	<b>int32</b> Range: <b>+/- 2.14 s</b> Resolution: <b>1x10E-9 s</b>	
<b>3</b>	<b>V Secondary TD</b>	Byte Field Size: <b>4</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD028</b>	Loran-C TD	Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.	
<b>DF45</b>	Time interval, precise	<b>int32</b> Range: <b>+/- 2.14 s</b> Resolution: <b>1x10E-9 s</b>	



## Loran-C TD Data

**PGN: 130052**  
**hex: 1FC04**

<b>4</b>	<b>W Secondary TD</b>			<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD028</b>	Loran-C TD					Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.
	<b>DF45</b>	Time interval, precise	<b>int32</b>	<i>Range:</i> <b>+/- 2.14 s</b>	<i>Resolution:</i> <b>1x10E-9 s</b>		
<b>5</b>	<b>X Secondary TD</b>			<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD028</b>	Loran-C TD					Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.
	<b>DF45</b>	Time interval, precise	<b>int32</b>	<i>Range:</i> <b>+/- 2.14 s</b>	<i>Resolution:</i> <b>1x10E-9 s</b>		
<b>6</b>	<b>Y Secondary TD</b>			<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD028</b>	Loran-C TD					Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.
	<b>DF45</b>	Time interval, precise	<b>int32</b>	<i>Range:</i> <b>+/- 2.14 s</b>	<i>Resolution:</i> <b>1x10E-9 s</b>		
<b>7</b>	<b>Z Secondary TD</b>			<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD028</b>	Loran-C TD					Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.
	<b>DF45</b>	Time interval, precise	<b>int32</b>	<i>Range:</i> <b>+/- 2.14 s</b>	<i>Resolution:</i> <b>1x10E-9 s</b>		
<b>8</b>	<b>Station status: Master</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i> <b>4</b>		<i>Command Parameter:</i>	Optional
	<b>DD030</b>	Loran-C station status					MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>		Used to construct bit fields
<b>9</b>	<b>Station status: V</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i> <b>4</b>		<i>Command Parameter:</i>	Optional
	<b>DD030</b>	Loran-C station status					MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>		Used to construct bit fields

## Loran-C TD Data

PGN: 130052

hex: 1FC04

10	Station status: W	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
DD030	Loran-C station status	MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
11	Station status: X	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
DD030	Loran-C station status	MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
12	Station status: Y	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
DD030	Loran-C station status	MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
13	Station status: Z	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
DD030	Loran-C station status	MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
14	Mode	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
DD025	Mode, Data	0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	

15	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv4	Command Parameter:	
	DD001	Reserved field				Variable number of reserved bits, all set to logic "1"
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
		Used to align subsequent data on a byte boundary.				

## Loran-C Range Data

**PGN: 130053**  
**hex: 1FC05**

This provides Propagation times (Ranges) of Loran-C signals relative to a single Group Repetition Interval.

Field #1, Group Repetition Interval (GRI), is identified as a request parameter for this Parameter Group.

All providers of this PGN shall accept and process requests based upon the requested value of Field #1.

A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for every GRI that has associated data fields.

If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

If no requested fields have been included with the Complex Request, than the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904) described above.

If the Complex Request (PGN 126208) includes the GRI field, then the response shall be filtered by the field (Field #1) and field value (GRI #) contained within the request.

For example, if the Complex Request for this PGN contained a value of 9960 for field 1, the Group Repetition Interval (GRI), and this was a GRI that the device was operating with or had information about, than the device would respond by providing a single PGN with Range measurement data associated with the 9960 GRI value requested.

If the GRI requested is considered valid by the device, but the device was not operating on that GRI, or had no data associated with the GRI requested, there are two possible responses:

1 - The device responds with the PGN containing the GRI requested and all other fields set to the value indicating "Data not available".

2 - The device responds with the Acknowledge Group PGN (126208) containing the error state of "0x2 = Temporarily unable to comply".

If the request was global no response would be required. If the request was addressed to the device, than either response 1 or 2 would apply.

If the GRI requested is not considered a valid GRI by the receiving device, then the appropriate response would be the Acknowledge Group PGN (126208), containing the error state for the requested GRI field of "0x3 = Request or command parameter out-of-range;".

Single Frame: **No**    Priority Default: **3**    Default Update Rate: **1000** milliseconds    Frequency: **1** cycles per second  
Destination: **Global**    Query Support: **Required**    Command Support: **Optional**    ACK Rqmnts: **None**

### Field #    Field Name

<b>1</b>	<b>Group Repetition Interval (GRI)</b>		Byte Field Size: <b>4</b>		Request Parameter: <b>Required</b>
			Bit Field Size:		Command Parameter: <b>Optional</b>
	<b>DD027</b> Loran-C GRI		Group Repetition Interval (GRI) in nano-sec. Often cited in units of 10 micro-sec. (i.e., 9960 = 99,600,000 ns)		
	<b>DF45</b> Time interval, precise	<b>int32</b>	Range: <b>+/- 2.14 s</b>	Resolution: <b>1x10E-9 s</b>	
<b>2</b>	<b>Master Range</b>		Byte Field Size: <b>4</b>		Request Parameter: <b>Optional</b>
			Bit Field Size:		Command Parameter: <b>Optional</b>
	<b>DD029</b> Loran - Range (Time)		The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.		
	<b>DF45</b> Time interval, precise	<b>int32</b>	Range: <b>+/- 2.14 s</b>	Resolution: <b>1x10E-9 s</b>	
<b>3</b>	<b>V Secondary Range</b>		Byte Field Size: <b>4</b>		Request Parameter: <b>Optional</b>
			Bit Field Size:		Command Parameter: <b>Optional</b>
	<b>DD029</b> Loran - Range (Time)		The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.		
	<b>DF45</b> Time interval, precise	<b>int32</b>	Range: <b>+/- 2.14 s</b>	Resolution: <b>1x10E-9 s</b>	

## Loran-C Range Data

**PGN: 130053**  
**hex: 1FC05**

<b>4</b>	<b>W Secondary Range</b>			<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD029</b>	Loran - Range (Time)			The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.		
	<b>DF45</b>	Time interval, precise	<b>int32</b>	<i>Range:</i> <b>+/- 2.14 s</b>	<i>Resolution:</i> <b>1x10E-9 s</b>		
<b>5</b>	<b>X Secondary Range</b>			<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD029</b>	Loran - Range (Time)			The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.		
	<b>DF45</b>	Time interval, precise	<b>int32</b>	<i>Range:</i> <b>+/- 2.14 s</b>	<i>Resolution:</i> <b>1x10E-9 s</b>		
<b>6</b>	<b>Y Secondary Range</b>			<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD029</b>	Loran - Range (Time)			The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.		
	<b>DF45</b>	Time interval, precise	<b>int32</b>	<i>Range:</i> <b>+/- 2.14 s</b>	<i>Resolution:</i> <b>1x10E-9 s</b>		
<b>7</b>	<b>Z Secondary Range</b>			<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD029</b>	Loran - Range (Time)			The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.		
	<b>DF45</b>	Time interval, precise	<b>int32</b>	<i>Range:</i> <b>+/- 2.14 s</b>	<i>Resolution:</i> <b>1x10E-9 s</b>		
<b>8</b>	<b>Station status: Master</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i> <b>4</b>		<i>Command Parameter:</i>	Optional
	<b>DD030</b>	Loran-C station status			MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care		
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>		Used to construct bit fields
<b>9</b>	<b>Station status: V</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i> <b>4</b>		<i>Command Parameter:</i>	Optional
	<b>DD030</b>	Loran-C station status			MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care		
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>		Used to construct bit fields

## Loran-C Range Data

**PGN: 130053**  
**hex: 1FC05**

<b>10</b>	<b>Station status: W</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	4	<i>Command Parameter:</i>	Optional
	<b>DD030</b>	Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care			
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields
<b>11</b>	<b>Station status: X</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	4	<i>Command Parameter:</i>	Optional
	<b>DD030</b>	Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care			
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields
<b>12</b>	<b>Station status: Y</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	4	<i>Command Parameter:</i>	Optional
	<b>DD030</b>	Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care			
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields
<b>13</b>	<b>Station status: Z</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	4	<i>Command Parameter:</i>	Optional
	<b>DD030</b>	Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care			
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields
<b>14</b>	<b>Mode</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>	4	<i>Command Parameter:</i>	Optional
	<b>DD025</b>	Mode, Data		0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available			
	<b>DF52</b>	Bit field	bit(n)	<i>Range:</i>	Variable	<i>Resolution:</i>	1 Used to construct bit fields

15	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv4	Command Parameter:	
	DD001	Reserved field				Variable number of reserved bits, all set to logic "1"
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
		Used to align subsequent data on a byte boundary.				

## Loran-C Signal Data

PGN: 130054

hex: 1FC06

SNR, ECD, and ASF values of Loran-C signals Field #1, Group Repetition Interval (GRI), is identified as a request parameter for this Parameter Group.

All providers of this PGN shall accept and process requests based upon the requested value of Field #1. A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for every GRI that has associated data fields.

If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner: If no requested fields have been included with the Complex Request, then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904) described above.

If the Complex Request (PGN 126208) includes the GRI field, then the response shall be filtered by the field (Field #1) and field value (GRI #) contained within the request.

For example, if the Complex Request for this PGN contained a value of 9960 for field 1, the Group Repetition Interval (GRI), and this was a GRI that the device was operating with or had information about, then the device would respond by providing a single PGN with Range measurement data associated with the 9960 GRI value requested.

If the GRI requested is considered valid by the device, but the device was not operating on that GRI, or had no data associated with the GRI requested, there are two possible responses:

- 1 - The device responds with the PGN containing the GRI requested and all other fields set to the value indicating "Data not available".
- 2 - The device responds with the Acknowledge Group PGN (126208) containing the error state of "0x2 = Temporarily unable to comply".

If the request was global no response would be required. If the request was addressed to the device, then either response 1 or 2 would apply.

Single Frame: No Priority Default: 3 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Group Repetition Interval (GRI)	Byte Field Size: 4	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
DD027	Loran-C GRI	Group Repetition Interval (GRI) in nano-sec. Often cited in units of 10 micro-sec. (i.e., 9960 = 99,600,000 ns)	
DF45	Time interval, precise	int32 Range: +/- 2.14 s	Resolution: 1x10E-9 s
2	Station identifier	Byte Field Size: char 1	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
DD031	Loran-C Station ID	1-character code for the Loran-C station: M = master, V, W, X, Y, Z	
DF63	String, fixed	char8(n) Range: 0 to 1,785 characters	Resolution: 1 char
		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary. Unused characters shall be treated as not available, and filled with [0xFF] = Data not available.	
3	Station SNR	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD026	Loran-C SNR	Signal at standard sampling point / RMS noise in 3kHz BW at 100KHz	
DF31	dB, relative measure	int16 Range: +/- 327.64 dB	Resolution: 1x10E-2 dB

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4	Station ECD			Byte Field Size: 4		Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD032	Loran-C ECD					
							Envelope-to-Cycle Discrepancy (ECD) of the Loran-C pulse
	DF45	Time interval, precise	int32	Range: +/- 2.14 s		Resolution: 1x10E-9 s	
5	Station ASF			Byte Field Size: 4		Request Parameter	Optional
				Bit Field Size:		Command Parameter:	Optional
	DD033	Loran-C ASF					
							Additional Secondary Factor (ASF) associated with the propagation of the signal from a Loran-C station
	DF45	Time interval, precise	int32	Range: +/- 2.14 s		Resolution: 1x10E-9 s	

## Label

**PGN: 130060**  
**hex: 1FC0C**

The Label PGN is used to set and retrieve a text label assigned to a particular device or a particular hardware resource within a particular device.

The Label PGN supports multiple-channel devices.

Field programmability of the fields within this PGN over the network is optional, but if implemented shall be performed using the NMEA Command Group Function (126208).

Global ISO Requests (PGN 059904) for this Parameter Group shall be ignored.

Global NMEA Request Group Functions (PGN 126208) for this Parameter Group that do not specify Request Parameters shall be ignored.

- Response to a global or an addressed NMEA Request Group Function (PGN 126208) for this Parameter Group that specifies one or more Request Parameters shall be the transmission of this PGN once for each Hardware Channel ID with fields that match the specified parameters.
- Response to an addressed ISO Request (PGN 059904) for this Parameter Group shall be the transmission of this PGN once for each defined Hardware Channel ID, and once for the device itself.
- Response to an addressed NMEA Request Group Function (PGN 126208) for this Parameter Group that does not specify any request parameters shall be the transmission of this PGN once for each defined Hardware Channel ID, and once for the device itself. Response to a valid NMEA Command Group Function (PGN 126208) in addition to any required acknowledgement shall be the transmission of this PGN once for each defined Hardware Channel ID affected by the command.

Additionally, any other device operations that change the values for any Hardware Channel ID configuration shall also result in the transmission of this PGN for each defined Hardware Channel affected.

- To retrieve labels from a device, issue an addressed ISO request for this PGN to the device. Devices will respond to the ISO request by transmitting an occurrence of this PGN for each channel that is capable of being labeled, plus one for the device itself.
- To change the value of a label for a data source instance within a multiple-channel device, an NMEA Command Group Function (126208) is sent to the device with the "Hardware Channel ID" field set the appropriate Hardware Channel ID and the "Label" field set to the desired new label value.
- To change the value of a label for a device taken as a whole, an NMEA Command Group Function (126208) is sent to the device with the "Hardware Channel ID" field set to 252 (0xFC), and with the "Label" field set to the desired label text. The Label message transmitted for Hardware Channel ID 252 (0xFC) will always have Data Source Instance Field Number, Secondary Enumeration Field Number, and Parameter Field Number Fields set to 255 (0xFF).
- To change the value of a label for an entire PGN applicable to all fields within that PGN, an NMEA Command Group Function (126208) is sent to the device with the "Hardware Channel ID" field set to the appropriate Hardware Channel ID, and with the "Label" field set to the desired label text. The Label message transmitted in response will always have Data Source Instance Field Number, Secondary Enumeration Field Number, and Parameter Field Number Fields set to 255 (0xFF).
- If a text label is shared by more than one Hardware Channel ID, then all occurrences affected by the change shall be transmitted. For example, a single-channel device shall support Hardware Channel ID values of 0, for the single sensor channel, and 252, for the device as a whole. It may share a single text label between these two Hardware Channel ID fields, however; in this case, changing the label with Hardware Channel ID 252 will result in the label with Hardware Channel ID 0 also being changed to the same value, resulting in a transmission for both Hardware Channel ID 0 and 252.

Re-transmission of this PGN any time changes are made to its parameters is done so that all displays in the system will be able to update their stored versions of the labels as they are changed. Any displays or display software in the system that implement the Label PGN are required to monitor the network for occurrences of this PGN and to replace this data with the contents of the received message.

Note 1: Every Command Group Function transmitted for this PGN shall contain a value for Field 1(Hardware Channel ID). The value commanded shall identify the hardware channel that the remaining commanded fields apply to.

Refer to Appendix D for more detailed explanations and application examples.

Single Frame: N

Priority Default: 7

Default Update Rate: Upon Request

Frequency: #Type! cycles per second

Destination: Global

Query Support: Required

Command Support: Optional

ACK Rqmnts: None

Field #	Field Name					
1	Hardware Channel ID		Byte Field Size:	1	Request Parameter: Required	
			Bit Field Size:		Command Parameter: Note 1	
	DD357 Hardware Channel ID		0 through 251 = Identifier for a single “real” hardware resource, such as a temperature sensor or a single switch contact. Each label in a device will have a unique Hardware Channel ID. Values in this range are to be assigned to hardware resources sequentially beginning with 0 and increasing by one until all resources are assigned.			
			252 (0xFC) = Refers to the device as a whole, and the label associated with this value is the label for the entire device.			
			253 = Reserved 254 = Error 255 = Data Not Available			
	DF53 Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
Uniquely identifies a hardware resource within a device to which the label applies. Labels with this field set to 252 (0xFC) shall have the PGN field, Data Source Instance Field Number field, Data Source Instance Value field, Secondary Enumeration Field Number field, Secondary Enumeration Field Value field, and Parameter Field Number field set to their appropriate Data Not Available values.						
2	PGN		Byte Field Size:		Request Parameter: Optional	
			Bit Field Size:	24	Command Parameter: Optional	
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first			
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
	PGN of the parameter group to which this label applies					
3	Data Source Instance Field Number		Byte Field Size:	1	Request Parameter: Optional	
			Bit Field Size:		Command Parameter: Optional	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.			
	DF53 Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
	For parameter groups that are transmitted multiple times by the same node with differing data source instances, each representing different measurements; this field identifies the field number of that data source instance.					
The value 255 means that the Label is not specific to an instance.						

## Label

PGN: 130060  
hex: 1FC0C

### 4 Data Source Instance Value

Byte Field Size: 1  
Bit Field Size:

Request Parameter: Optional  
Command Parameter: Optional

DD128 Generic instance

0 = Instance 0  
1 = Instance 1  
2 = Instance 2  
n = Instance n, where n < 253  
253 = Reserved  
254 = Error  
255 = Not available

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

The data source instance value to be matched to determine which transmission of the parameter group is to be used as the data source for this channel. If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.

### 5 Secondary Enumeration Field Number

Byte Field Size: 1  
Bit Field Size:

Request Parameter: Required  
Command Parameter: Optional

DD005 Generic numeric ID, short

Number of route, waypoint, event, mark, etc.

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

For parameter groups that are transmitted multiple times by the same node with differing data type, each representing different measurements; this field identifies the field number of that data type.

The value 255 means that the Label is not specific to a Secondary Enumeration.

### 6 Secondary Enumeration Field Value

Byte Field Size: 1  
Bit Field Size:

Request Parameter: Required  
Command Parameter: Optional

DD358 Secondary Enumeration Field Value

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

The data type value to be matched to determine which transmission of the parameter group is to be used as the data source for this channel.

### 7 Parameter Field Number

Byte Field Size: 1  
Bit Field Size:

Request Parameter: Required  
Command Parameter: Optional

DD005 Generic numeric ID, short

Number of route, waypoint, event, mark, etc.

DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

This field indicates the field number of the field in the parameter group specified by the PGN Field (Field 2) containing the measurement which this label identifies.

The value 255 means that the Label is not specific to a field.

8	Label	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n)Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
Contains the text of the label. If this field is programmable, the device should be able to store a Label with a minimum length of 32 ASCII or 16 Unicode characters. If the field is not programmable, labels should not exceed more than 32 ASCII or 16 Unicode characters.		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	

## Channel Source Configuration

**PGN: 130061**  
**hex: 1FC0D**

The Channel Source Configuration parameter group is used to identify data sources that a device receives from the NMEA network to satisfy device operational requirements.

For example, if a device stores the vessel location any time an event monitored by the device occurs, and there are more than one GPS device aboard the vessel, this parameter group may be used to report and also command which GPS is used/to use by the device. An example may be a MOB sensor.

This parameter group is especially useful for 'black box' devices that have no native GUI for direct configuration, and therefore would require configuration over the network. The input being reported/configured is identified using a Data Source Channel ID, in similar fashion to the Label parameter group (PGN 130060) Hardware Channel ID.

However, the Data Source Channel ID in this case is related to a channel of information being consumed by the device from the network, where the Label parameter group Hardware Channel ID was a channel of information being produced/transmitted to the network. An example could be an autopilot that requires rudder position feedback.

The autopilot may assign Data Source Channel ID 0 to rudder position feedback. When the autopilot transmits this parameter group using Data Source Channel ID 0, it is indicating which specific rudder angle adapter is being used for rudder position feedback. In the event that a device supports both this parameter group and the Label parameter group, no assumptions should be made regarding the relationship between source channels and label channels. Global ISO Requests (PGN 059904) for this Parameter Group shall be ignored.

Global NMEA Request Group Functions (PGN 126208) for this Parameter Group that do not specify Request Parameters shall be ignored. Response to a global or an addressed NMEA Request Group Function (PGN 126208) for this Parameter Group that specifies one or more Request Parameters shall be the transmission of this PGN once for each Channel Source ID with fields that match the specified parameters.

Response to an addressed ISO Request (PGN 059904) for this Parameter Group shall be the transmission of this PGN once for each defined Channel Source ID. Response to an addressed NMEA Request Group Function (PGN 126208) for this Parameter Group that does not specify any request parameters shall be the transmission of this PGN once for each defined Channel Source ID.

Response to a valid NMEA Command Group Function (PGN 126208) in addition to any required acknowledgement shall be the transmission of this PGN once for each defined Channel Source ID affected by the command.

Additionally, any other device operations that change the values for any Channel Source ID configuration or selection shall also result in the transmission of this PGN for each defined Channel Source ID affected.

The NMEA Command group function can be used to set the values for a device that broadcasts this parameter group. The level of programmability is dependent on the manufacturer.

On receipt of a valid command, the response should be to immediately use the new criteria to select a new data source, and once selected this parameter group should be transmitted with the result of that selection. Improperly formatted commands or command value combinations not supported by the manufacturer should be negatively acknowledged in their entirety.

Note 1: When NMEA Command group function support is provided, minimum support shall include a value for field

1. Every command shall include a value for field 1 and shall be used to identify the input channel being configured/commanded.

Single Frame: **N** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

Field # Field Name

# Channel Source Configuration

PGN: 130061  
hex: 1FC0D

1	<b>Data Source Channel ID</b>	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Note 1
	<b>DD359</b> Data Source Channel ID	0 through 252 = Identification of a data values used by the device, such as a value used in a calculation, a value logged when an event occurs, or a value converted/output as a physical stimulus. Data Source Channel IDs in this range are assigned sequentially to data requirements beginning with 0 and increasing until all data requirements are assigned.	
	<b>DF53</b> Integer, 8 bit unsigned Uniquely identifies a required data input for the node.	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
2	<b>Source Selection Status</b>	Byte Field Size: Bit Field Size: 2	Request Parameter: Optional Command Parameter: Optional
	<b>DD360</b> Source Selection Status	0b00 = No source selected for this channel, NAME and mask if provided represent template to match. 0b01 = Source selected for this channel, NAME identifies source, mask if provided identifies template. 0b10 = Reserved. 0b11 = No Data Available.	
	<b>DF52</b> Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
3	<b>NMEA Reserved</b>	Byte Field Size: Bit Field Size: resv 2	Request Parameter: Command Parameter:
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"	
	<b>DF52</b> Bit field Used to align subsequent data on a byte boundary.	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
4	<b>NAME Selection Criteria Mask</b>	Byte Field Size: Bit Field Size: 12	Request Parameter: Optional Command Parameter: Optional
	<b>DD327</b> NAME Selection Criteria Mask	0xxx xxxx xxx1 = NAME shall match Unique ID field 0xxx xxxx xx1x = NAME shall match Manufacturer Code field 0xxx xxxx x1xx = NAME shall match Device Instance Lower field 0xxx xxxx 1xxx = NAME shall match Device Instance Upper field 0xxx xxx1 xxxx = NAME shall match Device Function field 0xxx xx0x xxxx = Reserved bit (aligns with NAME Reserved field 6) 0xxx x1xx xxxx = NAME shall match Device Class field 0xxx 1xxx xxxx = NAME shall match System Instance field 0xx1 xxxx xxxx = NAME shall match Industry Group field 0x0x xxxx xxxx = Reserved bit (aligns with NAME Reserved field 10) 00xx xxxx xxxx = Reserved bit 1111 1111 1111 = Data not Available, Mask not used 'x' = don't care Note that multiple matches are possible. Inactive field selections shall be transmitted as 0. Reserved bits within the field shall be transmitted as 0, except when transmitting "Data Not Available, Mask not used".	
	<b>DF52</b> Bit field Identifies which NAME field(s) of the Address Claim Parameter Group (PGN 060928) must be matched when selecting the source for the data channel.	bit(n) Range: Variable Resolution: 1	Used to construct bit fields

## Channel Source Configuration

**PGN: 130061**  
**hex: 1FC0D**

<b>5</b>	<b>Source NAME</b>	<i>Byte Field Size:</i> <b>8</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD320</b> Network ID NAME	This field is defined by fields 1- 10 of PGN 60928		
	<b>DF56</b> Integer, 64 bit unsigned	<b>uint64</b>	<i>Range:</i> 0 to (2E+64)-4	<i>Resolution:</i> 1 bit Unit-less number
	Address Claim NAME of the node used as a source for this data channel			
<b>6</b>	<b>PGN</b>	<i>Byte Field Size:</i>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i> <b>24</b>	<i>Command Parameter:</i>	Optional
	<b>DD009</b> PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1 Used to construct bit fields
	Parameter group to be received for this data channel.			
<b>7</b>	<b>Data Source Instance Field Number</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD005</b> Generic numeric ID, short	Number of route, waypoint, event, mark, etc.		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252	<i>Resolution:</i> 1 bit Unit-less number
	For parameter groups that are transmitted multiple times by the same node with differing data source instances, each representing different measurements; this field identifies the field number of that data source instance.			
<b>8</b>	<b>Data Source Instance Value</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD128</b> Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252	<i>Resolution:</i> 1 bit Unit-less number
	The data source instance value to be matched to determine which transmission of the parameter group is to be used as the data source for this channel. If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			
<b>9</b>	<b>Secondary Enumeration Field Number</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD005</b> Generic numeric ID, short	Number of route, waypoint, event, mark, etc.		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252	<i>Resolution:</i> 1 bit Unit-less number
	For parameter groups that are transmitted multiple times by the same node with differing data type, each representing different measurements; this field identifies the field number of that data type.			
<b>10</b>	<b>Secondary Enumeration Field Value</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
	<b>DD358</b> Secondary Enumeration Field Value			
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252	<i>Resolution:</i> 1 bit Unit-less number
	The data type value to be matched to determine which transmission of the parameter group is to be used as the data source for this channel.			



11

Parameter Field Number

Byte Field Size: 1

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Optional

DD005

Generic numeric ID, short

Number of route, waypoint, event, mark, etc.

DF53

Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

For parameter groups that contain multiple fields representing different measurements of the same parameter, this field identifies a specific field within the transmitted parameter group to be used as the data source for this channel.

## Route and WP Service - Database List

**PGN: 130064**  
**hex: 1FC10**

Complex request for this PGN should return a list of Databases in which a navigation Device organizes its Routes and WPs. A Database may contain one WP-List and multiple Routes. A device need not support the concept of multiple Databases. The support of this PGN is then optional and the default Database ID = 0 shall be used in other "Route and Waypoint Service" PGNs. If supporting this PGN the Number of Databases defaults to 1. The reply should use the same transfer protocol as the request. ISO request shall, if this PGN is supported, return the 3 first fields with respectively: NA, 0 and the Number of Databases Available. For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Start Database ID</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	1st Database ID requested/sent. If not specified in the request, the reply shall default to the lowest available Database ID. If the requested Database does not exist, the default response is the next highest Database ID.		
<b>2</b>	<b>nItems</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	n Databases requested/sent. If not specified in the request, the reply shall include all Databases available (or as many as the transport protocol space permits).		
<b>3</b>	<b>Number of Databases available</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
<b>4</b>	<b>Database ID</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	Databases shall be included in this PGN in the order of increasing ID.		

## Route and WP Service - Database List

PGN: 130064

hex: 1FC10

5	Database Name	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
6	Database Timestamp	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD158	Generic time of day	24 hour clock, 0 = midnight, time is in UTC	
DF06	Time of day	uint32 Range: 0 to 86,401 s	Resolution: 1x10E-4 s
		~24 hours, 0 = midnight, range allows for up to two leap seconds per day	
7	Database Datestamp	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD039	Generic date	Days since January 1, 1970, Date is relative to UTC Time.	
DF41	Date, day count	uint16 Range: 0 to 65,532 days	Resolution: 1 day
		0 = January 1, 1970, max = ~179 years	
8	WP Position Resolution	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 4	Command Parameter: Optional
DD238	WP Position Resolution	0= [>0.1min.], 1= [<=0.1 & >0.01min.], 2= [<=0.01 & >0.001] 3= [<=0.001 & >0.0001] 4= [<=0.0001 & >=0.000001min.] 5-6 =reserved, 7= Not available (not known) (1min. = 0.01667deg.)	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1
		Used to construct bit fields	
9	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 4	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1
		Used to align subsequent data on a byte boundary.	

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## Route and WP Service - Database List

PGN: 130064

hex: 1FC10

10	Number of Routes in Database		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.			
	DF54	Integer, 16 bit unsigned	uint16	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
11	Number of WPs in Database		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
	Includes WPs from the WP-List and all other WPs embedded in Routes					
12	Number of Bytes in Database		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
13	Fields 4 thru 12 repeat as needed		Byte Field Size:	?	Request Parameter	Optional
			Bit Field Size:	n	Command Parameter:	Optional
	DD000	Undefined				
	DF00	Undefined	Undefined	Range: undefined	Resolution: undefined	Application specific, defined at time of use.

## Route and WP Service - Route List

**PGN: 130065**  
**hex: 1FC11**

Complex request for this PGN should return a list of Routes in a Database. A Database may contain Routes identified with Route ID in the range 0-65532. There may be empty gaps (the Route ID does not represent a valid/existent Route) anywhere in this range. This PGN shall include valid Routes only. The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Start Route ID</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Required</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	1st Route ID requested/sent. If not specified in the request, the reply shall default to the lowest available Route ID. If the requested Route is not available, the default response is the next highest Route ID.		
<b>2</b>	<b>nItems</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Required</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	n Routes requested/sent. If not specified in the request, the reply shall include all Routes available in the Database (or as many of them as the transport protocol space permits).		
<b>3</b>	<b>Number of Routes available in Database</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
<b>4</b>	<b>Database ID</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Required</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	Should be specified in the request. Is typically gathered from a prior "Database List PGN". If not specified in the request, the reply may use a default Database.		
<b>5</b>	<b>Route ID</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	Routes shall be included in this PGN in the order of increasing ID, skipping non-valid Routes.		

## Route and WP Service - Route List

PGN: 130065

hex: 1FC11

6	Route Name	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
7	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 2	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1
	Used to align subsequent data on a byte boundary.	Used to construct bit fields	
8	WP Identification Method	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
DD240	WP Identification Method	0=WP's in WP-List, 1=WP embedded in Rute, 2=Reserved 3=Null (info not available)	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1
		Used to construct bit fields	
9	Route Status	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 4	Command Parameter: Optional
DD239	Route Status	0=Active, 1=Inactive, 2=Deleted, 3-13= Reserved, 14=Error, 15= Null	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1
		Used to construct bit fields	
10	Fields 5 thru 9 repeat as needed	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	Undefined Range: undefined	Resolution: undefined
		Application specific, defined at time of use.	

Complex request for this PGN should return the attributes of a Route or the WP-List. WARNING: The Route Track may not be defined by the Waypoint positions only: The Navigation Method (GC/RL) and Radius of Turn at each Waypoint are optional additional parameters defining the Track. PGN 130066 field #8 "Critical supplementary parameters" shall be used to determine if there are additional parameters to the Waypoint positions. For a complete description of the Route and WP PGNs, see the application note in Appendix D. A Database may contain one WP-List and multiple Routes. The Database ID and the Route ID shall be specified in the request/reply. Route ID = 65535 (NA) indicates that the request/reply is addressing the WP-List. This PGN contains parameters common for the Route or WP-List. The individual Waypoints with positions and other associated parameters must be requested/transferred in other "Route and WP Service" PGNs, such as PGN 130067 "Route - WP Name & Position". The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: NoPriority Default: 7Default Update Rate:                      millisecondsFrequency: NA cycles per second

Destination: GlobalQuery Support: RequiredCommand Support: OptionalACK Rqmnts: None

Field #	Field Name						
1	Database ID		Byte Field Size:	2	Request Parameter	Required	
			Bit Field Size:		Command Parameter:	Optional	
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54	Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolution:	1 bit
2	Route ID		Byte Field Size:	2	Request Parameter	Required	
			Bit Field Size:		Command Parameter:	Optional	
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54	Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolution:	1 bit
Set to 65535 (NA) to access the WP-List in the Database.							
3	Route/WP-List Name		Byte Field Size:	8 or 16   n	Request Parameter	Optional	
			Bit Field Size:		Command Parameter:	Optional	
	DD004 Generic name string, short		Name of place, route, waypoint, destination, vessel, vehicle, etc.				
	DF50	String, variable, short	ch8or16(n)	Range:	0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution:	1 ASCII or 1 Unicode Character

## Route and WP Service - Route/WP-List Attributes

PGN: 130066

hex: 1FC12

4	Route/WP-List Timestamp	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD158	Generic time of day	24 hour clock, 0 = midnight, time is in UTC	
DF06	Time of day	uint32 Range: 0 to 86,401 s	Resolution: 1x10E-4 s ~24 hours, 0 = midnight, range allows for up to two leap seconds per day
5	Route/WP-List Datestamp	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD039	Generic date	Days since January 1, 1970, Date is relative to UTC Time.	
DF41	Date, day count	uint16 Range: 0 to 65,532 days	Resolution: 1 day 0 = January 1, 1970, max = ~179 years
6	Change at Last Timestamp	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 8	Command Parameter: Optional
DD237	Changed at timestamp flag	0000 0000 = No change in data. 0xxx xxx1 = WP: Change in main data (Position, Name) 0xxx xx1x = WP: Change in supplementary parameters (or new added) 0xxx x1xx = Changed no. of WP's in Route/WP-List, and/or name changed/added 0xxx 1xxx = Route: Change supplementary parameters (or new added) 0xx1 xxxx = Reserved 0x1x xxxx = Reserved 01xx xxxx = Other not specified change 1111 1111 = This flag is not supported x = don't care	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields
7	Number of WPs in the Route/WP-List	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
DF54	Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
8	Critical supplementary parameters	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 8	Command Parameter: Optional
DD258	Critical supplementary Route parameters	0000 0000 = There are no parameters additional to the Waypoint Positions xxxx xxx1 = Navigation Method (GC/RL), PGN 130069 xxxx xx1x = XTE Limit, PGN 130069 xxxx x1xx = Spare xxxx 1xxx = Spare xxx1 xxxx = Spare xx1x xxxx = Spare x1xx xxxx = Spare 1xxx xxxx = Spare	
		Each of these bitflags represents a parameter. If a flag is '1', the parameter must be downloaded and appended to the Route information. Ignoring any of these parameters will not be safe.	
		The spare flags shall be transmitted as '0's.	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields



## Route and WP Service - Route/WP-List Attributes

PGN: 130066

hex: 1FC12

<b>9</b>	<b>Navigation Method</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD119</b> Calculation Type		0 = Great Circle calculations, 1 = Rhumb Line calculations, 2 = Error, 3 = Null		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Not applicable to the WP-List NOTE: This is the default Navigation Method for the Route. It may be altered for specific legs. Ref. field 8, Critical supplementary parameters.				
<b>10</b>	<b>WP Identification Method</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	Optional
	<b>DD240</b> WP Identification Method		0=WP's in WP-List, 1=WP embedded in Rute, 2=Reserved 3=Null (info not available)		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Not applicable to the WP-List				
<b>11</b>	<b>Route Status</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<b>4</b>	<i>Command Parameter:</i>	Optional
	<b>DD239</b> Route Status		0=Active, 1=Inactive, 2=Deleted, 3-13= Reserved, 14=Error, 15= Null		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Not applicable to the WP-List				
<b>12</b>	<b>XTE Limit for the Route</b>	<i>Byte Field Size:</i>	<b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD149</b> Distance ordered		A commanded distance like radius order, off-track limit, etc.		
	<b>DF74</b> Distance, rough	<b>int16</b>	<i>Range:</i> +/-32,764 m	<i>Resolution:</i> 1 m	
	No negative values. The limit applies to both sides of the track. Not applicable to the WP-List. NOTE: This is the default XTE-Limit for the Route. It may be altered for specific legs. Ref. field 8, Critical supplementary parameters.				
<b>13</b>	<b>NMEA Reserved</b>	<i>Byte Field Size:</i>		<i>Request Parameter</i>	
		<i>Bit Field Size:</i>	resv 0	<i>Command Parameter:</i>	
	<b>DD001</b> Reserved field		Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
	Additional future Route parameters (eg. Radius of Turn, etc). Fields are normally not reserved at the end of a PGN because it is a general rule that new parameters may be appended to an existing (non-single frame) PGN. This is a reminder.				

## NMEA 2000 Appendix B.1 - Parameter Groups Report

Version 3.002 - 09-Feb-23

## Route and WP Service - Route - WP Name & Position

PGN: 130067

hex: 1FC13

Complex request of this PGN should return the Waypoints belonging to a Route.

**WARNING:** The Route Track may not be defined by the Waypoint positions only: The Navigation Method (GC/RL) and Radius of Turn at each Waypoint are optional additional parameters defining the Track.

PGN 130066 field #8 "Critical supplementary parameters" shall be used to determine if there are additional parameters to the

Waypoint positions. For a complete description of the Route and WP PGNs, see the application note in Appendix D.

The Waypoints of a Route are numbered with RPS# continuously from 0 and up in the Forward Direction. RPS# is the sequence number of the Waypoint in the Route. (Route Point Sequence #). A Database may contain one WP-List and multiple Routes. The WP-List holds Waypoints identified by WPID in the range 0-65532. Each of these may be single or belong to one or multiple Routes in the Database.

A Waypoint may be private to a particular Route and not exist in the WP List, its WPID shall then be 65535(NA).

The Database ID and Route ID shall be specified in the request/reply.

These will typically be selected from the information received in other "Route and WP Service" PGNs previously requested from the same Device. The Waypoint Name (if available) and Position shall be filled with valid data, even if the Waypoints are from the WP-List which the receiver may already have downloaded.

The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Start RPS#	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	RPS# of the 1st requested/sent Waypoint. If not specified in the request, the default is the first RPS# (=0) of the Route.		
2	nItems	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	n Waypoints requested/sent. If not specified in the request, the reply shall include all WPs of the Route (or as many thereof as the transport protocol space permits).		
3	Number of WPs in the Route	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	The receiver will use this parameter to determine if it has received all WPs of the complete route.		
4	Database ID	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number

## Route and WP Service - Route - WP Name &amp; Position

PGN: 130067

hex: 1FC13

5	Route ID	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
6	WPID	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	Shall have valid data if the Waypoint exists in the WP List.		
	The Waypoints shall be included in the order of increasing RPS# (The order of appearance in the Forward Direction of the Route).		
7	WP Name	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD004 Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
	DF50 String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
	Max. 30 ASCII or Unicode Characters		
	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.		
8	WP Latitude	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD022 Latitude, WGS-84	Latitude referenced to WGS-84.	
	DF23 Latitude	int32 Range: +/- 90 deg	Resolution: 1x10E-7 deg "-" = South, resolution ~1.1 cm
9	WP Longitude	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD023 Longitude, WGS-84	Longitude referenced to WGS-84.	
	DF25 Longitude	int32 Range: +/- 180 deg	Resolution: 1x10E-7 deg "-" = West, resolution ~1.1 cm

10	Fields 6 thru 9 repeat as needed	Byte Field Size: ?	Request Parameter	Optional
		Bit Field Size: n	Command Parameter:	Optional
DD000	Undefined			
DF00	Undefined	Undefined Range: undefined	Resolution: undefined	Application specific, defined at time of use.

## Route and WP Service - Route - WP Name

PGN: 130068

hex: 1FC14

Complex request of this PGN should return the Waypoints belonging to a Route. WARNING: The Route Track may not be defined by the Waypoint positions only: The Navigation Method (GC/RL) and Radius of Turn at each Waypoint are optional additional parameters defining the Track. PGN 130066 field #8 "Critical supplementary parameters" shall be used to determine if there are additional parameters to the Waypoint positions. For a complete description of the Route and WP PGNs, see the application note in Appendix D. The Waypoints of a Route are numbered with RPS# continuously from 0 and up in the Forward Direction. RPS# is the sequence number of the Waypoint in the Route. (Route Point Sequence #). A Database may contain one WP-List and multiple Routes. The WP-List holds Waypoints identified by WPID in the range 0-65532. Each of these may be single or belong to one or multiple Routes in the Database. A Waypoint may be private to a particular Route and not exist in the WP List, its WPID shall then be 65535(NA). The Database ID and Route ID shall be specified in the request/reply. These will typically be selected from the information received in other "Route and WP Service" PGNs previously requested from the same Device. The Waypoint Name (if available) and Position shall be filled with valid data, even if the Waypoints are from the WP-List which the receiver may already have downloaded. The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
 Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Start RPS#	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	1st RPS# requested/sent		
2	nItems	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	n RPS# requested/sent		
3	Number of WPs in the Route	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
4	Database ID	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
5	Route ID	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
6	WPID	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number

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7	WP Name	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n)Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
Max. 30 ASCII or Unicode Characters		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
8	field 6 thru 7 repeat as needed	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	UndefinedRange: undefined	Resolution: undefined
		Application specific, defined at time of use.	

# Route and WP Service - XTE Limit & Navigation Method

PGN: 130069

hex: 1FC15

Complex request of this PGN will return XTE Limit and/or Navigation Method specific to individual legs of a Route. The Database ID and Route ID shall be specified in the request/reply. The parameters apply to the one leg after the Waypoint identified with RPS# in the Forward Direction of the Route and overrides any Route default XTE Limit and Navigation Method. Waypoints where none of these parameters has valid data shall not be included in this PGN. The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported. For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Start RPS#	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	1st RPS# requested/sent		
	If not specified in the request, the default is the lowest RPS# with valid data.		
	If the requested RPS# has no valid data, the default response is the next highest RPS#.		
2	nItems	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	n RPS# requested/sent.		
	If not specified in the request, the reply shall include all RPS# with valid data (or as many the transfer protocol space permits).		
3	Number of Waypoints with a specific XTE Limit or Nav. Method	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	Note: This may be less than Number of Waypoints in the Route.		
4	Database ID	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
5	Route ID	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
6	RPS#	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	Waypoints without individually specific XTE Limit or Navigation Method shall not be included.		

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## Route and WP Service - XTE Limit & Navigation Method

PGN: 130069

hex: 1FC15

7	<b>XTE limit in the leg after WP</b>	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	<b>DD149</b> Distance ordered	A commanded distance like radius order, off-track limit, etc.	
	<b>DF74</b> Distance, rough	int16 Range: +/-32,764 m	Resolution: 1 m
	No negative values. The limit applies to both sides of the track.		
8	<b>Nav. Method in the leg after WP</b>	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 2	Command Parameter: Optional
	<b>DD119</b> Calculation Type	0 = Great Circle calculations, 1 = Rhumb Line calculations, 2 = Error, 3 = Null	
	<b>DF52</b> Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields
9	<b>NMEA Reserved</b>	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 6	Command Parameter:
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"	
	<b>DF52</b> Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields
	Used to align subsequent data on a byte boundary.		
10	<b>Fields 6 thru 9 repeat as needed</b>	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
	<b>DD000</b> Undefined		
	<b>DF00</b> Undefined	Undefined Range: undefined	Resolution: undefined Application specific, defined at time of use.



## Route and WP Service - WP Comment

PGN: 130070

hex: 1FC16

Complex request of this PGN should return supplementary Comments attached to Waypoints in a Route or a WP-List. Waypoints without a Comment shall not be included in this PGN. If the Route ID is set to 65535 (NA), the Comments will be for the Waypoints in the WP-List. The Database ID shall be specified in the request/reply. The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported. For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Start ID	Byte Field Size: 2	Request Parameter: Required
	DD007 Generic numeric ID, medium	Bit Field Size:	Command Parameter: Optional
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	1st requested/sent WPID in a WP-List or RPS# in a Route. If not specified in the request, the default is the lowest WPID/RPS# with a Comment. If the requested WPID/RPS# does not have a Comment, the default response is the next highest WPID/RPS#.		
2	nItems	Byte Field Size: 2	Request Parameter: Required
	DD007 Generic numeric ID, medium	Bit Field Size:	Command Parameter: Optional
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	n Waypoints requested/sent. If not specified in the request, the default is the all the Waypoints with a Comment (or as many the transfer protocol permits).		
3	Number of WPs with Comments	Byte Field Size: 2	Request Parameter: Optional
	DD007 Generic numeric ID, medium	Bit Field Size:	Command Parameter: Optional
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
4	Database ID	Byte Field Size: 2	Request Parameter: Required
	DD007 Generic numeric ID, medium	Bit Field Size:	Command Parameter: Optional
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
5	Route ID	Byte Field Size: 2	Request Parameter: Required
	DD007 Generic numeric ID, medium	Bit Field Size:	Command Parameter: Optional
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	Set to 65535 (NA) to access the WP-List in the Database.		
6	WPID / RPS#	Byte Field Size: 2	Request Parameter: Optional
	DD007 Generic numeric ID, medium	Bit Field Size:	Command Parameter: Optional
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	WPID shall be used when addressing a WP-List. RPS# shall be used when addressing a Route.		

7	Comment	Byte Field Size: 8 or 16 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD198	Generic name string, Medium	Medium size text strings.	
DF51	String, variable, medium	ch8or16(n)Range: 0 to 1,782 ASCII or 0 to 891 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
	Max 1782 ASCII or 891 Unicode characters		3 to 1,785 bytes. First and Second bytes in string (unit16) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Third byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 3 bytes, i.e. Count = 3) is a null string.
8	Fields 6 thru 7 repeat as needed	Byte Field Size: ? Bit Field Size: n	Request Parameter: Optional Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	UndefinedRange: undefined	Resolution: undefined
			Application specific, defined at time of use.

## Route and WP Service - Route Comment

PGN: 130071

hex: 1FC17

Complex request of this PGN should return supplementary Comments attached to Routes. The Database ID shall be specified in the request/reply. Routes without a comment shall not be included in this PGN. The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported. For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Start Route ID</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	1st Route ID requested/sent. If not specified in the request, the reply shall default to the lowest Route ID with a Comment. If the requested Route has no Comment, the default response is the next highest Route ID.		
<b>2</b>	<b>nItems</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	n Routes requested/sent. If not specified in the request, the reply shall include all Routes with a Comment in the Database (or as many of them as the transport protocol space permits).		
<b>3</b>	<b>Number of Routes with Comments</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
<b>4</b>	<b>Database ID</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
<b>5</b>	<b>Route ID</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned <b>uint16</b>	Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number

6	Comment	Byte Field Size: 8 or 16 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD198	Generic name string, Medium	Medium size text strings.	
DF51	String, variable, medium	ch8or16(n)Range: 0 to 1,782 ASCII or 0 to 891 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character 3 to 1,785 bytes. First and Second bytes in string (unit16) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Third byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 3 bytes, i.e. Count = 3) is a null string.
7	Fields 5 thru 6 repeat as needed	Byte Field Size: ? Bit Field Size: n	Request Parameter: Optional Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	UndefinedRange: undefined	Resolution: undefined Application specific, defined at time of use.

## Route and WP Service - Database Comment

PGN: 130072

hex: 1FC18

Complex request of this PGN should return supplementary Comments attached to Databases in the navigation Device. Databases without a Comment shall not be included in this PGN. The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if PGN is supported. For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Start Database ID	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	1st Database ID requested/sent. If not specified in the request, the reply shall default to the lowest Database ID with a Comment. If the requested Database has no Comment, the default response is the next highest Database ID.		
2	nItems	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	n Databases requested/sent. If not specified in the request, the reply shall include all Databases with a Comment (or as many of them as the transport protocol space permits).		
3	Number of Databases with comments	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
4	Database ID	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number

5	Comment text	Byte Field Size: 8 or 16 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD198	Generic name string, Medium	Medium size text strings.	
DF51	String, variable, medium	ch8or16(n)Range: 0 to 1,782 ASCII or 0 to 891 Unicode Characters Resolution: 1 ASCII or 1 Unicode Character	3 to 1,785 bytes. First and Second bytes in string (unit16) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Third byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 3 bytes, i.e. Count = 3) is a null string.
	Max. 1782 ASCII or 891 Unicode characters		
6	Fields 4 thru 5 repeat as needed	Byte Field Size: ? Bit Field Size: n	Request Parameter: Optional Command Parameter: Optional
DD000	Undefined		
DF00	Undefined	UndefinedRange: undefined Resolution: undefined	Application specific, defined at time of use.

## Route and WP Service - Radius of Turn

PGN: 130073

hex: 1FC19

Complex request of this PGN should return the Radius of Turn at specific Waypoints of a Route. For a complete description of the Route and WP PGNs, see the application note in Appendix D. The Radius of Turn is described in Appendix D.5.15.6. The Database ID and Route ID shall be specified in the request/reply. The Radius overrides any Route default Radius of Turn. Only those Waypoints with an individually specified Radius of Turn shall be included in this PGN. The Waypoints are identified with RPS#. The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Start RPS#	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	1st RPS# requested/sent If not specified in the request, the default is the first RPS# with valid data. If the requested RPS# has no valid data, the default response is the next highest RPS#.		
2	nItems	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	n RPS# requested/sent If not specified in the request, the reply shall include all RPS# with valid data (or as many the transfer protocol space permits).		
3	Number of Waypoints with a specific Radius of Turn	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	Note: This may be less than the number of Waypoints in the Route		
4	Database ID	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
5	Route ID	Byte Field Size: 2 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
6	RPS#	Byte Field Size: 2 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	Waypoints using the Route-default Radius or no Radius shall not be included.		

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7	Radius of Turn	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD149 Distance ordered	A commanded distance like radius order, off-track limit, etc.	
	DF74 Distance, rough	int16 Range: +/-32,764 m	Resolution: 1 m
	No negative values.		
8	Fields 6 and 7 repeated as needed	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
	DD000 Undefined		
	DF00 Undefined	Undefined Range: undefined	Resolution: undefined
	Application specific, defined at time of use.		



## Route and WP Service - WP List - WP Name &amp; Position

PGN: 130074

hex: 1FC1A

Complex request of this PGN should return the Waypoints of a WP-List. WARNING: The Route Track may not be defined by the Waypoint positions only: The Navigation Method (GC/RL) and Radius of Turn at each Waypoint are optional additional parameters defining the Track. PGN 130066 field #8 "Critical supplementary parameters" shall be used to determine if there are additional parameters to the Waypoint positions. For a complete description of the Route and WP PGNs, see the application note in Appendix D. The WP-List has Waypoints identified by WPID in the range 0-65532. Each of these may be single or belong to one or multiple Routes in the Database. There may be empty gaps anywhere in the range of WPIDs. These (non-valid WPs) shall not be included in this PGN. A Waypoint is valid when its Position is valid. A Database may contain one WP-List and multiple Routes. The Database ID shall be specified in the request/reply. The Database ID will typically be selected from the information received in the "Route and WP Service - Database List" PGN previously requested from the same Device. The reply should use the same transfer protocol as the request. ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Required Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Start WPID	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	1st requested/sent WPID.		
	If not specified in the request, the default is the lowest WPID with a valid Waypoint.		
	If the requested Waypoint is not valid, the default response is the next highest WPID.		
2	nItems	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	n Waypoints requested/sent.		
	Non-valid Waypoints shall be skipped and is not included in this count.		
	If not specified in the request, the reply shall include all valid WPs of the WP-List (or as many thereof as the transport protocol space permits).		
3	Number of valid WPs in the WP-List	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
4	Database ID	Byte Field Size: 2	Request Parameter: Required
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
5	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 16	Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
	Used to align subsequent data on a byte boundary.		

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## Route and WP Service - WP List - WP Name &amp; Position

PGN: 130074

hex: 1FC1A

6	WPID	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.
	DF54	Integer, 16 bit unsigned uint16 Range: 0 to 65,532 Resolution: 1 bit	Unit-less number
	The Waypoints shall be included in the order of increasing WPIDs. Non-valid WPs shall not be included.		
7	WP Name	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.
	DF50	String, variable, short ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	Max. 30 ASCII or Unicode Characters		
8	WP Latitude	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD022	Latitude, WGS-84	Latitude referenced to WGS-84.
	DF23	Latitude int32 Range: +/- 90 deg Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
9	WP Longitude	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD023	Longitude, WGS-84	Longitude referenced to WGS-84.
	DF25	Longitude int32 Range: +/- 180 deg Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
10	Fields 6 thru 9 repeat as needed	Byte Field Size: ?	Request Parameter: Optional
		Bit Field Size: n	Command Parameter: Optional
	DD000	Undefined	
	DF00	Undefined Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.

## Wind Data

**PGN: 130306**  
**hex: 1FD02**

Direction and speed of Wind. True wind can be referenced to the vessel or to the ground. The Apparent Wind is what is felt standing on the (moving) ship, i.e., the wind measured by the typical mast head instruments. The boat referenced true wind is given by the vector sum of Apparent wind and vessel's heading and speed through the water. The ground referenced true wind is given by the vector sum of Apparent wind and vessel's heading and speed over ground.

Single Frame: **Yes** Priority Default: **2** Default Update Rate: **100** milliseconds Frequency: **10.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Wind Speed</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD044</b>	Generic Speed		
<b>DF35</b>	Speed	<b>uint16</b> Range: <b>0 to 655.32 m/s</b> Resolution: <b>1x10E-2 m/s</b>	1 Knot = 0.5144 m/s
<b>3</b>	<b>Wind Direction</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD045</b>	Wind Direction		
<b>DF02</b>	Angle	<b>uint16</b> Range: <b>0 to 2Pi rad</b> Resolution: <b>1x10E-4 rad</b>	Resolution ~0.0057deg, 1 deg = .01745 rad
<b>4</b>	<b>Wind Reference</b>	Byte Field Size: Bit Field Size: <b>3</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD205</b>	Wind Reference	<p>0x00 = Theoretical Wind (ground referenced, referenced to True North; calculated using COG/SOG)</p> <p>0x01 = Theoretical Wind (ground referenced, referenced to Magnetic North; calculated using COG/SOG)</p> <p>0x02 = Apparent Wind (relative to the vessel centerline)</p> <p>0x03 = Theoretical (Calculated to Centerline of the vessel, referenced to ground; calculated using COG/SOG)</p> <p>0x04 = Theoretical (Calculated to Centerline of the vessel, referenced to water; calculated using Heading/Speed through Water)</p> <p>0x05 = Reserved</p> <p>0x06 = Error</p> <p>0x07 = Null</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields

5	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 21	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to align subsequent data on a byte boundary.		Used to construct bit fields		

## Environmental Parameters - DEPRECATED

PGN: 130310

hex: 1FD06

This PGN has been deprecated (as of version 1.200, PGN 130311 replaced PGN 130310) and is not recommended for new designs. However, support of PGN 130310 may be necessary to ensure compatibility with legacy equipment. PGN 130311 has also been deprecated as of version 1.210. The following PGNs are recommended to be used for new designs: 130314-Actual Pressure, 130315-Set Pressure, 130316-Temperature-Extended Range. The latest definition of PGN 130310 before deprecation was as follows: Local atmospheric environmental conditions.

Single Frame: Yes Priority Default: 5 Default Update Rate: 500 milliseconds Frequency: 2. cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

### Field # Field Name

1	Sequence ID	Byte Field Size: 1	Request Parameter: Optional
	DD056 Sequence ID	Bit Field Size:	Command Parameter: Optional
	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.		
	0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)		
	253 - 254 = reserved for future use		
	255 = No binding provided. NMEA recommends using binding SID values whenever practical.		
	DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252	Resolution: 1 bit Unit-less number
2	Water Temp	Byte Field Size: 2	Request Parameter: Optional
	DD043 Generic Temperature	Bit Field Size:	Command Parameter: Optional
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K
3	Outside Ambient Air Temp.	Byte Field Size: 2	Request Parameter: Optional
	DD043 Generic Temperature	Bit Field Size:	Command Parameter: Optional
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K
4	Atmospheric Pressure	Byte Field Size: 2	Request Parameter: Optional
	DD049 Generic Pressure	Bit Field Size:	Command Parameter: Optional
	DF47 Pressure, medium	uint16 Range: 0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa
5	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 8	Command Parameter:
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields
	Used to align subsequent data on a byte boundary.		

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## Environmental Parameters- DEPRECATED

PGN: 130311

hex: 1FD07

This PGN has been deprecated (as of version 1.210) and is not recommended for new designs. However, support of PGN 130311 may be necessary to ensure compatibility with legacy equipment. This PGN 130311 was originally created as a replacement to PGN 130310 in version 1.200. This PGN 130311 has since been deprecated (as of version 1.210, PGN's 130312, 130313, 130314, and 130315 replaced PGN 130311) and is not recommended for new designs. However, support of PGN 130311 may be necessary to ensure compatibility with legacy equipment. PGN 130312 has also been deprecated and replaced by PGN 130316 as of version 1.310. The following PGNs are recommended to be used for new designs: 130314-Actual Pressure, 130315-Set Pressure, 130316-Temperature-Extended Range. The latest definition of PGN 130311 before deprecation was as follows: Environmental Conditions contains Temperature, Humidity, and Atmospheric Pressure. This PGN is a rework of PGN 130310.

Single Frame: **Yes** Priority Default: **5** Default Update Rate: **500** milliseconds Frequency: **2.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Temperature Instance</b>	Byte Field Size: Bit Field Size: <b>6</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD229</b>	Temperature Instance	<p>0x00 = Sea Temperature, 0x01 = Outside Temperature, 0x02 = Inside Temperature, 0x03 = Engine Room Temperature, 0x04 = Main Cabin Temperature, 0x05 = Reserved, thru 0x3E = Reserved, 0x3F = Data Not Available</p>	
<b>DF52</b>	Bit field Used to qualify contents of field 4	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields
<b>3</b>	<b>Humidity Instance</b>	Byte Field Size: Bit Field Size: <b>2</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD230</b>	Humidity Instance	<p>0x00 = Inside Humidity, 0x01 = Outside Humidity, 0x02 = reserved, 0x03 = Data Not Available</p>	
<b>DF52</b>	Bit field Used to qualify contents of field 5	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields

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# Environmental Parameters- DEPRECATED

PGN: 130311  
hex: 1FD07

4	Temperature		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD043	Generic Temperature		
	DF39	Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K
5	Humidity		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD231	Humidity		
		Relative Humidity		
	DF84	Percent, Relative Measur	int16 Range: -131.072% to 131.056%	Resolution: 4x10E-3 %
6	Atmospheric Pressure		Byte Field Size: 2	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD049	Generic Pressure		
	DF47	Pressure, medium	uint16 Range: 0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa

## Temperature - DEPRECATED

PGN: 130312

hex: 1FD08

This PGN 130312 was originally created as a replacement for Temperature provided by PGN 130311 in version 1.210. PGN 130312 has also been deprecated and replaced by PGN 130316 as of version 1.310. However, support of PGN 130312 may be necessary to ensure compatibility with legacy equipment. The following PGN is recommended to be used for new designs: 130316-Temperature-Extended Range. The latest definition of PGN 130312 before deprecation was as follows: This PGN contains the Sequence ID, a Temperature Instance, Temperature Source, Temperature Value, and Set Temperature. For example the Temperature might be the temperature of sea water or live well as defined by the Temperature Source (field 3), with a Temperature Instance (field 2) of 1. Using Set Temperature (field 5) this PGN can also be used to control temperature or to report a targeted temperature. This PGN is a rework of PGN 130311 and was introduced in version 1.210 of this standard.

Single Frame: **Yes** Priority Default: **5** Default Update Rate: **2000** milliseconds Frequency: **.5** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

1	Sequence ID	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD056</b> Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.	
		0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)	
		253 - 254 = reserved for future use	
		255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
2	Temperature Instance	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD128</b> Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			



## Temperature - DEPRECATED

PGN: 130312

hex: 1FD08

### 3 Temperature Source

Byte Field Size:

Bit Field Size: 8

Request Parameter

Optional

Command Parameter:

Optional

DD291 Temperature Source

00 = Sea Temperature  
01 = Outside Temperature  
02 = Inside Temperature  
03 = Engine Room Temperature  
04 = Main Cabin Temperature  
05 = Live Well Temperature  
06 = Bait Well Temperature  
07 = Refrigeration Temperature  
08 = Heating System Temperature  
09 = Dew Point Temperature  
10 = Wind Chill Temperature, Apparent  
11 = Wind Chill Temperature, Theoretical  
12 = Heat Index Temperature  
13 = Freezer Temperature  
14 = Exhaust Gas Temperature  
15 = Shaft Seal Temperature  
16 through 128 Reserved  
129 through 252 Generic Temperature Sources other than those defined  
253 = Not Supported  
254 = Error  
255 = No Change / Data Not Available

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

### 4 Actual Temperature

Byte Field Size:

2

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Optional

DD043 Generic Temperature

DF39 Temperature, low

uint16

Range: 0 to 655.32 deg K

Resolution: 1x10E-2 deg K

### 5 Set Temperature

Byte Field Size:

2

Request Parameter

Optional

Bit Field Size:

Command Parameter:

Optional

DD043 Generic Temperature

DF39 Temperature, low

uint16

Range: 0 to 655.32 deg K

Resolution: 1x10E-2 deg K

### 6 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 8

Request Parameter

Command Parameter:

DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on a byte boundary.

# Humidity

**PGN: 130313**  
**hex: 1FD09**

This PGN contains the Sequence ID, a Humidity Instance, Humidity Source, the Actual Humidity, and the Set Humidity Value. For example the Humidity might be Inside as defined by the Humidity Source (field 3) with a Humidity Instance (field 2) of 2. Using Set Humidity (field 5) this PGN can also be used to control humidity or to report a targeted humidity. This PGN is a rework of PGN 130311 and was introduced in version 1.210 of this standard, it is to be used for new designs.

Single Frame: **Yes** Priority Default: **5** Default Update Rate: **2000** milliseconds Frequency: **.5** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

## Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Humidity Instance</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD128</b>	Generic instance	<p>0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n &lt; 253 253 = Reserved 254 = Error 255 = Not available</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			
<b>3</b>	<b>Humidity Source</b>	Byte Field Size: Bit Field Size: <b>8</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD292</b>	Humidity Source	<p>00 = Inside Humidity 01 = Outside Humidity 02 through 128 Reserved</p> <p>129 through 252 Generic Humidity Sources other than those defined 253 = Not Supported 254 = Error 255 = No Change / Data Not Available</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields

## Humidity

**PGN: 130313**  
**hex: 1FD09**

<b>4</b>	<b>Actual Humidity</b>			<i>Byte Field Size:</i> <b>2</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD231</b>	Humidity			Relative Humidity		
	<b>DF84</b>	Percent, Relative Measur	<b>int16</b>	<i>Range:</i>	-131.072% to 131.056%	<i>Resolution:</i>	4x10E-3 %
<b>5</b>	<b>Set Humidity</b>			<i>Byte Field Size:</i> <b>2</b>		<i>Request Parameter</i>	Optional
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Optional
	<b>DD231</b>	Humidity			Relative Humidity		
	<b>DF84</b>	Percent, Relative Measur	<b>int16</b>	<i>Range:</i>	-131.072% to 131.056%	<i>Resolution:</i>	4x10E-3 %
<b>6</b>	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i> <b>resv 8</b>		<i>Command Parameter:</i>	
	<b>DD001</b>	Reserved field			Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i>	Variable	<i>Resolution:</i>	1
		Used to align subsequent data on a byte boundary.					

## Actual Pressure

**PGN: 130314**  
**hex: 1FD0A**

This PGN contains a Sequence ID, Pressure Instance, Pressure Source, and the Pressure Value. For example Pressure might be Atmospheric Pressure as defined by the Pressure Source (Field 3) with a Pressure Instance (Field 2) of 1. Some devices may provide the capability to measure multiple instances of the same measurement type. An example of this might be a device that measures three filter pressures. For such a device, this PGN would be sent three times, once for each filter pressure measurement (Field 4) of a specific pressure source (Field 3) with a unique pressure instance value in Field 2. PGN 130314 replaces PGN 130311 as of version 1.310 of this standard, and is to be used for new designs. The deprecated PGN 130311 provides compatibility with legacy equipment.

Single Frame: **Yes**    Priority Default: **5**    Default Update Rate: **2000** milliseconds    Frequency: **.5** cycles per second  
Destination: **Global**    Query Support: **Optional**    Command Support: **Optional**    ACK Rqmnts: **None**

### Field #    Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.  0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)  253 - 254 = reserved for future use  255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
The Sequence ID field (SID) is used to link this PGN to other related PGN's from the same source address. When no linkage exists, the value of the SID shall be set to 255.			
<b>2</b>	<b>Pressure Instance</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD128</b>	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			

## Actual Pressure

PGN: 130314

hex: 1FD0A

### 3 Pressure Source

Byte Field Size:

Bit Field Size: 8

Request Parameter

Optional

Command Parameter:

Optional

DD289 Pressure Source

00 = Atmospheric Pressure  
01 = Water Pressure  
02 = Steam Pressure  
03 = Compressed Air Pressure  
04 = Hydraulic Pressure  
05 = Filter Pressure  
06 = Altimeter Setting  
07 = Oil Pressure  
08 = Fuel Pressure  
09 thru 128 Reserved  
129 thru 252 Generic pressure sources other than those defined  
253=Reserved  
254=Error  
255=No Change / Data Not Available

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

### 4 Pressure

Byte Field Size: 4

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

DD290 Pressure

DF103 Pressure

int32

Range: +/- 2.1E8

Resolution: 1x10E-1 Pa

### 5 NMEA Reserved

Byte Field Size:

Bit Field Size: resv 8

Request Parameter

Command Parameter:

DD001 Reserved field

Variable number of reserved bits, all set to logic "1"

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

Used to align subsequent data on a byte boundary.

## Set Pressure

**PGN: 130315**  
**hex: 1FD0B**

This PGN contains the Sequence ID, a Pressure Instance, Pressure Source, and the Set Pressure Value. This PGN can be sent to a device that controls pressure to change its targeted pressure, or it can be sent out by the control device to indicate its current targeted pressure. This PGN is a rework of PGN 130311 and was introduced in version 1.210 of this standard, it is to be used for new designs.

Single Frame: **Yes** Priority Default: **5** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Pressue Instance</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD128</b>	Generic instance	<p>0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n &lt; 253 253 = Reserved 254 = Error 255 = Not available</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			
<b>3</b>	<b>Pressure Source</b>	Byte Field Size: Bit Field Size: <b>8</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD289</b>	Pressure Source	<p>00 = Atmospheric Pressure 01 = Water Pressure 02 = Steam Pressure 03 = Compressed Air Pressure 04 = Hydraulic Pressure 05 = Filter Pressure 06 = Altimeter Setting 07 = Oil Pressure 08 = Fuel Pressure 09 thru 128 Reserved 129 thru 252 Generic pressure sources other than those defined 253=Reserved 254=Error 255=No Change / Data Not Available</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields

Set Pressure

PGN: 130315  
hex: 1FD0B

4	Pressure		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	DD290 Pressure			
	DF103 Pressure	int32	Range: +/- 2.1E8	Resolution: 1x10E-1 Pa
5	NMEA Reserved		Byte Field Size:	Request Parameter:
			Bit Field Size: resv 8	Command Parameter:
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1
	Used to align subsequent data on a byte boundary.			
				Used to construct bit fields

## Temperature, Extended Range

**PGN: 130316**  
**hex: 1FD0C**

This parameter group is used to report Temperature measurements that are not included in parameter groups for a specific equipment type.

For example, this parameter group would not be used to report Engine Temperature, which is already included in Engine Parameters, Dynamic (PGN 127489).

The Sequence ID field may be used to synchronize the measurement reported by this parameter group within a related group of measurements.

The Set Temperature field may be used to report a target temperature, or using the Command Group Function (PGN 126208) to set a target or control temperature.

This PGN performs the same function and replaces the Temperature parameter group Temperature (PGN 130312) for all new designs subsequent to version 1.301, and provides a wider temperature range data type for Actual Temperature to accommodate high temperature applications such as Exhaust Gas Temperature.

Note1: Values for field 2, Temperature Instance, shall be included when the Command Group Function 126208 is used with this PGN.

This value shall be interpreted as the temperature measurement or channel input for any commanded fields, such as Field 5.

Single Frame: **Yes**    Priority Default: **5**    Default Update Rate: **2000** milliseconds    Frequency: **.5** cycles per second  
Destination: **Global**    Query Support: **Optional**    Command Support: **Optional**    ACK Rqmnts: **None**

### Field #    Field Name

<b>1</b>	<b>Sequence ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD056</b>	Sequence ID	An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.  0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)  253 - 254 = reserved for future use  255 = No binding provided. NMEA recommends using binding SID values whenever practical.	
<b>DF53</b>	Integer, 8 bit unsigned	uint8    Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
<b>2</b>	<b>Temperature Instance</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Note 1</b>
<b>DD128</b>	Generic instance	0 = Instance 0 1 = Instance 1 2 = Instance 2 n = Instance n, where n < 253 253 = Reserved 254 = Error 255 = Not available	
<b>DF53</b>	Integer, 8 bit unsigned	uint8    Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
If a Request Parameter or Command Parameter is supported on any other Data Field, you must also support the capability on this Data Field.			



## Temperature, Extended Range

PGN: 130316

hex: 1FD0C

### 3 Temperature Source

Byte Field Size:

Bit Field Size: 8

Request Parameter

Optional

Command Parameter:

Optional

DD291 Temperature Source

00 = Sea Temperature  
01 = Outside Temperature  
02 = Inside Temperature  
03 = Engine Room Temperature  
04 = Main Cabin Temperature  
05 = Live Well Temperature  
06 = Bait Well Temperature  
07 = Refrigeration Temperature  
08 = Heating System Temperature  
09 = Dew Point Temperature  
10 = Wind Chill Temperature, Apparent  
11 = Wind Chill Temperature, Theoretical  
12 = Heat Index Temperature  
13 = Freezer Temperature  
14 = Exhaust Gas Temperature  
15 = Shaft Seal Temperature  
16 through 128 Reserved  
129 through 252 Generic Temperature Sources other than those defined  
253 = Not Supported  
254 = Error  
255 = No Change / Data Not Available

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

### 4 Actual Temperature

Byte Field Size: 3

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

DD314 Temperature, extended range and precision

DF105 Temperature, extended ra

uint24

Range: 0 to 16,777.212 deg K

Resolution: 0.001 deg K

### 5 Set Temperature

Byte Field Size: 2

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

DD130 Temperature, high

DF38 Temperature, high

uint16

Range: 0 to 6,553.2 deg K

Resolution: 1x10E-1 deg K

0.01° Kelvin

**PGN: 130320**  
**hex: 1FD10**

Single Frame: No      Priority Default: 6      Default Update Rate: 1000 milliseconds      Frequency: 1. cycles per second  
Destination: Global      Query Support: Optional      Command Support: Optional      ACK Rqmnts: None

1	Mode	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
DD025	Mode, Data	0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available		

<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
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2	Tide Tendency	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
	DD038 Tide direction	msb/lsb: 00 = Falling, 01 = Rising, 10 = Error, 11 = Unavailable, Unknown		

<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
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3	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size:	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	

<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable	<i>Resolution:</i> 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.					

4	Measurement date	Byte Field Size:	2	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional

**DD039** Generic date Days since January 1, 1970, Date is relative to UTC Time.

<b>DF41</b>	Date, day count	<b>uint16</b>	<b>Range:</b> 0 to 65,532 days	<b>Resolution:</b> 1 day	0 = January 1, 1970, max = ~179 years
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5	Measurement time	Byte Field Size:	4	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional

**DD158** Generic time of day 24 hour clock, 0 = midnight, time is in UTC

<b>DF06</b>	Time of day	<b>uint32</b>	<b>Range:</b> 0 to 86,401 s	<b>Resolution:</b> 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
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## Tide Station Data

**PGN: 130320**  
**hex: 1FD10**

<b>6</b>	<b>Station location, latitude</b>	<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD022</b>	Latitude, WGS-84	Latitude referenced to WGS-84.		
<b>DF23</b>	Latitude	<b>int32</b>	<i>Range:</i> +/- 90 deg	<i>Resolution:</i> 1x10E-7 deg "- " = South, resolution ~1.1 cm
<b>7</b>	<b>Station location, longitude</b>	<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD023</b>	Longitude, WGS-84	Longitude referenced to WGS-84.		
<b>DF25</b>	Longitude	<b>int32</b>	<i>Range:</i> +/- 180 deg	<i>Resolution:</i> 1x10E-7 deg "- " = West, resolution ~1.1 cm
<b>8</b>	<b>Tide level</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD041</b>	Tide Level	This value is relative to mean lower low water (MLLW).		
<b>DF46</b>	Distance, signed, medium	<b>int16</b>	<i>Range:</i> +/- 32.764 m	<i>Resolution:</i> 1x10E-3 m
<b>9</b>	<b>Tide level standard deviation</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD040</b>	Standard Deviation for tide level data	<p>The following text is from NOAA and is placed here to convey an understanding of the expected magnitude of the values. "The tide gage processes 181 water level samples, 1 second apart, centered on the 6 minute mark. It then computes the standard deviation of the Samples. Samples more than 3 sigma's away from the average are called "outliers". The "outliers" are removed from the samples and the standard deviation is recomputed. The number of outliers indicates how many samples were discarded. The standard deviation is a measure of noise in the water level environment. In a sheltered location, the typical standard deviation can be as low as 0.001 to 0.010 meters. More open locations could be higher, such as 0.150 meters. Every location is different.</p>		
<b>DF13</b>	Distance, short	<b>uint16</b>	<i>Range:</i> 0 to 655.32 m	<i>Resolution:</i> 1x10E-2 m

## Tide Station Data

**PGN: 130320**  
**hex: 1FD10**

### 10 Station ID String

Byte Field Size: **8 or 16** | **n**  
Bit Field Size:

Request Parameter: **Optional**  
Command Parameter: **Optional**

**DD004** Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

**DF50** String, variable, short **ch8or16(n)** Range: 0 to 250 ASCII or 0 to 125 Unicode Characters

Resolution: 1 ASCII or 1 Unicode Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

15 characters maximum.

If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will with the unit's Station ID. Otherwise if this field is specified only the units with a matching Station ID will respond with this PGN.

### 11 Station Name String

Byte Field Size: **8 or 16** | **n**  
Bit Field Size:

Request Parameter: **Optional**  
Command Parameter: **Optional**

**DD004** Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

**DF50** String, variable, short **ch8or16(n)** Range: 0 to 250 ASCII or 0 to 125 Unicode Characters

Resolution: 1 ASCII or 1 Unicode Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

50 characters maximum.

# Salinity Station Data

PGN: 130321  
hex: 1FD11

Salinity station measurement data including station location, numeric identifier, and name.

Single Frame: No Priority Default: 6 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Mode	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 4	Command Parameter:	Optional	
	DD025 Mode, Data	0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
2	NMEA Reserved	Byte Field Size:	Request Parameter		
		Bit Field Size: resv 4	Command Parameter:		
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.				
3	Measurement Date	Byte Field Size: 2	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Optional	
	DD039 Generic date	Days since January 1, 1970, Date is relative to UTC Time.			
	DF41 Date, day count	uint16	Range: 0 to 65,532 days	Resolution: 1 day	0 = January 1, 1970, max = ~179 years
4	Measurement time	Byte Field Size: 4	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Optional	
	DD158 Generic time of day	24 hour clock, 0 = midnight, time is in UTC			
	DF06 Time of day	uint32	Range: 0 to 86,401 s	Resolution: 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
5	Station location, latitude	Byte Field Size: 4	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Optional	
	DD022 Latitude, WGS-84	Latitude referenced to WGS-84.			
	DF23 Latitude	int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
6	Station location, longitude	Byte Field Size: 4	Request Parameter	Optional	
		Bit Field Size:	Command Parameter:	Optional	
	DD023 Longitude, WGS-84	Longitude referenced to WGS-84.			
	DF25 Longitude	int32	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm

## Salinity Station Data

PGN: 130321

hex: 1FD11

7	Salinity		Byte Field Size:	4	Request Parameter:	Optional
			Bit Field Size:		Command Parameter:	Optional
DD042	Salinity measure		The average Salinity of ocean water is about 35 grams of salts per kilogram of sea water (g/kg), usually written as 35 ppt which is read as 35 parts per thousand.			
DF49	Ratio, Relative measure	float32	Range:	Variable	Resolution:	Floats
						Unit-less number
8	Water Temperature		Byte Field Size:	2	Request Parameter:	Optional
			Bit Field Size:		Command Parameter:	Optional
DD043	Generic Temperature					
DF39	Temperature, low	uint16	Range:	0 to 655.32 deg K	Resolution:	1x10E-2 deg K
9	Station ID String		Byte Field Size:	8 or 16   n	Request Parameter:	Optional
			Bit Field Size:		Command Parameter:	Optional
DD004	Generic name string, short		Name of place, route, waypoint, destination, vessel, vehicle, etc.			
DF50	String, variable, short	ch8or16(n)	Range:	0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution:	1 ASCII or 1 Unicode Character
	15 characters maximum.					
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will with the unit's Station ID. Otherwise if this field is specified only the units with a matching Station ID will respond with this PGN.					
			2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.			

10	Station Name String	Byte Field Size: 8 or 16   n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n)Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
50 characters maximum.		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	

PGN: 130322  
hex: 1FD12

Single Frame: No      Priority Default: 6      Default Update Rate: 1000 milliseconds      Frequency: 1. cycles per second  
Destination: Global      Query Support: Optional      Command Support: Optional      ACK Rqmnts: None

**NMEA 2000 Appendix B.1 - Parameter Groups Report**  
**Version 3.002 - 09-Feb-23**



## Current Station Data

PGN: 130322

hex: 1FD12

6	Station location, latitude	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD022	Latitude, WGS-84	Latitude referenced to WGS-84.	
DF23	Latitude	int32 Range: +/- 90 deg	Resolution: 1x10E-7 deg "- " = South, resolution ~1.1 cm
7	Station location, longitude	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD023	Longitude, WGS-84	Longitude referenced to WGS-84.	
DF25	Longitude	int32 Range: +/- 180 deg	Resolution: 1x10E-7 deg "- " = West, resolution ~1.1 cm
Field Note: Values 0x0 – 0x4 may be used, however value 0xF is recommended for all new designs. When 0xF is set, see GNSS Type PGN 128xxx with same SID value for expanded GNSS Type and augmentation information.			
8	Measurement depth	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD047	Water Depth	Water depth measured from the water surface	
DF09	Distance	uint32 Range: 0 to ~4.295x10E+7 m	Resolution: 1x10E-2 m
9	Current speed	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD044	Generic Speed		
DF35	Speed	uint16 Range: 0 to 655.32 m/s	Resolution: 1x10E-2 m/s 1 Knot = 0.5144 m/s
10	Current flow direction	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD048	Current flow direction	Direction towards which current flows. Degrees relative to True North.	
DF02	Angle	uint16 Range: 0 to 2Pi rad	Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
11	Water Temperature	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD043	Generic Temperature		
DF39	Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K

## Current Station Data

**PGN: 130322**  
**hex: 1FD12**

### 12 Station ID String

Byte Field Size: **8 or 16** **n**  
Bit Field Size:

Request Parameter: **Optional**  
Command Parameter: **Optional**

**DD004** Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

**DF50** String, variable, short **ch8or16(n)** Range: 0 to 250 ASCII or 0 to 125 Unicode Characters

Resolution: 1 ASCII or 1 Unicode Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

15 characters maximum.

If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will with the unit's Station ID. Otherwise if this field is specified only the units with a matching Station ID will respond with this PGN.

### 13 Station Name String

Byte Field Size: **8 or 16** **n**  
Bit Field Size:

Request Parameter: **Optional**  
Command Parameter: **Optional**

**DD004** Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

**DF50** String, variable, short **ch8or16(n)** Range: 0 to 250 ASCII or 0 to 125 Unicode Characters

Resolution: 1 ASCII or 1 Unicode Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

50 characters maximum

# Meteorological Station Data

PGN: 130323

hex: 1FD13

Meteorological station measurement data including station location, numeric identifier, and name.

Single Frame: No Priority Default: 6 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

Field # Field Name

1	Mode	Byte Field Size:	4	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional
DD025	Mode, Data	0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

2	NMEA Reserved	Byte Field Size:		Request Parameter	
		Bit Field Size:	resv 4	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.					

3	Measurement date	Byte Field Size:	2	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional
DD039	Generic date	Days since January 1, 1970, Date is relative to UTC Time.			
DF41	Date, day count	uint16	Range: 0 to 65,532 days	Resolution: 1 day	0 = January 1, 1970, max = ~179 years

4	Measurement time	Byte Field Size:	4	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional
DD158	Generic time of day	24 hour clock, 0 = midnight, time is in UTC			
DF06	Time of day	uint32	Range: 0 to 86,401 s	Resolution: 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day

5	Station location, latitude	Byte Field Size:	4	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional
DD022	Latitude, WGS-84	Latitude referenced to WGS-84.			
DF23	Latitude	int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm

6	Station location, longitude	Byte Field Size:	4	Request Parameter	Optional
		Bit Field Size:		Command Parameter:	Optional
DD023	Longitude, WGS-84	Longitude referenced to WGS-84.			
DF25	Longitude	int32	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm

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# Meteorological Station Data

PGN: 130323

hex: 1FD13

7	Wind Speed	Byte Field Size: 2	Request Parameter: Optional
	DD044 Generic Speed	Bit Field Size:	Command Parameter: Optional
	DF35 Speed	uint16 Range: 0 to 655.32 m/s Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s
8	Wind Direction	Byte Field Size: 2	Request Parameter: Optional
	DD045 Wind Direction	Bit Field Size:	Command Parameter: Optional
	DF02 Angle	uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
9	Wind Reference	Byte Field Size:	Request Parameter: Optional
	DD205 Wind Reference	Bit Field Size: 3	Command Parameter: Optional
		0x00 = Theoretical Wind (ground referenced, referenced to True North; calculated using COG/SOG) 0x01 = Theoretical Wind (ground referenced, referenced to Magnetic North; calculated using COG/SOG) 0x02 = Apparent Wind (relative to the vessel centerline) 0x03 = Theoretical (Calculated to Centerline of the vessel, referenced to ground; calculated using COG/SOG) 0x04 = Theoretical (Calculated to Centerline of the vessel, referenced to water; calculated using Heading/Speed through Water) 0x05 = Reserved 0x06 = Error 0x07 = Null	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
10	NMEA Reserved	Byte Field Size:	Request Parameter:
	DD001 Reserved field	Bit Field Size: resv 5	Command Parameter:
		Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.		
11	Wind Gusts	Byte Field Size: 2	Request Parameter: Optional
	DD053 Wind gusts	Bit Field Size:	Command Parameter: Optional
		Peak wind gust speed. Sustained wind over an interval of 5 seconds.	
	DF35 Speed	uint16 Range: 0 to 655.32 m/s Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s
12	Atmospheric Pressure	Byte Field Size: 2	Request Parameter: Optional
	DD049 Generic Pressure	Bit Field Size:	Command Parameter: Optional
	DF47 Pressure, medium	uint16 Range: 0 to 6,553,200 Pa Resolution: 1x10E+2 Pa	
13	Air Temperature	Byte Field Size: 2	Request Parameter: Optional
	DD043 Generic Temperature	Bit Field Size:	Command Parameter: Optional
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K Resolution: 1x10E-2 deg K	

## Meteorological Station Data

**PGN: 130323**  
**hex: 1FD13**

### 14 Station ID String

Byte Field Size: **8 or 16** **n**  
Bit Field Size:

Request Parameter: Optional  
Command Parameter: Optional

**DD004** Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

**DF50** String, variable, short **ch8or16(n)** **Range:** 0 to 250 ASCII or 0 to 125 Unicode Characters

**Resolution:** 1 ASCII or 1 Unicode Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

15 characters maximum.

### 15 Station Name String

Byte Field Size: **8 or 16** **n**  
Bit Field Size:

Request Parameter: Optional  
Command Parameter: Optional

**DD004** Generic name string, short

Name of place, route, waypoint, destination, vessel, vehicle, etc.

**DF50** String, variable, short **ch8or16(n)** **Range:** 0 to 250 ASCII or 0 to 125 Unicode Characters

**Resolution:** 1 ASCII or 1 Unicode Character

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters  
Control byte = 1 => ASCII characters  
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

50 characters maximum.

# Moored Buoy Station Data

PGN: 130324  
hex: 1FD14

Moored buoy measurement data including station location and numeric identifier.

Single Frame: No Priority Default: 6 Default Update Rate: 1000 milliseconds Frequency: 1. cycles per second  
Destination: Global Query Support: Optional Command Support: Optional ACK Rqmnts: None

## Field # Field Name

1	Mode	Byte Field Size:	4	Request Parameter	Optional	
		Bit Field Size:		Command Parameter:	Optional	
	DD025	Mode, Data	0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
2	NMEA Reserved	Byte Field Size:		Request Parameter	Optional	
		Bit Field Size:	resv	4	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.					
3	Measurement date	Byte Field Size:	2	Request Parameter	Optional	
		Bit Field Size:		Command Parameter:	Optional	
	DD039	Generic date	Days since January 1, 1970, Date is relative to UTC Time.			
	DF41	Date, day count	uint16	Range: 0 to 65,532 days	Resolution: 1 day	0 = January 1, 1970, max = ~179 years
4	Measurement time	Byte Field Size:	4	Request Parameter	Optional	
		Bit Field Size:		Command Parameter:	Optional	
	DD158	Generic time of day	24 hour clock, 0 = midnight, time is in UTC			
	DF06	Time of day	uint32	Range: 0 to 86,401 s	Resolution: 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
5	Station location, latitude	Byte Field Size:	4	Request Parameter	Optional	
		Bit Field Size:		Command Parameter:	Optional	
	DD022	Latitude, WGS-84	Latitude referenced to WGS-84.			
	DF23	Latitude	int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
6	Station location, longitude	Byte Field Size:	4	Request Parameter	Optional	
		Bit Field Size:		Command Parameter:	Optional	
	DD023	Longitude, WGS-84	Longitude referenced to WGS-84.			
	DF25	Longitude	int32	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm

## Moored Buoy Station Data

**PGN: 130324**  
**hex: 1FD14**

7	Wind Speed		Byte Field Size: 2		Request Parameter: Optional	
			Bit Field Size:		Command Parameter: Optional	
	DD044	Generic Speed				
	DF35	Speed	uint16	Range: 0 to 655.32 m/s	Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s
8	Wind Direction		Byte Field Size: 2		Request Parameter: Optional	
			Bit Field Size:		Command Parameter: Optional	
	DD045	Wind Direction				
	DF02	Angle	uint16	Range: 0 to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
9	Wind Reference		Byte Field Size:		Request Parameter: Optional	
			Bit Field Size: 3		Command Parameter: Optional	
	DD205	Wind Reference	0x00 = Theoretical Wind (ground referenced, referenced to True North; calculated using COG/SOG) 0x01 = Theoretical Wind (ground referenced, referenced to Magnetic North; calculated using COG/SOG) 0x02 = Apparent Wind (relative to the vessel centerline) 0x03 = Theoretical (Calculated to Centerline of the vessel, referenced to ground; calculated using COG/SOG) 0x04 = Theoretical (Calculated to Centerline of the vessel, referenced to water; calculated using Heading/Speed through Water) 0x05 = Reserved 0x06 = Error 0x07 = Null			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
10	NMEA Reserved		Byte Field Size:		Request Parameter:	
			Bit Field Size: resv 5		Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.						
11	Wind Gusts		Byte Field Size: 2		Request Parameter: Optional	
			Bit Field Size:		Command Parameter: Optional	
	DD053	Wind gusts	Peak wind gust speed. Sustained wind over an interval of 5 seconds.			
	DF35	Speed	uint16	Range: 0 to 655.32 m/s	Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s

## Moored Buoy Station Data

PGN: 130324

hex: 1FD14

12	Wave Height		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD050	Wave Height	Wave height is calculated as the highest one-third of all of the wave heights during a 20-minute sampling period. Note: Accelerometers or inclinometers on board the buoys measure the heave acceleration or the vertical displacement of the buoy hull during the wave acquisition time. A Fast Fourier Transform (FFT) is applied to the data by the processor on board the buoy to transform the data from the temporal domain into the frequency domain. Note that the raw acceleration or displacement measurements are not transmitted shore-side. Response amplitude operator (RAO) processing is then performed on the transformed data to account for both hull and electronic noise. It is from this transformation that non-directional spectral wave measurements (i.e., wave energies with their associated frequencies) are derived. Along with the spectral energies, measurements such as significant wave height (WVHGT), average wave period (AVGPD), and dominant period (DOMPD) are also derived from the transformation.			
	DF13	Distance, short	uint16	Range: 0 to 655.32 m	Resolution: 1x10E-2 m	
13	Dominate Wave Period		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD051	Wave Period in seconds	Average wave period of all waves during a 20-minute period. Dominant wave period is the period with the maximum wave energy. Note: See DD50 note.			
	DF66	Time interval, .01sec	uint16	Range: 0 to 655.32s	Resolution: 1x10E-2sec	
14	Atmospheric Pressure		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD049	Generic Pressure				
	DF47	Pressure, medium	uint16	Range: 0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa	
15	Pressure Tendency Rate		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD052	Pressure Rate	Positive value indicates Rising, Negative value indicates Falling.			
	DF48	Pressure rate	int16	Range: +/- 327,640 Pa/hr	Resolution: 1x10E+1 Pa/hr	+ = increasing rate
16	Air temperature		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD043	Generic Temperature				
	DF39	Temperature, low	uint16	Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K	
17	Water temperature		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD043	Generic Temperature				
	DF39	Temperature, low	uint16	Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K	



18	Station ID String	Byte Field Size:	8 or 16	n	Request Parameter:	Required
		Bit Field Size:			Command Parameter:	Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.				
DF50	String, variable, short	ch8or16(n)	Range:	0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution:	1 ASCII or 1 Unicode Character
15 characters maximum.		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.				
If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will with the unit's Station ID. Otherwise if this field is specified only the units with a matching Station ID will respond with this PGN.						

This PGN provides a lighting controller settings and number of supported capabilities.

This PGN will be sent upon change or in response to a request.

This PGN allows for powering on and off the system, resetting it back to factory defaults, and changing the name of the lighting controller.

Message Length Upper bound of Max values are max user editable/changeable.:

- By the Data Payload Field
- Current Max values set below for NMEA Fast Packet
- Max Scenes values are determined by the Vendor
  - Max Scenes upper bound of 219
- Max Color Sequences values are determined by the Vendor
  - Max Color Sequences upper bound of 219
  - Max values user configurable.
- Max Program values are based on the current defined programs in the spec
  - Max Programs current of 7
- Controller Capabilities
  - Local Storage signifies the controller supports storing its state internally

Requests for all Zones/Scenes/Color Sequences may return more than the max values. Only less than max values can be changed by the user.

Begin Request Support:

Global ISO requests (PGN 059904) and Global NMEA Requests (PGN 126208) for this Parameter Group shall be ignored. An addressed ISO Request will result in a Negative Acknowledgement (PGN 059392) with Field 1 0x01 = Negative Acknowledgment.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If the Request Group Function (PGN 126208) includes the Field 1(Global Enable), then the response shall be filtered by this field.
- If the Request Group Function (PGN 126208) includes the Field 11 (Controller Capabilities) then the response shall be filtered by this field.

End Request Support.

Begin Command Support:

If a Command Group Function (PGN 126208) commanding this PGN is received, the receiving device shall respond in the following manner:

- If the Command Group Function (PGN 126208) is received containing a value for Field 1 (Global Enable) then the response shall be to transmit this PGN with a corresponding value in field 1 and the controller shall take the commanded action.
- If the Command Group Function (PGN 126208) containing Field 2 (Default Setting/Commands), then the controller will Transmit the change and take the commanded action. Upon reboot or factory reset the response is to be sent prior to change taking effect.
- If the Command Group Function (PGN 126208) containing Field 4( Name of the Lighting Controller) Name length is greater than the 32 ascii / 16 Unicode characters then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range.

## Lighting System Settings

**PGN: 130330**  
**hex: 1FD1A**

- If the Command Group Function (PGN 126208) containing Field 4 (Name of the Lighting Controller), then the controller will Transmit the change and take the commanded action.

End Command Support.

Further details can be found in the NMEA2000 Lighting Application Notes in Appendix D

Single Frame: **N** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts: **N**

### Field # Field Name

<b>1</b>	<b>Global Enable</b>	Byte Field Size:	Request Parameter	<b>Required</b>
		Bit Field Size: <b>2</b>	Command Parameter:	<b>Required</b>
	<b>DD002</b> Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
	<b>DF52</b> Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>		Used to construct bit fields
	Power state of connected lighting devices			
<b>2</b>	<b>Default Settings/Commands</b>	Byte Field Size:	Request Parameter	<b>Optional</b>
		Bit Field Size: <b>3</b>	Command Parameter:	<b>Required</b>
	<b>DD513</b> Lighting Device Commands	0= Idle 1= Detect Devices 2= Reboot 3= Factory Reset 4= Powering Up 5 -7= Reserved		
	<b>DF52</b> Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>		Used to construct bit fields
	Used to Issue commands to the controller Option 0 Commanding Idle has no effect. Option 4 Commanding Powering up has no effect.			
<b>3</b>	<b>NMEA Reserved</b>	Byte Field Size:	Request Parameter	
		Bit Field Size: <b>resv 3</b>	Command Parameter:	
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b> Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>		Used to construct bit fields

# Lighting System Settings

PGN: 130330  
hex: 1FD1A

4	Name of the lighting controller	Byte Field Size: 8 or 16 n Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD504	Name of Device		
DF130	String, variable, very short	ch8or16(n) Range: 0 to 32 ASCII or 0 to 16 Unicode Characters Resolution: 1 ASCII or 1 Unicode Character	2 to 34 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	Name of Lighting Controller		
	Name shall consist of no more than 32 ASCII or 16 Unicode Characters.		
5	Max Scenes	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
6	Max Scene Configuration Count	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
7	Max Zones	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
8	Max Color Sequences	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Optional
DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
	For requesting all may return more than max values. Max values are user configurable.		
9	Max Color Sequence Color Count	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.
DF53	Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number

## Lighting System Settings

PGN: 130330

hex: 1FD1A

10	Number of Programs		Byte Field Size:	1	Request Parameter	Required
			Bit Field Size:		Command Parameter:	Optional
	DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.			
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
Max Custom Program values are determined by the Vendor						
11	Controller Capabilities		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	8	Command Parameter:	Optional
	DD515	Lighting Controller Capabilities	xxxx xxx1 = Local Storage, xxxx xx0x = Reserved for future use xxxx x0xx = Reserved for future use xxxx 0xxx = Reserved for future use xxx0 xxxx = Reserved for future use xx0x xxxx = Reserved for future use x0xx xxxx = Reserved for future use 0xxx xxxx = Reserved for future use  Inactive states shall be transmitted as 0. Reserved and unsupported bits within the field shall be transmitted as 0.			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
12	Identify Device		Byte Field Size:	4	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Required
	DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.			
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
Commanding a lighting device ID will instruct the controller to take action to visually indicate the specified lighting device. 4,294,967,295 = Data not available or Do Not Change;						

## Payload Mass

PGN: 130560

hex: 1FE00

The Payload Mass parameter group is used to transmit the mass associated with vessel payloads. Since the SI units of mass (kilogram) are commonly understood by end users as the weight at standard gravitational acceleration, devices receiving this parameter group may display the transmitted value as either mass or weight.

Measurement status includes a 'Locked' status in addition to the stable status. Some scales may have the ability to filter out small changes to the measurement due to vessel motion or other influences. These scales may use the 'Locked' status to indicate that the transmitted Payload Mass will remain fixed until a significant change in mass is detected. The value for 'significant' may vary by manufacturer, but is usually 10% to 20% or more of the current mass measurement.

Applications for this PGN vary from recreational to commercial use. This may include, but is not limited to weighing fish, or weighing cargo. Response to Requests: Field #4, Measurement ID, is identified as a request parameter for this Parameter Group. All providers of this PGN may accept and process requests based upon the requested value of Field # 4. A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for every Measurement ID that has associated data fields.

- If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:
- If no requested fields have been included with the Complex Request, then the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904) described above.
- If the Complex Request (PGN 126208) includes the Measurement ID field, then the response shall be filtered by the field (Field #4) and field value (Measurement ID) contained within the request.

For example, if the Complex Request for this PGN contained a value of 2 for field 4, the Measurement ID, and this was a measurement channel that the device was operating with or had information about, then the device would respond by providing a single PGN with measurement data associated with the Measurement ID channel value requested.

If the Measurement ID requested is considered valid by the device, but the device was not operating on that measurement channel, or had no data associated with the measurement channel requested, there are two possible responses:

- 1 - The device responds with the PGN containing the measurement channel requested and all other fields set to the value indicating "Data not available".
- 2 - The device responds with the Acknowledge Group PGN (126208) containing the error state of "0x2 = Temporarily unable to comply".

If the request was global no response would be required. If the request was addressed to the device, then either response 1 or 2 would apply.

If the Measurement ID requested is not considered a valid measurement channel by the receiving device, then the appropriate response would be the Acknowledge Group PGN (126208), containing the error state for the requested measurement ID field of "0x3 = Request or command parameter out-of-range;".

Examples of equipment that might report Payload Mass include loading/unloading equipment and scales.

Single Frame: Yes    Priority Default: 5    Default Update Rate: 1000 milliseconds    Frequency: 1. cycles per second  
Destination: Global    Query Support: Optional    Command Support: Optional    ACK Rqmnts: None

Field #    Field Name

## Payload Mass

**PGN: 130560**  
**hex: 1FE00**

<b>1</b>	<b>Sequence ID</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> Optional
<b>DD056</b>	Sequence ID	<p>An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.</p> <p>0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)</p> <p>253 - 254 = reserved for future use</p> <p>255 = No binding provided. NMEA recommends using binding SID values whenever practical.</p>	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252 <i>Resolution:</i> 1 bit Unit-less number
Sequence number used to associate Payload Mass transmissions with other parameter groups being transmitted from the same source address.			
<b>2</b>	<b>Measurement Status</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i> <b>3</b>	<i>Command Parameter:</i> Optional
<b>DD312</b>	Scale Measurement Status	<p>Enumerated value to indicate measurement status</p> <p>0x00 = Current Changing – the payload acceleration is changing</p> <p>0x01 = Current Stable – the payload acceleration has reached equilibrium</p> <p>0x02 = Measurement Locked – the payload measurement is fixed until a significant mass change occurs (see description)</p> <p>0x04 = Almanac Mass – the payload mass is being transmitted from memory</p> <p>0x07 = Error or no status</p>	
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable <i>Resolution:</i> 1 Used to construct bit fields
Indicates if the measurement provided is current, and whether the measurement is stable.			
<b>3</b>	<b>NMEA Reserved</b>	<i>Byte Field Size:</i>	<i>Request Parameter:</i>
		<i>Bit Field Size:</i> <b>resv 5</b>	<i>Command Parameter:</i>
<b>DD001</b>	Reserved field	Variable number of reserved bits, all set to logic "1"	
<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> Variable <i>Resolution:</i> 1 Used to construct bit fields
Used to align subsequent data on byte boundary.			
<b>4</b>	<b>Measurement ID</b>	<i>Byte Field Size:</i> <b>1</b>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> Optional
<b>DD005</b>	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252 <i>Resolution:</i> 1 bit Unit-less number
Unique measurement identifier. May be used to differentiate between multiple channels of information on the same equipment or scale.			
<b>5</b>	<b>Payload Mass</b>	<i>Byte Field Size:</i> <b>4</b>	<i>Request Parameter:</i> Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i> Optional
<b>DD313</b>	Mass		
<b>DF104</b>	Mass	<b>uint32</b>	<i>Range:</i> 0 - 429,496.7292 kilograms <i>Resolution:</i> 1x10E-4 kg
Payload mass in kilograms. Corrected for gravitational acceleration.			

6	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 8	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1
Used to align subsequent data on byte boundary.		Used to construct bit fields		



## Lighting Zone

**PGN: 130561**  
**hex: 1FE01**

This PGN is used to report or configure a name for a given zone. A zone is a grouping of devices that are controlled by a Scene. This PGN will be sent upon change or in response to a request.

The Maximum number of zones supported is reported by the Lighting System Settings (130330)

### Notes:

If zone is using component settings in fields 3-7, the (Field 8) Program ID is reported as (254) Out of Range. Otherwise, the zone is using the Program setting fields 8-12.

Returning the device's current component colors is optional when zone is controlled by a program.

White can be controlled either through the K or setting R=G=B. Only RGB or Kelvin should be used at one time.

### Begin Request Support:

Global ISO requests (PGN 059904) and Global NMEA Requests (PGN 126208) for this Parameter Group shall be ignored. An addressed ISO Request will result in a Negative Acknowledgement (PGN 059392) with Field 1 0x01 = Negative Acknowledgment.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function, then the response is to return one or more PGNs
- If the Request Group Function (PGN 126208) includes the (Field 1) Zone Index, then the response shall be filtered by this field.
- If the Request Group Function (PGN 126208) includes the (Field 1) Zone Index that is greater than the Max Zones then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"

### End Request Support.

### Begin Command Support:

If a Command Group Function (PGN 126208) commanding this PGN is received, the receiving device shall respond in the following manner:

Command Support is Required for fields: 1, 2, 13

Command Support is Optional for fields: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

If the application requires Red, Green, Black, Kelvin, or Intensity settings use fields 3-7.

For Programs use fields 8-12.

- Every Command Group Function (PGN 126208) transmitted for this PGN shall contain a value for (Field 1) Zone Index and the commanded value shall identify which zone the remaining commanded fields apply to.
- If the Command Group Function (PGN 126208) containing (Field 1) Zone Index is not included then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".
- If the Command Group Function (PGN 126208) containing (Field 1) Zone Index is 252 (No Zone Assignment), Acknowledge Group Function (PGN 126208), containing the state.
- If the Command Group Function (PGN 126208) includes a valid index value (Field 1) and a valid Name (field 2), then the zone will be assigned that name.
- If the Command Group Function (PGN 126208) containing (Field 2) Name length is greater than the 32 ascii / 16 Unicode characters then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- If (Fields 3 through 7) are commanded, then they will be changed to the active state of the zone
- If (Fields 3 through 7) are commanded, then the active state will use these fields and (Field 8) Program ID will also change to (254) Out of Range.

## Lighting Zone

**PGN: 130561**  
**hex: 1FE01**

End Command Support.

Further details can be found in the NMEA2000 Lighting Application Notes in Appendix D

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts:

### Field # Field Name

<b>1</b>	<b>Zone Index</b>	Byte Field Size:	Request Parameter	Required
		Bit Field Size: <b>8</b>	Command Parameter:	Required
	<b>DD449</b> Device Zone	0 through 251 = Zone Assignment 252 = No Zone Assignment 253 = Reserved 254 = Out of Range 255 = Data Not Available/Do not change		
	<b>DF52</b> Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
<b>2</b>	<b>Zone Name</b>	Byte Field Size: <b>8 or 16 n</b>	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Required
	<b>DD504</b> Name of Device			
	<b>DF130</b> String, variable, very short	ch8or16(n) Range: 0 to 32 ASCII or 0 to 16 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character	2 to 34 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
Zone Name shall consist of no more than 32 ASCII or 16 Unicode Characters.				
<b>3</b>	<b>Red Component</b>	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: <b>8</b>	Command Parameter:	Optional
	<b>DD509</b> Color value	Color Options: Value 0-255 = color		
	<b>DF52</b> Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	

## Lighting Zone

PGN: 130561

hex: 1FE01

4	<b>Green Component</b>		Byte Field Size:		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD509	Color value	Color Options: Value 0-255 = color				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
5	<b>Blue Component</b>		Byte Field Size:		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD509	Color value	Color Options: Value 0-255 = color				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
6	<b>Color Temperature</b>		Byte Field Size:		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD511	Kelvin based color	A value covering the visible Kelvin range for lighting				
	DF124	Temperature, Very High The color temperature component	Uint16	Range: 0-65532 deg K	Resolution: 1	A value covering the visible Kelvin range for lighting	
7	<b>Intensity</b>		Byte Field Size:		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD512	Medium Absolute Percentage 0 – 100%	0-100%				
	DF120	Percent, Restricted Range The color intensity	uint8	Range: 0 - 100%	Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%	
8	<b>Program ID</b>		Byte Field Size:		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.				
	DF53	Integer, 8 bit unsigned The Program Index	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number	
9	<b>Program Color Sequence Index</b>		Byte Field Size:		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.				
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number	
10	<b>Program Intensity</b>		Byte Field Size:		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD512	Medium Absolute Percentage 0 – 100%	0-100%				
	DF120	Percent, Restricted Range The Intensity Field controls the overall intensity brightness of both the RGB and Kelvin values	uint8	Range: 0 - 100%	Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%	

## Lighting Zone

PGN: 130561  
hex: 1FE01

11	<b>Program Rate</b>		Byte Field Size: 1	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Optional
	DD512	Medium Absolute Percentage 0 – 100%	0-100%		
	DF120	Percent, Restricted Range	uint8	Range: 0 - 100%	Resolution: 5x10E-1 0 = 0%, 100 = 50%, 200 = 100%
12	<b>Program Color Sequence</b>		Byte Field Size: 1	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Optional
	DD512	Medium Absolute Percentage 0 – 100%	0-100%		
	DF120	Percent, Restricted Range	uint8	Range: 0 - 100%	Resolution: 5x10E-1 0 = 0%, 100 = 50%, 200 = 100%
13	<b>Zone Enabled</b>		Byte Field Size:	Request Parameter	Optional
			Bit Field Size: 2	Command Parameter:	Required
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
	Used to Enable Zone				
14	<b>NMEA Reserved</b>		Byte Field Size:	Request Parameter	
			Bit Field Size: resv 6	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
	Used to align subsequent data on a byte boundary.				

## Lighting Scene

**PGN: 130562**

**hex: 1FE02**

This PGN provides a sequence of zone program configurations. Each zone can execute a single program. Each program has various parameters. A program may not make use of all parameters and unused parameters can be set to 0. This PGN will be sent upon change or in response to a request.

### Notes:

- An invalid / unused scene has Config Count = 0
- Only Zones or Devices included in the scene will be changed when playing a scene.
- Intensity is a program variable; this generally would be a global intensity scaling of the color sequence intensity
- A (Field 6) Zone Index value of 255 indicates the configuration is a Device ID.
- If (Field 6) Zone Index is valid then (Field 7) Device ID should be 4,294,967,295.
- If (Field 7) specifies a Device ID of a device that does not support programs nothing will happen.
- When commanding a scene either (Field 6) Zone index or (Field 7) Device ID should be specified in a configuration.

### Example:

- If Color is 100% and Scene is 50% output is 50%
- Color is 50% Scene is 50% output is 25%.
- Rate is a program variable; this is a Min to Max setting
- Ex: 0 = Slowest Fade, 100 = Fastest Fade
- Custom programs may change this definition.
- Scene Indexes 220-252 are Reserved
- 220 – All Zones On (White)
- 221 - All Zones Off
- 222 – 252 Reserved for future use by NMEA
- See Lighting System Settings (PGN 130330) for Max Values

### Begin Request Support:

Global ISO requests (PGN 059904) and Global NMEA Requests (PGN 126208) for this Parameter Group shall be ignored. An addressed ISO Request will result in a Negative Acknowledgement (PGN 059392) with Field 1 0x01 = Negative Acknowledgment.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function, then the response is to return all scene information on the lighting controller. It may be one or multiple PGNs.
- If the Request Group Function (PGN 126208) includes the (Field 1) Scene Index, then the response shall be filtered by this field.
- If the Request Group Function (PGN 126208) includes the (Field 1) Scene Index that is greater than the Max Scenes, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- Control (Field 3) will be returned as invalid when reading.

### End Request Support:

### Begin Command Support:

If a Command Group Function (PGN 126208) commanding this PGN is received, the receiving device shall respond in the following manner:

Every Command Group Function (PGN 126208) transmitted for this PGN shall contain (Field 1) Scene Index the commanded shall identify which scene the remaining commanded fields apply to.

- If the Command Group Function (PGN 126208) containing (Field 1) Scene Index is greater than the Max Scenes and not equal to a valid reserved value then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- If the Command Group Function (PGN 126208) containing (Field 2) Scene Name is sent then the scene will be assigned that

name.

- If the Command Group Function (PGN 126208) containing (Field 2) Scene Name length is sent greater than the 32 ascii / 16 Unicode characters then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"

Every Command Group Function (PGN 126208) transmitted for this PGN shall contain (Field 3) Scene Control

Note 1:

The meaning of the Scene Controls fields is as follows:

- Store: The scene will be stored on the controller in the specified Scene Index. The PGN will be transmitted with the updated changes.
- Play: The scene will be played, if only (Field 1) and (Field 3) then the scene will be played from memory. Otherwise, the PGN contents will be used.
- If Play is only specified, no PGN will be sent as the scene is not stored by the controller after it has been applied. For instance, Requesting the same index will return the last stored scene, not the Play only scene.
- If the Command Group Function (PGN 126208) containing (Field 4) Config Count is sent then the scene will be assigned sized to that number of Configurations.
- If the Command Group Function (PGN 126208) containing (Field 4) Config Count is sent greater than the Max Scene Configuration Count then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range" To set a configuration entry in a Scene Configuration slot then (Field 5) Configuration Index must be commanded.
- If the Command Group Function (PGN 126208) containing (Field 5) Configuration Index is sent greater than the Config Count then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- If (Fields 6 through 12) are commanded, then they will be applied to the Configuration Slot of the last commanded (Field 5) Configuration Index.
- If (Field 6 through 12) are commanded without a previously commanded (Field 5) Configuration Index then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- If the Command Group Function (PGN 126208) containing (Field 6 and 7 or repeated) are greater than their corresponding max values then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"

Example:

Processing on the device shall be as follows:

- Commanded fields will be processed in order. Every time (Field 5) Configuration Index is processed the current Configuration slot will be set to this value.
- Any (Fields 6 through 12) after this will apply to the last commanded (Field 5) Configuration index
- This allows multiple slots to be sent as a group or single slots modified.
- If (Field 6 and 7 or repeated) are specified, they will set the other field to invalid. Only one should be sent when configuring a Configuration otherwise the last one commanded will be used.

End Command Support.

Further details can be found in the NMEA2000 Lighting Application Notes in Appendix D

Single Frame: No Priority Default: 7 Default Update Rate: milliseconds Frequency: NA cycles per second  
Destination: Global Query Support: Optional Command Support: Required ACK Rqmnts: None

# Lighting Scene

PGN: 130562  
hex: 1FE02

## Field # Field Name

1	Scene Index	Byte Field Size: 1 Bit Field Size:	Request Parameter: Required Command Parameter: Required
	DD005 Generic numeric ID, short DF53 Integer, 8 bit unsigned Scene Index (220-252 are reserved)	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
2	Scene Name	Byte Field Size: 8 or 16 n Bit Field Size:	Request Parameter: Optional Command Parameter: Optional
	DD504 Name of Device DF130 String, variable, very short	8 or 16(n) Range: 0 to 32 ASCII or 0 to 16 Unicode Characters Resolution: 1 ASCII or 1 Unicode Character	2 to 34 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
3	Control	Byte Field Size: Bit Field Size: 8	Request Parameter: Optional Command Parameter: Note 1
	DD514 Scene Control	0000 0000 = Reserved xxxx xxx1 = Store xxxx xx1x = Play xxxx x0xx to 0xxx xxxx = Reserved for future use Inactive states shall be transmitted as 0. Reserved and unsupported bits within the field shall be transmitted as 0.	
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
4	Configuration Count	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD005 Generic numeric ID, short DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number
5	Configuration Index	Byte Field Size: 1 Bit Field Size:	Request Parameter: Optional Command Parameter: Required
	DD005 Generic numeric ID, short DF53 Integer, 8 bit unsigned	uint8 Range: 0 to 252 Resolution: 1 bit	Unit-less number



## Lighting Scene

**PGN: 130562**  
**hex: 1FE02**

<b>6</b>	<b>Zone Index</b>		<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD005</b> Generic numeric ID, short			Number of route, waypoint, event, mark, etc.		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252	<i>Resolution:</i> 1 bit		Unit-less number
	Zone Index 252 = No Zone Assignment					
<b>7</b>	<b>Devices ID</b>		<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD010</b> Generic numeric ID, large			Number of route, waypoint, event, mark, etc.		
	<b>DF55</b> Integer, 32 bit unsigned	<b>uint32</b>	<i>Range:</i> 0 to 4,294,967,292	<i>Resolution:</i> 1 bit		Unit-less number
<b>8</b>	<b>Program Index</b>		<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD005</b> Generic numeric ID, short			Number of route, waypoint, event, mark, etc.		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252	<i>Resolution:</i> 1 bit		Unit-less number
	The program Index					
<b>9</b>	<b>Program Color Sequence Index</b>		<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD005</b> Generic numeric ID, short			Number of route, waypoint, event, mark, etc.		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> 0 to 252	<i>Resolution:</i> 1 bit		Unit-less number
	Index of color sequence					
<b>10</b>	<b>Program Intensity</b>		<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD512</b> Medium Absolute Percentage 0 – 100%			0-100%		
	<b>DF120</b> Percent, Restricted Range	<b>uint8</b>	<i>Range:</i> 0 - 100%	<i>Resolution:</i> 5x10E-1		0 = 0%, 100 = 50%, 200 = 100%
<b>11</b>	<b>Program Rate</b>		<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD512</b> Medium Absolute Percentage 0 – 100%			0-100%		
	<b>DF120</b> Percent, Restricted Range	<b>uint8</b>	<i>Range:</i> 0 - 100%	<i>Resolution:</i> 5x10E-1		0 = 0%, 100 = 50%, 200 = 100%
<b>12</b>	<b>Program Color Sequence Rate</b>		<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Required
	<b>DD512</b> Medium Absolute Percentage 0 – 100%			0-100%		
	<b>DF120</b> Percent, Restricted Range	<b>uint8</b>	<i>Range:</i> 0 - 100%	<i>Resolution:</i> 5x10E-1		0 = 0%, 100 = 50%, 200 = 100%
	This is always used for color transition changes					



13	Repeat Fields 5-12 as needed based on value of Field #4	Byte Field Size: ?	Request Parameter:	
		Bit Field Size: n	Command Parameter:	
DD000	Undefined			
DF00	Undefined	Undefined Range: undefined	Resolution: undefined	Application specific, defined at time of use.

## Lighting Device

**PGN: 130563**

**hex: 1FE03**

This PGN is used to provide status and capabilities of a lighting device. A lighting device may be a virtual device connected to a lighting controller or physical device on the network.

This PGN will be sent upon change or in response to a request.

### Notes:

- The Device ID should be a unique identifier of this device on this controller, it should be independent of the assigned Name field, power state or connection state. The idea is this should be unique way to identify a lighting device on this controller across the lifetime of the system. Example: A switch is configured to control a light.
- There may be cases that cause this HID to change and the Manufacturer should call these out. Most common could possibly be a system reset.
- Possible ID types are a Hash or Serial Number. This is up to the controller and should not be interpreted to have some meaning outside of being a HID.
- If device is using component settings in fields 7-11, the (Field 12) Program ID is reported as (254) Out of Range. Otherwise, the device is using the Program setting fields 12-16.
- Returning the device's current colors is optional.
- Commands to the RGB Component, Kelvin and Intensity will set the devices current color, if the device is part of an active Scene Program or Zone these values may be ignored or overwritten.
- For non-dimmable lights an intensity of 0 is off and anything else is on.
- White can be controlled either through the K or setting R=G=B. Only RGB or Kelvin should be used at one time.
- See PGN Lighting - System Settings 130330 for Max Values

### Begin Request Support:

Global ISO requests (PGN 059904) and Global NMEA Requests (PGN 126208) for this Parameter Group shall be ignored. An addressed ISO Request will result in a Negative Acknowledgement (PGN 059392) with Field 1 0x01 = Negative Acknowledgment.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- The Request Group Function (PGN 126208) shall always include (Field 1) Device ID, the response shall be filtered by this field.
- If the Request Group Function (PGN 126208) includes the Device ID that is not found then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x03 = Access Denied". "0x3 = Request or command parameter out-of-range"

### End Request Support.

### Begin Command Support:

If a Command Group Function (PGN 126208) commanding this PGN is received, the receiving device shall respond in the following manner:

Command Support is Required for Fields: 1, 4, 5, 17

Command Support is Optional for fields: 7,8,9,10,11,12,13,14,15,16

- If the application requires Red, Green, Black, Kelvin, or Intensity settings use fields 7-11.
- For Programs use fields 12-16.
- Every Command Group Function (PGN 126208) transmitted for this PGN shall contain (Field 1) Device ID to identify which device the remaining commands apply to.
- If the Command Group Function (PGN 126208) containing (Field 1) Device ID is not included then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".
- If the Command Group Function (PGN 126208) contains a valid (Field 4) Zone Index the device will be assigned to that zone.
- If the Command Group Function (PGN 126208) containing (Field 4) Zone Index is greater than the Max Zones then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code

## NMEA 2000 Appendix B.1 - Parameter Groups Report

### Version 3.002 - 09-Feb-23

## Lighting Device

**PGN: 130563**  
**hex: 1FE03**

(Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"

- If the Command Group Function (PGN 126208) contains a valid (Field 5) Name of Lighting Device will be assigned that name.
- If the Command Group Function (PGN 126208) containing (Field 5) Name of Lighting Device length is greater than the 32 ascii / 16 Unicode characters then the appropriate response would be the Acknowledge Group Function (PGN126208) , containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- If (Fields 7 through 11) are commanded, then the active state will use these fields and (Field 12) Program ID will also change to (254) Out of Range.

End Command Support.

Application examples are located in NMEA 2000 Appendix D.

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts:

### Field # Field Name

<b>1</b>	<b>Device ID</b>	Byte Field Size: <b>4</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Required</b>
	<b>DD010</b> Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
	<b>DF55</b> Integer, 32 bit unsigned	uint32 Range: 0 to 4,294,967,292 Resolution: 1 bit	Unit-less number
	This is a UID for this device on the network and not an index.		
<b>2</b>	<b>Device Capabilities</b>	Byte Field Size: Bit Field Size: <b>8</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Prohibited</b>
	<b>DD507</b> Lighting Device Functions	XXXX XXXX = Default XXXX XXX1 = Dimmable, XXXX XX1X = Programmable XXXX X1XX = Color Configurable XXXX 1XXX = Reserved for future use XXX1 XXXX = Reserved for future use XX1X XXXX = Reserved for future use X1XX XXXX = Reserved for future use 1XXX XXXX = Reserved for future use	
	<b>DF52</b> Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Describes the capabilities and functions of the Lighting Device. Reserve bits within the field shall be transmitted as 0		
<b>3</b>	<b>Color Capabilities</b>	Byte Field Size: Bit Field Size: <b>8</b>	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
	<b>DD508</b> Color Capabilities	XXXX XXXX = Not Changable XXXX XXX1 = R, XXXX XX1X = G XXXX X1XX = B XXXX 1XXX = K XXX1 XXXX = Daylight (~65XXX) XX1X XXXX = Warm (~35XXX) X1XX XXXX = Reserved for future use 1XXX XXXX = Reserved for future use	
	<b>DF52</b> Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
	Supported color capabilities for this Device Channel. Reserve bits within the field shall be transmitted as 0		

## Lighting Device

PGN: 130563

hex: 1FE03

4	Zone Index	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
	Zone the devices is assigned to. Zone Index 252 = No Zone Assignment		
5	Name of Lighting Device	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Required
	DD504 Name of Device		
	DF130 String, variable, very short	ch8or16(n)	Range: 0 to 32 ASCII or 0 to 16 Unicode Characters Resolution: 1 ASCII or 1 Unicode Character
	Name of Lighting Device shall consist of no more than 32 ASCII or 16 Unicode Characters.		
	2 to 34 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.		
6	Status	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
	DD510 Status of the light	0x00 = Detected / Normal 0x01 = Undetected 0x02 = General Error 0x03 = Temperature Error 0x04 = Voltage Error 0x05 = Maintenance Required 0x06 = Over Current Detected 0x07- 0xFF = Reserved for future use	
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252 Resolution: 1 bit Unit-less number
	The current state of the light, detected,		
7	Red Component	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 8	Command Parameter: Optional
	DD509 Color value	Color Options: Value 0-255 = color	
	DF52 Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields

## Lighting Device

PGN: 130563

hex: 1FE03

8	Green Component		Byte Field Size:		Request Parameter		Optional
			Bit Field Size: 8		Command Parameter:		Optional
	DD509	Color value	Color Options: Value 0-255 = color				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
9	Blue Component		Byte Field Size:		Request Parameter		Optional
			Bit Field Size: 8		Command Parameter:		Optional
	DD509	Color value	Color Options: Value 0-255 = color				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
10	Color Temperature		Byte Field Size: 2		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD511	Kelvin based color	A value covering the visible Kelvin range for lighting				
	DF124	Temperature, Very High The color temperature component	Uint16	Range: 0-65532 deg K	Resolution: 1	A value covering the visible Kelvin range for lighting	
11	Intensity		Byte Field Size: 1		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD512	Medium Absolute Percentage 0 – 100%	0-100%				
	DF120	Percent, Restricted Range The color intensity	uint8	Range: 0 - 100%	Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%	
12	Program ID		Byte Field Size: 1		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.				
	DF53	Integer, 8 bit unsigned The program ID	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number	
13	Program Color Sequence Index		Byte Field Size: 1		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.				
	DF53	Integer, 8 bit unsigned Index of colors sequence	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number	
14	Program Intensity		Byte Field Size: 1		Request Parameter		Optional
			Bit Field Size:		Command Parameter:		Optional
	DD512	Medium Absolute Percentage 0 – 100%	0-100%				
	DF120	Percent, Restricted Range Intensity 0 – 100%	uint8	Range: 0 - 100%	Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%	

## Lighting Device

PGN: 130563  
hex: 1FE03

15	Program Rate		Byte Field Size:	1	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD512	Medium Absolute Percentage 0 – 100%	0-100%			
	DF120	Percent, Restricted Range	uint8	Range: 0 - 100%	Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%
16	Program Color Sequence Rate		Byte Field Size:	1	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
	DD512	Medium Absolute Percentage 0 – 100%	0-100%			
	DF120	Percent, Restricted Range	uint8	Range: 0 - 100%	Resolution: 5x10E-1	0 = 0%, 100 = 50%, 200 = 100%
17	Enabled		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	2	Command Parameter:	Required
	DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Enable the Device					
18	NMEA Reserved		Byte Field Size:		Request Parameter	
			Bit Field Size:	resv 6	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Used to align subsequent data on a byte boundary.					

## Lighting Device Enumeration

**PGN: 130564**  
**hex: 1FE04**

This PGN allows for enumeration of the lighting devices on a lighting controller.

This PGN will be sent upon change or in response to a request or when Status or Total Number of devices change.

Begin Request Support:

Global ISO requests (PGN 059904) and Global NMEA Requests (PGN 126208) for this Parameter Group shall be ignored. Response to an addressed ISO request (PGN 059904) for this Parameter Group shall be the transmission of this PGN once.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included in the Request Group Function, then the response is to return a single PGN

Note 1: This Request Parameter is required. Both "Index of the first device" (field 1) and "Number of devices" (field 3) are required when making a filtered request for this PGN with the Request Group Function (PGN 126208).

- If field 1 and field 3 have been included in the Request Group Function then the response is to return the PGN with field values based on the values of the requested parameters.
- If values for field 1 and field 3 result in the selection of an index greater than the total number of devices, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x = Request or Command is not supported", and the corresponding field error will contain "0x3 = Request or command parameter out-of-range" for each invalid field.
- If any other fields are requested then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".

End Request Support.

If a Command Group Function (PGN 126208) commanding this PGN is received, the receiving device shall respond in the following manner:

- If the Command Group Function (PGN 126208) contains any fields then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".

End Command Support.

Further details can be found in the NMEA2000 Lighting Application Notes in Appendix D

Single Frame: **No** Priority Default: **7** Default Update Rate: **0** milliseconds Frequency: **#Div/0!** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Index of First Device</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Required</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned	<b>uint16</b> Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	65,532= Data Not Available		
<b>2</b>	<b>Total Number of Devices</b>	Byte Field Size: <b>2</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD007</b> Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	<b>DF54</b> Integer, 16 bit unsigned	<b>uint16</b> Range: <b>0 to 65,532</b>	Resolution: <b>1 bit</b> Unit-less number
	65,532= Data Not Available		

## Lighting Device Enumeration

**PGN: 130564**  
**hex: 1FE04**

<b>3</b>	<b>Number of Devices</b>		<i>Byte Field Size:</i> <b>2</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Prohibited
	<b>DD007</b>	Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.		
	<b>DF54</b>	Integer, 16 bit unsigned 65,532= Data Not Available	<b>uint16</b>	<i>Range:</i> 0 to 65,532	<i>Resolution:</i> 1 bit	Unit-less number
<b>4</b>	<b>Device ID</b>		<i>Byte Field Size:</i> <b>4</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Prohibited
	<b>DD010</b>	Generic numeric ID, large		Number of route, waypoint, event, mark, etc.		
	<b>DF55</b>	Integer, 32 bit unsigned	<b>uint32</b>	<i>Range:</i> 0 to 4,294,967,292	<i>Resolution:</i> 1 bit	Unit-less number
<b>5</b>	<b>Status</b>		<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i>	Optional
			<i>Bit Field Size:</i>		<i>Command Parameter:</i>	Prohibited
	<b>DD510</b>	Status of the light		0x00 = Detected / Normal 0x01 = Undetected 0x02 = General Error 0x03 = Temperature Error 0x04 = Voltage Error 0x05 = Maintenance Required 0x06 = Over Current Detected 0x07- 0xFF = Reserved for future use		
	<b>DF53</b>	Integer, 8 bit unsigned 0xFF= Data Not Available	<b>uint8</b>	<i>Range:</i> 0 to 252	<i>Resolution:</i> 1 bit	Unit-less number



This PGN can be used to configure color sequences that are used by a scene.  
This PGN will be sent upon change or in response to a request.  
A color sequence is a list of colors that will be transitioned through by the running scene.  
A sequence could be 1 to N number of colors.  
The transition method is up to the program that is running.  
A predefined set of color sequences. 1 to Max Color Sequence Color Count

Notes:

- An invalid / unset Color Sequence has a Color Count of 0.
- When specifying a color tuple if Kelvin = 0, then RGB is used; otherwise, the Kelvin value is used.
- The Intensity Field controls the overall intensity brightness of both the RGB and Kelvin values
- Sequence Indexes 220-252 are Reserved, these cannot be requested or commanded.

Preset definitions:

Sequence index has predefined values for various states.

Default Values 220-228

Values 0-219 configurable or provided by vendor.

A controller shall support the following sequence color values.

- 220 – Red
- 221 - Green
- 222 – Blue
- 223 – White
- 224 – Cool White
- 225 – Warm White
- 226 – Blue, White
- 227 – Red, Green, Blue, White
- 228 – Full Spectrum
  - {0xFF, 0xFF, 0xFF}
  - {0xFF, 0xFF, 0x80}
  - {0xFF, 0xFF, 0x40}
  - {0xFF, 0x69, 0x50}
  - {0xFF, 0x14, 0x93}
  - {0xFF, 0x00, 0x00}
  - {0xFF, 0x80, 0x00}
  - {0xFF, 0x45, 0x00}
  - {0xFF, 0x80, 0x40}
  - {0xFF, 0xF0, 0x00}
  - {0x00, 0xFF, 0x00}
  - {0x32, 0xFF, 0x32}
  - {0x00, 0xFF, 0x80}
  - {0x00, 0xFF, 0xFF}
  - {0x00, 0x00, 0xFF}
  - {0x00, 0xBF, 0xFF}
  - {0x4B, 0x00, 0x82}
  - {0xFF, 0x00, 0x80}
  - {0xFF, 0x00, 0xBC}
  - {0xFF, 0x00, 0xFF}

See PGN Lighting - System Settings 130330 for Max Values.

**Begin Request Support:**

Global ISO requests (PGN 059904) and Global NMEA Requests (PGN 126208) for this Parameter Group shall be ignored. An addressed ISO Request will result in a Negative Acknowledgement (PGN 059392) with Field 1 0x01 = Negative Acknowledgment.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function, then the response is to return one or more PGNs
- If the Request Group Function (PGN 126208) includes the (Field 1) Sequence Index, then the response shall be filtered by this field.
- If the Request Group Function (PGN 126208) includes the (Field 1) Sequence Index that is greater than the Max Color Sequences value of 219, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported, And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- If any other fields are requested then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".

**End Request Support.****Begin Command Support:**

If a Command Group Function (PGN 126208) commanding this PGN is received, the receiving device shall respond in the following manner:

- Every Command Group Function (PGN 126208) transmitted for this PGN shall contain (Field 1) Sequence Index in the first commanded field, and if the commanded value shall identify which sequence the remaining commanded fields apply to.
- If the Command Group Function (PGN 126208) containing (Field 1) Sequence Index is not included or not the first commanded field then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".
- If the Command Group Function (PGN 126208) containing (Field 1) Sequence Index is greater than the Max Color Sequences value of 219, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- To size a Color Sequence (Field 2) Color Count must be commanded
- If the Command Group Function (PGN 126208) (Field 2) Color Count is greater than Max Color Sequence Color Count, then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- To set a color entry in a Color Sequence slot then (Field 3) Color Index must be commanded.
- If (Field 3) Color Index is greater than Color Count then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"
- If (Fields 4 through 8) are commanded, then they will be applied to the Color Sequence Slot of the last commanded (Field 3) Color Index.
- If (Field 4 through 8) are commanded without a previously commanded (Field 3) Color Index then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"

**Example:**

Processing on the device shall be as follows.

- Commanded fields will be processed in order. Every time (Field 3) Color Index is processed the current color slot will be set to this value.

## Lighting Color Sequence

**PGN: 130565**  
**hex: 1FE05**

- Any (Fields 4 through 8) after this will apply to the last commanded (Field 3) Color index
- This allows multiple slots to be sent as a group or single slots modified

Further details can be found in the NMEA2000 Lighting Application Notes in Appendix D

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts:

### Field # Field Name

<b>1</b>	<b>Sequence Index</b>		Byte Field Size: <b>1</b>	Request Parameter: <b>Required</b>
			Bit Field Size:	Command Parameter: <b>Required</b>
	<b>DD005</b> Generic numeric ID, short		Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
	Sequence Index			
<b>2</b>	<b>Color Count</b>		Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
			Bit Field Size:	Command Parameter: <b>Required</b>
	<b>DD005</b> Generic numeric ID, short		Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
	Number of colors in this sequence			
<b>3</b>	<b>Color Index</b>		Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
			Bit Field Size:	Command Parameter: <b>Required</b>
	<b>DD005</b> Generic numeric ID, short		Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	Range: <b>0 to 252</b>	Resolution: <b>1 bit</b> Unit-less number
	Color Index in the sequence			
<b>4</b>	<b>Red Component</b>		Byte Field Size:	Request Parameter: <b>Optional</b>
			Bit Field Size: <b>8</b>	Command Parameter: <b>Optional</b>
	<b>DD509</b> Color value		Color Options: Value 0-255 = color	
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields
<b>5</b>	<b>Green Component</b>		Byte Field Size:	Request Parameter: <b>Optional</b>
			Bit Field Size: <b>8</b>	Command Parameter: <b>Optional</b>
	<b>DD509</b> Color value		Color Options: Value 0-255 = color	
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields
<b>6</b>	<b>Blue Component</b>		Byte Field Size:	Request Parameter: <b>Optional</b>
			Bit Field Size: <b>8</b>	Command Parameter: <b>Optional</b>
	<b>DD509</b> Color value		Color Options: Value 0-255 = color	
	<b>DF52</b> Bit field	<b>bit(n)</b>	Range: <b>Variable</b>	Resolution: <b>1</b> Used to construct bit fields

7	Color Temperature	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD511 Kelvin based color	A value covering the visible Kelvin range for lighting	
	DF124 Temperature, Very High	Uint16 Range: 0-65532 deg K	Resolution: 1
	The color temperature component	A value covering the visible Kelvin range for lighting	
8	Intensity	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD512 Medium Absolute Percentage 0 – 100%	0-100%	
	DF120 Percent, Restricted Range	uint8 Range: 0 - 100%	Resolution: 5x10E-1
	The intensity of the color	0 = 0%, 100 = 50%, 200 = 100%	
9	Fields 3-8 repeats as needed	Byte Field Size: ?	Request Parameter:
		Bit Field Size: n	Command Parameter:
	DD000 Undefined		
	DF00 Undefined	Undefined Range: undefined	Resolution: undefined
		Application specific, defined at time of use.	

## Lighting Program

**PGN: 130566**

**hex: 1FE06**

This PGN describes an available program on the controller.

Name of program

This PGN will be sent upon change or in response to a request.

The PGN generated by the Request, its (Field 1) Program Index will conform to the list below.

Program ID (Details for each Program ID located in Appendix D):

- 0 = Off
- 1 = Solid (Instant transition between colors in sequence, Program Color Sequence Rate controls time each color is shown).
- 2 = Fade (Transition through colors in sequence with fading to black in between, Program Rate controls time of transition)
- 3 = Strobe (Flashing quickly cycling through colors in sequence, Program Color Sequence Rate controls time each color is shown, Program Rate controls the strobe rate).
- 4 = Music Frequency (3 Frequency channels based on music input, Mapped to the first 3 colors in sequence).
- 5 = Music Intensity (Color intensity related to music intensity, Program Color Sequence Rate controls time each color is shown).
- 6 – 100 = NMEA reserved.
- 101 – 252 = Manufacturer specific Programs
- 253 = Reserved
- 254 = Out of Range
- 255 = Data not available or Do Not Change

Example: The controller returns Max Programs = 7. This Controller supports all NMEA programs and one extra custom program.

Requesting (Field 1) Program Index = 6 will generate a PGN response with the (Field 1) Program Index set to 101 (the first custom program index).

Requesting (Field 1) Program Index = 3 will generate a PGN response with the (Field 1) Program Index set to 3 (NMEA Strobe).

Begin Request Support:

Global ISO requests (PGN 059904) and Global NMEA Requests (PGN 126208) for this Parameter Group shall be ignored.

An addressed ISO Request will result in a Negative Acknowledgement (PGN 059392) with Field 1 0x01 = Negative Acknowledgment.

If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function, then the response is to return one or more PGNs shall be filtered by this field.
- If any other fields are requested then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported".

End Request Support.

Begin Command Support:

If a Command Group Function (PGN 126208) commanding this PGN is received, the receiving device shall respond in the following manner:

- If the Command Group Function (PGN 126208) contains any fields then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) "0x4 = Request or Command is not supported". And the corresponding field error will contain "0x3 = Request or command parameter out-of-range"

End Command Support.

Further details can be found in the NMEA2000 Lighting Application Notes in Appendix D

## NMEA 2000 Appendix B.1 - Parameter Groups Report

**Version 3.002 - 09-Feb-23**

# Lighting Program

**PGN: 130566**  
**hex: 1FE06**

Single Frame: **No** Priority Default: **7** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts:

## Field # Field Name

<b>1</b>	<b>Program ID</b>	Byte Field Size: <b>1</b> Bit Field Size:	Request Parameter: <b>Required</b> Command Parameter: <b>Prohibited</b>
	<b>DD005</b> Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b> Range: <b>0 to 252</b> Resolution: <b>1 bit</b>	Unit-less number
	See Program ID in PGN discription		
<b>2</b>	<b>Name of Program</b>	Byte Field Size: <b>8 or 16 n</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Prohibited</b>
	<b>DD504</b> Name of Device		
	<b>DF130</b> String, variable, very shor	<b>ch8or16(n)</b> Range: <b>0 to 32 ASCII or 0 to 16 Unicode Characters</b> Resolution: <b>1 ASCII or 1 Unicode Character</b>	2 to 34 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	Name of Program shall consist of no more than 32 ASCII or 16 Unicode Characters.		

# Lighting Program

PGN: 130566  
hex: 1FE06

3	Description	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Prohibited
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
Contains the text of the label. If this field is programmable, the device should be able to store a Label with a minimum length of 32 ASCII or 16 Unicode characters. If the field is not programmable, labels should not exceed more than 200 ASCII or 100 Unicode characters.		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
4	Program Capabilities	Byte Field Size:	Request Parameter: Required
		Bit Field Size: 4	Command Parameter: Prohibited
DD529	Program Capabilities	MSB/LSB: xxx1 = Program Color sequence xx1x = Program Intensity x1xx = Program Rate 1xxx = Program Color Rate	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1
		Used to construct bit fields	
5	NMEA Reserved	Byte Field Size:	Request Parameter:
		Bit Field Size: resv 4	Command Parameter:
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
DF52	Bit field	bit(n) Range: Variable	Resolution: 1
Used to align subsequent data on a byte boundary.		Used to construct bit fields	

## Watermaker Input Setting and Status

PGN: 130567

hex: 1FE07

This PGN may be requested or used to command and configure a number of Watermaker controls. The Command Group Function PGN 126208 is used perform the following: start/stop a production, start/stop rinse or flush operation , start/stop low and high pressure pump and perform an emergency stop.

The Request Group Function PGN 126208 or ISO Request PGN 059904 may be used to request this PGN. This PGN also provides Watermaker status and measurement information. The PGN is broadcast periodically.

Single Frame: **N** Priority Default: **6** Default Update Rate: **2500** milliseconds Frequency: **.4** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Required** ACK Rqmnts: **None**

### Field # Field Name

1	Watermaker Operating State	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 6	Command Parameter:	Optional	
DD363	Watermaker Operating State	0 = Stopped 1 = Starting 2 = Running 3 = Stopping 4 = Flushing 5 = Rinsing 6 = Initiating 7 = Manual Mode 62 = Error 63 = Unavailable			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
2	Production Start/Stop	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Required	
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
When commanding this field with PGN 126208, 00 Stops the Production and 01 Starts the Production. When this PGN is sent, 01 indicates the Production is ON and 00 indicates the production is off					
3	Rinse Start/Stop	Byte Field Size:	Request Parameter	Optional	
		Bit Field Size: 2	Command Parameter:	Required	
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
When commanding this field with PGN 126208, 00 Stops the Rinse/Flush and 01 Starts the Rinse/Flush. When this PGN is sent, 01 indicates the Rinse/Flush function is ON and 00 indicates the Rinse/Flush function is off					



## Watermaker Input Setting and Status

**PGN: 130567**  
**hex: 1FE07**

### 4 Low Pressure Pump Status

Byte Field Size:

Bit Field Size: **2**

Request Parameter

Optional

Command Parameter:

Required

**DD002** Generic status pair

MSB/LSB:

00 = [No, Off, Disabled, Reset, "0"],

01 = [Yes, On, Enabled, Set, "1"],

10 = Error,

11 = [Unavailable, Unknown]

**DF52** Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

When commanding this field with PGN 126208, 00 turns off the Low Pressure Pump and 01 starts the Low Pressure Pump. When this PGN is sent, 00 indicates the Low Pressure Pump is off and 01 indicates the Low Pressure Pump is on.

### 5 High Pressure Pump Status

Byte Field Size:

Bit Field Size: **2**

Request Parameter

Optional

Command Parameter:

Required

**DD002** Generic status pair

MSB/LSB:

00 = [No, Off, Disabled, Reset, "0"],

01 = [Yes, On, Enabled, Set, "1"],

10 = Error,

11 = [Unavailable, Unknown]

**DF52** Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

When commanding this field with PGN 126208, 00 turns off the High Pressure Pump and 01 starts the High Pressure Pump. When this PGN is sent, 00 indicates the High Pressure Pump is off and 01 indicates the High Pressure Pump is on.

### 6 Emergency Stop

Byte Field Size:

Bit Field Size: **2**

Request Parameter

Optional

Command Parameter:

Required

**DD002** Generic status pair

MSB/LSB:

00 = [No, Off, Disabled, Reset, "0"],

01 = [Yes, On, Enabled, Set, "1"],

10 = Error,

11 = [Unavailable, Unknown]

**DF52** Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

When commanding this field with PGN 126208, 01 initiates the Emergency Stop function of the Watermaker, all other values are ignored. Emergency Stop can only be activated by the value of 01. When this PGN is sent, normal operation is indicated by the value 00 which means the Emergency Stop is inactive (OFF).

### 7 Product Solenoid Valve Status

Byte Field Size:

Bit Field Size: **2**

Request Parameter

Optional

Command Parameter:

Optional

**DD364** Sensor Status

MSB/LSB:

00 = OK

01 = Warning

10 = Error

11 = [Unavailable, Unknown]

**DF52** Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

### 8 Flush Mode Status

Byte Field Size:

Bit Field Size: **2**

Request Parameter

Optional

Command Parameter:

Optional

**DD002** Generic status pair

MSB/LSB:

00 = [No, Off, Disabled, Reset, "0"],

01 = [Yes, On, Enabled, Set, "1"],

10 = Error,

11 = [Unavailable, Unknown]

**DF52** Bit field

bit(n)

Range:

Variable

Resolution: 1

Used to construct bit fields

## NMEA 2000 Appendix B.1 - Parameter Groups Report

**Version 3.002 - 09-Feb-23**

# Watermaker Input Setting and Status

PGN: 130567  
hex: 1FE07

9	Salinity Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD364	Sensor Status	MSB/LSB: 00 = OK 01 = Warning 10 = Error 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
10	Feed Pressure Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD364	Sensor Status	MSB/LSB: 00 = OK 01 = Warning 10 = Error 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
11	Oil Change Indicator Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD364	Sensor Status	MSB/LSB: 00 = OK 01 = Warning 10 = Error 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
12	Filter Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD364	Sensor Status	MSB/LSB: 00 = OK 01 = Warning 10 = Error 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
13	System Status	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 2	Command Parameter:	Optional
DD364	Sensor Status	MSB/LSB: 00 = OK 01 = Warning 10 = Error 11 = [Unavailable, Unknown]		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
14	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 2	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
Used to align subsequent data on a byte boundary.				

# Watermaker Input Setting and Status

PGN: 130567  
hex: 1FE07

15	Salinity	Byte Field Size: 2	Request Parameter: Optional
	DD365 Salinity, Watermaker	Bit Field Size:	Command Parameter: Optional
	DF112 Salinity	uint16 Range: 0 to 65,535 ppm	Resolution: 1 ppm
16	Product Water Temperature	Byte Field Size: 2	Request Parameter: Optional
	DD043 Generic Temperature	Bit Field Size:	Command Parameter: Optional
	DF39 Temperature, low	uint16 Range: 0 to 655.32 deg K	Resolution: 1x10E-2 deg K
17	Pre-filter Pressure	Byte Field Size: 2	Request Parameter: Optional
	DD049 Generic Pressure	Bit Field Size:	Command Parameter: Optional
	DF47 Pressure, medium	uint16 Range: 0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa
18	Post-filter Pressure	Byte Field Size: 2	Request Parameter: Optional
	DD049 Generic Pressure	Bit Field Size:	Command Parameter: Optional
	DF47 Pressure, medium	uint16 Range: 0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa
19	Feed Pressure	Byte Field Size: 2	Request Parameter: Optional
	DD366 Pressure, Watermaker	Bit Field Size:	Command Parameter: Optional
	DF113 Pressure, Compound	int16 Range: +/- 32,764 Kpa	Resolution: 1 Kpa
20	System High Pressure	Byte Field Size: 2	Request Parameter: Optional
	DD225 Generic Pressure High	Bit Field Size:	Command Parameter: Optional
	DF29 Pressure	uint16 Range: 0 to 65,532,000 Pa	Resolution: 1x10E+3 Pa
21	Product Water Flow	Byte Field Size: 2	Request Parameter: Optional
	DD131 Flow rate, low	Bit Field Size:	Command Parameter: Optional
	DF18 Flow rate, low	int16 Range: +/-3.2764 cu-m/hr	Resolution: 1x10E-4 cu-m/hr
22	Brine Water Flow	Byte Field Size: 2	Request Parameter: Optional
	DD131 Flow rate, low	Bit Field Size:	Command Parameter: Optional
	DF18 Flow rate, low	int16 Range: +/-3.2764 cu-m/hr	Resolution: 1x10E-4 cu-m/hr
23	Run Time	Byte Field Size: 4	Request Parameter: Optional
	DD132 Run time, Engine	Bit Field Size:	Command Parameter: Optional
	DF67 Time interval, large	uint32 Range: 0 to ~4.295x10E+9 s	Resolution: 1 sec

## Entertainment – Diagnostic Status

**PGN: 130568**  
**hex: 1FE08**

Details the diagnostic status of any Audio/Video Source. This PGN is sent upon change, in response to a request or periodically while diagnostic mode is enabled.

This PGN cannot be requested with the ISO request (PGN 059904).

Begin Request Group Function:

If a Request Group Function ( PGN 126208 ) requesting this PGN is received, the receiving device shall respond in the following manner :

IMPORTANT: The error codes specified in this PGN description for the Acknowledgement response shall take precedence.

This variation is specified to be consistent with the previously published suite of Entertainment PGNs, as the suite of entertainment PGNs contain an unusual response to Request Group Functions.

- If no requested fields have been included with the Request Group Function then the response is to return the Acknowledge Group Function ( PGN 126208 ), containing the error state for PGN error code ( Field 3 ) of "0x3 = Access denied".
- If the Request Group Function ( PGN 126208 ) includes the Audio/Video Source Type, Audio/Video Source Number field then the response shall be filtered by these fields contained within this request resulting in one response. If the fields requested are not valid then the appropriate response would be the Acknowledge Group Function ( PGN 126208 ), containing the error state for PGN error code ( Field 3 ) of "0x3 = Access denied".
- If an individual field is invalid the field parameter error code for that field shall be "0x3 = Requested or command parameter out-of-range".

End Request Group Function.

Begin Command Group Function:

- A NMEA Command Group Function (PGN 126208) is used to enable or disable diagnostic mode (Field 3).
- To change the diagnostic mode, the Command Group Function shall include the Audio/Video Source Type (Field 1), Audio/Video Source Number (Field 2) and Diagnostic Mode (Field 3).

End Command Group Function.

Further details can be found in the NMEA2000 Entertainment Application Notes in Appendix D.

Single Frame: **No**      Priority Default: **6**      Default Update Rate: **1000** milliseconds      Frequency: **1.** cycles per second  
Destination: **Global**      Query Support: **Required**      Command Support: **Required**      ACK Rqmnts: **Yes**

**Field #    Field Name**

---

1	Audio/Video Source Type		Byte Field Size: 8		Request Parameter: Required	
	DD389 Audio/Video Source Type		0 = Vessel Alarm 1 = AM 2 = FM 3 = Weather 4 = DAB 5 = Aux 6 = USB 7 = CD 8 = MP3 9 = Apple iOS 10 = Android 11 = Bluetooth 12 = Sirius XM 13 = Pandora 14 = Spotify 15 = Slacker 16 = Songza 17 = Apple Radio 18 = Last FM 19 = Ethernet 20 = Video MP4 21 = Video DVD 22 = Video BlueRay 23 = HDMI 24 = Video 25 - 252 = User Defined 253 = Reserved 254 = Error 255 = Not available			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
2	Audio/Video Source Number		Byte Field Size: 1		Request Parameter: Required	
			Bit Field Size:		Command Parameter: Required	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.			
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
	Audio/Video Source Number per Type. There can be more than one of each type of audio source available on a A/V Device (e.g. 3 USB Sources).					
	Device (e.g. 3 USB Sources).					
3	Diagnostic Mode		Byte Field Size:		Request Parameter: Optional	
			Bit Field Size: 2		Command Parameter: Required	
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
	Specifies the current diagnostic mode to enable/disable periodic update of the diagnostic data.					

4	NMEA Reserved	Byte Field Size:	Request Parameter	
		Bit Field Size: resv 6	Command Parameter:	
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52	Bit field	bit(n)	Range: Variable Resolution: 1 Used to construct bit fields
	Used to align subsequent data on byte boundary.			
5	Diagnostic Data	Byte Field Size: 8 or 16 n	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
	DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
	DF50	String, variable, short	ch8or16(n)	Range: 0 to 250 ASCII or 0 to 125 Unicode Characters Resolution: 1 ASCII or 1 Unicode Character
	0 to 125 Unicode Characters or 0 to 250 ASCII Characters. Displays the diagnostic data to the user.			
	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.			

## Entertainment - Current File and Status

PGN: 130569

hex: 1FE09

Details the current file being played and the current play status by Audio/Video zone.

Sent on start up, upon any change, upon request and periodically while a Audio/Video device is playing a file. Fields can be commanded by a client using the NMEA Command Group Function ( PGN 126208 ) to change the currently playing audio/video source, current file, adjust volume, change the playing status, save a favorite or tune a radio source.

A device receiving an ISO Request ( PGN 059904 ) for this PGN, shall respond by providing as many of these PGNs as necessary for every Audio/Video zone.

If a Request Group Function ( PGN 126208 ) requesting this PGN is received, the receiving device shall respond in the following manner :

- If no requested fields have been included with the Request Group Function then the response is to return one or more PGNs, just like responding to the ISO Request ( PGN 059904 ).
- If the Request Group Function ( PGN 126208 ) includes the Zone Number, Audio/Video Source Type, Audio/Video Source Number or File ID fields, then the response shall be filtered by these fields contained within this request resulting in one or more responses.
- If the fields requested are not valid then the appropriate response would be the Acknowledge Group Function ( PGN 126208 ), containing the error state for PGN error code ( Field 3 ) of "0x3 = Access denied".
- If an individual field is invalid the field parameter error code for that field shall be "0x3 = Requested or command parameter out-of-range".
- If the individual fields are valid but the combination of fields together are invalid then just the error state for PGN error code ( Field 3 ) of "0x3 = Access denied" would be in the Acknowledge Group Function ( PGN 126208 ) response. PGN Transmit Frequency is 1 cycle per second per Audio/Video Zone.

Note 1:

When commanding Fields 6, 8, 9, 11, and 12: valid values for Fields 1, 2 ,and 3 shall be provided in the NMEA Command Group Function.

Note 2:

When commanding Fields 10, 14, 15, 16, 17: Valid values for Fields 1, 2, and 3 shall be provided and Field 1 shall be set to "zero" in the NMEA Command Group Function. Some "Audio / Video Source Types", (Field 2), may not support playing different "File IDs", (Field 4) in different zones simultaneously.

A change to Fields 4, 5, 6, 8, 9, 11, 14 and 15 in any zone will result in the same change in all zones from the same source. Further details can be found in the NMEA2000 Entertainment Application Notes in Appendix D.

Single Frame: **N** Priority Default: **6** Default Update Rate: **500** milliseconds Frequency: **2.** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts: **Yes**

### Field # Field Name

1	Zone Number	Byte Field Size:	Request Parameter
		Bit Field Size: <b>8</b>	Command Parameter: <b>Required</b>
<b>DD396</b>	Entertainment Zones	0 = All Zones 1 = Zone 1 2 = Zone 2 3 = Zone 3 4 = Zone 4 5 - 252 = User Defined 253 = Reserved 254 = Error 255 = Data Not Available	
<b>DF52</b>	Bit field	bit(n) Range: <b>Variable</b> Resolution: <b>1</b>	Used to construct bit fields

An Audio/Video zone is a room or area of the vessel in which sound will be distributed. Each zone can be separately controlled and could play a different source of audio or video.

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**2 Audio/Video Source Type**

Byte Field Size:

Bit Field Size: **8**

Request Parameter

Required

Command Parameter:

Required

**DD389** Audio/Video Source Type

0 = Vessel Alarm  
 1 = AM  
 2 = FM  
 3 = Weather  
 4 = DAB  
 5 = Aux  
 6 = USB  
 7 = CD  
 8 = MP3  
 9 = Apple iOS  
 10 = Android  
 11 = Bluetooth  
 12 = Sirius XM  
 13 = Pandora  
 14 = Spotify  
 15 = Slacker  
 16 = Songza  
 17 = Apple Radio  
 18 = Last FM  
 19 = Ethernet  
 20 = Video MP4  
 21 = Video DVD  
 22 = Video BlueRay  
 23 = HDMI  
 24 = Video  
 25 - 252 = User Defined  
 253 = Reserved  
 254 = Error  
 255 = Not available

**DF52** Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

**3 Audio/Video Source Number**

Byte Field Size:

**1**

Bit Field Size:

Request Parameter

Required

Command Parameter:

Required

**DD005** Generic numeric ID, short

Number of route, waypoint, event, mark, etc.

**DF53** Integer, 8 bit unsigned

uint8

Range: 0 to 252

Resolution: 1 bit

Unit-less number

Audio/Video Source Number per Type. There can be more than one of each type of audio source available on a A/V Device (e.g. 3 USB Sources).

**4 File ID**

Byte Field Size:

**4**

Bit Field Size:

Request Parameter

Required

Command Parameter:

Required

**DD010** Generic numeric ID, large

Number of route, waypoint, event, mark, etc.

**DF55** Integer, 32 bit unsigned

uint32

Range: 0 to 4,294,967,292

Resolution: 1 bit

Unit-less number

ID of a file, song, station which is unique per Audio/Video source.



## 5 Play Status

Byte Field Size:

Bit Field Size: 8

Request Parameter

Optional

Command Parameter:

Required

DD390 Play Status

0 = Play (Normal functionality)  
 1 = Pause  
 2 = Stop  
 3 = FF (1x)  
 4 = FF (2x)  
 5 = FF (3x)  
 6 = FF (4x)  
 7 = RW (1x)  
 8 = RW (2x)  
 9 = RW (3x)  
 10 = RW (4x)  
 11 = Skip Ahead  
 12 = Skip Back  
 13 = Jog Ahead  
 14 = Jog Back  
 15 = Seek Up  
 16 = Seek Down  
 17 = Scan Up  
 18 = Scan Down  
 19 = Tune Up  
 20 = Tune Down  
 21 = Slow Motion (.75x)  
 22 = Slow Motion (.5x)  
 23 = Slow Motion (.25x)  
 24 = Slow Motion (.125x)  
 25 - 252 = User Defined  
 253 = Reserved  
 254 = Error  
 255 = Not available

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## 6 Elapsed Track/Chapter Time

Byte Field Size: 2

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Note 1

DD391 Time, Standard

Time, 1 Second Resolution

DF80 Time, 1sec

uint16

Range: 0 to 65532 seconds

Resolution: 1 second

## 7 Track/Chapter Time

Byte Field Size: 2

Bit Field Size:

Request Parameter

Optional

Command Parameter:

Optional

DD391 Time, Standard

Time, 1 Second Resolution

DF80 Time, 1sec

uint16

Range: 0 to 65532 seconds

Resolution: 1 second

## 8 Repeat Status

Byte Field Size:

Bit Field Size: 4

Request Parameter

Optional

Command Parameter:

Note 1

DD392 Repeat

0 = Off  
 1 = One ( Current File )  
 2 = All ( Play Queue )  
 3 - 14 = Reserved  
 15 = Data Not Available / Do Not Change

DF52 Bit field

bit(n)

Range: Variable

Resolution: 1

Used to construct bit fields

## Entertainment - Current File and Status

PGN: 130569

hex: 1FE09

9	Shuffle Status		Byte Field Size:		Request Parameter		Optional	
			Bit Field Size: 4		Command Parameter: Note 1			
	DD393	Shuffle	0 = Off 1 = Play Queue 2 = All 3 - 14 = Reserved 15 = Data Not Available / Do Not Change					
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields		
If the shuffle status is set to Play Queue the A/V device will play all the files in the Play Queue in random order.								
If the shuffle status is set to all the A/V device will play all files from a source in a random order. The A/V Device will no longer play files in the Play Queue.								
10	Save Favorite Number (write only)		Byte Field Size: 1		Request Parameter		Optional	
			Bit Field Size:		Command Parameter: Note 2			
	DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.					
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
Used to save current station as favorite. Tuner based sources only: AM/FM/DAB/SiriusXM. When this PGN is generated as a status or report, this field is set to not available (0xFF).								
11	Play Favorite Number		Byte Field Size: 1		Request Parameter		Optional	
			Bit Field Size:		Command Parameter: Note 1			
	DD005	Generic numeric ID, short	Number of route, waypoint, event, mark, etc.					
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
Used to command AV to play indicated favorite station								
12	Thumbs Up/Thumbs Down		Byte Field Size:		Request Parameter		Optional	
			Bit Field Size: 8		Command Parameter: Note 1			
	DD394	Thumbs Up / Thumbs Down	0 = None 1 = Thumbs Up 2 = Thumbs Down 3 - 253 = Reserved 254 = Error 255 = Data Not Available					
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields		
13	Signal Strength		Byte Field Size: 1		Request Parameter		Optional	
			Bit Field Size:		Command Parameter: Optional			
	DD263	Generic Absolute Percentage 0-252%						
	DF93	Percent, Absolute	uint8	Range: 0 - 252%	Resolution: 1%			
Generic Absolute Percentage 0-252%								
14	Radio Frequency		Byte Field Size: 4		Request Parameter		Optional	
			Bit Field Size:		Command Parameter: Note 2			
	DD016	Radio Tx or Rx Frequency						
	DF21	Frequency	uint32	Range: 0 to ~4.295x10E+10 Hz	Resolution: 10 Hz			

15	HD Frequency Multicast	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Note 2
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number
	Digital sub channel used for multicasting digital radio or television stations on a single frequency.		
16	Delete Favorite Number	Byte Field Size: 1	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Note 2
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number
	Used to delete a station as favorite. Tuner based sources only: AM/FM/DAB/SiriusXM. When this PGN is generated as a status or report, this field is set to not available ( 0xFF ).		
17	Total Number of Tracks	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Note 2
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned uint16	Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	Number of Tracks/files in current album, playlist or folder		

The PGN details the library data for an individual Audio/Video file. Field 15 Artist Name, Field 16 Album Name and Field 17 Station Name may optionally contain null strings (see DF 50 for details).

This PGN is sent upon request or change. This PGN cannot be requested with the ISO request (PGN 059904).

If a globally addressed ISO request is received, there is no response.

If an addressed ISO request is received, the response is the ISO Acknowledge (PGN 059392) providing a negative acknowledge (NAK). If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:

- If no requested fields have been included with the Request Group Function then the response is to return the Acknowledge Group Function ( PGN 126208 ), containing the error state for PGN error code ( Field 3 ) of "0x3 = Access denied".
- If the Request Group Function ( PGN 126208 ) includes the Audio/Video Source Type, Audio/Video Source Number, File ID and Library Data Type fields, then the response shall be filtered by these fields contained within this request resulting in one or more responses of this PGN.
- If the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) of "0x3 = Access denied". If an individual field is invalid the field parameter error code for that field shall be "0x3 = Requested or command parameter out-of-range".
- If the individual fields contain valid values but the combination of the fields together are invalid, then the appropriate response shall be the Acknowledge Group Function (PGN 126208) with the PGN error code (Field 3) set to "0x3 = Access denied".

Note 1:  
The fields can be commanded using the NMEA Command Group Function ( PGN 126208 ) to add or remove a file from a play queue. A command shall include all of the following fields; Audio/Video Source Type, Audio Video Source Number, File ID, Library Data Type, Play Queue Zone Number and In Play Queue fields.

This PGN may exceed 223 bytes. If the PGN exceeds 223 bytes, then ISO Transport Protocol shall be used to transmit this PGN (See NMEA 2000 Main Document for further information on ISO multi-packet transfers).

Further details can be found in the NMEA2000 Entertainment Application Notes in Appendix D.

Single Frame: NPriority Default: 6Default Update Rate: millisecondsFrequency: NAcycles per second

Destination: GlobalQuery Support: RequiredCommand Support: RequiredACK Rqmnts: Yes

Field #Field Name

1	Audio/Video Source Type		Byte Field Size: 8		Request Parameter: Required	
			Bit Field Size:		Command Parameter: Required	
DD389	Audio/Video Source Type		0 = Vessel Alarm 1 = AM 2 = FM 3 = Weather 4 = DAB 5 = Aux 6 = USB 7 = CD 8 = MP3 9 = Apple iOS 10 = Android 11 = Bluetooth 12 = Sirius XM 13 = Pandora 14 = Spotify 15 = Slacker 16 = Songza 17 = Apple Radio 18 = Last FM 19 = Ethernet 20 = Video MP4 21 = Video DVD 22 = Video BlueRay 23 = HDMI 24 = Video 25 - 252 = User Defined 253 = Reserved 254 = Error 255 = Not available			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
2	Audio/Video Source Number		Byte Field Size: 1		Request Parameter: Required	
			Bit Field Size:		Command Parameter: Required	
DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.			
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number	
Audio/Video Source Number per Type						
There can be more than one of each type of audio source available on a A/V Device (e.g. 3 USB Sources).						
3	File ID		Byte Field Size: 4		Request Parameter: Required	
			Bit Field Size:		Command Parameter: Required	
DD010	Generic numeric ID, large		Number of route, waypoint, event, mark, etc.			
DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number	
ID of a file, song, station which is unique per Audio/Video source.						

4	Library Data Type		Byte Field Size:	8	Request Parameter	Required
			Bit Field Size:		Command Parameter:	Optional
DD395 Library Data Type			0 = File 1 = Playlist Name 2 = Genre Name/ Category Name 3 = Album Name 4 = Artist Name 5 = Track Name/ Song Name 6 = Station Name/ Channel Name 7 = Station Number/ Channel Number 8 = Favorite Number 9 = Play Queue 10 = Content Info 11 - 253 = Reserved 254 = Error 255 = Data Not Available			
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
5	Library Data Name		Byte Field Size:	8 or 16 n	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
DD004 Generic name string, short			Name of place, route, waypoint, destination, vessel, vehicle, etc.			
	DF50	String, variable, short	ch8or16(n)	Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
6	Track/Chapter Number		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
DD007 Generic numeric ID, medium			Number of route, waypoint, event, mark, etc.			
	DF54	Integer, 16 bit unsigned	uint16	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
Generic numeric ID, medium						
7	Station Number		Byte Field Size:	2	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
DD007 Generic numeric ID, medium			Number of route, waypoint, event, mark, etc.			
	DF54	Integer, 16 bit unsigned	uint16	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
Generic numeric ID, medium						

# Entertainment - Library Data File

PGN: 130570  
hex: 1FE0A

8	<b>Favorite Number</b>		Byte Field Size: 1	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	<b>DD005</b> Generic numeric ID, short		Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number
	Used to save current station as favorite Tuner based sources only: AM/FM/DAB/SiriusXM			
9	<b>Radio Frequency</b>		Byte Field Size: 4	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	<b>DD016</b> Radio Tx or Rx Frequency			
	<b>DF21</b> Frequency	uint32	Range: 0 to ~4.295x10E+10 Hz	Resolution: 10 Hz
	Frequency			
10	<b>HD Frequency Multi-Cast</b>		Byte Field Size: 1	Request Parameter: Optional
			Bit Field Size:	Command Parameter: Optional
	<b>DD005</b> Generic numeric ID, short		Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit Unit-less number
	Generic numeric ID, short			
11	<b>Play Queue Zone Number</b>		Byte Field Size:	Request Parameter: Optional
			Bit Field Size: 8	Command Parameter: Note 1
	<b>DD396</b> Entertainment Zones		0 = All Zones 1 = Zone 1 2 = Zone 2 3 = Zone 3 4 = Zone 4 5 - 252 = User Defined 253 = Reserved 254 = Error 255 = Data Not Available	
	<b>DF52</b> Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
12	<b>In Play Queue</b>		Byte Field Size:	Request Parameter: Optional
			Bit Field Size: 2	Command Parameter: Note 1
	<b>DD002</b> Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]	
	<b>DF52</b> Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields
13	<b>Lock Status of Sirius XM Channel</b>		Byte Field Size:	Request Parameter: Optional
			Bit Field Size: 2	Command Parameter: Optional
	<b>DD415</b> Lock Status		0 = unlocked/unrestricted 1 = locked/restricted 2 = error 3 = unavailable/unknown	
	<b>DF52</b> Bit field	bit(n)	Range: Variable	Resolution: 1 Used to construct bit fields

14	NMEA Reserved	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: <b>resv</b> 4	Command Parameter:	Optional
	DD001	Reserved field	Variable number of reserved bits, all set to logic "1"	
	DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields
15	Artist Name	Byte Field Size: <b>8 or 16</b> n	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
	DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
	DF50	String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
The Artist name of the file if available				
16	Album Name	Byte Field Size: <b>8 or 16</b> n	Request Parameter	Optional
		Bit Field Size:	Command Parameter:	Optional
	DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
	DF50	String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
The Album name of the file if available				



17	Station Name	Byte Field Size: 8 or 16   n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n)Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
The Station name of the file if available		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	

The PGN details the library data for an individual Audio/Video group. A group is a list of IDs of other groups or files. This PGN is sent upon request. This PGN cannot be requested with the ISO request (PGN 059904).

If a globally addressed ISO request is received, there is no response.  
If an addressed ISO request is received, the response is the ISO Acknowledge (PGN 059392) providing a negative acknowledge (NAK). If a Request Group Function ( PGN 126208 ) requesting this PGN is received, the receiving device shall respond in the following manner :

- If no requested fields have been included with the Request Group Function then the response is to return the Acknowledge Group Function ( PGN 126208 ), containing the error state for PGN error code ( Field 3 ) of "0x3 = Access denied".
- If the Request Group Function (PGN 126208) includes the Audio/Video Source Type, Audio/Video Source Number, Group Type, Group ID and Index of first ID in PGN fields, then the response shall be filtered by these fields contained within this request resulting in one response.
- If the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) of "0x3 = Access denied". If an individual field is invalid the field parameter error code for that field shall be "0x3 = Requested or command parameter out-of-range".
- If the individual fields contain valid values but the combination of the fields together are invalid, then the appropriate response shall be the Acknowledge Group Function (PGN 126208) with the PGN error code (Field 3) set to "0x3 = Access denied. This PGN can exceed 223 bytes.

This PGN has been designed with a paging feature to allow the information to be packaged without exceeding 223 bytes per transmission. This may result in multiple transmissions of this PGN to convey all of the necessary information. As an alternative, ISO Transport protocol may also be used.

Further details can be found in the NMEA2000 Entertainment Application Notes in Appendix D.

Single Frame: NPriority Default: 6Default Update Rate: millisecondsFrequency: NA cycles per second

Destination: GlobalQuery Support: RequiredCommand Support: OptionalACK Rqmnts: Yes

Field #Field Name

**1 Audio/Video Source Type***Byte Field Size:**Bit Field Size:* **8***Request Parameter***Required***Command Parameter:***Optional****DD389** Audio/Video Source Type

0 = Vessel Alarm  
 1 = AM  
 2 = FM  
 3 = Weather  
 4 = DAB  
 5 = Aux  
 6 = USB  
 7 = CD  
 8 = MP3  
 9 = Apple iOS  
 10 = Android  
 11 = Bluetooth  
 12 = Sirius XM  
 13 = Pandora  
 14 = Spotify  
 15 = Slacker  
 16 = Songza  
 17 = Apple Radio  
 18 = Last FM  
 19 = Ethernet  
 20 = Video MP4  
 21 = Video DVD  
 22 = Video BlueRay  
 23 = HDMI  
 24 = Video  
 25 - 252 = User Defined  
 253 = Reserved  
 254 = Error  
 255 = Not available

**DF52** Bit field**bit(n)***Range:* **Variable***Resolution:* **1**

Used to construct bit fields

**2 Audio/Video Source Number***Byte Field Size:* **1***Bit Field Size:**Request Parameter***Required***Command Parameter:***Optional****DD005** Generic numeric ID, short

Number of route, waypoint, event, mark, etc.

**DF53** Integer, 8 bit unsigned**uint8***Range:* **0 to 252***Resolution:* **1 bit**

Unit-less number

Audio/Video Source Number per Type

There can be more than one of each type of audio source available on a A/V Device (e.g. 3 USB Sources).

3	Group Type		Byte Field Size:		Request Parameter		Required
			Bit Field Size: 8		Command Parameter: Optional		
	DD395	Library Data Type	0 = File 1 = Playlist Name 2 = Genre Name/ Category Name 3 = Album Name 4 = Artist Name 5 = Track Name/ Song Name 6 = Station Name/ Channel Name 7 = Station Number/ Channel Number 8 = Favorite Number 9 = Play Queue 10 = Content Info 11 - 253 = Reserved 254 = Error 255 = Data Not Available				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
4	Play Queue Zone Number		Byte Field Size:		Request Parameter		Required
			Bit Field Size: 8		Command Parameter: Optional		
	DD396	Entertainment Zones	0 = All Zones 1 = Zone 1 2 = Zone 2 3 = Zone 3 4 = Zone 4 5 - 252 = User Defined 253 = Reserved 254 = Error 255 = Data Not Available				
	DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
	Audio Video Zone Number						
5	Group ID		Byte Field Size: 4		Request Parameter		Required
			Bit Field Size:		Command Parameter: Optional		
	DD010	Generic numeric ID, large	Number of route, waypoint, event, mark, etc.				
	DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number	
	ID of a group which is unique per Audio/Video source.						
6	Index of first ID in PGN		Byte Field Size: 2		Request Parameter		Required
			Bit Field Size:		Command Parameter: Optional		
	DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54	Integer, 16 bit unsigned	uint16	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number	
	Generic numeric ID, medium						
7	Number of IDs in this PGN		Byte Field Size: 2		Request Parameter		Optional
			Bit Field Size:		Command Parameter: Optional		
	DD007	Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54	Integer, 16 bit unsigned	uint16	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number	
	Generic numeric ID, medium						

8	Total number of IDs available	Byte Field Size: 2	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.	
	DF54 Integer, 16 bit unsigned	uint16 Range: 0 to 65,532	Resolution: 1 bit Unit-less number
	Generic numeric ID, medium		
9	ID Type	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 8	Command Parameter: Optional
	DD397 ID Type	0 = Group 1 = File 2 = Encrypted Group 3 = Encrypted File 4 - 252 = User Defined 253 = Reserved 254 = Error 255 = DataNot Available	
	DF52 Bit field	bit(n) Range: Variable	Resolution: 1 Used to construct bit fields
10	ID	Byte Field Size: 4	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsigned	uint32 Range: 0 to 4,294,967,292	Resolution: 1 bit Unit-less number
	This field will be either a File ID or Group ID depending on the value of Field 9 ID Type.		
11	ID Name	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
	DD004 Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
	DF50 String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character 2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
12	Fields 9 – 11 repeat as needed	Byte Field Size: ?	Request Parameter:
		Bit Field Size: n	Command Parameter:
	DD000 Undefined		
	DF00 Undefined	Undefined Range: undefined	Resolution: undefined Application specific, defined at time of use.

13	Artist Name	Byte Field Size: 8 or 16   n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n)Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
The Artist name of the file if available		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	

This PGN details the library data for an individual Audio/Video group. A group is a list of IDs of other groups or files.

This PGN cannot be requested with the ISO request (PGN 059904).

If a globally addressed ISO request is received, there is no response.

If an addressed ISO request is received, the response is the ISO Acknowledge (PGN 059392) providing a negative acknowledge (NAK). If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner :

- If no requested fields have been included with the Request Group Function then the response is to return the Acknowledge Group Function (PGN 126208 , containing the error state for PGN error code ( Field 3 ) of "0x3 = Access denied".
- If the Request Group Function (PGN 126208) includes the Audio/Video Source Type, Audio/Video Source Number, and one or more Library Group Types, and Library Data Names in PGN fields, then the response shall be filtered by all of these fields contained within this request resulting in one response.
- If the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) of "0x3 = Access denied". If an individual field is invalid the field parameter error code for that field shall be "0x3 = Requested or command parameter out-of-range".
- If the individual fields contain valid values but the combination of the fields together are invalid, then the appropriate response shall be the Acknowledge Group Function (PGN 126208) with the PGN error code (Field 3) set to "0x3 = Access denied. This PGN may exceed 223 bytes.

If the PGN exceeds 223 bytes, then ISO Transport Protocol shall be used to transmit this PGN (See NMEA 2000 Main Document for further information on ISO multi-packet transfers).

Further details can be found in the NMEA2000 Entertainment Application Notes in Appendix D.

Single Frame: NPriority Default: 6Default Update Rate: millisecondsFrequency: NA cycles per second

Destination: GlobalQuery Support: RequiredCommand Support: OptionalACK Rqmnts: Yes

Field #Field Name

1	Audio/Video Source Type		Byte Field Size: 8		Request Parameter Required		Command Parameter: Optional	
DD389	Audio/Video Source Type		0 = Vessel Alarm 1 = AM 2 = FM 3 = Weather 4 = DAB 5 = Aux 6 = USB 7 = CD 8 = MP3 9 = Apple iOS 10 = Android 11 = Bluetooth 12 = Sirius XM 13 = Pandora 14 = Spotify 15 = Slacker 16 = Songza 17 = Apple Radio 18 = Last FM 19 = Ethernet 20 = Video MP4 21 = Video DVD 22 = Video BlueRay 23 = HDMI 24 = Video 25 - 252 = User Defined 253 = Reserved 254 = Error 255 = Not available					
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields			
2	Audio/Video Source Number		Byte Field Size: 1		Request Parameter Required		Command Parameter: Optional	
DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number			
Audio/Video Source Number per Type There can be more than one of each type of audio source available on a A/V Device (e.g. 3 USB Sources).								
3	Group ID		Byte Field Size: 4		Request Parameter Required		Command Parameter: Optional	
DD010	Generic numeric ID, large		Number of route, waypoint, event, mark, etc.					
DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number			
ID of a group which is unique per Audio/Video source.								



4	Library Group Type 1	Byte Field Size:	Request Parameter	Required
		Bit Field Size: 8	Command Parameter:	Optional
	DD395 Library Data Type	0 = File 1 = Playlist Name 2 = Genre Name/ Category Name 3 = Album Name 4 = Artist Name 5 = Track Name/ Song Name 6 = Station Name/ Channel Name 7 = Station Number/ Channel Number 8 = Favorite Number 9 = Play Queue 10 = Content Info 11 - 253 = Reserved 254 = Error 255 = Data Not Available		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
5	Library Data Name 1	Byte Field Size: 8 or 16 n Bit Field Size:	Request Parameter	Required
			Command Parameter:	Optional
	DD004 Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.		
	DF50 String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	The name string in this field will be of the type in Field 4 – Library Group Type 1.			

6	Library Group Type 2	Byte Field Size:	Request Parameter	Required
		Bit Field Size: 8	Command Parameter:	Optional
DD395	Library Data Type	0 = File 1 = Playlist Name 2 = Genre Name/ Category Name 3 = Album Name 4 = Artist Name 5 = Track Name/ Song Name 6 = Station Name/ Channel Name 7 = Station Number/ Channel Number 8 = Favorite Number 9 = Play Queue 10 = Content Info 11 - 253 = Reserved 254 = Error 255 = Data Not Available		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
7	Library Data Name 2	Byte Field Size: 8 or 16 n Bit Field Size:	Request Parameter	Required
			Command Parameter:	Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.		
DF50	String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
The name string in this field will be of the type in Field 6 – Library Group Type 2.				

8	Library Group Type 3	Byte Field Size:	Request Parameter	Required
		Bit Field Size: 8	Command Parameter:	Optional
DD395	Library Data Type	0 = File 1 = Playlist Name 2 = Genre Name/ Category Name 3 = Album Name 4 = Artist Name 5 = Track Name/ Song Name 6 = Station Name/ Channel Name 7 = Station Number/ Channel Number 8 = Favorite Number 9 = Play Queue 10 = Content Info 11 - 253 = Reserved 254 = Error 255 = Data Not Available		
DF52	Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
9	Library Data Name 3	Byte Field Size: 8 or 16 n Bit Field Size:	Request Parameter	Required
			Command Parameter:	Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.		
DF50	String, variable, short	ch8or16(n) Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
The name string in this field will be of the type in Field 8 – Library Group Type 3.				

## Entertainment - Supported Source Data

**PGN: 130573**  
**hex: 1FE0D**

This PGN details the Audio/Videos sources supported by an Audio/Video device.

This PGN is sent upon change or in response to a request. Pre-defined sources can be left unnamed or may be customized with a name, e.g. "iOs" vs "Steve's phone."

This PGN cannot be requested with the ISO request (PGN 059904).

- If a globally addressed ISO request is received, there is no response.
- If an addressed ISO request is received, the response is the ISO Acknowledge (PGN 059392) providing a negative acknowledge (NAK). If a Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner:
  - If no requested fields have been included with the Request Group Function then the response is to return the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) of "0x3 = Access denied".
  - If the Request Group Function (PGN 126208) includes the Index of first Source ID in this PGN field, then the response shall be filtered by these fields contained within this request resulting in one response containing one or more supported source data.
  - If the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) of "0x3 = Access denied".
- If an individual field is invalid the field parameter error code for that field shall be "0x3 = Requested or command parameter out-of-range".
- If the individual fields contain valid values but the combination of the fields together are invalid, then the appropriate response shall be the Acknowledge Group Function (PGN 126208) with the PGN error code (Field 3) set to "0x3 = Access denied".

If commanding the Audio/Video Source Name is supported (See Field 8, Source Capabilities), the NMEA Command Group Function (PGN 126208) shall be used. The command shall include the, Audio/Video Source Type, Audio/Video Source Number and Audio/Video Source Name fields.

This PGN can exceed 223 bytes. This PGN has been designed with a paging feature to allow the information to be packaged without exceeding 223 bytes per transmission. This may result in multiple transmissions of this PGN to convey all of the necessary information. As an alternative, ISO Transport protocol may also be used.

Further details can be found in the NMEA2000 Entertainment Application Notes in Appendix D

Single Frame: **N** Priority Default: **6** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Required** ACK Rqmnts: **Yes**

### Field # Field Name

1	Index of first Source ID in this PGN		Byte Field Size: <b>1</b>	Request Parameter	Required
			Bit Field Size:	Command Parameter:	Optional
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
2	Number of Source IDs in this PGN		Byte Field Size: <b>1</b>	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Optional
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
3	Total number of Source IDs available		Byte Field Size: <b>1</b>	Request Parameter	Optional
			Bit Field Size:	Command Parameter:	Optional
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
	DF53 Integer, 8 bit unsigned		uint8 Range: 0 to 252	Resolution: 1 bit	Unit-less number
	Generic numeric ID, short				

## Entertainment - Supported Source Data

**PGN: 130573**  
**hex: 1FE0D**

<b>4</b>	<b>Source ID</b>		<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i> <b>Optional</b>	
			<i>Bit Field Size:</i>		<i>Command Parameter:</i> <b>Required</b>	
	<b>DD005</b>	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
	<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b>	Unit-less number
		Generic numeric ID, short				
<b>5</b>	<b>Audio/Video Source Type</b>		<i>Byte Field Size:</i>		<i>Request Parameter</i> <b>Required</b>	
			<i>Bit Field Size:</i> <b>8</b>		<i>Command Parameter:</i> <b>Required</b>	
	<b>DD389</b>	Audio/Video Source Type		0 = Vessel Alarm 1 = AM 2 = FM 3 = Weather 4 = DAB 5 = Aux 6 = USB 7 = CD 8 = MP3 9 = Apple iOS 10 = Android 11 = Bluetooth 12 = Sirius XM 13 = Pandora 14 = Spotify 15 = Slacker 16 = Songza 17 = Apple Radio 18 = Last FM 19 = Ethernet 20 = Video MP4 21 = Video DVD 22 = Video BlueRay 23 = HDMI 24 = Video 25 - 252 = User Defined 253 = Reserved 254 = Error 255 = Not available		
	<b>DF52</b>	Bit field	<b>bit(n)</b>	<i>Range:</i> <b>Variable</b>	<i>Resolution:</i> <b>1</b>	Used to construct bit fields
		User defined allows for forward compatibility				
<b>6</b>	<b>Audio/Video Source Number</b>		<i>Byte Field Size:</i> <b>1</b>		<i>Request Parameter</i> <b>Required</b>	
			<i>Bit Field Size:</i>		<i>Command Parameter:</i> <b>Required</b>	
	<b>DD005</b>	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.		
	<b>DF53</b>	Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i> <b>0 to 252</b>	<i>Resolution:</i> <b>1 bit</b>	Unit-less number
		Audio/Video Source Number per Type				
		There can be more than one of each type of audio source available on a A/V Device (e.g. 3 USB Sources). Only one Bluetooth source is currently supported.				

7	Audio/Video Source Name	Byte Field Size: 8 or 16 n	Request Parameter: Optional
		Bit Field Size:	Command Parameter: Optional
DD004	Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.	
DF50	String, variable, short	ch8or16(n)Range: 0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character
		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
8	Source Capabilities	Byte Field Size:	Request Parameter: Optional
		Bit Field Size: 32	Command Parameter: Optional
DD403	Supported Play Status	xxxx xxxx xxxx xxxx xxxx xxxx xxxx x1x = Play xxxx xxxx xxxx xxxx xxxx xxxx xxxx x1x = Pause xxxx xxxx xxxx xxxx xxxx xxxx xxxx x1xx = Stop xxxx xxxx xxxx xxxx xxxx xxxx xxxx 1xxx = FF (1x) xxxx xxxx xxxx xxxx xxxx xxxx xxxx 1xxxx = FF (2x) xxxx xxxx xxxx xxxx xxxx xxxx xxxx x1x xxxx = FF (3x) xxxx xxxx xxxx xxxx xxxx xxxx x1xx xxxx = FF (4x) xxxx xxxx xxxx xxxx xxxx xxxx 1xxx xxxx = RW (1x) xxxx xxxx xxxx xxxx xxxx x1x xxxx xxxx = RW (2x) xxxx xxxx xxxx xxxx xxxx x1x xxxx xxxx = RW (3x) xxxx xxxx xxxx xxxx xxxx x1xx xxxx xxxx = RW (4x) xxxx xxxx xxxx xxxx xxxx 1xxx xxxx xxxx = Skip Ahead xxxx xxxx xxxx xxxx x1x xxxx xxxx xxxx = Skip Back xxxx xxxx xxxx xxxx x1x xxxx xxxx xxxx = Jog Ahead xxxx xxxx xxxx xxxx x1xx xxxx xxxx xxxx = Jog back xxxx xxxx xxxx xxxx 1xxx xxxx xxxx xxxx = Seek Up xxxx xxxx xxxx x1x xxxx xxxx xxxx xxxx = Seek Down xxxx xxxx xxxx x1x xxxx xxxx xxxx xxxx = Scan Up xxxx xxxx xxxx x1xx xxxx xxxx xxxx xxxx = Scan Down xxxx xxxx xxxx 1xxx xxxx xxxx xxxx xxxx = Tune Up xxxx xxxx x1x xxxx xxxx xxxx xxxx xxxx = Tune Down xxxx xxxx x1xx xxxx xxxx xxxx xxxx xxxx = Slow Mo(.75x) xxxx xxxx 1xxx xxxx xxxx xxxx xxxx xxxx = Slow Mo(.5x) xxxx xxxx 1xxxx xxxx xxxx xxxx xxxx xxxx = Slow Mo(.25x) xxxx x1x xxxx xxxx xxxx xxxx xxxx xxxx = Slow Mo(.125x) xxxx x1x xxxx xxxx xxxx xxxx xxxx xxxx = Source Renaming xxxx x1xx xxxx xxxx xxxx xxxx xxxx xxxx = Reserved xxxx 1xxx xxxx xxxx xxxx xxxx xxxx xxxx = Reserved x1x xxxx xxxx xxxx xxxx xxxx xxxx xxxx = Reserved x1xx xxxx xxxx xxxx xxxx xxxx xxxx xxxx = Reserved 1xxx xxxx xxxx xxxx xxxx xxxx xxxx xxxx = Reserved	
DF52	Bit field	bit(n)Range: Variable	Resolution: 1
		Used to construct bit fields	

9	Supported Browsing Methods	Byte Field Size:	16	Request Parameter:	Optional
		Bit Field Size:		Command Parameter:	Optional
DD404	Supported Browsing Methods	xxxx xxxx xxxx xxx1 = Filename xxxx xxxx xxxx xx1x = Playlist xxxx xxxx xxxx x1xx = Genre / Category xxxx xxxx xxxx 1xxx = Album xxxx xxxx xxx1 xxxx = Artist xxxx xxxx xx1x xxxx = Track / Song xxxx xxxx x1xx xxxx = Station Name / Channel Name xxxx xxxx 1xxx xxxx = Station Number / Channel Number xxxx xxx1 xxxx xxxx = Favorite Number xxxx xx1x xxxx xxxx = Play Queue xxxx x1xx xxxx xxxx = Content Info xxxx 1xxx xxxx xxxx = Reserved xxx1 xxxx xxxx xxxx = Reserved xx1x xxxx xxxx xxxx = Reserved x1xx xxxx xxxx xxxx = Reserved 1xxx xxxx xxxx xxxx = Reserved			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

10	Thumbs Supported	Byte Field Size:		Request Parameter:	Optional
		Bit Field Size:	2	Command Parameter:	Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

11	Source Connected	Byte Field Size:		Request Parameter:	Optional
		Bit Field Size:	2	Command Parameter:	Optional
DD002	Generic status pair	MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

12	NMEA Reserved	Byte Field Size:		Request Parameter:	
		Bit Field Size:	resv 4	Command Parameter:	
DD001	Reserved field	Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on a byte boundary.					

13	Repeat Supported	Byte Field Size:		Request Parameter:	Optional
		Bit Field Size:	4	Command Parameter:	Optional
DD405	Repeat Supported	xxx1 = Song xx1x = Play Queue x1xx = Reserved 1xxx = Reserved			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

14	Shuffle Supported	Byte Field Size:	Request Parameter	Optional
		Bit Field Size: 4	Command Parameter:	Optional
	DD409 Shuffle Supported	xxx1 = Play Queue xx1x = All x1xx = Reserved 1xxx = Reserved		
	DF52 Bit field	bit(n) Range: Variable Resolution: 1	Used to construct bit fields	
15	Fields 4 – 14 repeat as needed	Byte Field Size: ? Bit Field Size: n	Request Parameter	
	DD000 Undefined		Command Parameter:	
	DF00 Undefined	Undefined Range: undefined Resolution: undefined	Application specific, defined at time of use.	



## Entertainment - Supported Zone Data

**PGN: 130574**  
**hex: 1FE0E**

This PGN details the Audio/Video Zones supported by an Audio/Video device.

This PGN is sent upon change or in response to a request.

This PGN cannot be requested with the ISO request (PGN 059904).

- If a globally addressed ISO request is received, there is no response.
- If an addressed ISO request is received, the response is the ISO Acknowledge (PGN 059392) providing a negative acknowledge (NAK). If a Request Group Function ( PGN 126208 ) requesting this PGN is received, the receiving device shall respond in the following manner :
  - If no requested fields have been included with the Request Group Function then the response is to return the Acknowledge Group Function ( PGN 126208 ), containing the error state for PGN error code ( Field 3 ) of "0x3 = Access denied".
- If the Request Group Function ( PGN 126208 ) includes the Index of first Zone Number in this PGN field, then the response shall be filtered by these fields contained within this request resulting in one response containing one or more supported zone data.
- If the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208), containing the error state for PGN error code (Field 3) of "0x3 = Access denied". If an individual field is invalid the field parameter error code for that field shall be "0x3 = Requested or command parameter out-of-range".
- If the individual fields contain valid values but the combination of the fields together are invalid, then the appropriate response shall be the Acknowledge Group Function (PGN 126208) with the PGN error code (Field 3) set to "0x3 = Access denied. If commanding the Zone Name is supported, the NMEA Command Group Function (PGN 126208) shall be used. The command shall include the Zone Name (Field 4) and the Zone Number (Field 5).

This PGN can exceed 223 bytes. This PGN has been designed with a paging feature to allow the information to be packaged without exceeding 223 bytes per transmission. This may result in multiple transmissions of this PGN to convey all of the necessary information. As an alternative, ISO Transport protocol may also be used.

Further details can be found in the NMEA2000 Entertainment Application Notes in Appendix D.

Single Frame: **N** Priority Default: **6** Default Update Rate: milliseconds Frequency: **NA** cycles per second  
Destination: **Global** Query Support: **Required** Command Support: **Optional** ACK Rqmnts: **Yes**

### Field # Field Name

<b>1</b>	<b>Index of first Zone Number in this PGN</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Required</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD005</b> Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<b>Range:</b> 0 to 252 <b>Resolution:</b> 1 bit Unit-less number
<b>2</b>	<b>Number of Zone Numbers in this PGN</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD005</b> Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<b>Range:</b> 0 to 252 <b>Resolution:</b> 1 bit Unit-less number
<b>3</b>	<b>Total number of Zone Numbers available</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD005</b> Generic numeric ID, short	Number of route, waypoint, event, mark, etc.	
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<b>Range:</b> 0 to 252 <b>Resolution:</b> 1 bit Unit-less number

# Entertainment - Supported Zone Data

PGN: 130574  
hex: 1FE0E

4	Zone Number		Byte Field Size:		Request Parameter	Optional
			Bit Field Size:	8	Command Parameter:	Optional
DD396	Entertainment Zones		0 = All Zones 1 = Zone 1 2 = Zone 2 3 = Zone 3 4 = Zone 4 5 - 252 = User Defined 253 = Reserved 254 = Error 255 = Data Not Available			
DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1
						Used to construct bit fields
5	Zone Name		Byte Field Size:	8 or 16 n	Request Parameter	Optional
			Bit Field Size:		Command Parameter:	Optional
DD004	Generic name string, short					Name of place, route, waypoint, destination, vessel, vehicle, etc.
DF50	String, variable, short	ch8or16(n)	Range:	0 to 250 ASCII or 0 to 125 Unicode Characters	Resolution:	1 ASCII or 1 Unicode Character
						2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
6	Fields 4 – 5 repeat as needed		Byte Field Size:	?	Request Parameter	Optional
			Bit Field Size:	n	Command Parameter:	Optional
DD000	Undefined					
DF00	Undefined	Undefined	Range:	undefined	Resolution:	undefined
						Application specific, defined at time of use.

## Entertainment – Parental Control Status

PGN: 130575

hex: 1FE0F

Details the parental control / locked channel status for a Audio/Video source.

This PGN can be used lock and unlock a specific group or file id by sending the user pincode.

This PGN can also be used to change the user pincode by providing the current and new pincodes.

A device receiving an ISO Request ( PGN 059904 ) for this PGN, shall respond with this PGN with all fields set to invalid.

Begin Request Group Function If a Request Group Function ( PGN 126208 ) requesting this PGN is received, the receiving device shall respond in the following manner :

IMPORTANT: The error codes specified in this PGN description for the Acknowledgement response shall take precedence. This variation is specified to be consistent with the previously published suite of Entertainment PGNs, as the suite of Entertainment PGNs contain an unusual response to Request Group Functions.

- If no requested fields have been included with the Request Group Function then the response is to return the Acknowledge Group Function ( PGN 126208 ), containing the error state for PGN error code ( Field 3 ) of "0x3 = Access denied".
- If the Request Group Function ( PGN 126208 ) includes the Audio/Video Source Type, Audio/Video Source Number or File ID then the response shall be filtered by these fields contained within this request resulting in one response.
- If the fields requested are not valid then the appropriate response would be the Acknowledge Group Function (PGN 126208 ), containing the error state for PGN error code ( Field 3 ) of "0x3 = Access denied".
- If an individual field is invalid the field parameter error code for that field shall be "0x3 = Requested or command parameter out-of-range". If the individual fields are valid but the combination of fields together are invalid then just the error state for PGN error code (Field 3 ) of "0x3 = Access denied" would be in the Acknowledge Group Function (PGN 126208 ) response. End Request Group Function

Begin Command Group Function

The NMEA Command Group Function (PGN 126208) can be used to perform the following three possible operations:

Command to lock or unlock all file / station IDs    Command to lock or unlock a specific file / station ID)    Command to change the current pincode    The command to lock or unlock all file / station IDs shall include:

The Audio/Video Source Type (Field 1),    Audio/Video Source Number (Field 2),    Lock Type (Field 3) set to Master (value 0), Lock Status (Field 4),    Current Pincode (Field 7).

The command to lock or unlock a specific file / station ID command shall include:

- The Audio/Video Source Type (Field 1),    Audio/Video Source Number (Field 2),    Lock Type (field 3) set to Individual (Value 1)    Lock Status (Field 4),    File / Station ID (Field 6) and    Current Pincode (Field 7).
- The command to change the Pincode shall include:    Audio/Video Source Type (Field 1),    Audio/Video Source Number (Field 2), Current Pincode (Field 7) and New Pincode (Field 8).

End Command Group Function    Revisions: Created 2018 message database version 3.200, revised March 2018

Single Frame: No    Priority Default: 6    Default Update Rate: milliseconds    Frequency: NA cycles per second  
Destination: Global    Query Support: Required    Command Support: Required    ACK Rqmnts: Yes

Field #    Field Name

1	Audio/Video Source Type		Byte Field Size: 8		Request Parameter Required	
			Bit Field Size:		Command Parameter: Required	
DD389 Audio/Video Source Type			0 = Vessel Alarm 1 = AM 2 = FM 3 = Weather 4 = DAB 5 = Aux 6 = USB 7 = CD 8 = MP3 9 = Apple iOS 10 = Android 11 = Bluetooth 12 = Sirius XM 13 = Pandora 14 = Spotify 15 = Slacker 16 = Songza 17 = Apple Radio 18 = Last FM 19 = Ethernet 20 = Video MP4 21 = Video DVD 22 = Video BlueRay 23 = HDMI 24 = Video 25 - 252 = User Defined 253 = Reserved 254 = Error 255 = Not available			
DF52 Bit field			bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
2	Audio/Video Source Number		Byte Field Size: 1		Request Parameter Required	
			Bit Field Size:		Command Parameter: Required	
DD005 Generic numeric ID, short			Number of route, waypoint, event, mark, etc.			
DF53 Integer, 8 bit unsigned			uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
3	Lock Type		Byte Field Size:		Request Parameter Required	
			Bit Field Size: 2		Command Parameter: Required	
DD420 Lock Type			0 = Master 1 = Individual 2 = Reserved 3 = Do Not Use / Data Not Available			
DF52 Bit field			bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Specifies the lock type of the File ID						

4	Lock Status	Byte Field Size: <div>2</div>		Request Parameter	Required
		Bit Field Size: <div>2</div>		Command Parameter:	Required
DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Specifies the lock status of the File ID, which can be either enabled/locked or disabled/un-locked.					
5	NMEA Reserved	Byte Field Size:		Request Parameter	
		Bit Field Size: <div>resv 4</div>		Command Parameter:	
DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
DF52	Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Used to align subsequent data on byte boundary.					
6	File / Station ID	Byte Field Size: <div>4</div>		Request Parameter	Required
		Bit Field Size:		Command Parameter:	Required
DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.			
DF55	Integer, 32 bit unsigned	uint32	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
ID of a individual file or station that is being locked or unlocked. Note: the lock type (field 3) should be set to individual when used in conjunction with this field.					
7	Current Pincode	Byte Field Size: <div>2</div>		Request Parameter	Required
		Bit Field Size:		Command Parameter:	Required
DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
DF54	Integer, 16 bit unsigned	uint16	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
The current pincode field should be sent when unlocking or changing the pincode. The pincode should be a 4 digit numeric code which can range from 0000 to 9999.					
8	New Pincode	Byte Field Size: <div>2</div>		Request Parameter	Required
		Bit Field Size:		Command Parameter:	Optional
DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
DF54	Integer, 16 bit unsigned	uint16	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
The new pincode field should be sent when changing the current pincode. The pincode should be a 4 digit numeric code which can range from 0000 to 9999.					

## Trim Tab Status

**PGN: 130576**  
**hex: 1FE10**

This PGN is transmitted as a status of current trim tab settings on vessels.

Trim tabs improve planning and fuel efficiency, they correct for uneven weight distribution, and they improve speed, safety and overall boat performance.

Trim tab settings may be set over the network by using the NMEA Command Group Function (PGN 126208) to command individual trim tab positions.

The NMEA Acknowledge Group Function (PGN 126208) shall be sent as the response to the NMEA Command Group Function indicating acceptance or rejection of the command.

If the command is accepted, the trim tab status PGN shall be transmitted to confirm the actual settings.

This PGN shall be a response to a global ISO Request (PGN 059904) or global Request Group Function (PGN 126208).

If an addressed Request Group Function cannot be satisfied, the Acknowledgment Group Function shall be sent indicating the applicable error conditions of this request.

Used primarily by display or instrumentation devices.

This PGN title was changed from "Small Craft Status" to "Trim Tab Status" as of Database Version 2.00.

The Center Trim Tab (Field 3) was added to this PGN in the NMEA PGN Network Database Version 2.20.

Single Frame: **Yes**    Priority Default: **2**    Default Update Rate: **200** milliseconds    Frequency: **5** cycles per second  
Destination: **Global**    Query Support: **Optional**    Command Support: **Optional**    ACK Rqmnts: **None**

### Field #    Field Name

<b>1</b>	<b>Port trim tab</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD138</b> Generic percent of range		
	<b>DF30</b> Percent, Relative measure <b>int8</b> Range: <b>+/- 124%</b> Resolution: <b>1%</b>		
	Range 0 - 100%, where 0% =Full Up and 100% = Full Down Positions		
<b>2</b>	<b>Starboard trim tab</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD138</b> Generic percent of range		
	<b>DF30</b> Percent, Relative measure <b>int8</b> Range: <b>+/- 124%</b> Resolution: <b>1%</b>		
	Range 0 - 100%, where 0% =Full Up and 100% = Full Down Positions		
<b>3</b>	<b>Center trim tab</b>	Byte Field Size: <b>1</b>	Request Parameter: <b>Optional</b>
		Bit Field Size:	Command Parameter: <b>Optional</b>
	<b>DD138</b> Generic percent of range		
	<b>DF30</b> Percent, Relative measure <b>int8</b> Range: <b>+/- 124%</b> Resolution: <b>1%</b>		
	Range 0 - 100%, where 0% =Full Up and 100% = Full Down Positions		
<b>4</b>	<b>NMEA Reserved</b>	Byte Field Size:	Request Parameter:
		Bit Field Size: <b>resv 40</b>	Command Parameter:
	<b>DD001</b> Reserved field	Variable number of reserved bits, all set to logic "1"	
	<b>DF52</b> Bit field <b>bit(n)</b> Range: <b>Variable</b> Resolution: <b>1</b>		Used to construct bit fields
	Used to align subsequent data on a byte boundary.		

## Direction Data

**PGN: 130577**  
**hex: 1FE11**

The purpose of this PGN is to group three fundamental vectors related to vessel motion, - Speed and heading referenced to the water - Speed and course referenced to ground - Current speed and flow direction Products that are the primary form of navigation would be appropriate for construction and transmission of this sentence, either by combining PGN's 128259, 129026 or through direct measurement. The SID (Sequence Identification Number) should only be used to synchronize data when PGN 126992 (Time Stamp) is available, otherwise it should be set to unavailable. This PGN should only be used when all three elements are available and by a primary navigation product.

Single Frame: **No** Priority Default: **3** Default Update Rate: **1000** milliseconds Frequency: **1.** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Data Mode</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	<b>Optional</b>
				<i>Bit Field Size:</i>	<b>4</b>	<i>Command Parameter:</i>	<b>Optional</b>
	<b>DD025</b> Mode, Data				0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i>	<b>Variable</b>	<i>Resolution:</i>	<b>1</b>	Used to construct bit fields
<b>2</b>	<b>Set/COG/Heading Ref.</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	<b>Optional</b>
				<i>Bit Field Size:</i>	<b>2</b>	<i>Command Parameter:</i>	<b>Optional</b>
	<b>DD117</b> Direction reference				0 = True, 1 = Magnetic, 2 = Error, 3 = Null		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i>	<b>Variable</b>	<i>Resolution:</i>	<b>1</b>	Used to construct bit fields
<b>3</b>	<b>NMEA Reserved</b>			<i>Byte Field Size:</i>		<i>Request Parameter</i>	
				<i>Bit Field Size:</i>	<b>resv 2</b>	<i>Command Parameter:</i>	
	<b>DD001</b> Reserved field				Variable number of reserved bits, all set to logic "1"		
	<b>DF52</b> Bit field	<b>bit(n)</b>	<i>Range:</i>	<b>Variable</b>	<i>Resolution:</i>	<b>1</b>	Used to construct bit fields
	Used to align subsequent data on a byte boundary.						
<b>4</b>	<b>Sequence ID</b>			<i>Byte Field Size:</i>	<b>1</b>	<i>Request Parameter</i>	<b>Optional</b>
				<i>Bit Field Size:</i>		<i>Command Parameter:</i>	<b>Optional</b>
	<b>DD056</b> Sequence ID				An upward counting number that binds information transmitted in two or more PGNs from a single source address. Identical SID values within two or more different PGN transmissions identifies those PGN transmissions as a single related data set. For example, identical SID values bind the COG and SOG values in PGN 129026 to the Latitude and Longitude values in PGN 129029 as a single data set.  0 - 252 = binding available (when SID value reaches 252, resume with 0 on next data set)  253 - 254 = reserved for future use  255 = No binding provided. NMEA recommends using binding SID values whenever practical.		
	<b>DF53</b> Integer, 8 bit unsigned	<b>uint8</b>	<i>Range:</i>	<b>0 to 252</b>	<i>Resolution:</i>	<b>1 bit</b>	Unit-less number

## Direction Data

**PGN: 130577**  
**hex: 1FE11**

<b>5</b>	<b>Course Over Ground</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD165</b>	Course-Over-Ground (COG)	The direction of the path over ground actually followed by a vessel.		
<b>DF02</b>	Angle	<b>uint16</b>	<i>Range:</i> 0 to 2Pi rad	<i>Resolution:</i> 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
<b>6</b>	<b>Speed Over Ground</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD044</b>	Generic Speed			
<b>DF35</b>	Speed	<b>uint16</b>	<i>Range:</i> 0 to 655.32 m/s	<i>Resolution:</i> 1x10E-2 m/s 1 Knot = 0.5144 m/s
<b>7</b>	<b>Heading</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD167</b>	Heading	The horizontal direction in which a ship actually points or heads at any instant, expressed in angular units from a reference direction, usually from 000 at the reference direction clockwise through 359 degrees.		
<b>DF02</b>	Angle	<b>uint16</b>	<i>Range:</i> 0 to 2Pi rad	<i>Resolution:</i> 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
<b>8</b>	<b>Speed through Water</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD044</b>	Generic Speed			
<b>DF35</b>	Speed	<b>uint16</b>	<i>Range:</i> 0 to 655.32 m/s	<i>Resolution:</i> 1x10E-2 m/s 1 Knot = 0.5144 m/s
<b>9</b>	<b>Set</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD048</b>	Current flow direction	Direction towards which current flows. Degrees relative to True North.		
<b>DF02</b>	Angle	<b>uint16</b>	<i>Range:</i> 0 to 2Pi rad	<i>Resolution:</i> 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
<b>10</b>	<b>Drift</b>	<i>Byte Field Size:</i> <b>2</b>	<i>Request Parameter</i>	Optional
		<i>Bit Field Size:</i>	<i>Command Parameter:</i>	Optional
<b>DD044</b>	Generic Speed			
<b>DF35</b>	Speed	<b>uint16</b>	<i>Range:</i> 0 to 655.32 m/s	<i>Resolution:</i> 1x10E-2 m/s 1 Knot = 0.5144 m/s



## Vessel Speed Components

**PGN: 130578**  
**hex: 1FE12**

This PGN provides a single transmission that accurately describes the speed of a vessel by component vectors. This information is relevant for large vessels and would typically be provided by a product that interfaces to sensors such as dual axis logs. Products that can only measure speed in one direction should not use this PGN.

Single Frame: **No** Priority Default: **2** Default Update Rate: **250** milliseconds Frequency: **4** cycles per second  
Destination: **Global** Query Support: **Optional** Command Support: **Optional** ACK Rqmnts: **None**

### Field # Field Name

<b>1</b>	<b>Longitudinal Speed, Water-referenced</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD160</b>	Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.	
<b>DF36</b>	Speed, signed	<b>int16</b>	Range: <b>+/-32.764 m/s</b> Resolution: <b>1x10E-3 m/s</b>
<b>2</b>	<b>Transverse Speed, Water-referenced</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD160</b>	Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.	
<b>DF36</b>	Speed, signed	<b>int16</b>	Range: <b>+/-32.764 m/s</b> Resolution: <b>1x10E-3 m/s</b>
<b>3</b>	<b>Longitudinal Speed, Ground-referenced</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD160</b>	Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.	
<b>DF36</b>	Speed, signed	<b>int16</b>	Range: <b>+/-32.764 m/s</b> Resolution: <b>1x10E-3 m/s</b>
<b>4</b>	<b>Transverse Speed, Ground-referenced</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD160</b>	Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.	
<b>DF36</b>	Speed, signed	<b>int16</b>	Range: <b>+/-32.764 m/s</b> Resolution: <b>1x10E-3 m/s</b>
<b>5</b>	<b>Stern Speed, Water-referenced</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD160</b>	Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.	
<b>DF36</b>	Speed, signed	<b>int16</b>	Range: <b>+/-32.764 m/s</b> Resolution: <b>1x10E-3 m/s</b>
<b>6</b>	<b>Stern Speed, Ground-referenced</b>	Byte Field Size: <b>2</b> Bit Field Size:	Request Parameter: <b>Optional</b> Command Parameter: <b>Optional</b>
<b>DD160</b>	Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.	
<b>DF36</b>	Speed, signed	<b>int16</b>	Range: <b>+/-32.764 m/s</b> Resolution: <b>1x10E-3 m/s</b>

# NMEA 2000 Appendix B - Revision History

Rev ID	Date Version	Description
1	Sep 2001 1.001	Initial Release
2	Oct 2001 1.001	This Revision History Log Added
3	Oct 2001 1.001	DF09 Range Correction from 10E+5 to 10E+7
4	Oct 2001 1.001	DF21 Range Correction from 10E+10 to 10E+8
5	Dec 2001 1.001	DD176 Network Addresses updated the allocations. Corrections made to agree with specifications
6	Jan 2002 1.001	PGN 127489 - added a second Discrete Status Field 12
7	Jan 2002 1.001	DD223 Dictionary item added for 127489
8	Jan 2002 1.001	PGN 129545 inserted field 3 (Reserve of 6bits) for alignment and corrected Latitude expected error's Data Dictionary reference from DD001 to DD220
9	Sep 2002 1.002	PGNs 060160 & 060416 (Transport Protocol) chgd from priority 7 to 6 as defined by ISO
10	Sep 2002 1.002	PGN 060416 correct "ABORT" description labeling
11	Nov 2002 1.002	PGN 126996 corrected Single Frame "Yes" to "No", field 2 corrected grammer from "manufactures" to "manufacturer's"
12	Nov 2002 1.002	PGN 130321 Field 6 DD022 corrected to DD023
13	Nov 2002 1.002	PGN 129540 Added field 3 Reserve to pad previous field 2 - Mode to Byte, this new field insertion shifted all fields above 2 up 1
14	Nov 2002 1.002	PGN 129033 In description corrected incorrect pgn reference of 128012 to 126992
15	Nov 2002 1.002	PGN 126998 changed note field from 50 char to 70 ASCII or 35 Unicode
16	Nov 2002 1.002	PGN 130577 in description corrected pgn reference from 128006 & 128007 to 128259 & 129026. Also removed no longer appropriate reference to 128008.
17	Nov 2002 1.002	PGN 130577 in description corrected pgn reference from 128012 to 126992
18	May 2003 1.003	Changed Ack Rqmnts Field in PGNs 059904, 060416, 060928, 065240, 126208

Rev ID	Date Version	Description
19	May 2003 1.003	PGN 128520 - removed field 15 Reserve Bits is not needed at end.
20	May 2003 1.003	PGN 128520 - changed fields 14 & 13 from DD007 to DD050 var length short ASCII
21	May 2003 1.003	DD045 - Removed description with reference to ground, mag or true
22	May 2003 1.003	PGN 059392 - added clarification to description that message will always be sent with a destination address of 255. (Per agreement with SAE/ISO)
23	May 2003 1.003	PGN 127488 in description corrected pgn reference from 127509 to 127489
24	May 2003 1.003	PGN 129033 in description corrected pgn reference from 128012 to 126992
25	May 2003 1.003	PGN 129029 in description corrected pgn reference from 128005 to 129025
26	Jul 2003 1.004	PGN 126996 field 1 clarified version to "NMEA 2000 Database Version"
27	Jul 2003 1.004	PGN 127251 Rate of turn added along with DD125, DF85
28	Jul 2003 1.004	PGN 128520 fields 13 & 14 changed to ASCII String Fields
29	Jul 2003 1.004	DD217 correct upper 2 bit field definitions
30	Jul 2003 1.004	PGN 129540 GNSS Sats in View. Corrected field references, added missing field 16 Range Residuals "n", Clarified Description.
31	Sep 2003 1.004	Moved Eng Trim from PGN 127489 to PGN 127488
32	Oct 2003 1.005	PGN 127251 Rate of Turn, deleted Vessel Heading
33	Nov 2003 1.005	Moved "The message will always be sent with a destination address of 255" from ISO Request (pgn 059904) to ISO Acknowledge (pgn 059392)
34	Nov 2003 1.005	Time & Date PGN 129033 corrected old PGN reference 128012 to 126992
35	Feb 2004 1.100	PGN 127489 changed Fuel Pressure Range (field 9); required adding DD225 with DF29 range
36	Feb 2004 1.100	PGN 126208 Command Group, Description clarification made
37	Feb 2004 1.100	PGN 129283 Cross Track Error, removed field 3, increase Reserve field size to adjust
38	Feb 2004 1.100	PGN 129550 chgs fields 3&4 & PGN 129551 chgs fields 8,9

## Appendix B - Revision History

**Version 3.002 - 09-Feb-23**

Rev ID	Date Version	Description
39	Mar 2004 1.100	PGN 127505 Fluid Level, added field 4 - Tank Capacity
40	Mar 2004 1.100	PGN 129284 Navigation Data - updated Description
41	Mar 2004 1.100	PGN 129291 Set & Drift, Rapid Update - updated Description
42	Mar 2004 1.100	PGN 130577 Direction Data - field 8 added "through water" to Speed name
43	Apr 2004 1.101	PGN 127505 Fluid Level, revised field 4 size and resolution added DF86 & DD227 to support the change
44	Apr 2004 1.101	PGN 129283 Cross Track Error, added field 4 "Navigation Terminated" to previously "reserve" field
45	Apr 2004 1.101	PGN 129808 DSC Call Info, fields 8, 22, 24 use DD015, no other reference - DD015 was changed from DF63 to DF50. Notes added to each field defining maximum size
46	Apr 2004 1.101	PGN 126208 Command Group, Ack group 2 field 3 PGN error code state 0x4 added, 0xF removed
47	Apr 2004 1.101	PGN 127489 Eng Params, Dynamic - add % Torque and % Load
48	Apr 2004 1.101	PGN 127489 Eng Params, Status 2 - added Maintenance Required and Comm error Alarms
49	Apr 2004 1.101	PGN 130311 Environmental Parameters added to be used instead of PGN 130310 in new designs. Allows for instance of temp and humidity. More flexible. DD129, DD130, and DD131 added to support this.
50	May 2004 1.111	PGN 129027 Position Delta & PGN 129028 Altitude Delta added
51	May 2004 1.111	DD233 thru DD235 & DF88 thru DF90 added to support PGN129027&129028
52	May 2004 1.111	PGN 127496 Trip Parameters, Vessel
53	May 2004 1.111	PGN 127497 Trip Parameters, Engine - revised per discussions last meeting
54	May 2004 1.111	Nav & WP PGN's 129285, 130064 thru 130072 added
55	May 2004 1.111 +	PGN 127258 new PGN Name chgd from Heading variation to Magnetic Variation
56	Sep 2004 1.111 B	Engine Params Dynamic, added to Field 12, Engine discrete Status 2, the following status bits: Sub or Secondary Throttle, Neutral Start Protect, and Engine Shutting Down.
57	Sep 2004 1.111 B	Added description to Titles on first cover page on all reports

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**Version 3.002 - 09-Feb-23**

Rev ID	Date Version	Description
58	Sep 2004 1.111 B	PGN 126996 Product Information - added field 8 - Load Equivalency Number, DD242 added in support of this, other text clarifications
59	Oct 2004 1.111 B	Way Point and Route PGNs and supporting items updated.
60	Oct 2004 1.111 B	AIS PGNss and supporting items added and/or updated
61	Nov 2004 1.111 B	PGN 127508 - Field 5 SID added, replaced spare
62	Nov 2004 1.200	DD237 - bit field typo corrections
63	Nov 2004 1.200	PGN 130065 fields 7,8,9 realignment
64	Nov 2004 1.200	PGN 130066 fields 9,1,11 realignment
65	Nov 2004 1.200	WP & Route PGNs 130066, 130067, 130068, 130073, 130074 Descriptions updated
66	May 2009 1.200 A	Fluid Level Corrected DF84 range and resolution (used in PGN 127505)
67	May 2009 1.200 A	Added to PGN Reports the display of the PGN number in hexadecimal format. Located below original Decimal PGN #
68	May 2009 1.200 A	PGN 060928 ISO Address Claim - field 11 note field changed from "Only values less than 254 shall be used" to "Only values less than 252 shall be used"
69	Jul 2005 1.200 A	Added extensions to Command Group PGN 126208
70	Aug 2005 1.200 A	Added Proposed Power PGNs (PGN #s not yet assigned)
71	Aug 2005 1.200 A	PGN 126208 Request group Function, field 3 Transmission Interval added state 0xFFFF FFFE Restore default Time Interval
72	Aug 2005 1.200 A	PGN 059392 ISO Ack remove last line of description "This message will always be sent with a destination address of 255"
73	Sep 2005 1.200 B	PGN 059392 ISO Ack add last line of description "The destination address of this PGN shall always contain a destination specific address" and note about version 1.000
74	Sep 2005 1.200 B	PGN 129796 AIS Acknowledge correct field 10 from DD001 to DD010
75	Jul 2006 1.200 C	Power PGN Support added DF92 - DF102
76	Jul 2006 1.200 C	Power PGN Support added DD258 - DD288

## Appendix B - Revision History

**Version 3.002 - 09-Feb-23**

Rev ID	Date Version	Description
77	Jul 2006 1.200 C	Power PGNs added: 127503 AC Input Status                      127504 AC Output Status 127506 DC Detailed Status                      127507 Charger Status 127509 Inverter Status                      127510 Charger Configuration Status 127511 Inverter Configuration Status                      127512 Automatic Generator Start Status 127513 Battery Configuration Status                      127514 Automatic Generator Start Configuration Status
78	Aug 2006 1.200 D	Meeting Updates PGN 060928,127250, int24,129039,129538,130323, DD025, DD070, DD232
79	Sep 2006 1.210	PGNs added 130312,130313,130314,130315 to replace 130311 for future designs
80	Sep 2006 1.210	PGN 128259 designate field 3 not for new designs refer to 129026 for value
81	May 2009 1.300	Revised and added AIS Class B PGNs in accordance with AIS Class B working group report dated 24 April 2006, and as modified July 2008. - Revised: 129039, 129040 - Restored from vers 1.111: 129806 - New: 129807, 129809, 129810 - Data Definitions added: DD294 - DD304
82	May 2009 1.300	Implemented structural changes to database to make database maintenance easier: - Added VersionHistory table and changed all reports to list version identified for this file when printing - Changed "Pick_PGN_Form" to also refer to version identified for this file - Added RevisionHistory table, imported revision history data from "PGNs by Number" report footer, removed revision history data from report footer - Added "RevisionHistory-Edit" form for entering/editing revision history data - Added new "RevisionHistoryReport" and Revision History button on "Pick_PGN_Form" to launch it
84	May 2009 1.300	Revised AIS Class A PGNs to reflect changes and corrections noted during Update of AIS Class B PGNs; PGNs, affected: 129794, 129795, 129797, 129798, 129801, 129802.
85	Jun 2009 1.300 B	Corrected PGN 130315 and 130313 destination; changed from no value to Global.
86	Mar 2010 1.300 B	Revised PGNs 127503 AC Input Status, and 127504 AC Output Status. Marked as not for use in new designs per Standards Committee Meeting minutes of Feb 2008 and referred manufacturers to J1939-75.
87	Apr 2010 1.301	Structural change to create PGN sub-selection groups to allow printing Parameter Groups either by the full list or by the following selections: AIS, Environmental, Navigation, Power, Propulsion, Steering. All selections include the subselections Mandatory and Other. New selection group reports include electronic licensing agreement.
88	May 2010 1.301	Structural/formatting changes: - Modified reports used for standard publishing to include to include electronic licensing agreement, and cleaned up formatting so all reports are similar in formation and have consistent use of headers and footers. Reports modified: - Parameter_Group_ByNumber_Report - Data_Formats_ByNumber_Report - Data_Dictionary_Report - Type_ByType_Report - Created PGN Field List report.

Rev ID	Date Version	Description
89	Jul 2010 1.301 A	Added PG Short Name and PG Short Description to IDRef_Tbl for recording public unlicensed data dumps.
90	Sep 2010 1.301 A	Revise PGN 126208 to clarify that the Command group function always requires an acknowledgement either positively or negatively, and Request group functions only require an acknowledgement if the request cannot be completed. [August 2005 Standards Committee Meeting, Agenda Item 17b]
91	Sep 2010 1.301 A	(For Confirmation) Per request from Jacop Lie Simonsen, change PGN 127258 from priority 7 to priority 6 in recognition of the fact the the PGN contains real-time data. [October 2005 Standards Committee, Agenda Item 16]
92	Sep 2010 1.301 A	(For Confirmation) Change description for System Time (PGN 126992) and rename and update Time and Date (PGN 129033) in accordance with Standards Committee decision. Also removed/reworded Application Notes as necessary to ensure there is no conflict with the revised description [June 2007 Standards Committee Meeting, Agenda Item 7]
93	Sep 2010 1.301 A	Add to description for Engine Parameters, Static (PGN 127498) to require that no bit fields in Engine Discrete Status 1 and 2 may be set to unused/unimplemented. Also added requirement to DD206 and DD223. [May 2008 Standards Committee Meeting, Agenda Item 11]
94	Sep 2010 1.301 A	Add value ??? "Atmospheric Pressure, Corrected for Altitude" to Actual Pressure (PGN 130314), Field 3, DD289. [October 2007 Standards Committee Meeting, Agenda Item 6]
95	Sep 2010 1.301 A	Revise DF63, String Fixed, to require that unused characters be filled with 0xFF = Data not available. [July 2008 Standards Committee Meeting, Agenda Item 2]
96	Sep 2010 1.301 A	Corrected typographical error in Int24 definition: Range was mis-stated, should be -8,388,608 to 8,388,607. Also impacted definition of reserved values. [Reported by Actisense 2010-02-17]
97	Sep 2010 1.301 A	Corrected DF102 by revising resolution to match the specified range. Also revised all resolutions with fractional values to conform to standard "1x10E-n units". Affected DFs are: DF66, DF81, DF84, DF97, DF101, DF102, DF103. [Reported by Actisense 2010-02-17]
98	Sep 2010 1.301 A	(For Confirmation) Add requirement that Product Information (PGN 126996) parameter groups may only be requested from one device at a time. [July 2008 Standards Committee Meeting, Agenda Item 3]
99	Sep 2010 1.301 A	Corrected typo in GNSS Differential Correction Receiver Signal, Field 9, Differential Signal Detection Mode; removed invalid designation of 3 reserved bits. [Reported by Actisense 2010-02-17]
100	Sep 2010 1.301 A	Corrected field designations for GNSS Differential Correction Receiver Interface (PGN 129550), resolved missing field 6 by changing fields 7,8 to 6,7. [Reported by Actisense 2010-02-17]
101	Oct 2010 1.301 A	Added new parameter group AIS Aids to Navigation (AtoN) Report (PGN 129041); Also created new Data Definitions DD305, DD306, DD307, DD308, DD309; Also updated DD191 to define meaning for a value of 7. (Incorporated minor typographical fixes to new parameter group and DD's 10/6 & 10/19.)
103	Jan 2011 1.301 B	Revised SystemTime (126992) to state that when transmitted it always represents current system time; Revised Local Time Offset (PGN 129033) to remove the phrase "with the SID set to 255". (reverses previous revision 92) [September 2010 Standards Committee Meeting, Agenda Item 12]
104	Jan 2011 1.301 B	Modified Sequence ID (DD 056) to show a valid range of from 0 to 252, replacing a range from 0 to 250. [September 2010 Standards Committee Meeting, Agenda Item 12]
105	Feb 2011 1.301 B	Modified DD302 in accordance with AIS 1371-4 Updates dated 15 February 2011 by L. Luft. [February 2011 Standards Committee Meeting, Agenda Item 11] Net change is to revise order of enumerations 9, 10, and 11.

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Rev ID	Date Version	Description
106	Feb 2011 1.301 B	Revised AIS Class A Position Report (PGN 129038) in accordance with AIS 1371-4 Updates dated 15 February by L. Luft. Also Created new DD310 & DD311. [February 2011 Standards Committee Meeting, Agenda Item 11]
107	Feb 2011 1.301 B	Revised AIS Group Assignment (PGN 129807) to remove 'Class B' from its title; Added 'AIS Transceiver Information field to PGNs 129807, 129809, and 129810. [February 2011 Standards Committee Meeting, Agenda Item 11]
108	Mar 2011 1.301 B	Additional changes and confirmation of revisions 105-108 in accordance with L.Luft markup. [nmea-2000-corrigendum-1-2011_LAL_Mar_7_1]
109	Mar 2011 2.000	Added Payload Mass parameter group (PGN 130560) in accordance with approve PGN Template, including required DD312 Scale Measurement Status, DD313 Mass, and DF104 Mass; Added Command Support Field to IDRef_Tbl and Command Parameter Field to IDRef_Detail_Tbl [February 2011 Standards Committee Meeting, Agenda Item 12]
110	Jul 2011 2.000	Revised Address Claim (PGN 60928) to provide additional clarification of requirements and add a reference to address mode and request frequency limits established in Section 8.3.2; Revised PGN List - Received PGNs group function and PGN List - Transmitted PGNs group function to provide typographical corrections and to establish limitations on when requests for them may be made globally; Revised Product information (PGN 126996) and Configuration Information (PGN 126998) both to establish limitations on when requests for them may be made globally. [February 2011 Standards Committee Meeting, Agenda Item 15]
111	Jul 2011 2.000	Revised Binary Switch Bank Status (PGN127501) and Switch Bank Control (PGN127502 descriptions in accordance with descriptions developed at the meeting of the Power Distribution Group with the PGN committee in August 2010. Also added Command Support and Command Parameter field values according to the intent of the description and meeting notes. [February 2011 Standards Committee Meeting, Agenda Item 4]
112	Jul 2011 2.000	Added visability for Command Support and Command parameter fields added in revision 109. Includes changes to Queries "Test_Report_Query," "New_Report_Query," and "PG_Selection_Report_Query," and changes to reports "Test_Report," "Parameter_Group_Report," "Parameter_Group_By_Number_Report," and "Parameter_Group_Selection_Report_By_Number."
113	Jul 2011 2.000	Added new parameter group: Temperature, Extended Range (PGN 130316), and deprecated parameter group Temperature (PGN 130312). Added new Data Dictionary item Temperature, extended range and precision (DD314). Added new Data Format item Temperature, extended range and precision (DF105). Added new type uint24. [February 2011 Standards Committee Meeting, Agenda Item 9]
114	Jan 2012 2.000	Added new parameter group: Payload Mass (PGN 130560 )
116	Feb 2012 2.000	Revised the following AIS PGN's to include Sequence ID (SID) as the last field,so these PGN's can be linked to other PGN's: 129038, 129039, 129040, 129793, 129794, 129796, 129798, 129800, 129801, 129802, 129803, 129804, 129805, 129806, 129807, 129810 129810
117	Apr 2012 2.000	Edited AIS ACA Channel Assignment Message (PGN 129806). Field 9 has become the Source ID field. Fields 11 thru 14 have Lat Lon Resolution specified to 1/10 min. Addition of In Use Flag (Field 24), Time of in-use Flag Cahnge (Field 26), SID (Field 27).
118	Mar 2012 2.000	Edited Output rate of PGN 130313
119	Mar 2012 2.000	Edited Bit Field size of PGN 129285

## Appendix B - Revision History

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Rev ID	Date Version	Description
121	Mar 2012 2.000	Added Exhaust Gas Temperature as a state to Field 3 of PGN 130316.
122	Apr 2012 2.000	Deprecated PGN's 130310, 130311, 130312. Within the PGN descriptions lists all details and suggested PGN to use as replacements
123	Mar 2012 2.000	Added the following states to Filed 3 (DD289) to PGN 130314 - Filter Pressure, Altimeter Setting, Oil Pressure, and Fuel Pressure.
124	May 2012 2.000	Added "Maximum Depth Range" (Field 4 ) to PGN 128267
125	May 2012 2.000	Added "Speed Direction" (Field 5) to PGN 128259
126	May 2012 2.000	Added new ALERT Parameter Groups: Alert (PGN 126983), Alert Response (PGN 126984), Alert Text (PGN 126985), Alert Configuration (PGN 126986), Alert Threshold (PGN 126987), Alert Value (PGN 126988). Added 900 Alert codes to be used with Alert PGN's Added Alert document Appendix which details Alert PGN's and code implementation.
127	May 2012 2.000	Added Default update rate (2000ms) to PGN 130313 Humidity
128	May 2012 2.000	Added Field 8 (Consumed Amp Hours) to PGN 127506
129	Aug 2012 2.000	Added new Parameter Groups: Label (PGN 130060) and Channel Source Configuration (PGN 130061)
130	2.000	Added new Power Parameter Groups: Load Controller Connection State and Control (PGN 127500), AC Power / Current, Phase A (PGN 127744), AC Power / Current, Phase B (PGN 127745), AC Power / Current, Phase C (PGN 127746), AC Voltage/Frequency, Phase A (PGN 127747) , AC Voltage/Frequency, Phase B (PGN 127748), AC Voltage/Frequency, Phase C (PGN 127749), Converter (Inverter/Charger) Status (PGN 127750)
135	Sep 2012 2.000	Changed state options of Query Support box for all PGN headers New state options are: Required(formerly YES), Optional, Prohibited(formerly NO) States are described in Appendix A, Version 2.00
136	Sep 2012 2.000	Changed state options of Request Parameter box for ALL Fields within ALL PGN's New state options are: Required(formerly YES), Optional, Note(which is described in the PGN header) States are described in Appendix A, Version 2.00
137	Sep 2012 2.000	PGN 060416 (CTS Group Function) Added PGN description.
138	Sep 2012 2.000	PGN 060416 (EOM Group Function) Added PGN description.
139	Sep 2012 2.000	PGN 060416 (RTS Group Function) Added PGN description.
143	Sep 2012 2.000	PGN 126208 (Command Group Function) Added to description Note 1: When sending a complex command to a device, when accepted if the PGN referenced has command capability, then these fields shall contain the commanded values.

## Appendix B - Revision History

**Version 3.002 - 09-Feb-23**

Rev ID	Date Version	Description
144	Sep 2012 2.000	PGN 126208 (Request Group Function) Edited description and added the following: NMEA encourages manufacturers to provide the capability of altering the values of transmission time for NMEA certified products on the network. When the values of transmission time or delay before the first transmission are altered, they should be maintained after power cycling.
145	Sep 2012 2.000	Edited fields within all PGN's to reference new Class & Function Codes Appendix B6 (where applicable)
146	Sep 2012 2.000	All PGN's- removed "NMEA 2000" specifics in PGN descriptions in preparation for NMEA OneNet. These are now referred to as "NMEA Network Messages"
147	Sep 2012 2.000	126996 Field 1 added the following note: NMEA encourages manufacturers to provide the capability to support multiple NMEA Network Message database versions within their product. This provides a means for manufacturers products to retain backwards compatability with previous versions of the database and existing legacy products.
148	Sep 2012 2.000	Added NEW Command Support header box to ALL PGN's Command Support state options are: Required, Optional, Prohibited States are described with detail in Appendix A, Version 2.00
149	Sep 2012 2.000	Added NEW Command Parameter box to ALL Fields within ALL PGN's Command Parameter state options are: Required, Optional, Prohibited, Note(which is described in the PGN header) States are described with detail in Appendix A, Version 2.00

Rev ID	Date Version	Description
150	Sep 2012 2.000	<p>Changed the Query Support header box value on listed PGN's below to the following values:</p> <p>126998 Optional to Prohibited</p> <p>126208 Optional to Required</p> <p>065240 Blank to Required</p> <p>060416 Blank to Required</p> <p>127245 Optional to Required</p> <p>127250 Optional</p> <p>127251 Optional</p> <p>127527 Optional</p> <p>127258 No to Optional</p> <p>127488 Required</p> <p>127489 Optional to Required</p> <p>127493 Optional to Required</p> <p>127496 No to Optional</p> <p>127497 Optional to Required</p> <p>127498 Optional to Required</p> <p>127505 Optional to Required</p> <p>127507 Required</p> <p>127508 Optional to Required</p> <p>129027 No to Optional</p> <p>129028 No to optional</p> <p>129038 No to optional</p> <p>129285 No to optional</p> <p>129547 No to optional</p> <p>129039 No to optional</p> <p>129040 No to optional</p> <p>129401 No to optional</p> <p>129792 No to optional</p> <p>129793 No to optional</p> <p>129794 No to optional</p> <p>129795 No to optional</p> <p>129796 No to optional</p> <p>129797 No to optional</p> <p>129798 No to optional</p> <p>129799 No to optional</p> <p>129800 No to optional</p> <p>129802 No to optional</p> <p>129803 No to optional</p> <p>129804 No to optional</p> <p>129805 No to optional</p> <p>129806 No to optional</p> <p>129807 No to optional</p>

Rev ID	Date Version	Description
151	Sep 2012 2.000	<p>Changed the Request Parameter box value on the following PGN's and Field Numbers within the PGN's</p> <p>060416 Field 1 Optional to Required</p> <p>126208 Field 1 Optional to Required</p> <p>126208 Field 2 Optional to Required</p> <p>126998 Field 1,2,3 Optional to Prohibited</p> <p>127237 Field 1,2,3,4,5,6,7,9,10,11,12,13,14,15,16,17,18 No to Optional</p> <p>127245 Field 1,2,4,5 Optional to Required</p> <p>127250 Field 1,2,3,4,5 Optional</p> <p>127251 Field 1,2 Optional</p> <p>127527 Field 1,2,3,4 Optional</p> <p>127258 Field 1,2,3,4,5 No to Optional</p> <p>127489 Field 1,2,3,4,5,6,7,8,9,11,12,13,14 Optional to Required</p> <p>127493 Field 1 Optional to Required</p> <p>127496 Field 1,2,3,4 No to Optional</p> <p>127497 Field 1 Optional to Required</p> <p>127498 Field 1 Optional to Required</p> <p>127500 Field 2 Required</p> <p>127501 Field 1 Required</p> <p>127505 Field 1 Required</p> <p>127507 Field 1,2 Required</p> <p>127508 Field 1 Required</p> <p>127509 Field 1,2 Required</p> <p>127510 Field 1,2 Required</p> <p>127511 Field 1,2 Required</p> <p>127512 Field 1,2 Required</p> <p>127513 Field 1 Required</p> <p>127514 Field 1,2 Required</p> <p>129793 Field 1 Required</p> <p>129796 Field 1 Required</p>
152	Sep 2012 2.000	Added Sequence ID (SID) Sentence to PGN 129794 header description.
153	Sep 2012 2.000	PGN 060416 (Abort Group Function) Added PGN description.
155	Sep 2012 2.000	PGN 060416 (BAM Group Function) Added PGN description.
156	Nov 2012 2.000	Discussion regarding Deprecation of PGN 127502- Temporary decision was to keep 127502 until NMEA consults with SAE regarding obtaining more addressable PGN's. NMEA will then create a new addressable PGN based on 127502. Date is TBD.
157	Jan 2013 2.000	Re-named references to "Table 8 Class & Function Codes" to "Appendix B.6 Class & Function Codes"
158	Jan 2013 2.000	<p>Deprecated PGN's As of January 2013:</p> <p>127503</p> <p>127504</p> <p>130310</p> <p>130311</p> <p>130312</p> <p>127507</p> <p>127509</p>

Rev ID	Date Version	Description
160	Mar 2013 2.100	Released Power PGN Corrigendum containing the following PGNs 127744 AC Power / Current Phase A 127745 AC Power / Current Phase B 127746 AC Power / Current Phase C 127747 AC Voltage / Frequency Phase A 127748 AC Voltage / Frequency Phase B 127749 AC Voltage / Frequency Phase C 127750 Converter (Inverter / Charger) Status 127751 DC Voltage and Current 127500 Load Controller Connection State and Control
161	Mar 2013 2.100	Appendix B.6 Class & Function Codes Added to Class 10- Functions 120, 121, 122, 123. Added to Class 25- Functions 136, 137. Changed Solar Panel to Function 142 in Class 35. Removed NMEA 2000 Wireless Gateway from Class 90.
162	Dec 2013 2.100	PGN 127509, changed Field 7 DD item to Ripple Voltage DD287. Previously Field 7 was DD001 and this was incorrectly entered in draft version 1.4. This PGN was deprecated in V2.000. DD item was changed to align correct number of bits. Garmin identified this issue.
163	Jan 2014 2.100	Heartbeat PGN 126993 . Changed reserved Field 3 bit boundary error. Was incorrect at 24 bits, corrected to 40 bits.
164	Jan 2014 2.100	PGN 126208 Group Function PGN. Moved ACK Requirements to a Note at the end of the PGN text description for Command and Request Group function. This makes the page look cleaner and read easier as the note was too big for the ACK Requirements box which usually is filled with "none".
165	Jan 2014 2.100	PGN 126208 Read & Write Fields Group Function Clarifications: The clarification of the Read Fields and Write Fields group functions (and their associated Reply group functions) was necessary to clarify their use to interrogate and configure PGNs that have at least one instance field.
166	Jan 2014 2.100	PGN 126208 Text Descriptions clarification: The text descriptions for each specific group function have now been placed within the header of each group function. Previously, all text describing each of the group functions were only listed in the Request Group Function PGN description.
167	Dec 2014 2.100	(PDW) In Table "DD#_Tbl", DD351 was missing Bit field size - should be 8 bits. Fixed. This fix is also related to a fix at RevisionID 168 below
168	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1741 ("State"), has a value set for "Reserved bits". This should be blank - This relates to Revision ID 167 above - because the reserved bit size was set, the PGN report worked, but the definition was incorrect, this is not a reserved field.
169	Dec 2014 2.100	(PDW) In Table "DD#_Tbl", DD352 was set to a bit field size of 13. Should be 16 bits. Although the three bits at the end are "reserved", the whole field size is actually 16 bits. Fixed. This fix is also related to a fix at RevisionID 170 below.
170	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1742 ("Status") has a value of 16 set for "Reserved bits". This should be blank - This relates to Revision ID 169 above - because the reserved bit size was set, the PGN report worked, but the definition was incorrect, this is not a reserved field.
171	Dec 2014 2.100	(PDW) In Table "DD#_Tbl", DD353 ("AIS Channel Management Source") had no bit field size. Should be 3 bits. Fixed. This fix is also related to a fix at RevisionID 172 below.

Rev ID	Date Version	Description
172	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1566 ("Source Identifier") has a value of 3 set for "Reserved bits". This should be blank - This relates to Revision ID 171 above - because the reserved bit size was set, the PGN report worked, but the definition was incorrect, this is not a reserved field.
173	Dec 2014 2.100	(PDW) In Table "DD#_Tbl", DD330 ("Alert State") uses DF53, which is an integer byte field (8 bits), but also has a bit field size set of 8. The bit field size is not required, it has been removed.
174	Dec 2014 2.100	(PDW) In Table "Type_Tbl", bit0(n) has been added - makes clear a bit type that defaults to a value of "0" when NULL or unused - clarifies this requirement for AIS fields. Linked to Revision ID 175 below.
175	Dec 2014 2.100	(PDW) In Table "DF#_Tbl", DF118 has been added - makes clear a data format that defaults to a value of "0" when NULL or unused - clarifies this requirement for AIS fields. Linked to Revision ID 174 above.
176	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", The following fields marked "AIS Spare" currently set to "DD001" need to change to "DD311" Where "RefID_Detail_ID" = 1038, 1056, 1068, 1075, 1087, 1106, 1117, 1119, 1111, 1130, 1151, 1137, 1142, 1146, 1164, 1157, 1172, 1176, 1218, 1224, 1241, 1252, 1267, 1283, 1557, 1539, 1545, 1531, 1563, 1579, 1598 (All are definitions of the AIS Spare bits, which should use DD311 as this definition ensures that the description shows that all bit default to zero for null data)
177	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", The following fields marked "Reserved for Regional Applications" used in AIS Messages currently set to "DD001" have been changed to "DD311" Where "RefID_Detail_ID" = 1104, 1191, 1192, 1205, 1206, 1253 (All are definitions of the AIS Spare bits, which should use DD311 as this definition ensures that the description shows that all bit default to zero for null data)
178	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1524 ("Message ID") has a value of 6 set for "Reserved bits". This should be blank - this is not a reserved field, the bit field is defined in the DD type DD188 "Bit field size" of 6 bits
179	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1525 ("Repeat Indicator") has a value of 2 set for "Reserved bits". This should be blank - this is not a reserved field, the bit field is defined in the DD type DD185 "Bit field size" of 2 bits
180	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1547 ("Repeat Indicator") has a value of 2 set for "Reserved bits". This should be blank - this is not a reserved field, the bit field is defined in the DD type DD185 "Bit field size" of 2 bits
181	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1549 ("Type of Ship and Cargo") has a value of 8 set for "Reserved bits". This should be blank - this is not a reserved field, the bit field is defined in the DD type DD193 "Bit field size" of 8 bits
182	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1582 ("Message ID") has a value of 6 set for "Reserved bits". This should be blank - this is not a reserved field, the bit field is defined in the DD type DD188 "Bit field size" of 6 bits
183	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1583 ("Repeat Indicator") has a value of 2 set for "Reserved bits". This should be blank - this is not a reserved field, the bit field is defined in the DD type DD185 "Bit field size" of 2 bits
184	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl", entry 1782 ("In-Use flag") has a value of 2 set for "Reserved bits". This should be blank - this is not a reserved field, the bit field is defined in the DD type DD354 "Bit field size" of 2 bits. Linked to Revision ID 185 below.
185	Dec 2014 2.100	(PDW) In Table "DD#_Tbl", DD354 ("AIS Channel Management Parameters Usage") had no bit field size. Should be 2 bits. Fixed. This fix is related to the fix at RevisionID 184 above.

Rev ID	Date Version	Description
186	Dec 2014 2.100	(PDW) In Table "DD#_Tbl", DD391 ("Time, Standard") uses DF65, which is an unsigned integer 32 bit field (32 bits), but also has a bit field size set of 32. The bit field size is not required, it has been removed, as it is already defined in the DF table
187	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl" PGN 129550 [IDRef ID 27] has bad field sequence - field "7" should be field "6" and field "8" should be field "7"
189	Dec 2014 2.100	(PDW) In Table "IDRef_Detail_Tbl" ID= 1517 was not being used - it had no ID ref, name or other details. It has been re-assigned to PGN 127512 (AGS status), as this PGN had 44 unassigned bits at the end. In the default single packet PGNS, it should be made clear that remaining bits must be set to one. Adding this field 4 DD01 reserved bit definition of 44 bits makes this clear.
190	Dec 2014 2.100	(PDW) PGN 129538 has 6 bits remaining at the end of the message that should be set to "reserved" Added field 11 to this PGN with DD001 and reserved size of 6 bits to show these bits must always be set to "1"
191	Dec 2014 2.100	Removed DF115 as this was not associated with any specific Data Dictionary Item or PGN. DF115 Time Interval was the same as DF116 Time interval. DF116 has more detail and is used with the Heartbeat PGN, Field #1. DF115 is now available for future use of data dictionary items.
192	Dec 2014 2.100	ID Reference 119, PGN 129803 Field 21 has been changed to 6 bits instead of 4 bits so it is aligned on the correct byte boundary. Versions beyond this version, this field has been corrected to 6 bits, as it was 4.
193	Dec 2014 2.100	DD311 now links to DF115, instead of DF118 which was available for future use based on the 12/9/2014 change, see RevisionID 191. DF118 is now open for future use
194	Dec 2014 2.100	Added "Status" field at the far right of the IDRef_Tbl to indicate if the PGN is "Current", "Draft", or "Deprecated"
195	Dec 2014 2.100	Removed "orphan" ID References 230, 222, 224, 225 as these were not used
196	Jan 2015 2.100	Added new Data Dictionary Item specific to Engine / Transmission Instance. DD410. Updated engine and transmission PGNS to reflect using the DD410 instead of DD128. These specific PGNS are 127493, 127488, 127489, 127497, 127498
197	2.100	Added 12 new Entertainment / Audio PGNS: Entertainment Current File & Status 130569, Entertainment Library Data File 130570, Entertainment Library Data Group 130571, Entertainment Library Data Search 130572, Entertainment System Configuration Status 130580, Entertainment Zone Volume Status 130582, Entertainment Zone Configuration Status 130581, Entertainment Supported Zone Data 130574, Entertainment Supported Source Data 130573, Entertainment Available Audio EQ Presets 130583, Entertainment Bluetooth Source Status 130585, Entertainment Bluetooth Devices 130584
198	2.100	Updated Alert Configuration PGN 126986 to include instructions as to how to create custom user defined alerts. Added a new 2 bit Field 11 called User defined alert assignment along with new Data Dictionary item DD411. Moved all proceeding fields ahead by one and reduced NMEA Reserved Field 12 from 6 bits down to 4 bits.
199	Feb 2015 2.100	Increased the recommended update rate of PGN 127500 to 15,000 per request of manufacturer member Maretron.
200	Feb 2015 2.100	Combined Reserved fields in AIS PGN ID 232 starting at Field 12 and adjusted remaining fields accordingly.

## Appendix B - Revision History

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Rev ID	Date Version	Description
201	Feb 2015 2.100	Combined Reserved fields in AIS PGN ID 231 starting at Field 7 and adjusted remaining fields accordingly.
202	2.100	Added 3 new AIS PGNs Single Slot 129811, Multi Slot 129812, Long Range Binary 129813
203	Sep 2013 2.100	Added Watermaker PGN 130567
204	Jun 2014 2.100	Added Heave PGN 127252
205	Jun 2019 2.100	Added Heartbeat PGN 126993
206	Sep 2013 2.100	Added MOB PGN 127233
207	Sep 2013 2.100	Updated Field 7 of Product Information PGN 126996. Added Field Note "As of February 2015 and Version 2.000 of the Main Document, Certification Level 7 shall be set to 2 meaning "Not Applicable" Also added State 2 "Not Applicable"
208	Sep 2013 2.100	Revised DSC PGN 129808 to reflect exactly what was in DSC Corrigenda from 2013.
209	Mar 2017 2.200	Updated DD291. Added shaft seal temperature as State 15. Changed Reserved states to 16 to 128.
210	Apr 2017 2.200	Trim Tab Status PGN- 130576. Added center trim tab (Field 3)
211	Apr 2017 2.200	Added Nautical Leeway Angle PGN 128000
212	Apr 2017 2.200	Added Elevator Car Status PGN 128538
213	Apr 2017 2.200	Added Elevator Deck Push Button PGN 128769
214	Apr 2017 2.200	Added Elevator Motor Control PGN 128768
215	Aug 2020 2.300 A	Update to Engine Parameters - 127489, Dynamic- New Warning Flag added
216	Aug 2021 2.300 A	Added Lighting messages - 130330, 130561, 130562, 130563, 130564, 130565, 130566
217	Aug 2021 2.300 A	Update Entertainment Zone Volume- Increased Padding - NMEA reserved
218	Feb 2021 2.300 A	Added Linear Actuator - 128780
219	Oct 2021 2.300 A	Added Acceleration - 126001

## Appendix B - Revision History

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Rev ID	Date Version	Description
222	Feb 2021 2.300 A	Added Windlass Messages, 128776, 128777, 128778
223	Feb 2021 2.300 A	Added Thruster Messages 128006, 128007, 128008
220	Oct 2021 3.000	Deprecated Binary Switch Command 127502
221	Oct 2021 3.000	Updated Binary Switch Status 127501
224	Dec 2021 3.000	Added Lighting Messages, Linear Actuator Message, Vessel Acceleration
225	Mar 2022 3.000	Release 3.000
226	3.001 A	Update to 126998 fields 1&2 from Optional to Required to support OneNet TPP requirements.
227	Jun 2022 3.001 A	Update to Data Dictionary Entry(s) DD449, DD507, DD515. Updates to PGN 130330, 130561, 130563, 130565.
229	Dec 2022 3.002	PGN 127751 DC Voltage/Current, Update Field 5 NMEA Reserved to 8 Bit from 16 Bit

Rev ID	Date Version	Description
230	Jan 2023 3.002	<p>PGN 130579 Entertainment - System Configuration, deprecated in version 3.000 in error.</p> <p>PGN 128520 Tracked Target Data - Added NMEA Reserved Field 15, 6 Bit</p> <p>PGN 129793 AIS UTC and Date Report- Added NMEA Reserved Field 16, 6 Bit</p> <p>PGN 129798 AIS SAR Aircraft Position Report- updated description, added NMEA Reserved Field 17, 2 Bit</p> <p>Added PGN 129810 AIS Static Data Report, Part A</p> <p>PGN 129810 AIS Static Data Report, Part B- Added NMEA Reserved Field 15, 5 Bit</p> <p>PGN 130561 Lighting Zone Added NMEA Reserved Field 14, 6 Bit</p> <p>PGN 130563 Lighting Device Added NMEA Reserved Field 18, 6 Bit</p> <p>PGN 130566 Lighting Program Added NMEA Reserved Field 5, 4 Bit</p> <p>PGN 128538 Elevator Car Status Added NMEA Reserved Field 32, 2 Bit</p> <p>PGN 129038 updated description and field guidance.</p> <p>PGN 129039 updated description guidance and field name change.</p> <p>PGN 129040 updated description</p> <p>PGN 129041 updated description</p> <p>PGN 129794 updated description and field notes</p> <p>New PGN 127494 Electric Drive Information</p> <p>New PGN 127490 Electric Drive Status (Dynamic)</p> <p>New PGN 128002 Electric Drive Status (Rapid Update)</p> <p>New PGN 127495 Electric Energy Storage Information</p> <p>New PGN 127491 Electric Energy Storage Status</p> <p>New PGN 128003 Electric Energy Storage Status (Rapid Update)</p> <p>PGN 129802 updated description guidance and field name change.</p> <p>PGN 129803 updated description guidance and field name change.</p> <p>PGN 129804 updated description guidance and field name change.</p> <p>DD352 Connection Status Corrected 16 Bit to 13 Bit</p> <p>PGN 127501 Switch Bank Status - Description field updated with improved guidance for new designs. 127501 Command Support changed Restricted to Optional</p> <p>Correction to DF for DD283 Battery Capacity (Coulombs)</p> <p>Updated DD223 Engine Discrete Status 2, xxxx xx1x xxxx xxxx = Aftertreatment System Cleaning Active.</p>