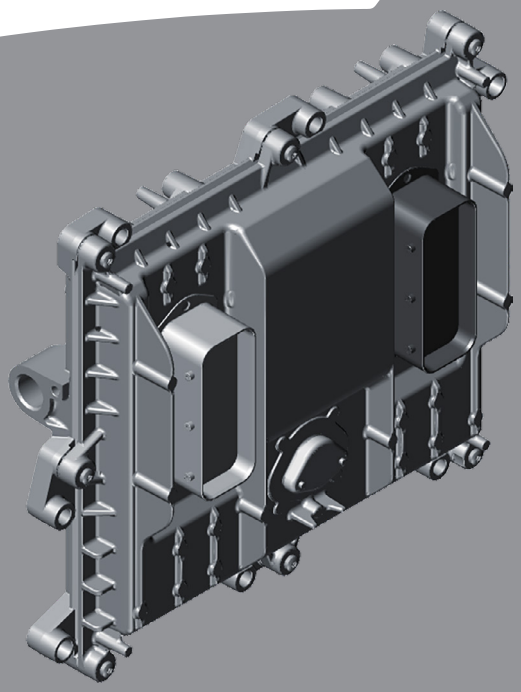
MARINE



EDC17CV41

CAN Interface Specification

Revision 1.0 Feb 2020

REVISION HISTORY

Document updating

Modification description	Date
First release	Feb 2020

FPT internal document reference Revision 2.2

Rev	Date	Description	Authors	Approval
2.2	11/12/2019	Modified Document Name EAC Auxiliary/ water system pressure added for C16	M. Brunello	A. Mazzurco

INTRODUCTION

Symbols Reference

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Legend

Signals compliant with SAE which are "not used" or "not evaluated".

Signals in the proprietary messages which are "not used" or "not evaluated".

"**h**" hexadecimal values.

"**b**" binary values.

NB: Value of signals in the messages that are "not used" or "not evaluated" could be not specified.

REFERENCES

All data is subject to change without notice.

INDEX

1. ECM TRANSMITTED MESSAGES

1.1. *Electronic Engine Controller #1 - EEC1*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	0C F0 04 00	10 ms time synchronous	Ref SAE J1939/71 – PGN 61444

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	STATUS_EEC1	DRIVERS DEMAND ENGINE PERCENT TORQUE	ACTUAL ENGINE PERCENT TORQUE	ENGINE SPEED		SOURCE ADDRESS OF CONTROLLING DEVICE FOR ENGINE CONTROL	ENGINE STARTER MODE	ENGINE DEMAND PERCENT TORQUE
SAE J1939/71 Reference		512	513	190		1483	1675	2432
Scale		1%/bit	1%/bit	0.125 rpm/bit		1/bit		1%/bit
Offset		-125 %	-125 %	0 rpm		0		-125%
Data Range		-125 to +125%	-125 to +12 %	0 to +8031.875 rpm		0 to 253		-125 to +125%
Operating Range		0 to +125%	0 to +125%					0 to +125%
Remarks	See parameter description below		Actual engine – percent torque (related to the maximum positive torque)				See parameter description below	

Parameter	Status_EEC1	
	BIT 8-5	BIT 4-1
Definition	ACTUAL ENGINE PERCENT TORQUE – HIGH RESOLUTION	ENGINE TORQUE MODE
SAE J1939/71 Reference	4154	899
Operating range	0000: additional torque representation: +0.000% 0001: additional torque representation: +0.125% 0010: additional torque representation: +0.250% 0011: additional torque representation: +0.375% 0100: additional torque representation: +0.500% 0101: additional torque representation: +0.625% 0110: additional torque representation: +0.750% 0111: additional torque representation: +0.875% 1xxx: No action / Not available	0000b Idling 0001b Accelerator Pedal governo (not used) 0010b Cruise Control (not used) 0011b Power Take Off governor (not used) 0100b Road Speed limiter (not used) 0101b ASR control (not used) 0110b Transmission control (not used) 0111b ABS control (not used) 1000b Torque limiter 1001b High speed governor 1010b Retarder control (not used) 1011b Not defined 1100b Fuel limitation (not used) 1101b VCM torque demand (not used) 1110b VCM speed demand 1111b Not available
Remarks		

Parameter	Engine starter Mode	
	Bit 8-5	Bit 4-1
Definition	Not Defined	Engine Starter Mode
SAE J1939/71 Reference		1675
Operating range		0000b Start not requested 0001b Starter active, gear not engaged 0010b Starter active, gear engaged 0011b Starter finished 0100b Starter inhibited due to engine already running 0101b Starter inhibited due to engine not ready for start (not used) 0110b Starter inhibited due to driveline engaged (not used) 0111b Starter inhibited due to Immobilizer (not used) 1100b Started inhibited – reason unknown 1110b Error 1111b Not available
Remarks	Always set to 1111b	

1.2. *Electronic Engine Controller #2 – EEC2*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	0C F0 03 00	time synchronous 50 ms	Ref SAE J1939/71 – PGN 61443

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	Status_EEC2	Accelerator Pedal Position 1	Percent Load at Current Speed	Remote Accelerator Pedal Position	Accelerator Pedal Position 2	Vehicle Acceleration Rate Limit Status	Actual Maximum Available Engine – Percent Torque	Estimated Pumping - Percent
SAE J1939/71 Reference		91	92	974	29	2979	3357	5398
Scale		0.4% / bit	1% / bit	0.4 % /bit	0.4 % /bit		0.4% / bit	
Offset		0%	0%	0%	0%		0%	
Data Range		0 to +100 %	0 to +250%	0 to +100 %	0 to +100 %		0 to +100 %	
Operating Range		0 to +100 %	0 to +125%				0 to +100 %	
Remarks	Evaluated by ECM only for one-box applications (accelerator pedal hardwired to ECM): see description below Not evaluated by ECM for two-box applications: FFh	The ratio of current position of the accelerator pedal to its maximum position. Evaluated by ECM only for one-box applications (accelerator pedal hardwired to ECM): FEh in case of failure at accelerator pedal Not evaluated by ECM for two-box applications: FFh	The ratio of actual engine percent torque to maximum indicated the torque available at the current engine speed	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)		Not evaluated by the ECM – It has not to be evaluated by receiver(s)

Parameter	STATUS_EEC2			
	Bit 8-7	Bit 6-5	Bit 4-3	Bit 2-1
Definition	Not Defined	Road Speed Limit State	Accelerator Pedal Kickdown Status	Accelerator Pedal Low-Idle Switch Position
SAE J1939/71 Reference		1437	559	558
Operating range			00b KickDown passive 01b KickDown active	00b Not Idling 01b Idling 10b Error (Fault in accelerator pedal low-idle switch) 11b Not available
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	

1.3. *Electronic Engine Controller #3 – EEC3*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE DF 00	time synchronous 250 ms	Ref SAE J1939/71 – PGN 65247

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	NOMINAL FRICTION PERCENT TORQUE	ENGINE'S DESIRED OPERATING SPEED		ENGINE'S OPERATING SPEED ASYMMETRY ADJUSTMENT				
SAE J1939/71 Reference	514	515		519				
Scale	1 % /bit	0.125 rpm/bit		1 ratio				
Offset	-125 %	0 rpm		0				
Data Range	-125 to +125 %	0 to +8031,875 rpm		0 to +250				
Operating Range	0 to +125 %							
Remarks	Nominal engine friction – percent torque (related to the maximum engine torque)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)		Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)			

1.4. *Electronic Engine Controller #4 – EEC4*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	1C FE BE 00	On Request	Ref SAE J1939/71 – PGN 65214

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	ENGINE RATED POWER		ENGINE RATED SPEED					
SAE J1939/71 Reference	166		189					
Scale	0,5 kW / bit		0,125 rpm / bit					
Offset	0 kW		0 rpm					
Data Range	0 to +32127,5 kW		0 to +8031,875 rpm					
Operating Range	0 to +32127,5 kW		0 to +8031,875 rpm					
Remarks					Not evaluated by the ECM – It has not to be evaluated by receiver(s)			

1.5. *Engine Configuration #1 – EC1*

The ECM has to support the Mode 2 for the engine characteristic, according to SAE J1939/71 Surface Vehicle Recommended Practice – Parameter group ENGINE CONFIGURATIon – Mode 2.
ENGINE CONFIGURATIon – Mode 2 provides a HIGH IDLE point where torque equals zero and the ENDSPEED GOVERNOR GAIN Kp.
The engine configuration is transmitted as a multi-packet message, consisting of a broadcast announce message and 4 sequential packets with the specified data.

1.5.1. EC1_BAM (Broadcast Announce Message)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EC FF 00	time synchronous 5000 or in the event of a change of speed and/ or torque curves more than ±10%	This message is used to inform all stations on the CAN that a large message is about to be transmitted. After this broadcast message, individual packages can be transmitted

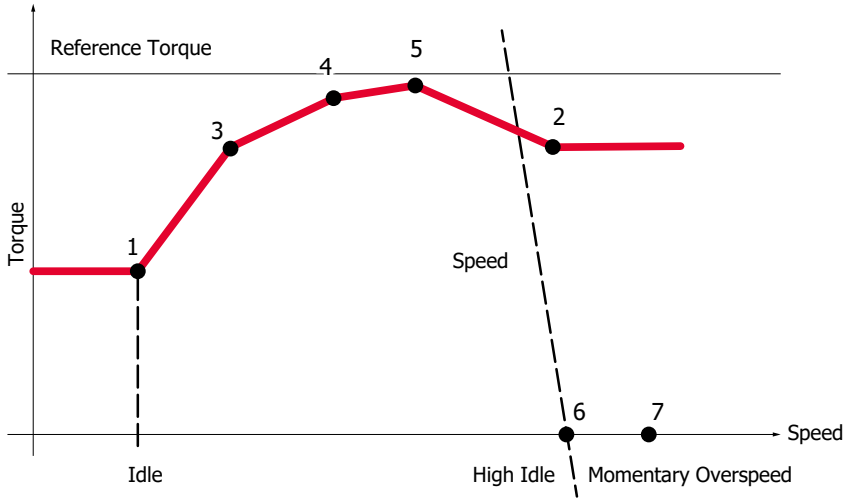
Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	CONTROL BYTE	TOTAL MESSAGE SIZE, NUMBER OF BYTES		TOTAL NUMBER OF PACKETS	RESERVED FOR ASSIGNMENT BY SAE	PARAMETER GROUP NUMBER OF THE PACKET MESSAGE		
Assigned value	32	28		4	FFH	E3FE00H		
Remarks								

1.5.2. EC1_TP-DT (Transport Protocol – Data Transfer)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EB FF 00	time synchronous 5000 or in the event of a change of speed and/or torque curves more than ±10%	This is a multipackage message consisting of 4 packets and the interval between individual messages is 50 ms. A characteristic curve for limiting torque is transmitted, according to SAE J1939/71 Surface Vehicle Recommended Practice – Parameter group ENGINE CONFIGURATIon – Mode 2

	Definition
Point 1	Torque / speed point at idle, variable
Point 2	Torque / speed at highest possible engine speed, fixed applicable
Points 3-5	Torque / speed points between points 1 and 2 to permit linear interpolation over the entire torque range, fixed applicable.
Point 6	High idle speed (torque = 0) , variable
Point 7	Maximum momentary engine override speed (torque = 0) , fixed applicable



Message Template

Package 1

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 1	Point 1 Engine speed at idle		Point 1 Percent torque at idle	Point 2 Highest possible engine speed		Point 2 Percent torque at highest speed	Point 3 Low byte of engine speed

Package 2

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 2	Point 3 High byte of engine speed	Point 3 Percent torque	Point 4 Engine speed		Point 4 Percent torque	Point 5 Engine speed	

Package 3

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 3	Point 5 Percent torque	Point 6 Engine speed at high idle		Gain of endspeed governor		Reference engine torque	

Package 4

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 4	Point 7 Maximum momentary engine override speed		Maximum momentary engine override time limit	Not supported			

Value normalization

Value	Scale	Offset	Data Range	Operating Range
Speed	0.125 rpm / bit	0 rpm	0 to +8031 rpm	
Percent Torque	1% / bit	-125%	-125 to +125%	0 to +125%
Gain Kp	0.00078125 % engine ref. torque/rpm / bit;	0%/rpm	0 to +50,2 %/rpm	
Torque	1 Nm / bit	0 Nm	0 to +64 255 Nm	
Override Time Limit	0.1 s / bit	0 s	0 to +25 s	

Conditions of maximum torque curve reduction.
ECM will reduce the maximum torque curve indicated in the Engine configuration message in the following conditions:

Type of torque limitation	Remarks
Engine overheat protection	
Atmospheric pressure correction	
System degradation	

Conditions of low idle increase.
The low idle setpoint, actuated and indicated as point 1 of the Engine Configuration message, can be increased by one of the following events (the max value is selected):

Event for low idle increase	Remarks
Low engine temperature	
Low battery voltage	

Conditions of high idle decrease.
The high idle setpoint, actuated and indicated as point 6 of the Engine Configuration message, can be increased by one of the following events (the min value is selected):

Event for high idle decrease	Remarks
System degradation	
Low engine temperature after start	

Reference speed setpoints calculation.

Speed Point in ENG_CONF	Calculation
Point 1	Current low idle speed (dynamic calculation)
Point 2	Application value (static)
Point 3	Application value (static)
Point 4	Application value (static)
Point 5	Application value (static)
Point 6	Current high idle speed (dynamic calculation)
Point 7	Application value (static)
Gain of endspeed governor	Current endspeed feedback factor (dynamic calculation)

1.6. *Engine Temperature - ET1*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE EE 00	time synchronous 1000 ms	Ref SAE J1939/71 - PGN 65262

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	ENGINE COOLANT TEMPERATURE	FUEL TEMPERATURE	ENGINE OIL TEMPERATURE		TURBO OIL TEMPERATURE		ENGINE INTERCOOLER TEMPERATURE	ENGINE INTERCOOLER THERMOSTAT OPENING
SAE J1939/71 Reference	110	174	175		176		52	1134
Scale	1 °C/bit	1 °C/bit	0.03125 °C/bit					
Offset	-40 °C	-40 °C	-273 °C					
Data Range	-40 to +210°C	-40 to +210°C	-273 to +1735°C					
Operating Range								
Remarks	FEh in case of defective sensor	FEh in case of defective sensor	FE00h in case of defective sensor		Not evaluated by the ECM – It has not to be evaluated by receiver(s)		Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

1.7. *Ambient conditions – AMB*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE F5 00	time synchronous 1000 ms	Ref SAE J1939/71 - PGN 65269

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	BAROMETRIC PRESSURE	CAB INTERIOR TEMPERATURE		AMBIENT AIR TEMPERATURE		AIR INLET TEMPERATURE	ROAD SURFACE TEMPERATURE	
SAE J1939/71 Reference	108	170		171		172	79	
Scale	0.5 kPa/bit			0.03125 °C/bit				
Offset	0 kPa			-273 °C				
Data Range	0 to +125 kPa			-273 to +1735 °C				
Operating Range								
Remarks	FEh in case of defective sensor	Not evaluated by the ECM – It has not to be evaluated by receiver(s)		This is the temperature read after the engine intake air filter FE00h in case of defective sensor		Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	

1.8. *Inlet / Exhaust Conditions – IC1*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE F6 00	time synchronous 500 ms	Ref SAE J1939/71 - PGN 65270

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	PARTICULATE TRAP INLET PRESSURE	BOOST PRESSURE	INTAKE MANIFOLD TEMPERATURE	AIR INLET PRESSURE	AIR FILTER DIFFERENTIAL PRESSURE	EXHAUST GAS TEMPERATURE		COOLANT FILTER DIFFERENTIAL PRESSURE
SAE J1939/71 Reference	81	102	105	106	107	173		112
Scale	0.5 kPa/bit	2 kPa/bit	1 °C/bit		0.05 kPa/bit	0.03125 °C/bit		
Offset	0 kPa	0 kPa	-40 °C		0 kPa	-273 °C		
Data Range	0 to +125 kPa	0 to +500 kPa	-40 to +210 °C		0 to 12.5 kPa	-273 to +1735.0 °C		
Operating Range								
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	FEh in case of defective sensor	FEh in case of defective sensor	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	FEh in case of defective sensor	FEh in case of defective sensor		Not evaluated by the ECM – It has not to be evaluated by receiver(s)

1.9. *Engine Fluid Level/Pressure #1 – EFL/P1*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE EF 00	time synchronous 500 ms	Ref SAE J1939/71 - PGN 65263

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	FUEL DELIVERY PRESSURE	EXTENDED CRANKCASE BLOW-BY PRESSURE	ENGINE OIL LEVEL	ENGINE OIL PRESSURE	ENGINE CRANKCASE PRESSURE 1		SEA WATER PRESSURE	COOLANT LEVEL
SAE J1939/71 Reference	94	22	98	100	101		109	111
Scale				4 kPa/bit	1/128 kPa/bit			
Offset				0 kPa	-250 kPa			
Data Range				0 to 1000 kPa	-250 to 251.99 kPa			
Operating Range								
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	FEh in case of defective sensor Note: This value is absolute pressure – not relative.	Only evaluated on CURSOR applications – FE00h in case of defective sensor For NEF applications it is not evaluated by the ECM – It has not to be evaluated by receiver(s)		Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

1.10. *Engine Fuel/ Lube Systems – EFS*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE 6A 00	time synchronous 500 ms	Ref SAE J1939/71 – PGN 65130

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	Engine Oil Level Remote Reservoir	Engine Fuel Supply Pump Intake Pressure	Engine Fuel Filter (Suction Side). Differential Pressure	Engine Waste Oil Reservoir Level	Engine Oil- Filter Outlet Pressure	Engine Oil Priming Pump Switch Engine Oil Priming State Engine Coolant Pre-Heated State	Engine Ventilation Status Fuel Pump Primer Status	Not Defined
SAE J1939/71 Reference	1380	1381	1382	3548	3549	3550 – 3551 –3552 – 3553	3554 - 4083	
Scale			2 kPa/bit					
Offset			0					
Data Range			0 to 500 kPa					
Operating Range								
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Only evaluated on CURSOR applications – FE00h in case of defective sensor For NEF applications it is not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

1.11. *Vehicle Electrical Power – VEP1*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE F7 00	time synchronous 1000 ms	Ref SAE J1939/71 - PGN 65271

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	NET BATTERY CURRENT	ALTERNATOR CURRENT	ALTERNATOR POTENTIAL (VOLTAGE)		ELECTRICAL POTENTIAL (VOLTAGE)		BATTERY POTENTIAL (VOLTAGE), SWITCHED	
SAE J1939/71 Reference	114	115	167		168		158	
Scale					0.05 V/ bit		0.05 V/ bit	
Offset					0 V		0 V	
Data Range					0 to +3212.75 V		0 to +3212.75 V	
Operating Range					0 to +3212.75 V			
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)		Same as SPN 158			

1.12. *Shutdown – SHUTDOWN*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE E4 00	time synchronous 1000 ms	Ref SAE J1939/71 - PGN 65252

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	IDLE SHUTDOWN_1	IDLE SHUTDOWN_2	REFRIGERANT PRESS_1	LAMP COMMANDS	ENGINE SHUTDOWN_1	ENGINE SHUTDOWN_2	NOT DEFINED	
SAE J1939/71 Reference	594, 1110	591	605, 875, 985					
Scale								
Offset								
Data Range								
Operating Range								
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	See parameter description below	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	

Parameter	LAMP_COMMANDS	
	BIT 8-3	BIT 2-1
Definition	NOT DEFINED	WAIT TO START LAMP
SAE J1939/71 Reference		1081
Operating Range		00b Off 01b On
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Cold start grid heater lamp.

1.13. *Fuel Economy – LFE*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE F2 00	Time synchronous 100 ms	Ref SAE J1939/71 - PGN 65266

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	FUEL RATE		INSTANTANEOUS FUEL ECONOMY		AVERAGE FUEL ECONOMY		THROTTLE POSITION	ENGINE THROTTLE 2 POSITION
SAE J1939/71 Reference	183		184		185		51	3673
Scale	0.05 L/h/ bit		1/512 km/L/ bit					
Offset	0 L/h		0 km/L					
Data Range	0 to +3212,75 L/h		0 to +125.5 km/L					
Operating Range								
Remarks			Not evaluated by the ECM – It has not to be evaluated by receiver(s)		Not evaluated by the ECM – It has not to be evaluated by receiver(s)		Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

1.14. *Fuel Consumption – LFC*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE E9 00	Sent on request	Ref SAE J1939/71 - PGN 65257

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	TRIP FUEL				TOTAL FUEL USED			
SAE J1939/71 Reference	182				250			
Scale					0,5 L/bit			
Offset					0			
Data Range					0 to 2 105 540 607,5 L			
Operating Range								
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)							

1.15. *Engine Hours, Revolutions – HOURS*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE E5 00	Sent on request	Ref SAE J1939/71 - PGN 65253

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	TOTAL ENGINE HOURS				TOTAL ENGINE REVOLUTIONS			
SAE J1939/71 Reference	247				249			
Scale	0,05 h/bit				1000 r/bit			
Offset	0 h				0 r			
Data Range	0 to 210 554 060,75				0 to 4 211 081 215 000			
Operating Range								
Remarks								

1.16. *Software Identification – SOFT*

The Software Identification Information is transmitted as a multi-packet message, consisting of a broadcast announce message and 5 sequential packets with the specified data.

1.16.1. CNFBAM (Broadcast Announce Message)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EC FF 00	On Request	This message is used to inform all stations on the CAN that a large message is about to be transmit. After this broadcast message, individual packages can be transmitted Ref SAE J1939/71 – PGN 65259

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	CONTROL BYTE	TOTAL MESSAGE SIZE, NUMBER OF BYTES		TOTAL NUMBER OF PACKETS	RESERVED FOR ASSIGNMENT BY SAE	PARAMETER GROUP NUMBER OF THE PACKET MESSAGE		
Assigned value	32	56		8	FFh	DAFE00h		
Remarks								

1.16.2. CNFPCK (Transport Protocol - Data Transfer)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EB FF 00	On Request	This is a multipackage message consisting of 5 packets and the interval between individual messages is 50 ms.

Message Template

Package 1

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 1	4	SW PROJECT →					

Package 2

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 2	→ SW PROJECT →						

Package 3

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 3	→ SW PROJECT		Delimiter "*" (0x2A)	SW VERSION →			

Package 4

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 4	→ SW VERSION →						

Package 5

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 5	→ SW VERSION	Delimiter "*" (0x2A)	Delimiter "*" (0x2A)	CALIBRATION IDENTIFICATION →			

Package 6

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 6	→ CALIBRATION IDENTIFICATION →						

Package 7

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 7	→ CALIBRATION IDENTIFICATION					Delimiter "*" (0x2A)	DATABASE VERSION

Package 8

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 8	→ DATABASE VERSION						

1.17. *EDC2BC (Engine Controller to Body controller)*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FF 21 00	time synchronous 1000 ms	FPT Proprietary message

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	NOT DEFINED	STATUS INFORMATION 2	NOT DEFINED	NOT DEFINED	NOT DEFINED	STATUS INFORMATION 6	NOT DEFINED	STATUS INFORMATION 8
Scale								
Offset								
Data Range								
Operating Range								
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	See parameter description below	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	See parameter description below	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	See parameter description below

Parameter	STATUS INFORMATION 2			
	BIT 8-6	BIT 5	BIT 4-3	BIT 2-1
Definition	ENGINE OVER TEMPERATURE (PRE-WARNING)	NOT USED	ENGINE OVERSPEED	NOT USED
SAE J1939/71 Reference				
Operating range	000 No warning 001 Pre-warning 10 Warning 11 111 Not defined		00 Normal 01 Above operating range 10 Reserved 11 Not Available	
Remarks		Not evaluated by the ECM – It has not to be evaluated by receiver(s)		Not evaluated by the ECM – It has not to be evaluated by receiver(s)

Parameter	STATUS INFORMATION 6			
	BIT 8-7	BIT 6-5	BIT 4-3	BIT 2-1
Definition	ENGINE OIL TEMPERATURE HIGH	NOT USED	WATER IN FUEL	ENGINE OIL PRESSURE LOW
SAE J1939/71 Reference				
Operating range	00 Normal 01 Above operating range 10 Reserved 11 Not Available		00 No 01 Yes 10 Error 11 Not Available	00 Normal 01 Below operating range 10 Reserved 11 Not Available
Remarks		Not evaluated by the ECM – It has not to be evaluated by receiver(s)		

Parameter	STATUS INFORMATION 8			
	BIT 8-7	BIT 6-5	BIT 4-3	BIT 2-1
Definition	NOT USED	LOW COOLANT LEVEL STATUS	NOT USED	NOT USED
SAE J1939/71 Reference				
Operating range		0 Normal Coolant Level 1 Low Coolant Level 2 Error 3 Not Available		
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)		Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

1.18. *Diagnostic Message #1 from ECM - DM1 single - DM1_ECM*

The transmission of DTCs corresponding to faults with lamp code =0 is selectable by application.

SPN/FMI: refer to FnR description file

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE CA 00	time synchronous 1000 ms and immediately when a fault becomes active/inactive or the Failure Mode Indicator changes	Ref SAE J1939/73 par 5.7.1

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	LAMPS_STATUS	LAMP_STATUS EXTENSION	SUSPECT PARAMETER NUMBER – LEAST BYTE	SUSPECT PARAMETER NUMBER – SECOND BYTE	SPN_FMI	SPN_CONV	NOT DEFINED	
SAE J1939/71 Reference			1214	1214				
Scale								
Offset								
Data Range								
Operating Range								
Remarks	See parameter description below	FFh			See parameter description below	See parameter description below	FFFFh	

Parameter	LAMPS_STATUS			
	BIT 8-7	BIT 6-5	BIT 4-3	BIT 2-1
Definition	MALFUNCTION INDICATOR LAMP STATUS	RED STOP LAMP STATUS	AMBER WARNING LAMP STATUS	PROTECT LAMP STATUS
SAE J1939/71 Reference	1213	624	624	987
Operating range		00b Lamp off 01b Lamp on	00b Lamp off 01b Lamp on	
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s) Not evaluated by ECM (00b)			Not evaluated by the ECM – It has not to be evaluated by receiver(s) Not evaluated by ECM (11b)

Parameter	SPN_FMI	
	Bit 8-6	Bit 5-1
Definition	Suspect Parameter Number – Most Significant Bits	Failure Mode Indicator
SAE J1939/71 Reference	1214	1215
Operating range		0-31
Remarks		

Parameter	SPN_CONV	
	Bit 8	Bit 7-1
Definition	Suspect Parameter Number Conversion Method	Occurrence Count
SAE J1939/71 Reference	1706	1216
Operating range	Always set to 0	0 to 126 valid values 127 not available
Remarks		

DM1 single in case of no active DTC

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	Lamps_status	Lamp_status_ extension	Suspect Parameter Number – Least Byte	Suspect Parameter Number – Second Byte	SPN_FMI	SPN_CONV	Not Defined	
Assigned value	03h	FFh	00h	00h	00h	00h	FFh	

1.19. *Diagnostic Message #1 from ECM – DM1 multipacket*

The transmission of DTCs corresponding to faults with lamp code =0 is selectable by application

SPN/FMI: refer to FnR description file

1.19.1. DM1BAM (Broadcast Announce Message)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EC FF 00	On request	Ref SAE J1939/73 par 5.7.1

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	Control Byte	Total Message Size, Number of Bytes		Total Number of Packets	Reserved for Assignment by SAE	Parameter Group Number of the Packet Message		
Assigned value	32				FFH	CAFÉ00H		
Remarks		Depends on number of faults		Depends on number of faults				

1.19.2. DM1TP-DT (Transport Protocol – Data Transfer)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EB FF 00	On request	This is a multipackage message and the interval between individual messages is 50 ms. Faults information are packed and the total bytes length can also be a number not multiple of 8, according to SAE J1939/73.

Message Template (example of 4 DTCs)

Package 1

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 1	Diagnostic Lamp Status	Reserved (FFh)	Diagnostic Trouble Code (DTC) #1				DTC #2

Package 2

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 2	DTC #2 – continued			DTC #3			

Package 3

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 3	DTC #4				All FF's		

1.20. *Diagnostic Message #2 from ECM – DM2 single - DM2_ECM*

The transmission of DTCs corresponding to faults with lamp code =0 is selectable by application

SPN/FMI: refer to FnR description file

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE CB 00	On request	Ref SAE J1939/73 par 5.7.1

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	LAMPS_STATUS	LAMP_STATUS EXTENSION	SUSPECT PARAMETER NUMBER – LEAST BYTE	SUSPECT PARAMETER NUMBER – SECOND BYTE	SPN_FMI	SPN_CONV	NOT DEFINED	
SAE J1939/71 Reference			1214	1214				
Scale								
Offset								
Data Range								
Operating Range								
Remarks								
	See parameter description below	Always set to FFh			See parameter description below	See parameter description below	FFFFh	

Parameter	LAMPS_STATUS			
	BIT 8-7	BIT 6-5	BIT 4-3	BIT 2-1
Definition	MALFUNCTION INDICATOR LAMP STATUS	RED STOP LAMP STATUS	AMBER WARNING LAMP STATUS	PROTECT LAMP STATUS
SAE J1939/71 Reference	1213	624	624	987
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	00b Lamp off 01b Lamp on	00b Lamp off 01b Lamp on	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

Parameter	SPN_FMI	
	BIT 8-6	BIT 5-1
Definition	SUSPECT PARAMETER NUMBER – MOST SIGNIFICANT BITS	FAILURE MODE INDICATOR
SAE J1939/71 Reference	1214	1215
Operating range		0-31
Remarks		

Parameter	SPN_CONV	
	BIT 8	BIT 7-1
Definition	SUSPECT PARAMETER NUMBER CONVERSION METHOD	OCCURRENCE COUNT
SAE J1939/71 Reference	1706	1216
Operating range	Always set to 0	0 to 126 valid values 127 not available
Remarks		

DM2 single in case of no previous active DTC

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	LAMPS_STATUS	LAMP_STATUS EXTENSION	SUSPECT PARAMETER NUMBER – LEAST BYTE	SUSPECT PARAMETER NUMBER – SECOND BYTE	SPN_FMI	SPN_CONV	NOT DEFINED	
	03h	FFh	00h	00h	00h	00h	FFh	FFh

1.21. *Diagnostic Message #2 from ECM – DM2-E multipacket*

The transmission of DTCs corresponding to faults with lamp code =0 is selectable by application

SPN/FMI: refer to FnR description file

1.21.1. DM2BAM (Broadcast Announce Message)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EC FF 00	On request	Ref SAE J1939/73 par 5.7.1

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	CONTROL BYTE	TOTAL MESSAGE SIZE, NUMBER OF BYTES		TOTAL NUMBER OF PACKETS	RESERVED FOR ASSIGNMENT BY SAE	PARAMETER GROUP NUMBER OF THE PACKET MESSAGE		
Assigned value	32				FFH	CBFE00H		
Remarks		Depends on number of faults		Depends on number of faults				

1.21.2. DM2TP-DT (Transport Protocol - Data Transfer)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EB FF 00	On request	This is a multipackage message and the interval between individual messages is 50 ms. Faults information are packed and the total bytes length can also be a number not multiple of 8, according to SAE J1939/73.

Message Template (example of 4 DTCs)

Package 1

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 1	Diagnostic Lamp Status	Reserved (FFh)	Diagnostic Trouble Code (DTC) #1				DTC #2

Package 2

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 2	DTC #2 - continued			DTC #3			

Package 3

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 3	DTC #4				All FF's		

1.22. *Component Identification – CI*

The Component Identification Information is transmitted as a multi-packet message, consisting of a broadcast announce message and 5 sequential packets with the specified data.

1.22.1. CNFBAM (Broadcast Announce Message)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EC FF 00	On Request	This message is used to inform all stations on the CAN that a large message is about to be transmit. After this broadcast message, individual packages can be transmitted Ref SAE J1939/71 – PGN 65259

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	CONTROL BYTE	TOTAL MESSAGE SIZE, NUMBER OF BYTES		TOTAL NUMBER OF PACKETS	RESERVED FOR ASSIGNMENT BY SAE	PARAMETER GROUP NUMBER OF THE PACKET MESSAGE		
Assigned value	32	33		5	FFh	EBFE00h		
Remarks								

1.22.2. CNFPCK (Transport Protocol – Data Transfer)

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 EB FF 00	On Request	This is a multipackage message consisting of 5 packets and the interval between individual messages is 50 ms.

Message Template

Package 1

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 1	MAKE					Delimiter "*" (0x2A)	ENGINE TYPE →

Package 2

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 2	→ ENGINE TYPE →						

Package 3

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 3	→ ENGINE TYPE	Delimiter "*" (0x2A)	ENGINE SERIAL NUMBER →				

Package 4

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 4	→ ENGINE SERIAL NUMBER →						

Package 5

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Package identification 5	→ ENGINE SERIAL NUMBER			Delimiter "*" (0x2A)	Delimiter "*" (0x2A)	0xFFFF	

Value normalization

Parameter	SAE J1939/71 Reference	Scale	Offset	Data Range	Operating Range
MAKE	586	ASCII	0	0 to 255 per byte	0 to 255 per byte
ENGINE TYPE	587	ASCII	0	0 to 255 per byte	0 to 255 per byte
ENGINE SERIAL NUMBER	588	ASCII	0	0 to 255 per byte	0 to 255 per byte

1.23. *Engine Auxiliary Coolant – EAC*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE 94 00	time synchronous 500 ms	Ref SAE J1939/71 - PGN 65172

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4 - 8
Parameter	AUXILIARY/ WATER SYSTEM PRESSURE	NOT DEFINED	SEA WATER PUMP OUTLET PRESSURE	NOT DEFINED
SAE J1939/71 Reference				
Scale	4 kPa/bit		2 kPa/bit	
Offset	0 kPa		0 kPa	
Data Range	0 to +1000 kPa		0 to +500 kPa	
Operating Range	0 to +1000 kPa		0 to +500 kPa	
Remarks	FEh in case of defective sensor Used in C16 Engines only	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	FEh in case of defective sensor Used in NEF EVO Engines only	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

1.24. *Transmission Fluids 1 – TRF1*

Message transmitted only when the Converter Oil P/T option is mounted

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FE F8 00	time synchronous 1000 ms	Ref SAE J1939/71 - PGN 65272

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	TRANSMISSION CLUTCH 1 PRESSURE	TRANSMISSION OIL LEVEL 1	TRANSMISSION FILTER DIFFERENTIAL PRESSURE	TRANSMISSION 1 OIL PRESSURE	TRANSMISSION OIL TEMPERATURE 1		TRANSMISSION OIL LEVEL 1 HIGH / LOW	TRANSMISSION OIL LEVEL 1 INFO
SAE J1939/71 Reference	123	124	126	127	177		3027	3026-3028
Scale				16 kPa/bit	0.03125 °C/bit			
Offset				0 kPa	-273 °C			
Data Range				0 to +4000 kPa	-273 to 1734.96875 °C			
Operating Range								
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	FEh in case of defective sensor	FE00h in case of defective sensor		Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

Current NEF and CURSOR16 applications do not support TRF1. The same SPN are available according to the below description.

1.24.1. Interim solution for converter oil pressure

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FF 92 00	time synchronous 1000 ms	FPT proprietary message

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	NOT DEFINED	NOT DEFINED	NOT DEFINED	NOT DEFINED	TRANSMISSION OIL PRESSURE		NOT DEFINED	NOT DEFINED
SAE J1939/71 Reference								
Scale					1 kPa/bit			
Offset					0 kPa			
Data Range					0 to 6425.5kPa			
Operating Range								
Remarks	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	FE00h in case of defective sensor		Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

Valid only for Cursor 16 with MD1 application

1.24.2. Interim solution for converter oil temperature

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 FF 95 00	time synchronous 1000 ms	FPT proprietary message

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	TRANSMISSION OIL PRESSURE		NOT DEFINED	NOT DEFINED	NOT DEFINED	NOT DEFINED	NOT DEFINED	NOT DEFINED
SAE J1939/71 Reference								
Scale	0.03125 °C/bit							
Offset	-273 °C							
Data Range	-273 to 1734.96875 °C							
Operating Range								
Remarks	FE00h in case of defective sensor		Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)	Not evaluated by the ECM – It has not to be evaluated by receiver(s)

Valid only for Cursor 16 with MD1 application

1.25. *UDS Response message*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 DA FA 00	On request	ISO 14229-1

2. ECM RECEIVED MESSAGES

2.1. *TSC1_VE_SpeedControl – Torque / Speed Control #1 from VCM to Engine*

Message used only in case of CAN throttle

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	0C 00 00 27	Every 10 ms	Ref SAE J1939/71 – PGN 0

Message Template

	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Parameter	CONTROL BITS	REQUESTED SPEED/ SPEED LIMIT		REQUESTED TORQUE / TORQUE LIMIT	TSC1 RATE AND CONTROL PURPOSE	EXTENSION BYTE	NOT DEFINED	MESSAGE COUNTER / CHECKSUM
SAE J1939/71 Reference		898		518	3349 - 3350			4206 - 4207
Scale		0.125 rpm/bit		1%/bit gain				
Offset		0 rpm		-125%				
Data Range		0 to +8031,875 rpm		-125 to +125%				
Operating Range		0 to +8031,875 rpm		0 to +125%				
Remarks	See parameter description below			Not evaluated by the ECM	Not evaluated by the ECM	Not evaluated by the ECM	Not evaluated by the ECM	See parameter description below

Parameter	CONTROL BITS			
	BIT 8-7	BIT 6-5	BIT 4-3	BIT 2-1
Definition	NOT DEFINED	OVERRIDE CONTROL MODE PRIORITY	INTERMEDIATE SPEED GOVERNOR PARAMETER SET	OVERRIDE CONTROL MODE
SAE J1939/71 Reference		897	696	695
Operating range		00b Highest priority 01b High priority 10b Medium priority 11b Low priority	00b Governor 0 01b Governor 1 10b Governor 2 11b Governor 3	00b Disabled 01b Speed control 10b Torque control (not used) 11b Speed/torque limit (not used)
Remarks	Not evaluated by the ECM			

Parameter	MESSAGE COUNTER / CHECKSUM	
	BIT 8-5	BIT 4-1
Definition	MESSAGE CHECKSUM	MESSAGE COUNTER
SAE J1939/71 Reference	4207	4206
Operating range	0-7dec	0-7dec
Data Range	0-15dec	0-15dec
Remarks	The ECM checks the checksum only if the value is in Operating range. Values >8 indicate message checksum is not available.	The ECM checks the counter only if the value is in Operating range. Values >8 indicate message counter is not available.

2.2. *PGN Request – PGNReq_ECM*

Data Length	Identifier (hex)	Cycle Time	Remarks
3 Bytes	18 EA xx yy xx: both 00 and FF accepted as DA yy: any SA accepted	On occurrence Time gap between two consecutive requests shall not be lower than the scheduler timer (E.g. around 20 ms)	Ref SAE J1939/21

Message Template

	Byte 1	Byte 2	Byte 3
Requested message	**PGN LSB**	**PGN**	**PGN MSB**
EEC4	BE	FE	00
DM2-E	CB	FE	00
HOURS	E5	FE	00
LFC	E9	FE	00
CI	EB	FE	00
SOFT	DA	FE	00

2.3. *UDS Request message*

Data Length	Identifier (hex)	Cycle Time	Remarks
8 Bytes	18 DA 00 FA	On occurrence	ISO 14229-1

3. SPEED CONTROL – TSC1

Generally, for marine applications the engine is managed in speed control that means the Body Computer or Vehicle Control Module acquiring the driver's accelerator pedal or the throttle lever of a joystick converts the relevant position in a desired speed set-point.
Here, the architecture of the engine management is assumed to be a Two-Box where the driver commands are all managed by the Body Computer/ VCM which, in turn, controls the engine via CAN interface. The CAN message which the VCM has to send to the ECM is the **TSC1-VE SPEED REQUEST**, with the parameter **OVERRIDE CONTROL MODE** set to 01b for Speed Control and the desired value assigned to the parameter **REQUESTED SPEED/SPEED LIMIT**.
Values of requested speed above the High Idle and below the Low Idle will be ignored by the ECM.

Remark
TSC1 CAN message can be used for:
- Speed Control, TSC1-VE_SpeedControl: **OVERRIDE CONTROL MODE** set to 01b + speed setpoint.

TABLE 1: TSC1 PARAMETERS

Parameter	TSC1-VE Speed Request
Override Control Mode	01b
Requested Speed/Speed limit	Low Idle to High Idle (internal ECM values but even dynamically values changed via VCM2ECM)
Message Counter / Checksum	See above algorithm

During normal working conditions the TSC1-VE is used to control the engine speed: VCM requires a speed set point through the parameter **REQUESTED SPEED** transmitted in Bytes 2-3. Values of requested speed above the High Idle speed, below the Low Idle speed will be ignored by the ECM. High idle speed is dynamically updated in case of derating.

The Parameter **OVERRIDE CONTROL MODE** must be sent with value of 01b meaning Speed control and override control mode priority with value of 01b representing an High priority.

Moreover, during the normal behavior ECM, with a certain delay, provides a feedback of actual engine speed in Message **EEC1. ENGINE SPEED**, message **ID: 0CF00400**.

In case of throttle lever in failure the TSC1 must be sent with Override Control Mode parameter sent with the value of 00b (disable mode); in message **EEC1.SOURCE ADDRESS OF CONTROLLING DEVICE FOR ENGINE CONTROL** it is provided information of the device controlling the Engine. After the throttle fault this parameter will not report the VCM as source of control device but it will be the secondary throttle lever. Also in this condition, the ECM, with a certain delay, provides a feedback of actual engine speed in Message **EEC1. ENGINE SPEED**, message **ID: 0CF00400**.

3.1. *Message Counter and Message Checksum calculation*

Below indication are valid for all Message Counter and Message Checksum used in this document.

The parameter **MESSAGE COUNTER** (or Rolling Counter in according to the Bosch SW name) is used to detect situations where the transmitting ECU malfunction repeats the same frame all the time. The receiver of the information may use the counter parameter to detect this situation. The transmitting device will increase the message counter in every cycle. The message counter will count from 0 to 7 and then wrap

The **MESSAGE CHECKSUM** is used to verify the signal path from the transmitting device to the receiving device.
The **MESSAGE CHECKSUM** is calculated using the first 7 data bytes, the message counter and the bytes of the message identifier. It is calculated as follows:

Checksum = (Byte1 + Byte2 + Byte3 + Byte4 + Byte5 + Byte6 + Byte7 + message counter & 0x0F + message ID low byte + message ID mid low byte + message ID mid high byte + message ID high byte)

Message Checksum = (((Checksum >> 6) & 0x03) + (Checksum >>3) + Checksum) & 0x07

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