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SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1939-71 | REV. DEC2004

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Superseding J1939-71 DEC2003

Vehicle Application Layer – J1939-71 (through December 2003)

Foreword

This document has also changed to comply with the SAE Technical Standards Board format. Definitions have changed to Section 3 and Abbreviations to Section 4. All other sections numbers have changed accordingly.

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

New parameters and parameter groups are reviewed and discussed by the Subcommittee on a regular basis. This documents reflects all changes and additions approved and balloted through December 2003.

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Geotab Exhibit 1047
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Vehicle Application Layer – J1939-71 (through December 2003)

1. Scope

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

1.1 Rationale

This document contains all approved parameters through December 2003.

2. References

2.1 Applicable Documents

General information regarding this series of recommended practices is found in SAE J1939. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1349—Engine Power Test Code-Spark Ignition and Compression Ignition-Net Power Rating
SAE J1843—Accelerator Pedal Position Sensor for Use with Electronic Controls in Medium- and Heavy-Duty Diesel On-Highway Engines
SAE J1922—Powertrain Control Interface for Electronic Controls Used in Medium- and Heavy-Duty Diesel On-Highway Engines
SAE J1939—Recommended Practice for a Serial Control and Communication Vehicle Network
SAE J1939-21—Data Link Layer

2.1.2 ISO PUBLICATIONS

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

3. Definitions

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

4. Abbreviations

ACC	Adaptive Cruise Control or Autonomous Cruise Control
ATA	American Trucking Association
CTI	Central Tire Inflation
EBS	Electronic Braking System
FMS	Fleet Management System
Kp	Engine endspeed governor gain
ROP	Roll Over Prevention
VDC	Vehicle Dynamic (Stability) Control
VGT	Variable Geometry Turbocharger
VMRS	Vehicle Maintenance Reporting System

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

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5. Technical Requirements

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

5.1 General Guidelines

5.1.1 SIGNAL CHARACTERIZATION

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

5.1.2 MESSAGE FORMAT

The message format of SAE J1939 uses the parameter group number as the label for a group of parameters. Each of the parameters within the group can be expressed in ASCII, as scaled data defined by the ranges described in 5.1.4, or as function states consisting of two or more bits. Alphanumeric data will be transmitted with the most significant byte first. Unless otherwise specified, alphanumeric characters will conform to the ISO Latin 1 ASCII character set as shown in section 5.1.3. Other parameters consisting of 2 or more data bytes shall be transmitted least significant byte first.

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

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

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5.1.3 ISO LATIN 1 CHARACTER SET

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

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

5.1.4 PARAMETER RANGES

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

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

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

5.1.5 ASSIGNMENT OF RANGES TO NEW PARAMETERS

This section is intended to define a set of recommended SLOTs (Scaling, Limit, Offset, and Transfer Function) which can be used when parameters are added to J1939. This permits data consistency to be maintained as much as possible between parameters of a given type (temperature, pressure, speed, etc.). Each SLOT is intended to provide a range and resolution suitable for most parameters within a given type. When necessary, a different scaling factor or offset can be used. All SLOTs should be based

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on a power of 2 scaling from another SLOT. This will minimize the math required for any internal scaling and reduce the opportunity for misinterpreted values. Offsets should be selected preferably on the following basis:

a. Offset = 0, or
b. Offset = 50% (equal ± range)

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

TABLE 1 - TRANSMITTED SIGNAL RANGES

Range Name	1 byte	2 bytes	4 bytes	ASCII
Valid Signal	0 to 250 00_{16} to FA_{16}	0 to 64 255 0000_{16} to $FAFF_{16}$	0 to 4 211 081 215 00000000_{16} to $FAFFFFFF_{16}$	1 to 254 01_{16} to FE_{16}
Parameter specific indicator	251 FB_{16}	64 256 to 64 511 $FB00_{16}$ to $FBFF_{16}$	4 211 081 216 to 4 227 858 431 $FBxxxxxx_{16}$	none
Reserved range for future indicator bits	252 to 253 FC_{16} to FD_{16}	64 512 to 65 023 $FC00_{16}$ to $FDFF_{16}$	4 227 858 432 to 4 261 412 863 $FC000000_{16}$ to $FDFFFFFF_{16}$	none
Error indicator	254 FE_{16}	65 024 to 65 279 $FExx_{16}$	4 261 412 864 to 4 278 190 079 $FExxxxxx_{16}$	0 00_{16}
Not available or not requested	255 FF_{16}	65 280 to 65 535 $FFxx_{16}$	4 278 190 080 to 4 294 967 294 $FFxxxxxx_{16}$	255 FF_{16}

TABLE 2 - TRANSMITTED VALUES FOR DISCRETE PARAMETERS (MEASURED)

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

TABLE 3 - TRANSMITTED VALUES FOR CONTROL COMMANDS (STATUS)

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

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5.1.6 ADDING PARAMETERS TO PARAMETER GROUPS

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

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

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

5.1.7 TRANSMISSION REPETITION RATES (UPDATE RATES)

5.1.7.1 Definition of Transmission Repetition Rate

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

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

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

1. At speeds above 500 rpm, the time from sampling to message transmission shall not exceed 12 ms. Systems that acquire engine speed information via period measurement inherently have less time delay at higher speeds. Above 1000 rpm, for instance, the time from sampling to message transmission shall range from 5 to 30 ms. Less time is required because the period measurement takes less time at higher speeds. How much time is saved depends on the number of crank angle degrees used to perform the period measurement.

2. “Normal” update rates:

    a. Time based updates will occur every 20 ms.

    b. Hybrid time based and engine crank angle based updates are shown in Figure 1

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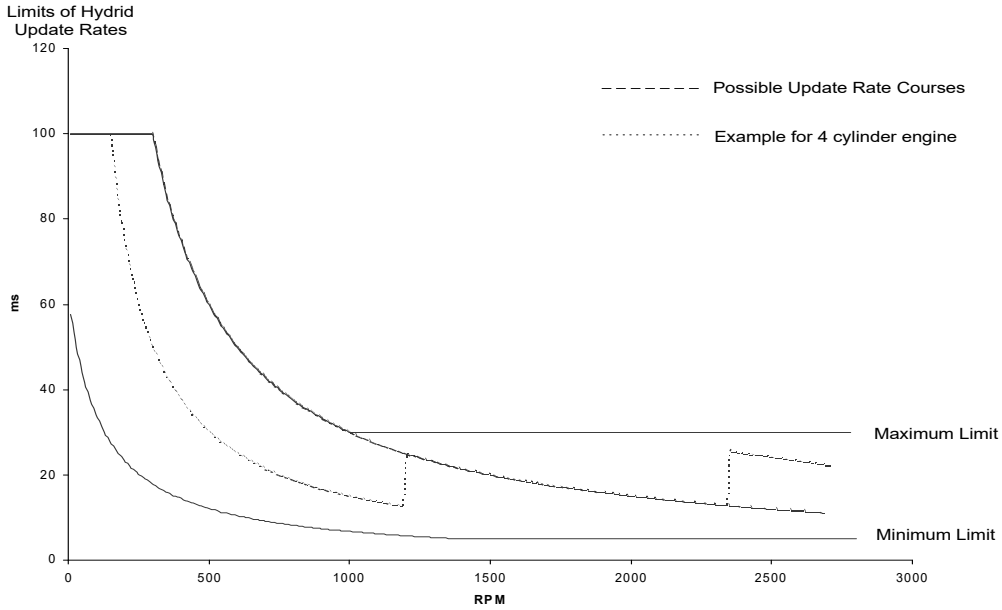


FIGURE 1—LIMITS OF HYBRID UPDATE RATES

5.1.8 NAMING CONVENTION FOR ENGINE PARAMETERS

When there are multiple instances of the same parameter on the same component (i.e., exhaust ports), the following naming convention will by used. While facing the engine from the flywheel housing, left bank (LB) parameters are assigned prior to the right bank (RB) parameters. Front parameters are assigned prior to the rear or back parameters (with the rear/back being the end containing the flywheel housing). For a six cylinder in-line engine, the position furthest from the flywheel will be identified as 1. For a 12 cylinder "V" engine, the position furthest from the flywheel on the left bank will be identified as 1, followed by the position next closest to the flywheel on the left bank. When only one parameter is required or available, the parameter denoted as number 1 should be used. (i.e., an engine having only one turbocharger would use Turbocharger 1 Compressor Inlet Temperature when broadcasting the temperature).

5.2 Parameter Definitions

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

After power on, a node should internally set the "availability bits" of received parameters as not available and operate with default values until valid data is received. When transmitting, undefined bytes should be sent as 255 (FF_{16}) and undefined bits should be sent as 1.

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5.2.1 CONTROL PARAMETERS

5.2.1.1 Net Brake Torque (Power)

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

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

5.2.1.2 Friction Torque

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

5.2.1.3 Indicated Torque

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

5.3 Application Notes

5.3.1 PARAMETERS WITH MULTIPLE SOURCES

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

(R) 5.4 Conventions for SPN Start Position and Unused Bits in Message Definitions

The purpose of this section is to explain the convention in the PGN definition for identify the position of parameters within the PGN data field. This section explains how to determine the bits occupied by the parameter data and how to deal with the unspecified bits in the data field definition.

5.4.1 SPN START POSITION AND THE DATA FIELD BITS OCCUPIED

The data field space occupied by a parameter is determined by the 'Starting Position' and 'Length' attributes listed next to the Parameter in the PGN definition. Each of the different Start Position conventions (indication techniques) used within the PGN definitions are explained in the tables below. The indication conventions are grouped according to whether the parameter data length is an integer number of bytes (1 byte, 2 byte, etc.), a fractional byte length (2 bits, 4 bits, 10 bits, etc.), or variable byte length.

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Start Position	Length	Interpretation
R	Y byte	Indicates the parameter occupies the whole number of bytes starting with byte 'R'. **Examples** 3 1 byte: Parameter occupies byte 3 2 7 bytes: Parameter occupies bytes 2 through 8
R	8 bits	Indicates the parameter occupies all 8 bits of byte 'R'. **Example** 3 8 bits: Parameter occupies byte 3
R-S	Y bytes	Indicates the parameter occupies the 'Y' bytes from byte 'R' through byte 'S'. **Examples** 3-5 3 bytes: Parameter occupies bytes 3, 4, and 5 17-20 4 bytes: Parameter occupies bytes 17, 18, 19, and 20
R, S	Y bytes	Indicates the parameter occupies the 'Y' bytes from byte 'R' through byte 'S'. **Example** 3, 4 2 bytes: Parameter occupies bytes 3 and 4

TABLE 4 - CONVENTIONS FOR PARAMETERS WITH INTEGER BYTE LENGTH

Start Position	Length	Interpretation
R.x	Y bits	Indicates the parameter occupies 'Y' number of bits of byte 'R' starting at bit 'x' in byte 'R'. **Examples** 1.5 4 bits: Parameter occupies byte 1, bits 8-5 3.1 2 bits: Parameter occupies byte 3, bits 2-1
R.x-S	Y bits	Indicates the parameter occupies the most significant bits of byte 'R' from bit 'x' to bit 8 plus all whole bytes up to 'S'. **Example (PGN 64982)** 1.7-2 10 bits: Parameter occupies byte 1, bits 8-7 and all of byte 2 (where the least significant 2 bits are in byte 1 and the 8 most significant bits are in byte 2 (byte 2 bit 8 is most significant bit of the 10 bits))
R-S.x	Y bits	Indicates the parameter occupies all whole byte from 'R' up to 'S' and the remaining modulo-8 number of bits starting from bit 'x' in byte 'S'. **Example (SPN 3169)** 6, 7.1 12 bits: Parameter occupies byte 6 and byte 7, bits 4-1 (where 4 most significant bits at byte 7, bits 4-1 and least significant 8 bits in byte 6) **Example (SPN 3036, J1939-73)** 6-8.6 19 bits: Parameter occupies byte 6, 7 and byte 8, bits 8-6 (where 3 most significant bits at byte 8, bits 8-6 and least significant 8 bits in byte 6)

TABLE 5 - CONVENTIONS FOR PARAMETERS WITH FRACTIONAL BYTE LENGTHS

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Start Position	Length	Interpretation
R-'N'	Variable – up to Y characters ("*" delimited)	Indicates the parameter starts at byte 'R' and continues through some variable number of bytes where the end is denoted by an asterisk character in the data stream. **Example** 2-N Variable - up to 200 characters ("*" delimited): Parameter starts at byte 2 and continues up to the asterisk character (at byte 202 at the highest)
R to 'N' 'N'+1 to 'P'	Variable – up to Y characters Variable – up to Y characters	Indicates the first parameter starts at byte 'R' and continues through some variable number of bytes to the end denoted by an asterisk. And indicates the second parameter starts at the first byte following the asterisk delimiter for the first parameter and continues through some variable number of bytes to the end denoted by an asterisk. **Example (PGN 64958)** 5 to A Variable - up to 100 characters: Parameter starts at byte 5 and continues up to the asterisk character (byte 105 at the highest) A+1 to B Variable - up to 100 characters: Parameter starts at first byte after the delimiter for the previous and continues up to the next asterisk character
'n'	Variable – up to Y characters ("*" delimited)	Indicates the parameter is the nth field and continues some variable number of bytes where the end is denoted by an asterisk character in the data stream. **Example (PGN 64965)** c Variable - up to 200 characters ("*" delimited): Parameter is the 3rd field and continues up to the asterisk character (200 bytes beyond start of 3rd field at the highest)
'n'	Y bytes	Indicates the parameter is sequentially field 'n' and occupies Y number of bytes from the point that the field starts. **Example** a 5 bytes: Parameter is the first field and consists of 5 bytes from the start of that field

TABLE 6 - CONVENTIONS FOR PARAMETERS WITH VARIABLE LENGTH AND FIELDS

5.4.2 UNSPECIFIED BITS IN THE PGN DATA FIELD DEFINITION

The J1939-71 PGN Definitions only list the data field bits and bytes that have parameter assignments. Any bits of the PGN data field that are not assigned to a parameter are not shown in the PGN definition. The 'Data Length' attribute of the PGN definition specifies the byte length of the data field for the PGN. Bits within this data field byte length that are not accounted for by the collection of parameters in the PGN are unspecified bits. When transmitted, the message data field for the transmitted PGN must be at least the minimum length specified by the 'Data Length' attribute. All unspecified bits within the transmitted message data length must be filled with a value of one (1). The unspecified bits are available for assignment to parameters at some future time.

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5.4.2.1 Example using PGN 65213

The PGN Data Length and PGN data content for PGN 65213 are shown below. The 'Data Length' attribute for this PGN indicates the PGN has a message data field length of 8 bytes. Only 28 bits of the message data field have data assignments – byte 1, bits 4-1 of byte 2, byte 3 and byte 4. There are 36 unspecified bits in the message – bits 8-5 of byte 2 and bytes 5-8. When transmitted, the message data field for this PGN must be 8 bytes in length. The 36 unspecified bits must be filled each with a one (1) and the assigned 28 bits must be filled appropriately.

PGN 65213 Fan Drive – FD
Data Length: 8

Start Position	Length	Parameter Name	SPN
1	1 byte	Estimated Percent Fan Speed	975
2.1	4 bits	Fan Drive State	977
3-4	2 bytes	Fan Speed	1639

Byte 1								Byte 2								Byte 3								Byte 4							
8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
SPN 975								1	1	1	1	SPN 977				SPN 1639															

Byte 5								Byte 6								Byte 7								Byte 8							
8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1	8	7	6	5	4	3	2	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 7 – Example PGN 65213

6. Notes

6.1 Marginal Indicia

The (R) is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.

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APPENDIX A
SLOTS

	SlotName	Slot Type	Units	Scaling	Range	Offset	Length
	SAEac01	Acceleration	m/s²	1/2048 m/s² per bit	-15.687 to +15.687 m/s²	-15.687 m/s²	2 bytes
	SAEac02	Acceleration	m/s²	0.1 m/s² per bit	-12.5 to +12.5 m/s²	-12.5 m/s²	1 byte
	SAEad01	Angle/Direction	deg	10^-7 deg/bit	-210 to 211.1008122 deg	-210 deg	4 bytes
	SAEad02	Angle/Direction	deg	0.1 sec/bit	-3276.8 to 3148.7 sec	-3,276.8 sec	2 bytes
	SAEad03	Angle/Direction	deg	1/1024 rad per bit	-31.374 to +31.374 rad	-31.374 rad	2 bytes
	SAEad04	Angle/Direction	deg	1/128 deg/bit	-200 to 301.99 deg	-200 deg	2 bytes
	SAEad05	Angle/Direction	deg	1/128 deg/bit	0 to 501.99 deg	0	2 bytes
	SAEad06	Angle/Direction	deg	1 deg/bit	-125 to 125 deg	-125 deg	1 byte
(R)	SAEad07	Angle/Direction	deg	1/256 deg/bit	-125 to 125 deg	-125 deg	2 bytes
	SAEat0001	ASCII,text	ASCII	ASCII	0 to 255 per byte	0	1 byte
	SAEat0002	ASCII,text	ASCII	ASCII	0 to 255 per byte	0	2 bytes
	SAEat0004	ASCII,text	ASCII	ASCII	0 to 255 per byte	0	4 bytes
	SAEat0005	ASCII,text	ASCII	ASCII	0 to 255 per byte	0	5 bytes
	SAEat0007	ASCII,text	ASCII	ASCII	0 to 255 per byte	0	7 bytes
(R)	SAEat0100	ASCII,text	ASCII	ASCII	0 to 255 per byte	0	Variable - up to 100 characters
	SAEat0200	ASCII,text	ASCII	ASCII	0 to 255 per byte	0	Variable - up to 200 characters ("*" delimited)
	SAEat1728	ASCII,text	ASCII	ASCII	0 to 255 per byte	0	Variable ("*" delimited)
	SAEba01	Brake Applications	brake appl	1 brake appl/bit	0 to 4,227,858,431 appl	0	4 bytes
	SAEbs01	Bit Field	bit	2 states/1 bit	0 to 1	0	1 bit
	SAEbs02	Bit Field	bit	4 states/2 bit	0 to 3	0	2 bits
	SAEbs03	Bit Field	bit	8 states/3 bit	0 to 7	0	3 bits
	SAEbs04	Bit Field	bit	16 states/4 bit	0 to 15	0	4 bits
	SAEbs05	Bit Field	bit	32 states/5 bit	0 to 31	0	5 bits
	SAEbs06	Bit Field	bit	64 states/6 bit	0 to 63	0	6 bits
	SAEbs07	Bit Field	bit	128 states/7 bit	0 to 127	0	7 bits
	SAEbs08	Bit Field	bit	256 states/8 bit	0 to 255	0	8 bits
(R)	SAEbs11	Bit Field	bit	2047 states/11bit	0 to 2047	0	11 bits
(R)	SAEbs21	Bit Field	bit	2097151 states/21bit	0 to 2097151	0	21 bits
(R)	SAEby01	Number of bytes	bytes	1 byte/bit	0 to 250	0	1 byte
	SAEca01	Capacity, Battery	mAhr	1 mAhr/bit	0 to 64255mAhr (64.255Ahr)	0 mAhr	2 bytes
	SAEcb01	Control byte	binary	1 count/bit	0 to 255	0	1 byte
	SAEcd01	Calendar,days	Days	0.25 days/bit	0 to 62.5 days	0	1 byte
	SAEcm01	Calendar,months	Months	1 month/bit	0 to 250 months	0	1 byte
	SAEct01	Count	count	1 turn/bit	-32 to 29 turns	-32 turns	6 bits
	SAEct02	Count	binary	1 count/bit	0 to 250	0	1 byte
	SAEct03	Count	binary	1 count/bit	0 to 255	0	1 byte
	SAEct04	Count	count	1 count/bit	0 to 64,255 counts	0	2 bytes
	SAEct05	Count	count	1 count/bit	0 to 65,535 counts	0	2 bytes
	SAEct06	Count	count	1 count/bit	0 to 16,777,216 counts	0	3 bytes
	SAEct07	Count	count	1 count/bit	0 to 4,294,967,295 counts	0	4 bytes
(R)	SAEct08	Count	binary	1 count/bit	0 to 15	0	4 bits
(R)	SAEct10	Count	binary	1 count/bit	0 to 31	0	5 bits
(R)	SAEct11	Count	binary	1 count/bit	0 to 4095	0	12 bits
	SAEcw01	Calendar,weeks	Weeks	1 week/bit	-125 to 125 weeks	-125 weeks	1 byte
	SAEcy01	Calendar,years	Years	1 year/bit	1985 to 2235 years	1985 years	1 byte
	SAEde01	Dielectricity		0.1/bit	0 to 25.0	0	1 byte
	SAEds02	Distance	m	100 mm/bit	-209.7152 m to 211.3929215 m	-209.7152 m	4 bytes
	SAEds03	Distance	m	0.1 mm/bit	-3,200 to 3,225.5 mm	-3,200 mm	2 bytes
	SAEds04	Distance	m	0.1 mm/bit	0 to 6,425.5 mm	0	2 bytes
	SAEds05	Distance	m	0.001 m/bit	0 to 4,211,081.215 m	0	4 bytes
	SAEds06	Distance	m	0.125 m/bit	-2500 to 5531.875 m	-2500 m	2 bytes
	SAEds07	Distance	m	1 m/bit	0 to 250 m	0	1 byte
	SAEds08	Distance	m	1 m/bit	-125 to 125 m	-125 m	1 byte

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	SlotName	Slot Type	Units	Scaling	Range	Offset	Length
	SAEds09	Distance	m	5 m/bit	0 to 21,055,406 km	0	4 bytes
	SAEds10	Distance	m	0.125 km/bit	0 to 526,385,151.9 km	0	4 bytes
	SAEds11	Distance	m	5 km/bit	-160,635 to 160,640 km	-160,635 km	2 bytes
	SAEec01	Electrical Current	Amps	0.05 A/bit	-1600 to 1612.75 A	-1600 A	2 bytes
	SAEec02	Electrical Current	Amps	1 A/bit	-125 to 125 A	-125 A	1 byte
	SAEec03	Electrical Current	Amps	1 A/bit	0 to 250 A	0	1 byte
	SAEec04	Electrical Current	Amps	1 A/bit	0 to 64,255 Amps	0	2 bytes
	SAEeg01	Economy,gaseous	km/kg	1/512 km/kg per bit	0 to 125.5 km/kg	0	2 bytes
	SAEel01	Economy,liquid	km/L	1/512 km/L per bit	0 to 125.5 km/L	0	2 bytes
	SAEen01	Energy	kWh	1 kWh/bit	0 to 4211081215 kWh	0	4 bytes
	SAEev01	Electrical Voltage	Volts	0.05 V/bit	0 to 3212.75 V	0	2 bytes
	SAEev02	Electrical Voltage	Volts	1 V/bit	0 to 64,255 Volts	0	2 bytes
	SAEfg01	Flow rate,gaseous	kg/h	0.05 kg/h per bit	0 to 3212.75 kg/h	0	2 bytes
	SAEfl01	Flow rate,liquid	l/h	0.05 L/h per bit	0 to 3,212.75 L/h	0	2 bytes
	SAEfq01	Frequency	Hz	1/128 Hz/bit	0 to 501.9921875 Hz	0	2 bytes
	SAEfr01	Force	N	5 N/bit	0 to 321,275 N	0	2 bytes
	SAEfr02	Force	N	10 N/bit	-320,000 to 322,550 N	-320,000 N	2 bytes
	SAEfr03	Force	N	1000 N/bit	-100 kN to 150 kN	-100 kN	1 byte
	SAEfug01	Fuel Used,gaseous	kg	0.5 kg/bit	0 to 2,105,540,607.5 kg	0	4 bytes
	SAEful01	Fuel Used,liquid	l	0.5 L/bit	0 to 2,105,540,607.5 L	0	4 bytes
	SAEfv01	Flow rate,volumetric	m^3/h	0.1 m^3/h per bit	0 to 6425.5 m^3/h	0	2 bytes
	SAEgf01	Group Function	binary	1 count/bit	0 to 255	0	1 byte
	SAEgg01	Governor gain	%/rpm	1/1280 %/rpm per bit	0 to 50.2 %/rpm	0	2 bytes
	SAEgr01	Gear Ratio		0.01/bit	0 to 642.55	0	2 bytes
	SAEgv01	Gear Value	gear value	1 gear value/bit	-125 to 125	-125	1 byte
	SAEgv02	Gear Value	gear value	1 gear value/bit	0 to 250	0	1 byte
	SAEid01	Identifier,component/software	ID	1 ID/bit	0 to 250 ID	0	1 byte
	SAEie01	Inertia	kg/m²	0.004 kg-m^2/bit	0 to 257.02 kg-m^2	0	2 bytes
	SAEio01	Intensity, optical	mW/cm^2	0.4 mW/cm^2 per bit	0 to 100 mW/cm^2	0	1 byte
	SAEkv01	Kinematic viscosity	mm²/s	1 mm^2/s per bit	0 to 250 mm^2/s	0	1 byte
	SAEmc01	Mass,cargo	kg	0.5 kg/bit	0 to 32,127.5 kg	0	2 bytes
	SAEmc02	Mass,cargo	kg	2 kg/bit	0 to 128,510 kg	0	2 bytes
	SAEmc03	Mass,cargo	kg	10 kg/bit	0 to 642,550 kg	0	2 bytes
	SAEnm00	Name (short)	binary	1 count/bit	0 to (2^32 - 1)	0	4 bytes
	SAEnm01	Name (long)	binary	1 count/bit	0 to (2^64 - 1)	0	8 bytes
	SAEpa01	Power, Apparent	VA	1 VA/bit	-2,000,000,000 to +2,211,081,215 VA	0	4 bytes
	SAEpc01	Percent,position/level	%	0.0025 %/bit	0 to 160.6375 %	0	2 bytes
	SAEpc02	Percent,position/level	%	0.1 %/bit	0 to 102 %	0	10 bits
	SAEpc03	Percent,position/level	%	0.4 %/bit	0 to 100 %	0	1 byte
	SAEpc04	Percent,position/level	%	0.8 %/bit	-100 to 100 %	-100	1 byte
	SAEpc05	Percent,position/level	%	1 %/bit	-125 to 125 %	-125 %	1 byte
	SAEpc06	Percent,position/level	%	1 %/bit	0 to 250 %	0	1 byte
	SAEpd01	Proprietary Data	Manufacturer Determined	Manufacturer Determined	Manufacturer Determined	Manufacturer Determined	64 to 14,280 bits
	SAEpf01	Power Factor		1/16384 per bit	-1.00000 to +2.921814	-1	2 bytes
	SAEpr01	Pressure	kPa	1/128 kPa/bit	-250 kPa TO 251.99 kPa	-250 kPa	2 bytes
	SAEpr02	Pressure	kPa	0.05 kPa/bit	0 to 12.5 kPa	0	1 byte
	SAEpr03	Pressure	kPa	0.1 kPa/bit	0 to 6,425.5 kPa	0	2 bytes
	SAEpr04	Pressure	kPa	0.125 kPa/bit	0 to +8031.875 kPa (0 to 1164.62 psi)	0	2 bytes
	SAEpr05	Pressure	kPa	0.5 kPa/bit	0 to 125 kPa	0	1 byte

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	SlotName	Slot Type	Units	Scaling	Range	Offset	Length
	SAEpr06	Pressure	kPa	0.5 kPa/bit	0 to 32,127.5 kPa	0	2 bytes
	SAEpr07	Pressure	kPa	2 kPa/bit	0 to 500 kPa	0	1 byte
	SAEpr08	Pressure	kPa	2 kPa/bit	0 to 128,510 kPa	0	2 bytes
	SAEpr09	Pressure	kPa	1/256 MPa/bit	0 to 251 Mpa	0	2 bytes
	SAEpr10	Pressure	kPa	4 kPa/bit	0 to 1000 kPa	0	1 byte
	SAEpr11	Pressure	kPa	5 kPa/bit	0 to 1,250 kPa	0	1 byte
	SAEpr12	Pressure	kPa	5 kPa/bit	0 to 321,275 kPa	0	2 bytes
	SAEpr13	Pressure	kPa	8 kPa/bit	0 to 2,000 kPa	0	1 byte
	SAEpr14	Pressure	kPa	16 kPa/bit	0 to 4000 kPa	0	1 byte
	SAEpr15	Pressure	kPa	100 kPa/bit	0 to 25 MPa	0	1 byte
	SAEprc01	Pressure Rate Change	Pa/s	0.1 Pa/s per bit	0 Pa/s to 6425.5 Pa/s	0	2 bytes
	SAEpt01	Power, Reactive	VAr	1 VAr/bit	-2,000,000,000 to +2,211,081,215 Var	0	4 bytes
	SAEpw01	Power, Real	W	1 W/bit	-2,000,000,000 to +2,211,081,215 Watts	0	4 bytes
	SAEpw02	Power, Real	W	2 W/bit	0 to 128,510 W	0	2 bytes
	SAEpw03	Power, Real	kW	0.5 kW/bit	0 to 32,127.5 kW	0	2 bytes
	SAEr01	Ratio	Ratio	0.001/bit	0 to 64.255	0	2 bytes
	SAEr02	Ratio	Ratio	0.1/bit	0 to 25.0	0	1 byte
	SAEr03	Ratio	Ratio	1/bit	0 to 250	0	1 byte
	SAErc01	Road Curvature	1/km	1/128 1/km per bit	-250 to 251.992 1/km	-250 1/km	2 bytes
	SAEre01	Record	Record	1 record/bit	0 to 250 records	0	1 byte
	SAErv01	Revolutions	r	1000 r/bit	0 to 4,211,081,215,000 r	0	4 bytes
	SAEsa01	Source Address	SA	1 source address/bit	0 to 255	0	1 byte
	SAEsg01	Specific Gravity		0.0001/bit	0 to 6.4255	0	2 bytes
	SAEsh01	Specific Gravity		0.0001/bit	0 to 6.4255	0	2 bytes
	SAEsr01	Specific Resistance	Mohm*m	0.1 Mohm*m/bit	0 to 25 Mohm*m	0	1 byte
	SAEst01	Step	step	1 step/bit	0 to 250 steps	0	1 byte
	SAEtd01	Transfer Data	Request Dependent	Request Dependent	9 to 1777 bytes of data	Request Dependent	72 to 14,216 bits
	SAEtd02	Transport Data	Request Dependent	Request Dependent	9 to 1784 bytes of data	Request Dependent	72 to 14,272 bits
	SAEtm01	Time	Seconds	0.01 ms/bit	0 to 642.55 ms	0	2 bytes
	SAEtm02	Time	Seconds	1 ms/bit	0 to 64.255 s	0	2 bytes
	SAEtm03	Time	Seconds	0.1 s/bit	0 to 25 s	0	1 byte
	SAEtm04	Time	Seconds	0.25 s/bit	0 to 62.5 s	0	1 byte
	SAEtm05	Time	Seconds	1 s/bit	0 to 64,255 s	0	2 bytes
	SAEtm06	Time	Seconds	1 s/bit	0 to 4,211,081,215 s	0	4 bytes
	SAEtm07	Time	Seconds	1 min/bit	-125 to 125 mins	-125 mins	1 byte
	SAEtm08	Time	Seconds	1 min/bit	0 to 250 mins	0	1 byte
	SAEtm09	Time	Seconds	0.05 hr/bit	0 to 210,554,060.75 hr	0	4 bytes
	SAEtm10	Time	Seconds	1 hr/bit	-125 to 125 hr	-125 hr	1 byte
	SAEtm11	Time	Seconds	1 hr/bit	0 to 250 hr	0	1 byte
	SAEtm12	Time	Seconds	1 hr/bit	-32,127 to 32,128 hr	-32,127 hr	2 bytes
	SAEtm13	Time	Seconds	51.2 us/bit	0 to 3.289856 s	0	2 bytes
	SAEtp01	Temperature	C	1 deg C/bit	-40 to 210 deg C	-40 deg C	1 byte
	SAEtp02	Temperature	C	0.03125 deg C/bit	-273 to 1735 deg C	-273 deg C	2 bytes
	SAEtq01	Torque	Nm	1 Nm/bit	-32,000 to 32,255 Nm	-32,000 Nm	2 bytes
	SAEtq02	Torque	Nm	1 Nm/bit	0 to 64,255 Nm	0	2 bytes
	SAEtq03	Torque	Nm	2 Nm/bit	0 to 128,510 Nm	0	2 bytes
	SAEtq04	Torque	Nm	30 Nm/bit	0 to 7500 Nm	0	1 byte
	SAEva01	Velocity,angular	rad/s	1/8192 rad/s per bit	-3.92 to +3.92 rad/s	-3.92 rad/s	2 bytes
	SAEvd01	VariantData	VariantDetermined	VariantDetermined	VariantDetermined	VariantDetermined	4 bytes
	SAEvl01	Velocity, linear	m/s	0.001 m/s per bit	0 to 64.255 m/s	0 m/s	2 bytes
	SAEvl02	Velocity, linear	kph	1/256 km/h per bit	0 to 250.996 km/h	0	2 bytes
	SAEvl03	Velocity, linear	kph	1/128 km/h per bit	-250 to 251.992 km/h	-250 km/h	2 bytes
	SAEvl04	Velocity, linear	kph	1/16 km/h per bit	-7.8125 to 7.8125 km/h	-7.8125 km/h	1 byte
	SAEvl05	Velocity, linear	kph	1 km/h per bit	0 to 250 km/h	0	1 byte
(R)	SAEvm01	Velocity, magnitude	m/h	2 m/h per bit	0 to 128510 m/h	0	2 bytes

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	SlotName	Slot Type	Units	Scaling	Range	Offset	Length
	SAEvm1	Volume	liters	0.5 L/bit	0 to 2,105,540,607.5 L	0	4 bytes
	SAEvr01	Velocity, rotational	rpm	0.125 rpm/bit	0 to 8,031.875 rpm	0	2 bytes
	SAEvr02	Velocity, rotational	rpm	0.5 rpm/bit	0 to 32,127.5 rpm	0	2 bytes
	SAEvr03	Velocity, rotational	rpm	4 rpm/bit	0 to 257,020 rpm	0	2 bytes
	SAEvr04	Velocity, rotational	rpm	10 rpm/bit	0 to 2,500 rpm	0	1 byte
	SAEvr05	Velocity, rotational	rpm	32 rpm/bit	0 to 8,000 rpm	0	1 byte

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APPENDIX B
SPNs

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

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

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

SPN 21 Engine ECU Temperature (use SPN 1136)

Temperature of the engine electronic control unit.

(21, 1207 are not to be used - obsolete)
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN

SPN 22 (R) Engine Extended Crankcase Blow-by Pressure

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

(1264 not to be used – obsolete)
Data Length: 1 byte
Resolution: 0.05 kPa/bit, 0 offset
Data Range: 0 to 12.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65263

SPN 29 (R) Accelerator Pedal Position 2

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

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

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

NOTE—See SPNs 91, 28, and 974 for additional accelerator position parameters.

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

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SPN 39 Tire Pressure Check Interval

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

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

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

SPN 46 Pneumatic Supply Pressure

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

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

SPN 51 (R) Engine Throttle Position

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

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

SPN 52 Engine Intercooler Temperature

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

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

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SPN 53 Transmission Synchronizer Clutch Value

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

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

SPN 54 Transmission Synchronizer Brake Value

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

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

SPN 59 Transmission Shift Finger Gear Position

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

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

SPN 60 Transmission Shift Finger Rail Position

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

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

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SPN 69 Two Speed Axle Switch

Switch signal which indicates the current axle range.

00 - Low speed range
01 - High speed range

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

SPN 70 Parking Brake Switch

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

00 - Parking brake not set
01 - Parking brake set

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

SPN 72 (R) Engine Blower Bypass Valve Position

Relative position of the blower bypass valve.

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

SPN 73 Auxiliary Pump Pressure

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

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

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SPN 74 Maximum Vehicle Speed Limit

Maximum vehicle velocity allowed.

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

SPN 75 Steering Axle Temperature

Temperature of lubricant in steering axle.

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

SPN 79 Road Surface Temperature

Indicated temperature of road surface over which vehicle is operating.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65269

SPN 80 Washer Fluid Level

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

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

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SPN 81 (R) Engine Particulate Trap Inlet Pressure

Exhaust back pressure as a result of particle accumulation on filter media placed in the exhaust stream.

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

SPN 82 (R) Engine Air Start Pressure

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

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

SPN 84 Wheel-Based Vehicle Speed

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

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

SPN 86 Cruise Control Set Speed

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

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

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SPN 87 Cruise Control High Set Limit Speed

Maximum vehicle velocity at which cruise can be set.

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

SPN 88 Cruise Control Low Set Limit Speed

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

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

SPN 90 Power Takeoff Oil Temperature

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

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

SPN 91 (R) Accelerator Pedal Position 1

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

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

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

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

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

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SPN 92 (R) Engine Percent Load At Current Speed

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

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

SPN 94 (R) Engine Fuel Delivery Pressure

Gage pressure of fuel in system as delivered from supply pump to the injection pump. See Figures SPN16_A & SPN16_B.

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

SPN 95 (R) Engine Fuel Filter Differential Pressure

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

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

SPN 96 Fuel Level

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

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

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SPN 97 Water In Fuel Indicator

Signal which indicates the presence of water in the fuel.

00 - No
01 - Yes

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

SPN 98 Engine Oil Level

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

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

SPN 99 Engine Oil Filter Differential Pressure

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

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

SPN 100 Engine Oil Pressure

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

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

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SPN 101 (R) Engine Crankcase Pressure

Gage pressure inside engine crankcase.

Data Length: 2 bytes

Resolution: 1/128 kPa/bit, -250 kPa offset

Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65263

SPN 102 (R) Engine Turbocharger Boost Pressure

Gage pressure of air measured downstream on the compressor discharge side of the turbocharger. See also SPNs 1127-1130 for alternate range and resolution. If there is one boost pressure to report and this range and resolution is adequate, this parameter should be used.

Data Length: 1 byte

Resolution: 2 kPa/bit, 0 offset

Data Range: 0 to 500 kPa Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65270

SPN 103 (R) Engine Turbocharger 1 Speed

Rotational velocity of rotor in the turbocharger.

Data Length: 2 bytes

Resolution: 4 rpm/bit, 0 offset

Data Range: 0 to 257,020 rpm Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65245

SPN 104 (R) Engine Turbocharger Lube Oil Pressure 1

Gage pressure of oil in turbocharger lubrication system.

Data Length: 1 byte

Resolution: 4 kPa/bit, 0 offset

Data Range: 0 to 1000 kPa Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65245

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SPN 105 (R) Engine Intake Manifold 1 Temperature

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

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

SPN 106 (R) Engine Air Inlet Pressure

Absolute air pressure at inlet to intake manifold or air box.

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

SPN 107 (R) Engine Air Filter 1 Differential Pressure

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

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

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

SPN 108 Barometric Pressure

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

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

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SPN 109 (R) Engine Coolant Pressure

Gage pressure of liquid found in engine cooling system.

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

SPN 110 (R) Engine Coolant Temperature

Temperature of liquid found in engine cooling system.

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

SPN 111 (R) Engine Coolant Level

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

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

SPN 112 (R) Engine Coolant Filter Differential Pressure

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

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

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SPN 114 Net Battery Current

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

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

SPN 115 Alternator Current

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

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

SPN 116 Brake Application Pressure

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

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

SPN 117 Brake Primary Pressure

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

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

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SPN 118 Brake Secondary Pressure

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

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

SPN 119 Hydraulic Retarder Pressure

Gage pressure of oil in hydraulic retarder system.

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

SPN 120 Hydraulic Retarder Oil Temperature

Temperature of oil found in a hydraulic retarder.

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

SPN 123 Clutch Pressure

Gage pressure of oil within a wet clutch.

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

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SPN 124 Transmission Oil Level

Ratio of volume of transmission sump oil to recommended volume.

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

SPN 126 Transmission Filter Differential Pressure

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

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

SPN 127 Transmission Oil Pressure

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

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

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

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

(Obsolete - use SPN 1349)

Data Length: 2 bytes
Resolution: 1/256 MPa/bit, 0 offset
Data Range: 0 to 251 Mpa Operational Range: same as data range
Type: Measured
Supporting information:
PGN

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SPN 132 (R) Engine Inlet Air Mass Flow Rate

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

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

SPN 136 Auxiliary Vacuum Pressure Reading

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

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

SPN 137 Auxiliary Gage Pressure Reading 1

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

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

SPN 138 Auxiliary Absolute Pressure Reading

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

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

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SPN 141 Trailer, Tag Or Push Channel Tire Pressure Target

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

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

SPN 142 Drive Channel Tire Pressure Target

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

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

SPN 143 Steer Channel Tire Pressure Target

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

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

SPN 144 Trailer, Tag Or Push Channel Tire Pressure

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

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

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SPN 145 Drive Channel Tire Pressure

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

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

SPN 146 Steer Channel Tire Pressure

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

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

SPN 156 (R) Engine Injector Timing Rail 1 Pressure

The gage pressure of fuel in the timing rail delivered from the supply pump to the injector timing inlet. See Figure SPN16_A.

Data Length: 2 bytes
Resolution: 1/256 MPa/bit, 0 offset
Data Range: 0 to 251 Mpa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65243

SPN 157 (R) Engine Injector Metering Rail 1 Pressure

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

Data Length: 2 bytes
Resolution: 1/256 MPa/bit, 0 offset
Data Range: 0 to 251 Mpa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65243

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SPN 158 Battery Potential (Voltage), Switched

Electrical potential measured at the input of the electronic control unit supplied through a switching device.

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

SPN 159 (R) Engine Gas Supply Pressure

Gage pressure of gas supply to fuel metering device.

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

SPN 160 Main Shaft Speed

Rotational velocity of the first intermediate shaft of the transmission.

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

SPN 161 Transmission Input Shaft Speed

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

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

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SPN 162 Transmission Requested Range

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

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

SPN 163 Transmission Current Range

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

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

SPN 164 (R) Engine Injection Control Pressure

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

Data Length: 2 bytes
Resolution: 1/256 MPa/bit, 0 offset
Data Range: 0 to 251 Mpa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65243

SPN 165 Compass Bearing

Present compass bearing of vehicle.

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

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SPN 166 (R) Engine Rated Power

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

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

SPN 167 Alternator Potential (Voltage)

Electrical potential measured at the alternator output.

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

SPN 168 Electrical Potential (Voltage)

Measured electrical potential of the battery.

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

SPN 169 Cargo Ambient Temperature

Temperature of air inside vehicle container used to accommodate cargo.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65276

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SPN 170 Cab Interior Temperature

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

Note: See SPN 1662 and SPN 1691.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65269

SPN 171 Ambient Air Temperature

Temperature of air surrounding vehicle.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65269

SPN 172 (R) Engine Air Inlet Temperature

Temperature of air entering vehicle air induction system.

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

SPN 173 (R) Engine Exhaust Gas Temperature

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

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65270

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SPN 174 (R) Engine Fuel Temperature

Temperature of fuel entering injectors.
Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65262

SPN 175 Engine Oil Temperature 1

Temperature of the engine lubricant.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65262

SPN 176 (R) Engine Turbocharger Oil Temperature

Temperature of the turbocharger lubricant.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65262

SPN 177 Transmission Oil Temperature

Temperature of the transmission lubricant.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65272

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SPN 180 Trailer Weight

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

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

SPN 181 Cargo Weight

The mass of freight carried.

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

SPN 182 (R) Engine Trip Fuel

Fuel consumed during all or part of a journey.

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

SPN 183 (R) Engine Fuel Rate

Amount of fuel consumed by engine per unit of time.

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

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SPN 184 (R) Engine Instantaneous Fuel Economy

Current fuel economy at current vehicle velocity.

Data Length: 2 bytes
Resolution: 1/512 km/L per bit, 0 offset
Data Range: 0 to 125.5 km/L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65266

SPN 185 (R) Engine Average Fuel Economy

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

Data Length: 2 bytes
Resolution: 1/512 km/L per bit, 0 offset
Data Range: 0 to 125.5 km/L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65266

SPN 186 Power Takeoff Speed

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

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

SPN 187 Power Takeoff Set Speed

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

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

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

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

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

SPN 189 Engine Rated Speed

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

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

SPN 190 Engine Speed

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

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

SPN 191 Transmission Output Shaft Speed

Calculated speed of the transmission output shaft.

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

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SPN 233 Unit Number (Power Unit)

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

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

Data Length: Variable - up to 200 characters ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65259

SPN 234 Software Identification

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

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

Data Length: Variable - up to 200 characters ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65242

SPN 235 (R) Engine Total Idle Hours

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

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

SPN 236 (R) Engine Total Idle Fuel Used

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

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

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SPN 237 Vehicle Identification Number

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

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

Data Length: Variable - up to 200 characters ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65260

SPN 241 Tire Pressure

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

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

SPN 242 Tire Temperature

Temperature at the surface of the tire sidewall.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65268

SPN 244 Trip Distance

Distance traveled during all or part of a journey.

NOTE See SPN 918 for alternate resolution.

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

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SPN 245 Total Vehicle Distance

Accumulated distance traveled by vehicle during its operation.

NOTE See SPN 917 for alternate resolution.

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

SPN 246 Total Vehicle Hours

Accumulated time of operation of vehicle.

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

SPN 247 (R) Engine Total Hours of Operation

Accumulated time of operation of engine.

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

SPN 248 Total Power Takeoff Hours

Accumulated time of operation of power takeoff device.

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

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SPN 249 (R) Engine Total Revolutions

Accumulated number of revolutions of engine crankshaft during its operation.

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

SPN 250 (R) Engine Total Fuel Used

Accumulated amount of fuel used during vehicle operation.

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

SPN 411 (R) Engine Exhaust Gas Recirculation Differential Pressure

Differential pressure across the Exhaust Gas Recirculation (EGR) system

Data Length: 2 bytes
Resolution: 1/128 kPa/bit, -250 kPa offset
Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65188

SPN 412 (R) Engine Exhaust Gas Recirculation Temperature

Temperature of Recirculated Exhaust Gas

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65188

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SPN 441 Auxiliary Temperature 1

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

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

SPN 442 Auxiliary Temperature 2

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

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

SPN 444 Battery 2 Potential (Voltage)

The voltage for isolated battery #2.

Data Length: 2 bytes
Resolution: 0.05 V/bit, 0 offset
Data Range: 0 to 3212.75 V Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65165

SPN 509 (R) Milepost Identification

Used to identify the milepost as detected by a milepost sensor

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

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SPN 512 Driver's Demand Engine - Percent Torque

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

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

SPN 513 Actual Engine - Percent Torque

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

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

SPN 514 (R) Nominal Friction - Percent Torque

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

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

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

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: 0 to 125%
Type: Status
Supporting information:
PGN 65247

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SPN 515 Engine's Desired Operating Speed

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

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

SPN 517 Navigation-Based Vehicle Speed

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

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

SPN 518 (R) Engine Requested Torque/Torque Limit

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

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

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

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

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

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

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SPN 519 Engine's Desired Operating Speed Asymmetry Adjustment

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

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

SPN 520 Actual Retarder - Percent Torque

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

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

SPN 521 (R) Brake Pedal Position

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

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

SPN 522 Percent Clutch Slip

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

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

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

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SPN 523 (R) Transmission Current Gear

The gear currently engaged in the transmission or the last gear engaged while the transmission is in the process of shifting to the new or selected gear. Transitions toward a destination gear will not be indicated. Once the selected gear has been engaged then Transmission Current Gear (SPN 525) will reflect that gear.

Data Length: 1 byte

Resolution: 1 gear value/bit, -125 offset

Data Range: -125 to 125 Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.

Type: Measured

Supporting information:

PGN 61445

SPN 524 Transmission Selected Gear

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

Data Length: 1 byte

Resolution: 1 gear value/bit, -125 offset

Data Range: -125 to 125 Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.

Type: Status

Supporting information:

PGN 61445

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SPN 525 (R) Transmission Requested Gear

Gear requested by the operator, ABS, or engine.

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

Parameter specific values for this parameter are as follows:
0xFD (253 dec) = Hold current gear
0xFC (252 dec) = Forward Drive Position
0xFB (251 dec) = 'Park' position
0xFA (250 dec) = Forward 'Low' position
0xF9 (249 dec) = Upshift 1 gear from current position
0xF8 (248 dec) = Upshift 2 gears from current position
0xF7 (247 dec) = Downshift 1 gear from current position
0xF6 (246 dec) = Downshift 2 gears from current position
0xF5 (245 dec) = D-1: 1st forward selector position referenced from 'Drive'
0xF4 (244 dec) = D-2: 2nd forward selector position referenced from 'Drive'
0xF3 (243 dec) = D-3: 3rd forward selector position referenced from 'Drive'
0xF2 (242 dec) = D-4: 4th forward selector position referenced from 'Drive'
0xF1 (241 dec) = D-5: 5th forward selector position referenced from 'Drive'
0xF0 (240 dec) = D-6: 6th forward selector position referenced from 'Drive'
0xEF (239 dec) = D-7: 7th forward selector position referenced from 'Drive'
0xEE (238 dec) = Between two shift selector positions (if detail is unknown)
0xED (237 dec) = Between two reverse shift selector positions
0xEC (236 dec) = Between two forward shift selector positions
0xEB (235 dec) = Between D-7 and D-6 shift selector positions
0xEA (234 dec) = Between D-6 and D-5 shift selector positions
0xE9 (233 dec) = Between D-5 and D-4 shift selector positions
0xE8 (232 dec) = Between D-4 and D-3 shift selector positions
0xE7 (231 dec) = Between D-3 and D-2 shift selector positions
0xE6 (230 dec) = Between D-2 and D-1 shift selector positions
0xE5 (229 dec) = Between D-1 and 'Drive' shift selector positions
0xE4 (228 dec) = Between 'Drive' and 'Neutral' shift selector positions
0xE3 (227 dec) = Between 'Neutral' and 'Reverse' shift selector positions
0xE2 (226 dec) = Between 'Reverse' and 'Park' shift selector positions
0xE1 (225 dec) = Press of momentary button to reselect current position
0xE0 (224 dec) = Position unknown and/or no buttons pressed
0xDF (223 dec) = Reverse Selector Position
0xDD - 0x41 (222 dec - 65 dec) = Reserved
0x3D - 0x00 (61 dec - 0 dec) = Reserved

Forward selector position from drive (0xF5 to 0xEF) – Indicates shift selector position in reference to the 'Drive' position on the selector. It is possible that the shift selector software may not know the number of forward ranges. The shift selector may identify the position selected by the operator while the transmission ECU determines what range or gear that represents. If there is a digital display, the transmission ECU would communicate what is to be displayed via another message such as ETC#2 or ETC#7.

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

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

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

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

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

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

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

SPN 526 Transmission Actual Gear Ratio

Actual ratio of input shaft speed to output shaft speed.

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

SPN 527 Cruise Control States

This parameter is used to indicate the current state, or mode, of operation by the cruise control device. This is a status parameter. (Reference: PGN 65,265)

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

SPN 528 Engine Speed At Point 2 (Engine Configuration)

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

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

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SPN 529 Engine Speed At Point 3 (Engine Configuration)

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

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

SPN 530 Engine Speed At Point 4 (Engine Configuration)

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

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

SPN 531 Engine Speed At Point 5 (Engine Configuration)

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

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

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

Engine speed of high idle (point 6) of the engine torque map (see PGN 65251 and supporting document). In engine configuration mode 3 (see Table SPN976_A), point 6 is not defined by the engine torque map but by the governor characteristic and the zero torque line.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

SPN 544 (R) Engine Reference Torque (Engine Configuration)

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

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

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SPN 545 (R) Engine Gain (Kp) Of The Endspeed Governor (Engine Configuration)

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

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

KP = delta Torque / delta Speed
kp (normalized) = KP * 250/100% * 8031 rpm/64255 * 4096 = KP * 1280 rpm/%

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

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

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

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

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

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

Maximum speed of retarder (Please reference PGN 65249).
Data Length: 2 bytes
Resolution: 0.125 rpm/bit, 0 offset
Data Range: 0 to 8,031.875 rpm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65249

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SPN 549 Retarder Speed At Point 3 (Retarder Configuration)

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

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

SPN 550 Retarder Speed At Point 4 (Retarder Configuration)

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

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

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

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

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

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

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

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

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SPN 553 Percent Torque At Point 3 (Retarder Configuration)

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

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

SPN 554 Percent Torque At Point 4 (Retarder Configuration)

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

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

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

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

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

SPN 556 Reference Retarder Torque (Retarder Configuration)

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

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

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SPN 557 Retarder Control Method (Retarder Configuration)

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

Data Length: 1 byte

Resolution: 1 step/bit, 0 offset

Data Range: 0 to 250 steps Operational Range: 0: continuous control,1 On/Off control, 2 to 250: Number of steps

Type: Measured

Supporting information:

PGN 65249

SPN 558 (R) Accelerator Pedal 1 Low Idle Switch

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

00 Accelerator pedal 1 not in low idle condition
01 Accelerator pedal 1 in low idle condition
10 Error

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3 Operational Range: same as data range

Type: Measured

Supporting information:

PGN 61443

SPN 559 Accelerator Pedal Kickdown Switch

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

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

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3 Operational Range: same as data range

Type: Measured

Supporting information:

PGN 61443

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SPN 560 (R) Transmission Driveline Engaged

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

00 - Driveline disengaged
01 - Driveline engaged
10 - Error
11 - Not available

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

SPN 561 ASR Engine Control Active

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

00 - ASR engine control passive but installed
01 - ASR engine control active
10 - Reserved
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61441

SPN 562 ASR Brake Control Active

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

00 - ASR brake control passive but installed
01 - ASR brake control active
10 - Reserved
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61441

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SPN 563 Anti-Lock Braking (ABS) Active

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

00 - ABS passive but installed
01 - ABS active
10 – Reserved
11 – Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61441

SPN 564 Differential Lock State - Central

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

00 Differential lock disengaged
01 Differential lock engaged

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information: See Appendix D - SPN 564
PGN 61446

SPN 565 Differential Lock State - Central Front

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

00 Differential lock disengaged
01 Differential lock engaged

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61446

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SPN 566 Differential Lock State - Central Rear

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

00 Differential lock disengaged
01 Differential lock engaged

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61446

SPN 567 Differential Lock State - Front Axle 1

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

00 Differential lock disengaged
01 Differential lock engaged

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61446

SPN 568 Differential Lock State - Front Axle 2

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

00 Differential lock disengaged
01 Differential lock engaged

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61446

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SPN 569 Differential Lock State - Rear Axle 1

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

00 Differential lock disengaged
01 Differential lock engaged

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61446

SPN 570 Differential Lock State - Rear Axle 2

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

00 Differential lock disengaged
01 Differential lock engaged

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61446

SPN 571 Retarder Enable - Brake Assist Switch

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

00 Retarder - brake assist disabled
01 Retarder - brake assist enabled

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

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SPN 572 Retarder Enable - Shift Assist Switch

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

00 Retarder - shift assist disabled
01 Retarder - shift assist enabled

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

SPN 573 Torque Converter Lockup Engaged

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

00 Torque converter lockup disengaged
01 Torque converter lockup engaged

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

SPN 574 (R) Transmission Shift In Process

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

00 - Shift is not in process
01 - Shift in process

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

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SPN 575 ABS Off-road Switch

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

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

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

SPN 576 ASR Off-road Switch

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

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

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

SPN 577 ASR "Hill Holder" Switch

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

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

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

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SPN 578 Drive Axle Temperature

Temperature of axle lubricant in drive axle.

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

SPN 579 Drive Axle Lift Air Pressure

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

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

SPN 580 Altitude

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

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

SPN 581 Transmission Gear Ratio

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

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

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SPN 582 Axle Weight

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

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

SPN 583 Pitch

Pitch of the vehicle as calculated by the navigation device(s).

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

SPN 584 Latitude

Latitude position of the vehicle.

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

SPN 585 Longitude

Longitude position of the vehicle.

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

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SPN 586 Make

Make of the component corresponding to the codes defined in the American Trucking Association Vehicle Maintenance Reporting Standard (ATA/VMRS). It is suggested that spaces (ASCII 32) are used to fill the remaining characters if the ATA/VMRS make code is less than five characters in length.

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

Data Length: 5 bytes
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65259

SPN 587 Model

Model of the component.

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

Data Length: Variable - up to 200 characters ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65259

SPN 588 Serial Number

Serial number of the component.

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

Data Length: Variable - up to 200 characters ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65259

SPN 589 Alternator Speed

Actual rotation speed of the alternator.

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

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SPN 590 (R) Engine Idle Shutdown Timer State

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

00 - Inactive
01 - Active

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

SPN 591 (R) Engine Idle Shutdown Timer Function

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

00 - Disabled in calibration
01 - Enabled in calibration

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

SPN 592 (R) Engine Idle Shutdown Timer Override

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

00 - Inactive
01 - Active

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

SPN 593 (R) Engine Idle Shutdown has Shutdown Engine

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

00 - No
01 - Yes

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

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SPN 594 (R) Engine Idle Shutdown Driver Alert Mode

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

00 - Inactive
01 - Active

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

SPN 595 Cruise Control Active

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

00 - Cruise control switched off
01 - Cruise control switched on

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

SPN 596 Cruise Control Enable Switch

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

00 - Cruise control disabled
01 - Cruise control enabled

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

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SPN 597 Brake Switch

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

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

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

SPN 598 Clutch Switch

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

00 - Clutch pedal released
01 - Clutch pedal depressed

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

SPN 599 Cruise Control Set Switch

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

00 - Cruise control activator not in the position "set"
01 - Cruise control activator in position "set"

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

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SPN 600 Cruise Control Coast (Decelerate) Switch

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

00 - Cruise control activator not in the position “coast”
01 - Cruise control activator in position “coast”

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

SPN 601 Cruise Control Resume Switch

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

00 - Cruise control activator not in the position “resume”
01 - Cruise control activator in position “resume”

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

SPN 602 Cruise Control Accelerate Switch

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

00 - Cruise control activator not in the position “accelerate”
01 - Cruise control activator in position “accelerate”

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

SPN 604 Transmission Neutral Switch

Identifies the status of the switch that indicates neutral.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65219

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SPN 605 Refrigerant High Pressure Switch

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

00 - Pressure normal
01 - Pressure too high, compressor clutch may be disengaged

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

SPN 606 (R) Engine Momentary Overspeed Enable

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

00 Momentary engine overspeed is disabled
01 Momentary engine overspeed is enabled
11 Take no action

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

SPN 607 Progressive Shift Disable

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

00 Progressive shift is not disabled
01 Progressive shift is disabled
11 Take no action

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

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SPN 619 Parking Brake Actuator

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

00 - Parking brake actuator inactive
01 - Parking brake actuator active

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65274

SPN 626 (R) Engine Start Enable Device 1

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

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

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

SPN 681 (R) Transmission Gear Shift Inhibit Request

Command signal to inhibit gear shifts.

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

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

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SPN 682 Torque Converter Lockup Disable Request

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

00 Allow torque convertor lockup
01 Disable torque convertor lockup
11 Take no action

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

SPN 683 Disengage Driveline Request

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

00 Allow driveline engagement
01 Disengage driveline
11 Take no action

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

SPN 684 Requested Percent Clutch Slip

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

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

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SPN 685 Disengage Differential Lock Request - Front Axle 1

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

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

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

SPN 686 Disengage Differential Lock Request - Front Axle 2

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

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

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

SPN 687 Disengage Differential Lock Request - Rear Axle 1

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

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

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

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SPN 688 Disengage Differential Lock Request - Rear Axle 2

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

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

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

SPN 689 Disengage Differential Lock Request - Central

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

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

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

SPN 690 Disengage Differential Lock Request - Central Front

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

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

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

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SPN 691 Disengage Differential Lock Request - Central Rear

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

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

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

SPN 695 (R) Engine Override Control Mode

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

00 Override disabled - Disable any existing control commanded by the source of this command.
01 Speed control - Govern speed to the included “desired speed” value.
10 Torque control - Control torque to the included “desired torque” value.
11 Speed/torque limit control - Limit speed and/or torque based on the included limit values. The speed limit governor is a droop governor where the speed limit value defines the speed at the maximum torque available during this operation.

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

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

Remarks:

a. The realization of a torque limit (minimum selection) is possible by setting the speed limit to a high value (0xFAFF).
b. The realization of a speed limit (minimum selection) is possible by setting the torque limit to a high value (0xFA).
c. Limiting the retarder torque means to limit the magnitude of the torque request. As the brake torque is represented by negative torque values, the limitation must be done by a maximum selection of the requested torque and the retarder internal torque signals.
d. For torque increasing functions, time limits for the torque or speed value (command) and the direct modes are desirable.

e. The selection of which device has control of the engine's speed or torque depends on the override mode priority (see SPN 897) with the highest priority device gaining control. In the case of two devices with identical priority, the engine responds to speed/torque control commands over speed/torque limit commands and will act on the speed or torque commands on a first come, first served basis. The torque limit will be a “lowest wins” selection (e.g., if one device commands 60% limit and another 80% limit, then the engine will limit torque to 60%). Figure SPN695_A provides a flowchart of the torque/speed control priority selection logic.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information: See Appendix D - SPN 695
PGN 0

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SPN 696 (R) Engine Requested Speed Control Conditions

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

00 Transient Optimized for driveline disengaged and non-lockup conditions
01 Stability Optimized for driveline disengaged and non-lockup conditions
10 Stability Optimized for driveline engaged and/or in lockup condition 1 (e.g., vehicle driveline)
11 Stability Optimized for driveline engaged and/or in lockup condition 2 (e.g., PTO driveline)

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

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

10b - This control condition has been optimized to minimize rpm overshoot and undershoot given a more complex plant. For instance, the more complex plant would contain the engine, its accessory loads and the driveline characteristics. As an example, the driveline characteristics might include the effective spring mass relationship of pumps, tires, clutches, axles, driveshafts, and multiple gear ratios. This characteristic is most appropriate when a driveline is engaged.

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

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

SPN 701 Auxiliary I/O #01

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

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SPN 702 Auxiliary I/O #02

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 703 Auxiliary I/O #03

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 704 Auxiliary I/O #04

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 705 Auxiliary I/O #05

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

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SPN 706 Auxiliary I/O #06

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 707 Auxiliary I/O #07

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 708 Auxiliary I/O #08

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 709 Auxiliary I/O #09

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

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SPN 710 Auxiliary I/O #10

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 711 Auxiliary I/O #11

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 712 Auxiliary I/O #12

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 713 Auxiliary I/O #13

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

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SPN 714 Auxiliary I/O #14

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 715 Auxiliary I/O #15

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 716 Auxiliary I/O #16

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

00 - Auxiliary channel off
01 - Auxiliary channel on

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

SPN 740 Transmission Lockup Clutch Actuator

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

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

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SPN 748 Transmission Output Retarder

Identifies the status of the transmission output retarder.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65218

SPN 767 Transmission Reverse Direction Switch

Identifies the status of the switch that indicates reverse direction.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65219

SPN 768 Transmission Range High Actuator

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

00 -Off
01 -On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 769 Transmission Range Low Actuator

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

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

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SPN 770 Transmission Splitter Direct Actuator

Identifies the status of the splitter direct actuator in the auxiliary unit.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 771 Transmission Splitter Indirect Actuator

Identifies the status of the splitter indirect actuator in the auxiliary unit.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 772 Transmission Shift Finger Rail Actuator 1

Identifies the status of the actuator that moves the shift finger identified as rail actuator #1.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 773 Transmission Shift Finger Gear Actuator 1

Identifies the status of the actuator that moves the shift finger identified as gear actuator #1.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

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SPN 778 Transmission High Range Sense Switch

Identifies the status of the switch that represents high range.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65219

SPN 779 Transmission Low Range Sense Switch

Identifies the status of the switch that represents low range.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65219

SPN 780 Transmission Shift Finger Neutral Indicator

Indicates the status of the shift finger in the neutral position.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 781 Transmission Shift Finger Engagement Indicator

Identifies the status of the shift finger in the engagement position.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

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SPN 782 Transmission Shift Finger Center Rail Indicator

Identifies the status of the shift finger in the center rail position.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 783 Transmission Shift Finger Rail Actuator 2

Identifies the status of the actuator that moves the shift finger identified as rail actuator #2.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 784 Transmission Shift Finger Gear Actuator 2

Identifies the status of the actuator that moves the shift finger identified as gear actuator #2.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 786 Transmission Defuel Actuator

Identifies the status of the actuator that controls the engine defuel mechanism.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

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SPN 787 Transmission Inertia Brake Actuator

Identifies the status of the actuator that controls the inertia brake.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 788 Transmission Clutch Actuator

Identifies the status of the actuator that controls the clutch.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65223

SPN 875 Refrigerant Low Pressure Switch

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

00 - Pressure normal
01 - Pressure too low, compressor clutch may be disengaged

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

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SPN 897 Override Control Mode Priority

This field is used as an input to the engine or retarder to determine the priority of the Override Control Mode received in the Torque/Speed Control message (see PGN 0). The default is 11 (Low priority). It is not required to use the same priority during the entire override function. For example, the transmission can use priority 01 (High priority) during a shift, but can set the priority to 11 (Low priority) at the end of the shift to allow traction control to also interact with the torque limit of the engine.

The four priority levels defined are:

00 Highest priority
01 High priority
10 Medium priority
11 Low priority

00b - Highest Priority = Used for situations that require immediate action by the receiving device in order to provide safe vehicle operation (i.e., braking systems). This level of priority should only be used in safety critical conditions.

01b - High Priority = Used for control situations that require prompt action in order to provide safe vehicle operation. An example is when the transmission is performing a shift and requires control of the engine in order to control driveline reengagement.

10b - Medium Priority = Used for powertrain control operations which are related to assuring that the vehicle is in a stable operating condition. An example is when the traction control system is commanding the engine in order to achieve traction stability.

11b - Low Priority = Used to indicate that the associated command desires powertrain control but is needed for function which improves the driver comfort which may be overridden by other devices. An example is cruise control or the non-critical part of a transmission shift to a new gear.

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

SPN 898 (R) Engine Requested Speed/Speed Limit

Parameter provided to the engine from external sources in the torque/speed control message. This is the engine speed which the engine is expected to operate at if the speed control mode is active or the engine speed which the engine is not expected to exceed if the speed limit mode is active.

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

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SPN 899 (R) Engine Torque Mode

State signal which indicates which engine torque mode is currently generating, limiting, or controlling the torque. Note that the modes are not in prioritized order. Not all modes may be relevant for a given device. Some devices may not implement all functions. For typical priorities refer to Figures SPN512_A and SPN512_B for engine control. The data type of this parameter is measured.

Mode 0000b means “No request”: engine torque may range from 0 to full load only due to low idle governor output.

Modes 0001b to 1110b indicate that there is either a torque request or the identified function is currently controlling the engine: engine torque may range from 0 (no fueling/no braking) to the upper limit.

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information: See Appendix D - SPN 899
PGN 61444

SPN 900 Retarder Torque Mode

State signal which indicates which retarder torque mode is currently generating, limiting, or controlling the torque. Note that the modes are not in prioritized order. Not all modes may be relevant for a given device. Some devices may not implement all functions. For typical priorities refer to Tables SPN518_A to SPN518_B for retarder control. The data type of this parameter is measured.

Mode 0000b means “No request”: retarder torque = 0 (no braking).

Modes 0001b to 1110b indicate that there is either a torque request or the identified function is currently controlling the retarder: retarder torque may range from 0 (no fueling/no braking) to the upper limit.

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61440

SPN 901 Retarder Type

A vehicle retarder is a supplementary device to the wheel brakes for the driver to better control the vehicle. The wheel brakes used in the vehicle are not designed for continuous retarding operation. In a prolonged period of braking, the brakes can be thermally over-stressed, causing the braking effect to be reduced or even lead to complete braking system failure. The vehicle retarder is designed for continuous operation for braking during downhill operation and is also used for braking the vehicle to comply with speed limits and traffic conditions.

This parameter provides some indication of the retarder dynamics. It is used in the retarder configuration message (See PGN 65249). The data type of this parameter is measured.

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information: See Appendix D - SPN 901
PGN 65249

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SPN 902 Retarder Location

This parameter defines whether the “torque/speed curve” defined by the retarder configuration message (PGN 65249) is dependent on engine rpm, output shaft rpm, or other parameter. The data type of this parameter is measured.

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information: See Appendix D - SPN 902
PGN 65249

SPN 903 Transmission Forward Direction Switch

Identifies the status of the switch that indicates forward direction.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65219

SPN 904 Front Axle Speed

The average speed of the two front wheels.

Data Length: 2 bytes
Resolution: 1/256 km/h per bit, 0 offset
Data Range: 0 to 250.996 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65215

SPN 905 Relative Speed; Front Axle, Left Wheel

The speed of the front axle, left wheel relative to the front axle speed, SPN 904.

Data Length: 1 byte
Resolution: 1/16 km/h per bit, -7.8125 km/h offset
Data Range: -7.8125 to 7.8125 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65215

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SPN 906 Relative Speed; Front Axle, Right Wheel

The speed of the front axle, right wheel relative to the front axle speed, SPN 904.

Data Length: 1 byte
Resolution: 1/16 km/h per bit, -7.8125 km/h offset
Data Range: -7.8125 to 7.8125 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65215

SPN 907 Relative Speed; Rear Axle #1, Left Wheel

The speed of the rear axle #1, left wheel relative to the front axle speed, SPN 904.

Data Length: 1 byte
Resolution: 1/16 km/h per bit, -7.8125 km/h offset
Data Range: -7.8125 to 7.8125 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65215

SPN 908 Relative Speed; Rear Axle #1, Right Wheel

The speed of the rear axle #1, right wheel relative to the front axle speed, SPN 904.

Data Length: 1 byte
Resolution: 1/16 km/h per bit, -7.8125 km/h offset
Data Range: -7.8125 to 7.8125 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65215

SPN 909 Relative Speed; Rear Axle #2, Left Wheel

The speed of the rear axle #2, left wheel relative to the front axle speed, SPN 904.

Data Length: 1 byte
Resolution: 1/16 km/h per bit, -7.8125 km/h offset
Data Range: -7.8125 to 7.8125 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65215

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SPN 910 Relative Speed; Rear Axle #2, Right Wheel

The speed of the rear axle #2, right wheel relative to the front axle speed, SPN 904.

Data Length: 1 byte
Resolution: 1/16 km/h per bit, -7.8125 km/h offset
Data Range: -7.8125 to 7.8125 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65215

SPN 911 (R) Service Component Identification

Identification of component needing service. See Table SPN911_A.

Data Length: 1 byte
Resolution: 1 ID/bit, 0 offset
Data Range: 0 to 250 ID Operational Range: same as data range
Type: Measured
Supporting information: See Appendix D - SPN 911
PGN 65216

SPN 912 Service Component Identification

Identification of component needing service. See Table SPN911_A.

Data Length: 1 byte
Resolution: 1 ID/bit, 0 offset
Data Range: 0 to 250 ID Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65216

SPN 913 Service Component Identification

Identification of component needing service. See Table SPN911_A.

Data Length: 1 byte
Resolution: 1 ID/bit, 0 offset
Data Range: 0 to 250 ID Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65216

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SPN 914 Service Distance

The distance which can be traveled by the vehicle before the next service inspection is required. A negative distance is transmitted if the service inspection has been passed. The component that requires service is identified by the service component identification (see SPN 911-913, 1379, and 1584).

Data Length: 2 bytes
Resolution: 5 km/bit, -160,635 km offset
Data Range: -160,635 to 160,640 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65216

SPN 915 Service Delay/Calendar Time Based

The time in weeks until the next vehicle service inspection is required. A negative value is transmitted if the service inspection has been passed. The component that requires service is identified by the service component identification (see SPN 911-913, 1379, and 1584).

Data Length: 1 byte
Resolution: 1 week/bit, -125 weeks offset
Data Range: -125 to 125 weeks Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65216

SPN 916 Service Delay/Operational Time Based

The time in vehicle operational time until the next vehicle service inspection is required. A negative value is transmitted if the service inspection has been passed. The component that requires service is identified by the service component identification (see SPN 911-913, 1379, and 1584).

Data Length: 2 bytes
Resolution: 1 hr/bit, -32,127 hr offset
Data Range: -32,127 to 32,128 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65216

SPN 917 High Resolution Total Vehicle Distance

Accumulated distance traveled by the vehicle during its operation.

NOTE - See SPN 245 for alternate resolution.

Data Length: 4 bytes
Resolution: 5 m/bit, 0 offset
Data Range: 0 to 21,055,406 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65217

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SPN 918 High Resolution Trip Distance

Distance traveled during all or part of a journey.

NOTE - See SPN 244 for alternate resolution.

Data Length: 4 bytes
Resolution: 5 m/bit, 0 offset
Data Range: 0 to 21,055,406 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65217

SPN 927 Location

To identify to which of several similar devices (such as tires or fuel tanks) the information applies.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61446

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SPN 928 Axle Location

To identify to which of several similar devices (such as tires or fuel tanks) the information applies.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length:	8 bits		
Resolution:	256 states/8 bit, 0 offset		
Data Range:	0 to 255	Operational Range:	same as data range
Type:	Measured		
Supporting information:			
PGN	65258		

SPN 929 (R) Tire Location

Identifies which tire is associated with the parametric data in this PGN.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length:	8 bits		
Resolution:	256 states/8 bit, 0 offset		
Data Range:	0 to 255	Operational Range:	same as data range
Type:	Measured		
Supporting information:			
PGN	65268		

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SPN 930 Drive Axle Location

To identify to which of several similar devices (such as tires or fuel tanks) the information applies.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65273

SPN 957 Number of Forward Gear Ratios

Number of forward gear ratios in the transmission, provided as part of the configuration.

Data Length: 1 byte
Resolution: 1 gear value/bit, 0 offset
Data Range: 0 to 250 Operational Range: 0 to 125 gear ratios
Type: Measured
Supporting information:
PGN 65250

SPN 958 Number of Reverse Gear Ratios

Number of reverse gear ratios in the transmission, provided as part of the transmission configuration.

Data Length: 1 byte
Resolution: 1 gear value/bit, 0 offset
Data Range: 0 to 250 Operational Range: 0 to 125 gear ratios
Type: Measured
Supporting information:
PGN 65250

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SPN 959 Seconds

Part of a parameter used to represent time.

Data Length: 1 byte
Resolution: 0.25 s/bit, 0 offset
Data Range: 0 to 62.5 s Operational Range: 0 to 59.75 sec
Type: Measured
Supporting information:
PGN 65254

SPN 960 Minutes

Part of a parameter used to represent time.

Data Length: 1 byte
Resolution: 1 min/bit, 0 offset
Data Range: 0 to 250 mins Operational Range: 0 to 59 min
Type: Measured
Supporting information:
PGN 65254

SPN 961 Hours

Part of a parameter used to represent time.

Data Length: 1 byte
Resolution: 1 hr/bit, 0 offset
Data Range: 0 to 250 hr Operational Range: 0 to 23 hr
Type: Measured
Supporting information:
PGN 65254

SPN 962 Day

Part of a parameter used to represent a calendar date.

NOTE - A value of 0 for the date is null. The values 1, 2, 3, and 4 are used to identify the first day of the month; 5, 6, 7, and 8 identify the second day of the month; etc.

Data Length: 1 byte
Resolution: 0.25 days/bit, 0 offset
Data Range: 0 to 62.5 days Operational Range: 0.25 to 31.75 day
Type: Measured
Supporting information:
PGN 65254

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SPN 963 Month

Part of a parameter used to represent a calendar date.

NOTE - A value of 0 for the month is null. The value 1 identifies January; 2 identifies February; etc.

Data Length: 1 byte
Resolution: 1 month/bit, 0 offset
Data Range: 0 to 250 months Operational Range: 1 to 12 month
Type: Measured
Supporting information:
PGN 65254

SPN 964 Year

Part of a parameter used to represent a calendar date.

NOTE - A value of 0 for the year identifies the year 1985; a value of 1 identifies 1986; etc.

Data Length: 1 byte
Resolution: 1 year/bit, 1985 years offset
Data Range: 1985 to 2235 years Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65254

SPN 965 Number of Software Identification Fields

Number of software identification designators represented in the software identification parameter group.

Data Length: 1 byte
Resolution: 1 step/bit, 0 offset
Data Range: 0 to 250 steps Operational Range: 0 to 125
Type: Measured
Supporting information:
PGN 65242

SPN 966 Engine Test Mode Switch

Switch signal which indicates the position of the engine test mode switch.

00 - Off
01 - On

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

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SPN 967 (R) Engine Idle Decrement Switch

Switch signal which indicates the position of the idle decrement switch.

00 - Off
01 - On

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

SPN 968 (R) Engine Idle Increment Switch

Switch signal which indicates the position of the idle increment switch.

00 - Off
01 - On

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

SPN 969 Remote Accelerator Enable Switch

Switch signal which indicates that the remote accelerator has been enabled and controls the engine.

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

NOTE—The accelerator interlock switch (see SPN 972) must be disabled in order for the remote accelerator to perform engine control.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

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SPN 970 (R) Engine Auxiliary Engine Shutdown Switch

Switch signal which requests that all engine fueling stop.

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

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

SPN 971 Engine Derate Switch

Switch signal used to activate the torque limiting feature of the engine. The specific nature of torque limiting should be verified with the manufacturer.

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

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

SPN 972 Accelerator Interlock Switch

Switch signal used to disable the accelerator and remote accelerator inputs, causing the engine to return to idle.

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

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

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SPN 973 Engine Retarder Selection

The position of the operator controlled selector, expressed as a percentage and determined by the ratio of the current position of the selector to its maximum possible position. Zero percent means no braking torque is requested by the operator from the engine while 100% means maximum braking.

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

SPN 974 (R) Remote Accelerator Pedal Position

The ratio of actual position of the remote analog engine speed/torque request input device (such as an accelerator pedal or throttle lever) to the maximum position of the input device.

For example, in on-highway vehicles this could be an accelerator control device that is external to the drivers cab or an accelerator that is controlled by a hand lever from the operators seat.

The Remote Accelerator Enable Switch is SPN 969. This parameter enables the remote accelerator operation.

NOTE—See SPNs 28, 29, and 91 for additional accelerator position parameters. If only one accelerator position exists on a vehicle, SPN 91 shall be used

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

SPN 975 Estimated Percent Fan Speed

Estimated fan speed as a ratio of the fan drive (current speed) to the fully engaged fan drive (maximum fan speed). A two state fan (off/on) will use 0% and 100% respectively. A three state fan (off/intermediate/on) will use 0%, 50% and 100% respectively. A variable speed fan will use 0% to 100%. Multiple fan systems will use 0 to 100% to indicate the percent cooling capacity being provided.

Note that the intermediate fan speed of a three state fan will vary with different fan drives, therefore 50% is being used to indicate that the intermediate speed is required from the fan drive.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65213

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SPN 976 (R) PTO State

This parameter is used to indicate the current state or mode of operation by the power takeoff (PTO) device. It needs to be ensured that each achieved state information be set up to be conveyed in at least one datalink message before a transition to another state is allowed. The Suspect Parameter Number for this parameter is 976.

Data Length: 5 bits

Resolution: 32 states/5 bit, 0 offset

Data Range: 0 to 31 Operational Range: same as data range

Type: Status

Supporting information: See Appendix D - SPN 976

PGN 65265

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SPN 977 Fan Drive State

This parameter is used to indicate the current state or mode of operation by the fan drive.

0000 Fan off
0001 Engine system–General
0010 Excessive engine air temperature
0011 Excessive engine oil temperature
0100 Excessive engine coolant temperature
0101 Excessive transmission oil temperature
0110 Excessive hydraulic oil temperature
0111 Default Operation
1000 Not defined
1001 Manual control
1010 Transmission retarder
1011 A/C system
1100 Timer
1101 Engine brake
1110 Other
1111 Not available

Fan off 0000b —Used to indicate that the fan clutch is disengaged and the fan is inactive

Engine system–General 0001b —Used to indicate that the fan is active due to an engine system not otherwise defined.

Excessive engine air temperature 0010b —Used to indicate that the fan is active due to high air temperature.

Excessive engine oil temperature 0011b —Used to indicate that the fan is active due to high oil temperature.

Excessive engine coolant temperature 0100b —Used to indicate that the fan is active due to high coolant temperature.

Manual control 1001b —Used to indicate that the fan is active as requested by the operator.

Transmission retarder 1010b —Used to indicate that the fan is active as required by the transmission retarder.

A/C system 1011b —Used to indicate that the fan is active as required by the air conditioning system.

Timer 1100b —Used to indicate that the fan is active as required by a timing function.

Engine brake 1101b —Used to indicate that the fan is active as required to assist engine braking.

Excessive transmission oil temperature - 0101b - Used to indicate fan is active due to excessive transmission oil temperature.

Excessive hydraulic oil temperature - 0110b - Used to indicate fan is active due to excessive hydraulic oil temperature.

Default Operation - 0111b - Used to indicate fan is active due to a error condition resulting in default operation

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65213

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SPN 978 (R) Engine Remote PTO Variable Speed Control Switch

Switch signal which indicates that the remote PTO toggle switch is in the enabled (ON) position. If the toggle switch is enabled and other conditions are satisfied then the remote PTO control feature is activated and the PTO will control at a variable speed.

00 - Off
01 - On
10 - Error

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65264

SPN 979 (R) Engine Remote PTO Preprogrammed Speed Control Switch

Switch signal which indicates that the remote PTO toggle switch is in the enabled (ON) position. If the toggle switch is enabled and other conditions are satisfied then the remote PTO control feature is activated and the PTO will control at the preprogrammed speed.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65264

SPN 980 (R) Engine PTO Enable Switch

Switch signal which indicates that the PTO toggle switch is in the enabled (ON) position and therefore it is possible to manage the PTO control function.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65264

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SPN 981 (R) Engine PTO Accelerate Switch

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

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65264

SPN 982 (R) Engine PTO Resume Switch

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

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65264

SPN 983 (R) Engine PTO Coast/Decelerate Switch

Switch signal of the PTO control activator which indicates that the activator is in the position "coast/decelerate".

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65264

SPN 984 (R) Engine PTO Set Switch

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

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65264

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SPN 985 A/C High Pressure Fan Switch

Switch signal which indicates that the pressure in the coolant circuit of an air conditioning system is high and the fan may be engaged.

00 - Pressure normal
01 - Pressure high, fan may be engaged

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

SPN 986 Requested Percent Fan Speed

Fan speed as a ratio of the actual fan drive (current speed) to the fully engaged fan drive (maximum fan speed). A two state fan (off/on) will use 0% and 100% respectively. A three state fan (off/intermediate/on) will use 0%, 50% and 100% respectively. A variable speed fan will use 0% to 100%. Multiple fan systems will use 0 to 100% to indicate the percent cooling capacity being provided. Feedback to this request is provided using the estimated fan speed (see SPN 975).

Note that the intermediate fan speed of a three state fan will vary with different fan drives, therefore 50% is being used to indicate that the intermediate speed is required from the fan drive.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 57344

SPN 988 Trip Group 1

Command signal used to reset the PGNs and parameters as defined in Table SPN988_A.

00 Take no action
01 Reset
11 Not applicable

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information: See Appendix D - SPN 988
PGN 56832

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SPN 989 Trip Group 2 - Proprietary

Command signal used to reset proprietary parameters associated with a trip but not defined within this document.

00 Take no action
01 Reset
11 Not applicable

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 56832

SPN 990 Total Compression Brake Distance

Total distance over which the compression brakes have been active for the life of the engine.

Data Length: 4 bytes
Resolution: 0.125 km/bit, 0 offset
Data Range: 0 to 526,385,151.9 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65212

SPN 991 Trip Compression Brake Distance

Total distance over which the compression brakes have been active since the last trip reset.

Data Length: 4 bytes
Resolution: 0.125 km/bit, 0 offset
Data Range: 0 to 526,385,151.9 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65212

SPN 992 Trip Service Brake Distance

Total distance over which the service brakes have been active since the last trip reset.

Data Length: 4 bytes
Resolution: 0.125 km/bit, 0 offset
Data Range: 0 to 526,385,151.9 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65212

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SPN 993 Trip Service Brake Applications

Total number of times the service brakes have been activated since the last trip reset. Brake applications of less than 0.5 s are not counted and lengthy brake applications (longer than 0.5 s) are counted as a single event.

NOTE - Definition and resolution shall stay the same if brakes are applied by only the tractor, only the trailer or both.

Data Length: 4 bytes
Resolution: 1 brake appl/bit, 0 offset
Data Range: 0 to 4,227,858,431 appl Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65212

SPN 994 Trip Fan On Time

Total time the fan has been on (due to an automatic trigger or manual trigger) since the last trip reset. The fan could be requested to be on by the engine system, a manual switch, and/or the A/C system. Whichever system requests the fan activation first shall have the time accumulated against it. The sum total of these three values shall equal the trip fan on time.

NOTE—If the fan has been requested to be on by a component that is not one of the defined categories, this time shall be

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65211

SPN 995 Trip Fan On Time Due to the Engine System

Total time the fan has been on due to engine triggers (i.e., excluding time on due to an operator manual switch or A/C system) since the last trip reset. For the time to be accumulated against the engine system, it is necessary that it be the first to request the fan activation or it be the only system requesting fan activation.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65211

SPN 996 Trip Fan On Time Due to a Manual Switch

Total time the fan has been on due to manual activation by the operator (i.e., excluding time on due to automatic triggers) since the last trip reset. For the time to be accumulated against the manual switch, it is necessary that it be the first to request the fan activation or it be the only system requesting fan activation.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65211

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SPN 997 Trip Fan On Time Due to the A/C System

Total time the fan has been on due to the A/C system since the last trip reset. For the time to be accumulated against the A/C system, it is necessary that it be the first to request the fan activation or it be the only system requesting fan

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65211

SPN 998 Trip Distance on VSL

Total distance accumulated while the engine torque mode is road speed governing since the last trip reset.

Data Length: 4 bytes
Resolution: 0.125 km/bit, 0 offset
Data Range: 0 to 526,385,151.9 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65210

SPN 999 Trip Gear Down Distance

Total distance accumulated while the vehicle has operated in the gear which is one gear down from top gear and exceeds a calibrated minimum time (typically the time to shift the transmission) since the last trip reset.

Data Length: 4 bytes
Resolution: 0.125 km/bit, 0 offset
Data Range: 0 to 526,385,151.9 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65210

SPN 1000 Trip Distance in Top Gear

Total distance accumulated while the vehicle has operated in top gear for a calibrated minimum time since the last trip reset.

Data Length: 4 bytes
Resolution: 0.125 km/bit, 0 offset
Data Range: 0 to 526,385,151.9 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65210

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SPN 1001 Trip Drive Fuel Used

Total fuel consumed while the engine speed is greater than zero, vehicle speed is greater than or equal to 2 km/h, and neither the PTO or the remote PTO is controlling the engine power output, since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1007 for alternate resolution.

Data Length: 4 bytes
Resolution: 0.5 L/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65209

SPN 1002 Trip PTO Moving Fuel Used

Total fuel consumed while the PTO or remote PTO is in the hold state, the engine speed is greater than zero, and vehicle speed is greater than or equal to 2 km/h, since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1008 for alternate resolution.

Data Length: 4 bytes
Resolution: 0.5 L/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65209

SPN 1003 Trip PTO Non-moving Fuel Used

Total fuel consumed while the PTO or remote PTO is in the hold state, the engine speed is greater than zero, and vehicle speed is less than 2 km/h, since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1009 for alternate resolution.

Data Length: 4 bytes
Resolution: 0.5 L/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65209

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SPN 1004 Trip Vehicle Idle Fuel Used

Total fuel consumed while neither the PTO or remote PTO is in the hold state, the engine speed is greater than zero, and vehicle speed is less than 2 km/h, since the last trip reset.

In marine applications, this parameter is defined as the total fuel consumed while the engine speed is greater than zero, and less than or equal to 50 RPM greater than low idle, since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1010 for alternate resolution.

Data Length: 4 bytes
Resolution: 0.5 L/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65209

SPN 1005 Trip Cruise Fuel Used

Total fuel consumed while the engine is in the cruise hold state since the last trip reset. If both cruise control and VSL (vehicle speed limiter) are commanding the same amount of fuel, the cruise control is deemed the active torque mode and fuel will be accumulated in "trip cruise fuel used" parameter. If fuel commanded due to the accelerator pedal position is larger than fuel commanded by cruise control (e.g., accelerator override torque mode), the cruise control is not deemed the active torque mode and fuel will not be accumulated in the "trip cruise fuel used" parameter.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1011 for alternate resolution.

Data Length: 4 bytes
Resolution: 0.5 L/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65209

SPN 1006 Trip Drive Fuel Economy

Trip drive fuel economy is equal to the distance traveled by vehicle in the drive state (engine speed greater than zero, vehicle speed greater than or equal to 2 km/h, and neither the PTO or remote PTO is controlling engine power output) divided by trip drive fuel used (SPN 1001), since the last trip reset.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1012 for alternate resolution.

Data Length: 2 bytes
Resolution: 1/512 km/L per bit, 0 offset
Data Range: 0 to 125.5 km/L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65209

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SPN 1007 Trip Drive Fuel Used (Gaseous)

Total fuel consumed while the engine speed is greater than zero, vehicle speed is greater than or equal to 2 km/h, and neither the PTO or the remote PTO is controlling the engine power output, since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1001 for alternate resolution.

Data Length: 4 bytes
Resolution: 0.5 kg/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65208

SPN 1008 Trip PTO Moving Fuel Used (Gaseous)

Total fuel consumed while the PTO or remote PTO is in the hold state, the engine speed is greater than zero, and vehicle speed is greater than or equal to 2 km/h, since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1002 for alternate resolution.

Data Length: 4 bytes
Resolution: 0.5 kg/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65208

SPN 1009 Trip PTO Non-moving Fuel Used (Gaseous)

Total fuel consumed while the PTO or remote PTO is in the hold state, the engine speed is greater than zero, and vehicle speed is less than to 2 km/h, since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1003 for alternate resolution.

Data Length: 4 bytes
Resolution: 0.5 kg/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65208

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SPN 1010 Trip Vehicle Idle Fuel Used (Gaseous)

Total fuel consumed while neither the PTO or remote PTO is active, the engine speed is greater than zero, and vehicle speed is less than to 2 km/h, since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1004 for alternate resolution. Trip vehicle idle fuel while in fast idle (vehicle speed less than 2 km/h with engine speed greater than 700 rpm) shall be accumulated in the trip vehicle idle fuel category. All other fuel usage scenarios that do not fall directly in the categories defined shall be accumulated in trip drive fuel used.

Data Length: 4 bytes
Resolution: 0.5 kg/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65208

SPN 1011 Trip Cruise Fuel Used (Gaseous)

Total fuel consumed while the engine is in the cruise hold state since the last trip reset. If both cruise control and VSL (vehicle speed limiter) are commanding the same amount of fuel, the cruise control is deemed the active torque mode and fuel will be accumulated in "trip cruise fuel used" parameter. If fuel commanded due to the accelerator pedal position is larger than fuel commanded by cruise control (e.g., accelerator override torque mode), the cruise control is not deemed the active torque mode and fuel will not be accumulated in the "trip cruise fuel used" parameter.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1005 for alternate resolution.

Data Length: 4 bytes
Resolution: 0.5 kg/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65208

SPN 1012 Trip Drive Fuel Economy (Gaseous)

Trip drive fuel economy is equal to the distance traveled by vehicle in the drive state (engine speed greater than zero, vehicle speed greater than or equal to 2 km/h, and neither the PTO or remote PTO is controlling engine power output) divided by trip drive fuel used (SPN 1007), since the last trip reset.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1006 for alternate resolution.

Data Length: 2 bytes
Resolution: 1/512 km/kg per bit, 0 offset
Data Range: 0 to 125.5 km/kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65208

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SPN 1013 Trip Maximum Engine Speed

Maximum engine speed achieved since the last trip reset.

Data Length: 2 bytes
Resolution: 0.125 rpm/bit, 0 offset
Data Range: 0 to 8,031.875 rpm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65207

SPN 1014 Trip Average Engine Speed

Average speed of the engine since the last trip reset.

NOTE—Excludes ignition-on time without the engine speed above zero. Includes idle, PTO (moving and non-moving), and drive operation.

Data Length: 2 bytes
Resolution: 0.125 rpm/bit, 0 offset
Data Range: 0 to 8,031.875 rpm Operational Range: same as data range
Type: Measured
Supporting information: See Appendix D - SPN 1014
PGN 65207

SPN 1015 Trip Drive Average Load Factor

Average engine load factor while engine speed is greater than zero, vehicle speed is greater than or equal to 2 km/h, and both the PTO (moving/non-moving) and remote PTO are not in the hold state, since the last trip reset. Engine operation during cruise control operation is included.

In marine applications, this parameter is defined as the average engine load factor while engine speed is greater than zero, since last trip reset.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65207

SPN 1016 Total Drive Average Load Factor

Average engine load factor while engine speed is greater than zero, vehicle speed is greater than or equal to 2 km/h, and both the PTO (moving/non-moving) and remote PTO are not in the hold state, over the life of the engine. Engine operation during cruise control operation is included.

In marine applications, this parameter is defined as the average engine load factor while engine speed is greater than zero.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65207

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SPN 1017 Total Engine Cruise Time

Total time that the engine has operated in the cruise hold state, excluding time in accelerator override, over the life of the

Data Length: 4 bytes

Resolution: 0.05 hr/bit, 0 offset

Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65207

SPN 1018 Trip Maximum Vehicle Speed

Maximum vehicle speed achieved while the engine speed is greater than zero and the accelerator pedal position (APS) is at a value greater than 0%, since the last trip reset.

Data Length: 2 bytes

Resolution: 1/256 km/h per bit, 0 offset

Data Range: 0 to 250.996 km/h Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65206

SPN 1019 Trip Cruise Distance

Total distance that the engine has operated in the cruise hold state, excluding time in accelerator override, since the last trip reset.

Data Length: 4 bytes

Resolution: 0.125 km/bit, 0 offset

Data Range: 0 to 526,385,151.9 km Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65206

SPN 1020 Trip Number of Hot Shutdowns

Total number of hot shutdowns since the last trip reset. A hot shutdown is based on operation at high load or high engine speed or for long operating periods without allowing the engine to cool sufficiently.

Data Length: 2 bytes

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 64,255 counts Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65205

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SPN 1021 Trip Number of Idle Shutdowns

Total number of times the engine has been shutdown due to idling too long (at normal idle or fast idle) since the last trip

Data Length: 2 bytes

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 64,255 counts Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65205

SPN 1022 Trip Number of Idle Shutdown Overrides

Total number of times an operator disables idle shutdown to prevent an engine shutdown, since the last trip reset.

Data Length: 2 bytes

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 64,255 counts Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65205

SPN 1023 Trip Sudden Decelerations

Total number of decelerations whenever the vehicle deceleration is more than XYZ km/h/sec (where XYZ is a calibratible threshold), since the last trip reset. A lengthy deceleration shall be counted as one sudden deceleration.

Data Length: 2 bytes

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 64,255 counts Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65205

SPN 1024 Trip Time in VSL

Total time accumulated when the engine has operated on the vehicle speed limiter (VSL) while not in the cruise hold state, since the last trip reset. The engine torque mode is equal to road speed governor during this operation.

Data Length: 4 bytes

Resolution: 0.05 hr/bit, 0 offset

Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65204

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SPN 1025 Trip Time in Top Gear

Total time accumulated when the vehicle has operated in top gear for a calibrated minimum time, since the last trip reset.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65204

SPN 1026 Trip Time in Gear Down

Total time accumulated when the vehicle has operated in one gear down from the top gear for a calibrated minimum time, since the last trip reset.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65204

SPN 1027 Trip Time in Derate by Engine

Total time accumulated when the engine final fueling has been derated due to an engine protection algorithm, since the last

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65204

SPN 1028 Total Engine PTO Fuel Used

Total fuel used while the PTO or remote PTO is in the hold state and engine speed is above zero, over the life of the engine.

Data Length: 4 bytes
Resolution: 0.5 L/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65203

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SPN 1029 Trip Average Fuel Rate

Average fuel rate, equal to trip fuel divided by trip time while the engine speed is above zero, since the last trip reset. This includes idle, PTO (both moving and non-moving) and drive operation but excludes ignition-on time while the engine speed is at zero rpm.

NOTE—This parameter is intended for liquid fueled engines. See SPN 1031 for alternate resolution.

Data Length: 2 bytes
Resolution: 0.05 L/h per bit, 0 offset
Data Range: 0 to 3,212.75 L/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65203

SPN 1030 Total Engine PTO Fuel Used (Gaseous)

Total fuel used while the PTO or remote PTO is in the hold state and engine speed is above zero, over the life of the engine.

Data Length: 4 bytes
Resolution: 0.5 kg/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65202

SPN 1031 Trip Average Fuel Rate (Gaseous)

Average fuel rate, equal to trip fuel divided by trip time while the engine speed is above zero, since the last trip reset. This includes idle, PTO (both moving and non-moving) and drive operation but excludes ignition-on time while the engine speed is at zero rpm.

NOTE—This parameter is intended for gaseous fueled engines. See SPN 1029 for alternate resolution.

Data Length: 2 bytes
Resolution: 0.05 kg/h per bit, 0 offset
Data Range: 0 to 3212.75 kg/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65202

SPN 1032 Total ECU Distance

Total distance accumulated over the life of the ECU. When the ECU is replaced this value shall be reset.

Data Length: 4 bytes
Resolution: 0.125 km/bit, 0 offset
Data Range: 0 to 526,385,151.9 km Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65201

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SPN 1033 Total ECU Run Time

Total time accumulated over the life of the ECU, from ignition switch ON to ignition switch OFF. When the ECU is replaced this value shall be reset.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65201

SPN 1034 Trip Cruise Time

Total time accumulated while the engine is in the cruise hold state, excluding time in accelerator override, since the last trip

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65200

SPN 1035 Trip PTO Time

Total time accumulated while the engine is in the PTO or remote PTO hold state since the last trip reset.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65200

SPN 1036 Trip Engine Running Time

Total time accumulated while the engine speed is greater than zero since the last trip reset. Note that time with the ignition switch on but engine speed at zero is not included.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65200

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SPN 1037 Trip Idle Time

Total time accumulated while the engine speed is greater than zero, both the PTO and remote PTO is inactive, and the vehicle speed is less than 2 km/h, since the last trip reset.

In marine applications, this parameter is defined as the total time accumulated while the engine speed is greater than zero, and less than or equal to 50 RPM greater than low idle, since the last trip reset.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65200

SPN 1038 Trip Air Compressor On Time

Total time that the air compressor is on and compressing air since the last trip reset.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65200

SPN 1039 Trip Fuel (Gaseous)

Total fuel consumed (trip drive fuel + trip PTO moving fuel + trip PTO non-moving fuel + trip idle fuel) since the last trip

Data Length: 4 bytes
Resolution: 0.5 kg/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65199

SPN 1040 Total Fuel Used (Gaseous)

Total fuel consumed (trip drive fuel + trip PTO moving fuel + trip PTO non-moving fuel + trip idle fuel) over the life of the

Data Length: 4 bytes
Resolution: 0.5 kg/bit, 0 offset
Data Range: 0 to 2,105,540,607.5 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65199

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SPN 1081 (R) Engine Wait to Start Lamp

Lamp signal which indicates that the engine is too cold to start and the operator should wait until the signal becomes inactive (turns off).

00 - Off
01 - On

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

SPN 1082 Engine Coolant Load Increase

Status of an event, external to the engine, that may increase the nominal temperature of the engine coolant liquid.

00 No coolant load increase
01 Coolant load increase possible

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

SPN 1083 Auxiliary I/O Channel #1

Auxiliary channel of data (16 bit) read by the ECU. This data is in A/D counts and is manufacturer specific. It may be configured uniquely per application.

Data Length: 2 bytes
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 64,255 counts Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65241

SPN 1084 Auxiliary I/O Channel #2

Auxiliary channel of data (16 bit) read by the ECU. This data is in A/D counts and is manufacturer specific. It may be configured uniquely per application.

Data Length: 2 bytes
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 64,255 counts Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65241

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SPN 1085 Intended Retarder Percent Torque

Braking torque of retarder that the retarder is currently trying to achieve. This value takes into account all static limitations, but not the limitations due to the dynamic behavior of the retarder. This value, if unchanged over a certain time, can and will be reached by the actual retarder - percent torque (See SPN 520).

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: -125 to 0%
Type: Status
Supporting information: See Appendix D - SPN 1085
PGN 61440

SPN 1086 Parking and/or Trailer Air Pressure

The pneumatic pressure in the circuit or reservoir for the parking brake and/or the trailer supply.

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

SPN 1087 Service Brake Air Pressure Circuit #1

The pneumatic pressure in the service brake circuit or reservoir #1.

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

SPN 1088 Service Brake Air Pressure Circuit #2

The pneumatic pressure in the service brake circuit or reservoir #2.

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

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SPN 1089 Auxiliary Equipment Supply Pressure

The pneumatic pressure in the auxiliary circuit.

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

SPN 1090 Air Suspension Supply Pressure

The pneumatic pressure in the circuit for the electronically controlled air suspension system.

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

SPN 1091 Brake Application Pressure High Range, Front Axle, Left Wheel

The brake application pressure for the left wheel on the front axle.

Data Length: 1 byte
Resolution: 5 kPa/bit, 0 offset
Data Range: 0 to 1,250 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65197

SPN 1092 Brake Application Pressure High Range, Front Axle, Right Wheel

The brake application pressure for the right wheel on the front axle.

Data Length: 1 byte
Resolution: 5 kPa/bit, 0 offset
Data Range: 0 to 1,250 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65197

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SPN 1093 Brake Application Pressure High Range, Rear Axle #1, Left Wheel

The brake application pressure for the left wheel on the rear axle #1.

Data Length: 1 byte
Resolution: 5 kPa/bit, 0 offset
Data Range: 0 to 1,250 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65197

SPN 1094 Brake Application Pressure High Range, Rear Axle #1, Right Wheel

The brake application pressure for the right wheel on the rear axle #1.

Data Length: 1 byte
Resolution: 5 kPa/bit, 0 offset
Data Range: 0 to 1,250 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65197

SPN 1095 Brake Application Pressure High Range, Rear Axle #2, Left Wheel

The brake application pressure for the left wheel on the rear axle #2.

Data Length: 1 byte
Resolution: 5 kPa/bit, 0 offset
Data Range: 0 to 1,250 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65197

SPN 1096 Brake Application Pressure High Range, Rear Axle #2, Right Wheel

The brake application pressure for the right wheel on the rear axle #2.

Data Length: 1 byte
Resolution: 5 kPa/bit, 0 offset
Data Range: 0 to 1,250 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65197

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SPN 1097 Brake Application Pressure High Range, Rear Axle #3, Left Wheel

The brake application pressure for the left wheel on the rear axle #3.

Data Length: 1 byte
Resolution: 5 kPa/bit, 0 offset
Data Range: 0 to 1,250 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65197

SPN 1098 Brake Application Pressure High Range, Rear Axle #3, Right Wheel

The brake application pressure for the right wheel on the rear axle #3.

Data Length: 1 byte
Resolution: 5 kPa/bit, 0 offset
Data Range: 0 to 1,250 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65197

SPN 1099 Brake Lining Remaining, Front Axle, Left Wheel

The percentage of brake lining which can still be measured for the left wheel on the front axle. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65196

SPN 1100 Brake Lining Remaining, Front Axle, Right Wheel

The percentage of brake lining which can still be measured for the right wheel on the front axle. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65196

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SPN 1101 Brake Lining Remaining, Rear Axle #1, Left Wheel

The percentage of brake lining which can still be measured for the left wheel on the rear axle #1. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65196

SPN 1102 Brake Lining Remaining, Rear Axle #1, Right Wheel

The percentage of brake lining which can still be measured for the right wheel on the rear axle #1. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65196

SPN 1103 Brake Lining Remaining, Rear Axle #2, Left Wheel

The percentage of brake lining which can still be measured for the left wheel on the rear axle #2. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65196

SPN 1104 Brake Lining Remaining, Rear Axle #2, Right Wheel

The percentage of brake lining which can still be measured for the right wheel on the rear axle #2. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65196

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SPN 1105 Brake Lining Remaining, Rear Axle #3, Left Wheel

The percentage of brake lining which can still be measured for the left wheel on the rear axle #3. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65196

SPN 1106 Brake Lining Remaining, Rear Axle #3, Right Wheel

The percentage of brake lining which can still be measured for the right wheel on the rear axle #3. 100% represents new brake linings, 0% represents totally worn brake linings.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65196

SPN 1107 Engine Protection System Timer State

Status signal which indicates the current mode of the engine protection system timer system. See Figure SPN1107_A.

00 - Inactive
01 - Active

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information: See Appendix D - SPN 1107
PGN 65252

SPN 1108 Engine Protection System Timer Override

Status signal which indicates the status of the override feature of the engine protection system timer. See Figure SPN1107_A.

00 – Inactive
01 – Active

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

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SPN 1109 Engine Protection System Approaching Shutdown

Status signal which indicates that engine shutdown is imminent. This engine protection signal can be a result of different systems failing, i.e., engine overheating. See Figure SPN1107_A.

00 - Not approaching
01 - Approaching

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

SPN 1110 Engine Protection System has Shutdown Engine

Status signal which indicates whether or not the engine protection system has shutdown the engine. See Figure SPN1107_A.

00 – No
01 – Yes

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

SPN 1111 Engine Protection System Configuration

Parameter which indicates the configuration of the engine shutdown system.

00 - Disabled in calibration
01 - Enabled in calibration

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

SPN 1113 Recommended Gear

The transmission calculates this gear continuously. In dangerous situations this gear may be selected to gain back vehicle control.

Data Length: 1 byte
Resolution: 1 gear value/bit, -125 offset
Data Range: -125 to 125 Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.
Type: Status
Supporting information:
PGN 65195

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SPN 1114 Lowest Possible Gear

The transmission calculates this gear continuously. Together with the highest possible gear (see SPN 1115), it enables a management computer to know the exact range of available gears.

Data Length: 1 byte
Resolution: 1 gear value/bit, -125 offset
Data Range: -125 to 125 Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.
Type: Status
Supporting information:
PGN 65195

SPN 1115 Highest Possible Gear

The transmission calculates this gear continuously. Together with the lowest possible gear (see SPN 1114), it enables a management computer to know the exact range of available gears.

Data Length: 1 byte
Resolution: 1 gear value/bit, -125 offset
Data Range: -125 to 125 Operational Range: -125 to +125, negative values are reverse gears, positive values are forward gears, zero is neutral. 251 (0xFB) is park.
Type: Status
Supporting information:
PGN 65195

SPN 1116 (R) Engine Gaseous Fuel Correction Factor

A correction to a predefined gaseous fuel energy (expressed in energy per unit volume) represented as a percentage. The actual fuel energy used to control the engine is the product of the gaseous fuel correction factor and the energy of the gas.

Data Length: 1 byte
Resolution: 1 %/bit, 0 offset
Data Range: 0 to 250 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65194

SPN 1117 (R) Engine Desired Rated Exhaust Oxygen

The desired amount of oxygen in the exhaust at rated conditions represented as a percentage by volume with respect to the total volume of exhaust gases leaving the engine.

Data Length: 2 bytes
Resolution: 0.0025 %/bit, 0 offset
Data Range: 0 to 160.6375 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65193

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SPN 1118 (R) Engine Desired Exhaust Oxygen

The desired amount of oxygen in the exhaust represented as a percentage by volume with respect to the total volume of exhaust gases leaving the engine.

Data Length: 2 bytes
Resolution: 0.0025 %/bit, 0 offset
Data Range: 0 to 160.6375 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65193

SPN 1119 (R) Engine Actual Exhaust Oxygen

The actual amount of oxygen in the exhaust represented as a percentage by volume with respect to the total volume of exhaust gases leaving the engine.

Data Length: 2 bytes
Resolution: 0.0025 %/bit, 0 offset
Data Range: 0 to 160.6375 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65193

SPN 1120 Articulation Angle

Angle of deflection of an articulated transit vehicle. A right turn is indicated with a positive angle and a left turn is indicated with a negative angle.

Data Length: 1 byte
Resolution: 1 deg/bit, -125 deg offset
Data Range: -125 to 125 deg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65192

SPN 1121 EBS Brake Switch

Switch signal which indicates that the brake pedal is being pressed. The EBS brake switch is independent of the brake light switch and has no provisions for external connections.

00 - Brake pedal is not being pressed
01 - Brake pedal is being pressed
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

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SPN 1122 (R) Alternator Bearing 1 Temperature

Temperature of the bearing inside the alternator. Bearing 1 is the left or rear bearing.

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65191

SPN 1123 (R) Alternator Bearing 2 Temperature

Temperature of the bearing inside the alternator. Bearing 2 is the right or front bearing.

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65191

SPN 1124 (R) Alternator Winding 1 Temperature

Temperature of the windings inside the alternator.

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65191

SPN 1125 (R) Alternator Winding 2 Temperature

Temperature of the windings inside the alternator.

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65191

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SPN 1126 (R) Alternator Winding 3 Temperature

Temperature of the windings inside the alternator.

Data Length: 1 byte

Resolution: 1 deg C/bit, -40 deg C offset

Data Range: -40 to 210 deg C Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65191

SPN 1127 (R) Engine Turbocharger 1 Boost Pressure

Gage pressure of air measured downstream of the compressor discharge side of the turbocharger. See also SPN 102 for alternate range and resolution. If there is only one boost pressure to report and the range and resolution in SPN 102 is adequate, then it should be used.

Data Length: 2 bytes

Resolution: 0.125 kPa/bit, 0 offset

Data Range: 0 to +8031.875 kPa (0 to Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65190

SPN 1128 (R) Engine Turbocharger 2 Boost Pressure

Gage pressure of air measured downstream of the compressor discharge side of the turbocharger. See also SPN 102 for alternate range and resolution. If there is only one boost pressure to report and the range and resolution in SPN 102 is adequate, then it should be used.

Data Length: 2 bytes

Resolution: 0.125 kPa/bit, 0 offset

Data Range: 0 to +8031.875 kPa (0 to Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65190

SPN 1129 (R) Engine Turbocharger 3 Boost Pressure

Gage pressure of air measured downstream of the compressor discharge side of the turbocharger. See also SPN 102 for alternate range and resolution. If there is only one boost pressure to report and the range and resolution in SPN 102 is adequate, then it should be used.

Data Length: 2 bytes

Resolution: 0.125 kPa/bit, 0 offset

Data Range: 0 to +8031.875 kPa (0 to Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65190

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SPN 1130 (R) Engine Turbocharger 4 Boost Pressure

Gage pressure of air measured downstream of the compressor discharge side of the turbocharger. See also SPN 102 for alternate range and resolution. If there is only one boost pressure to report and the range and resolution in SPN 102 is adequate, then it should be used.

Data Length: 2 bytes
Resolution: 0.125 kPa/bit, 0 offset
Data Range: 0 to +8031.875 kPa (0 to Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65190

SPN 1131 (R) Engine Intake Manifold 2 Temperature

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

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65189

SPN 1132 (R) Engine Intake Manifold 3 Temperature

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

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65189

SPN 1133 (R) Engine Intake Manifold 4 Temperature

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

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65189

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SPN 1134 Engine Intercooler Thermostat Opening

The current position of the thermostat used to regulate the temperature of the engine intercooler. A value of 0% represents the thermostat being completely closed and 100% represents the thermostat being completely open.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65262

SPN 1135 Engine Oil Temperature 2

Temperature of the engine lubricant.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65188

SPN 1136 Engine ECU Temperature

Temperature of the engine electronic control unit.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65188

SPN 1137 (R) Engine Exhaust Gas Port 1 Temperature

Temperature at the cylinder exhaust port of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65187

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SPN 1138 (R) Engine Exhaust Gas Port 2 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65187

SPN 1139 (R) Engine Exhaust Gas Port 3 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65187

SPN 1140 (R) Engine Exhaust Gas Port 4 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65187

SPN 1141 (R) Engine Exhaust Gas Port 5 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65186

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SPN 1142 (R) Engine Exhaust Gas Port 6 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65186

SPN 1143 (R) Engine Exhaust Gas Port 7 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65186

SPN 1144 (R) Engine Exhaust Gas Port 8 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65186

SPN 1145 (R) Engine Exhaust Gas Port 9 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65185

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SPN 1146 (R) Engine Exhaust Gas Port 10 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65185

SPN 1147 (R) Engine Exhaust Gas Port 11 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65185

SPN 1148 (R) Engine Exhaust Gas Port 12 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65185

SPN 1149 (R) Engine Exhaust Gas Port 13 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65184

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SPN 1150 (R) Engine Exhaust Gas Port 14 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65184

SPN 1151 (R) Engine Exhaust Gas Port 15 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65184

SPN 1152 (R) Engine Exhaust Gas Port 16 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65184

SPN 1153 (R) Engine Exhaust Gas Port 17 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65183

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SPN 1154 (R) Engine Exhaust Gas Port 18 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65183

SPN 1155 (R) Engine Exhaust Gas Port 19 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65183

SPN 1156 (R) Engine Exhaust Gas Port 20 Temperature

Temperature at the cylinder exhaust port of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65183

SPN 1157 (R) Engine Main Bearing 1 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65182

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SPN 1158 (R) Engine Main Bearing 2 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65182

SPN 1159 (R) Engine Main Bearing 3 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65182

SPN 1160 (R) Engine Main Bearing 4 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65182

SPN 1161 (R) Engine Main Bearing 5 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65181

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SPN 1162 (R) Engine Main Bearing 6 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65181

SPN 1163 (R) Engine Main Bearing 7 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65181

SPN 1164 (R) Engine Main Bearing 8 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65181

SPN 1165 (R) Engine Main Bearing 9 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65180

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SPN 1166 (R) Engine Main Bearing 10 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65180

SPN 1167 (R) Engine Main Bearing 11 Temperature

Temperature of the main bearing which supports the crankshaft of the engine.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65180

SPN 1168 (R) Engine Turbocharger Lube Oil Pressure 2

Gage pressure of oil in turbocharger lubrication system.

Data Length: 1 byte
Resolution: 4 kPa/bit, 0 offset
Data Range: 0 to 1000 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65179

SPN 1169 (R) Engine Turbocharger 2 Speed

Rotational velocity of rotor in the turbocharger.

Data Length: 2 bytes
Resolution: 4 rpm/bit, 0 offset
Data Range: 0 to 257,020 rpm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65179

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SPN 1170 (R) Engine Turbocharger 3 Speed

Rotational velocity of rotor in the turbocharger.

Data Length: 2 bytes
Resolution: 4 rpm/bit, 0 offset
Data Range: 0 to 257,020 rpm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65179

SPN 1171 (R) Engine Turbocharger 4 Speed

Rotational velocity of rotor in the turbocharger.

Data Length: 2 bytes
Resolution: 4 rpm/bit, 0 offset
Data Range: 0 to 257,020 rpm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65179

SPN 1172 (R) Engine Turbocharger 1 Compressor Inlet Temperature

Temperature of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65178

SPN 1173 (R) Engine Turbocharger 2 Compressor Inlet Temperature

Temperature of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65178

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SPN 1174 (R) Engine Turbocharger 3 Compressor Inlet Temperature

Temperature of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65178

SPN 1175 (R) Engine Turbocharger 4 Compressor Inlet Temperature

Temperature of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65178

SPN 1176 (R) Engine Turbocharger 1 Compressor Inlet Pressure

Gage pressure of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
Resolution: 1/128 kPa/bit, -250 kPa offset
Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65177

SPN 1177 (R) Engine Turbocharger 2 Compressor Inlet Pressure

Gage pressure of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
Resolution: 1/128 kPa/bit, -250 kPa offset
Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65177

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SPN 1178 (R) Engine Turbocharger 3 Compressor Inlet Pressure

Gage pressure of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
Resolution: 1/128 kPa/bit, -250 kPa offset
Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65177

SPN 1179 (R) Engine Turbocharger 4 Compressor Inlet Pressure

Gage pressure of the air entering the compressor side of the turbocharger.

Data Length: 2 bytes
Resolution: 1/128 kPa/bit, -250 kPa offset
Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65177

SPN 1180 (R) Engine Turbocharger 1 Turbine Inlet Temperature

Temperature of the combustion by-products entering the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65176

SPN 1181 (R) Engine Turbocharger 2 Turbine Inlet Temperature

Temperature of the combustion by-products entering the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65176

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SPN 1182 (R) Engine Turbocharger 3 Turbine Inlet Temperature

Temperature of the combustion by-products entering the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65176

SPN 1183 (R) Engine Turbocharger 4 Turbine Inlet Temperature

Temperature of the combustion by-products entering the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65176

SPN 1184 (R) Engine Turbocharger 1 Turbine Outlet Temperature

Temperature of the combustion by-products exiting the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65175

SPN 1185 (R) Engine Turbocharger 2 Turbine Outlet Temperature

Temperature of the combustion by-products exiting the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65175

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SPN 1186 (R) Engine Turbocharger 3 Turbine Outlet Temperature

Temperature of the combustion by-products exiting the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65175

SPN 1187 (R) Engine Turbocharger 4 Turbine Outlet Temperature

Temperature of the combustion by-products exiting the turbine side of the turbocharger.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65175

SPN 1188 (R) Engine Turbocharger 1 Wastegate Drive

Position of the wastegate drive. A value of 0% represents fully closed and a value of 100% represents fully open.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65174

SPN 1189 (R) Engine Turbocharger 2 Wastegate Drive

Position of the wastegate drive. A value of 0% represents fully closed and a value of 100% represents fully open.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65174

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SPN 1190 (R) Engine Turbocharger 3 Wastegate Drive

Position of the wastegate drive. A value of 0% represents fully closed and a value of 100% represents fully open.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65174

SPN 1191 (R) Engine Turbocharger 4 Wastegate Drive

Position of the wastegate drive. A value of 0% represents fully closed and a value of 100% represents fully open.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65174

SPN 1192 (R) Engine Turbocharger Wastegate Actuator Control Air Pressure

Gage pressure of the air used to control the actuator which opens and closes the wastegate valve.

Data Length: 1 byte
Resolution: 4 kPa/bit, 0 offset
Data Range: 0 to 1000 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65174

SPN 1193 Engine Operation Time Since Rebuild

The time in engine operation since the last engine rebuild.

Data Length: 4 bytes
Resolution: 1 s/bit, 0 offset
Data Range: 0 to 4,211,081,215 s Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65173

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SPN 1194 Anti-theft Encryption Seed Present Indicator

Indicates the presence of the encryption seed random number.

00 - Random number is not present
01 - Random number is present

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 56320

SPN 1195 Anti-theft Password Valid Indicator

Indicates the presence of a validated password.

00 - Password is not a validated password
01 - Password is a validated password

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 56320

SPN 1196 Anti-theft Component Status States

Indicates whether or not the component can be started.

00 Unlocked
01 Locked
10 Blocked
11 Not defined

00b - Unlocked = This state indicates that the component can be started without the end user being required to enter a password.

01b - Locked = This state indicates that the component can NOT be started (i.e., Unlocked) without the end user being required to enter a password.

10b - Blocked = This state indicates that a Lock or Unlock command cannot be executed because some other algorithm or command of higher priority is commanding differently.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 56320

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SPN 1197 Anti-theft Modify Password States

This parameter is used to indicate whether a password request was successfully performed, or if the request could not be perform due to system constraints or if the request was not a valid request.

00 Ok
01 Full_of_Passwords
10 Empty_of_Passwords
11 Not_valid

00b - Ok = This state indicates that the request was successfully performed.

01b - Full_Of_Passwords = This state indicates that the component can NOT store any additional passwords in its memory.

10b - Empty_Of_Passwords = This state indicates that the component would be empty of passwords (an unacceptable condition) if the password under which the end user is logged in, is deleted. Thus the delete password command is not successfully executed.

Note that if the Delete_Password command is sent to a component that does not currently have a password the Empty_Of_Passwords state indicator shall be used.

11b - Not_Valid = This state indicates that the request is not a valid one.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 56320

SPN 1198 Anti-theft Random Number

A seven byte random numeric code provided by the component in response to an anti-theft request. This parameter is sent as a numeric value utilizing the full range of 0 to 0xFFFFFFFFFFFFFF. The most significant byte is sent first, not following the rules of Table 1.

Data Length: 7 bytes
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Status
Supporting information:
PGN 56320

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SPN 1199 Anti-theft Encryption Indicator States

This parameter is used to indicate if a random number seed is being requested, or if an encrypted password is being provided to the component.

00 Encryption_Seed_Request
01 Encrypted_Code_Present
10 Not defined
11 Not_Available

00b - Encryption_Seed_Request = This state represents a request to the component to provide a random number seed.

01b - Encrypted_Code_Present = This state is used to indicate that an encrypted password is being provided to the component.

11b - Not_Available = This state is used to indicate that a random number is NOT being requested nor is an encrypted password being provided to the component.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 56576

SPN 1200 Anti-theft Desired Exit Mode States

This parameter is used to specify the desired triggers that are to be used by the component in deciding when to transition to the Locked state.

00 Lock_Upon_Operator_Request
01 Lock_When_Key_Off
10 Not defined
11 Not_Available

00b - Lock_Upon_Operator_Request—This state is used to indicate that the end user would have to manually enter a password to Lock the engine.

01b - Lock_When_Keyoff—This state is used to indicate that the component would automatically transition to the Locked state when the end user turns off the engine (i.e. without the end user being required to manually enter the password).

11b - Not_Available—This state is indicates that the option is not selectable or changeable by the operator via using current tool.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 56576

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SPN 1201 Anti-theft Command States

This parameter is used to identify the specific requests being sent to the component.

000 Add_Password
001 Delete_Password
010 Change_Password
011 Lock_or_Unlock
100 Check_Status
101 Login
110-111 Not defined

000b - Add_Password—This state represents a request to the component to add a password to the list of passwords that the component has stored as valid codes. This command will not be performed if the component has already stored, the maximum number of passwords that it is capable of storing. The Login command must precede this command.

001b - Delete_Password—This state represents a request to the component to delete the password (the same one used when the end-user logged in). See SPN 1197 for limitations.

010b - Change_Password—This state represents a request to the component to change the password (the same one that the end-user logged in with) to a different password, which is to be specified by the end user. The Login command must precede this command.

011b - Lock_Or_Unlock—This state represents a request to the component to change from the Locked state to the Unlocked state or from the Unlocked state to the Locked state.

100b - Check_Status—This state represents a request to check to see if the component is in the Locked or Unlocked state.

101b - Login—This state represents a request to validate the end user, before performing commands such as Add_Password and Change_Password.

Data Length:	3 bits		
Resolution:	8 states/3 bit, 0 offset		
Data Range:	0 to 7	Operational Range:	same as data range
Type:	Status		
Supporting information:			
PGN	56576		

SPN 1202 Anti-theft Password Representation

This parameter is the seven byte numeric code (i.e., 'encrypted password' or 'key') that is generated based on the encryption algorithm, the password supplied by the end user, and the random number seed given by the component. This parameter is sent as a numeric value utilizing the full range of 0 to 0xFFFFFFFFFFFFFF. The most significant byte is sent first, not following the rules of Table 1.

Data Length:	7 bytes		
Resolution:	ASCII, 0 offset		
Data Range:	0 to 255 per byte	Operational Range:	same as data range
Type:	Status		
Supporting information:			
PGN	56576		

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SPN 1203 Engine Auxiliary Coolant Pressure

Gage pressure of coolant found in the intercooler which is located after the turbocharger.

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

SPN 1204 Electrical Load

Electrical power delivered by the engine to the electrical system connected to the generator.

Data Length: 2 bytes
Resolution: 0.5 kW/bit, 0 offset
Data Range: 0 to 32,127.5 kW Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65171

SPN 1205 Safety Wire Status

Status signal which indicates that the safety wire has been activated. When the safety wire is activated, the engine will not operate. This is used for maintenance purposes.

00 - Safety wire has not been activated
01 - Safety wire has been activated

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65171

SPN 1206 Turning Gear Engaged

Status signal which indicates that the turning gear is engaged. The turning gear is used to turn the flywheel/crankshaft, for maintenance purposes, while the engine is not running.

00 - Turning gear is not engaged
01 - Turning gear is engaged

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65171

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SPN 1207 Engine ECU Temperature (OBSOLETE use SPN 1136)

Temperature of the engine electronic control unit.

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

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN

SPN 1208 (R) Engine Pre-filter Oil Pressure

Gage pressure of the engine oil before the oil reaches the oil filter.

Data Length: 1 byte
Resolution: 4 kPa/bit, 0 offset
Data Range: 0 to 1000 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65170

SPN 1209 (R) Engine Exhaust Gas Pressure

Gage pressure of the exhaust gasses as measured at the turbine inlet of the turbocharger.

Data Length: 2 bytes
Resolution: 1/128 kPa/bit, -250 kPa offset
Data Range: -250 kPa TO 251.99 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65170

SPN 1210 (R) Engine Fuel Rack Position

Measured position of the engine fuel rack. A value of 0% rack represents no fueling and a value of 100% rack represents maximum fueling.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65170

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SPN 1211 Engine Build Hours Reset

Command signal used to reset the engine rebuild hours.

00 Do not reset
01 Reset
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 56832

SPN 1212 Engine Auxiliary Coolant Temperature

Temperature of coolant found in the intercooler which is located after the turbocharger.

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65172

SPN 1237 Engine Shutdown Override Switch

Switch signal which indicates the position of the engine shutdown override switch. This switch function allows the operator to override an impending engine shutdown.

00 - Off
01 - On

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

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SPN 1238 Traction Control Override Switch

Switch signal which indicates the position of the traction control override switch. The traction control override signal disables the automatic traction control function allowing the wheels to spin.

00- off
01- on
10 - Error
11 - Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

SPN 1239 (R) Engine Fuel Leakage 1

Status signal which indicates fuel leakage in the fuel rail of the engine. The location can be either before or after the fuel pump.

00 - no leakage detected
01 – leakage detected

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65169

SPN 1240 (R) Engine Fuel Leakage 2

Status signal which indicates fuel leakage in the fuel rail of the engine. The location can be either before or after the fuel pump.

00 - no leakage detected
01 – leakage detected

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65169

SPN 1241 (R) Engine Mass Flow (Gaseous)

Mass flow of natural gas to the engine.

Data Length: 2 bytes
Resolution: 0.05 kg/h per bit, 0 offset
Data Range: 0 to 3212.75 kg/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65170

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SPN 1242 Instantaneous Estimated Brake Power

Estimate of the power developed by the engine.

Data Length: 2 bytes
Resolution: 0.5 kW/bit, 0 offset
Data Range: 0 to 32,127.5 kW Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65170

SPN 1243 ABS Fully Operational

Signal which indicates whether an ABS system is fully operational or whether its functionality is reduced by a defect or by an intended action (e.g., by activation of an ABS-off-road switch or during special diagnostic procedures). There are cases where the signal is necessary to fulfill legal regulations for special applications (e.g., switching off integrated retarders).

00 - Not Fully Operational
01 - Fully Operational
10 - Reserved
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61441

SPN 1246 (R) Number of Engine Torque History Records

Number of torque history records contained in the engine torque history PGN. A value of 0 is broadcast if no torque history records are stored in the ECU.

Data Length: 1 byte
Resolution: 1 record/bit, 0 offset
Data Range: 0 to 250 records Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1247 Engine Power

Advertised engine power capability. Advertised power is what a customer will find on a sales sheet for an engine with a certain calibration.

Data Length: 2 bytes
Resolution: 0.5 kW/bit, 0 offset
Data Range: 0 to 32,127.5 kW Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

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SPN 1248 (R) Engine Peak Torque 1

Maximum torque output of the current ECU calibration when the engine operates on torque curve 1. For calibrations that support two torque curves, this parameter shall be assigned the value of the lower curve. For calibrations that support only one curve, this parameter should be used.

Data Length: 2 bytes
Resolution: 1 Nm/bit, 0 offset
Data Range: 0 to 64,255 Nm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1249 (R) Engine Peak Torque 2

Maximum torque output of the current ECU calibration when the engine operates on torque curve 2. For calibrations that support two torque curves, this parameter shall be assigned the value of the higher curve. For calibrations that support only one curve, this parameter should to set to “not available”.

Data Length: 2 bytes
Resolution: 1 Nm/bit, 0 offset
Data Range: 0 to 64,255 Nm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1250 Calibration Record Start Month

Calendar month timestamp when an ECU record was established.

NOTE - A value of 0 for the month is null. The value 1 identifies January; 2 identifies February; etc.

Data Length: 1 byte
Resolution: 1 month/bit, 0 offset
Data Range: 0 to 250 months Operational Range: 1 to 12 month
Type: Measured
Supporting information:
PGN 65168

SPN 1251 Calibration Record Start Day

Calendar day timestamp when an ECU record was established.

NOTE - A value of 0 for the date is null. The values 1, 2, 3, and 4 are used to identify the first day of the month; 5, 6, 7, and 8 identify the second day of the month; etc.

Data Length: 1 byte
Resolution: 0.25 days/bit, 0 offset
Data Range: 0 to 62.5 days Operational Range: 0.25 to 31.75 day
Type: Measured
Supporting information:
PGN 65168

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SPN 1252 Calibration Record Start Year

Calendar year timestamp when an ECU record was established.

NOTE - A value of 0 for the year identifies the year 1985; a value of 1 identifies 1986; etc.

Data Length: 1 byte
Resolution: 1 year/bit, 1985 years offset
Data Range: 1985 to 2235 years Operational Range: 1985 to 2235 year
Type: Measured
Supporting information:
PGN 65168

SPN 1253 Calibration Record Duration Time

Duration in hours for which the engine operated in the conditions captured in the current record.

Data Length: 4 bytes
Resolution: 0.05 hr/bit, 0 offset
Data Range: 0 to 210,554,060.75 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1254 Torque Limiting Feature Status

Status of an ECU feature which limits the torque output of the engine.

00 - Disabled
01 - Enabled

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65168

SPN 1255 Transmission Gear Ratio 1

Gear ratio value stored in the ECU that is used to define a range of transmission gears for which a limit is applied to the engine output torque. Transmission gear ratio 1 should be the numerically highest transmission gear ratio breakpoint that defines ratio ranges for torque limits.

Data Length: 2 bytes
Resolution: 0.01/bit, 0 offset
Data Range: 0 to 642.55 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

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SPN 1256 Engine Torque Limit 1, Transmission

Limit applied to the engine output torque during vehicle operation in transmission gear ratios numerically greater than transmission gear ratio 1 (see SPN 1255).

Data Length: 2 bytes
Resolution: 1 Nm/bit, 0 offset
Data Range: 0 to 64,255 Nm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1257 Transmission Gear Ratio 2

Gear ratio value stored in the ECU that is used to define a range of transmission gears for which a limit is applied to the engine output torque. Transmission gear ratio 2 should be the numerically highest transmission gear ratio breakpoint less than transmission gear ratio 1 (see SPN 1255) that defines ratio ranges for torque limits.

Data Length: 2 bytes
Resolution: 0.01/bit, 0 offset
Data Range: 0 to 642.55 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1258 Engine Torque Limit 2, Transmission

Limit applied to the engine output torque during vehicle operation in transmission gear ratios numerically less than or equal to transmission gear ratio 1 (see SPN 1255) and numerically greater than transmission gear ratio 2 (see.SPN 1257). For example, with transmission gear ratio 1 equal to 12.0:1 and transmission gear ratio 2 equal to 5.0:1, vehicle operation in a transmission gear with a ratio of 6.0:1 will result in the application of engine torque limit 2, transmission.

Data Length: 2 bytes
Resolution: 1 Nm/bit, 0 offset
Data Range: 0 to 64,255 Nm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1259 Transmission Gear Ratio 3

Gear ratio value stored in the ECU that is used to define a range of transmission gears for which a limit is applied to the engine output torque. Transmission gear ratio 3 should be the numerically highest transmission gear ratio breakpoint less than transmission gear ratio 2 (see SPN 1257) that defines ratio ranges for torque limits.

Data Length: 2 bytes
Resolution: 0.01/bit, 0 offset
Data Range: 0 to 642.55 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

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SPN 1260 Engine Torque Limit 3, Transmission

Limit applied to the engine output torque during vehicle operation in transmission gear ratios numerically less than or equal to transmission gear ratio 2 (see SPN 1257) and numerically greater than transmission gear ratio 3 (see.SPN 1259). For example, with transmission gear ratio 2 equal to 5.0:1 and transmission gear ratio 3 equal to 2.0:1, vehicle operation in a transmission gear with a ratio of 3.0:1 will result in the application of engine torque limit 3, transmission.

Data Length: 2 bytes
Resolution: 1 Nm/bit, 0 offset
Data Range: 0 to 64,255 Nm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1261 Engine Torque Limit 4, Transmission

Limit applied to the engine output torque during vehicle operation in transmission gear ratios numerically less than or equal to transmission gear ratio 3 (see SPN 1259).

Data Length: 2 bytes
Resolution: 1 Nm/bit, 0 offset
Data Range: 0 to 64,255 Nm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1262 Engine Torque Limit 5, Switch

Limit applied to the engine output torque based on activation of an ECU switch input.

Data Length: 2 bytes
Resolution: 1 Nm/bit, 0 offset
Data Range: 0 to 64,255 Nm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

SPN 1263 Engine Torque Limit 6, Axle Input

Limit applied to the engine output torque based on the maximum allowable axle input torque. Axle input torque is calculated as the current engine torque output multiplied by the transmission gear ratio.

Data Length: 2 bytes
Resolution: 2 Nm/bit, 0 offset
Data Range: 0 to 128,510 Nm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65168

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SPN 1264 (R) Engine Extended Crankcase Blow-by Pressure - duplicate (see SPN 22)

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

(1264 not to be used – obsolete)

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

SPN 1320 (R) Engine External Shutdown Air Supply Pressure

Pressure of the air used to shut off the fuel supply to the engine.

Data Length: 2 bytes
Resolution: 0.5 kPa/bit, 0 offset
Data Range: 0 to 32,127.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65167

SPN 1349 (R) Engine Injector Metering Rail 2 Pressure

The gage pressure of fuel in the metering rail #2 as delivered from the supply pump to the injector metering inlet. See Figure SPN1381_A for fuel system related parameters. Although the figure does not show rail #2 it does show the relationship of rail pressure to other signals.

Data Length: 2 bytes
Resolution: 1/256 MPa/bit, 0 offset
Data Range: 0 to 251 Mpa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65243

SPN 1350 Time Since Last Service

The vehicle operation time since the last service was performed. The type of service information is identified by the service component identification number.

Data Length: 2 bytes
Resolution: 1 hr/bit, -32,127 hr offset
Data Range: -32,127 to 32,128 hr Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65166

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SPN 1376 Battery 2 Potential (Voltage) (duplicate - see also SPN 444)

The voltage for isolated battery #2.

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

SPN 1377 (R) Engine Synchronization Switch

This is the On/Off operation of the Multiple Unit Synchronization functionality. When it is enabled (i.e. On) the master engine will synchronize one or more slave engines to operate at the same speed. This switch position indicates whether this feature is disabled (off) or enabled (on).

00 Functionality is disabled (off)
01 Functionality is enabled (on)
10 Error
11 Not available or Unused

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64971

SPN 1379 Service Component Identification

Identification of component needing service. See Table SPN911_A.

Data Length: 1 byte
Resolution: 1 ID/bit, 0 offset
Data Range: 0 to 250 ID Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65166

SPN 1380 Engine Oil Level Remote Reservoir

Ratio of current volume of engine oil in a remote reservoir to the maximum required volume. If a single switch (on/off) is used, 20% and 100% respectively will be used where 100% means no oil needs to be added and 20% means oil needs to be added. If two switches are used, 20%, 50%, and 100% will be used where 20% indicates the oil is critically low, 50% indicates the oil level is low, and 100% means no oil needs to be added. For continuous sensors, the actual measured

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65130

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SPN 1381 (R) Engine Fuel Supply Pump Inlet Pressure

Absolute pressure of fuel at the fuel supply pump inlet. See Figures SPN16_A & SPN16_B

Data Length: 1 byte

Resolution: 2 kPa/bit, 0 offset

Data Range: 0 to 500 kPa Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65130

SPN 1382 (R) Engine Fuel Filter (suction side) Differential Pressure

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

Data Length: 1 byte

Resolution: 2 kPa/bit, 0 offset

Data Range: 0 to 500 kPa Operational Range: same as data range

Type: Measured

Supporting information:

PGN 65130

SPN 1385 Auxiliary Temperature #1 (duplicate see also SPN 441)

Temperature measured by auxiliary temperature sensor #1 or #2. Not to be used in place of existing SPNs.

Data Length: 1 byte

Resolution: 1 deg C/bit, -40 deg C offset

Data Range: -40 to 210 deg C Operational Range: same as data range

Type: Measured

Supporting information:

PGN

SPN 1386 Auxiliary Temperature #2 (duplicate see also SPN 442)

Temperature measured by auxiliary temperature sensor #1 or #2. Not to be used in place of existing SPNs.

Data Length: 1 byte

Resolution: 1 deg C/bit, -40 deg C offset

Data Range: -40 to 210 deg C Operational Range: same as data range

Type: Measured

Supporting information:

PGN

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SPN 1387 Auxiliary Pressure #1

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

Data Length: 1 byte
Resolution: 16 kPa/bit, 0 offset
Data Range: 0 to 4000 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65164

SPN 1388 Auxiliary Pressure #2

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

Data Length: 1 byte
Resolution: 16 kPa/bit, 0 offset
Data Range: 0 to 4000 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65164

SPN 1389 (R) Engine Fuel Specific Gravity

This parameter conveys the specific gravity of the gaseous fuel being used by the engine. The specific gravity of the fuel can then be used to compute the density of the fuel.

Data Length: 2 bytes
Resolution: 0.0001/bit, 0 offset
Data Range: 0 to 6.4255 Operational Range: 0 to 2.0000
Type: Status
Supporting information:
PGN 65202

SPN 1390 (R) Engine Fuel Valve Inlet Absolute Pressure

The absolute pressure at the inlet of the gaseous fuel valve.

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65163

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SPN 1391 (R) Engine Fuel Valve Differential Pressure

The differential pressure between the inlet and the outlet of a gaseous fuel valve.

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65163

SPN 1392 (R) Engine Air to Fuel Differential Pressure

The differential pressure between the gaseous fuel and the air intake manifold.

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65163

SPN 1393 (R) Engine Cylinder #1 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65160

SPN 1394 (R) Engine Cylinder #2 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65160

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SPN 1395 (R) Engine Cylinder #3 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65160

SPN 1396 (R) Engine Cylinder #4 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65160

SPN 1397 (R) Engine Cylinder #5 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65160

SPN 1398 (R) Engine Cylinder #6 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65160

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SPN 1399 (R) Engine Cylinder #7 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65160

SPN 1400 (R) Engine Cylinder #8 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65160

SPN 1401 (R) Engine Cylinder #9 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65161

SPN 1402 (R) Engine Cylinder #10 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65161

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SPN 1403 (R) Engine Cylinder #11 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65161

SPN 1404 (R) Engine Cylinder #12 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65161

SPN 1405 (R) Engine Cylinder #13 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65161

SPN 1406 (R) Engine Cylinder #14 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65161

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SPN 1407 (R) Engine Cylinder #15 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65161

SPN 1408 (R) Engine Cylinder #16 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65161

SPN 1409 (R) Engine Cylinder #17 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65162

SPN 1410 (R) Engine Cylinder #18 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65162

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SPN 1411 (R) Engine Cylinder #19 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65162

SPN 1412 (R) Engine Cylinder #20 Ignition Transformer Secondary Output

This parameter indicates the relative intensity of the secondary output voltage of the ignition transformer.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65162

SPN 1413 (R) Engine Cylinder #1 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65154

SPN 1414 (R) Engine Cylinder #2 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65154

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SPN 1415 (R) Engine Cylinder #3 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65154

SPN 1416 (R) Engine Cylinder #4 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65154

SPN 1417 (R) Engine Cylinder #5 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65155

SPN 1418 (R) Engine Cylinder #6 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65155

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SPN 1419 (R) Engine Cylinder #7 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65155

SPN 1420 (R) Engine Cylinder #8 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65155

SPN 1421 (R) Engine Cylinder #9 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65156

SPN 1422 (R) Engine Cylinder #10 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65156

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SPN 1423 (R) Engine Cylinder #11 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65156

SPN 1424 (R) Engine Cylinder #12 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65156

SPN 1425 (R) Engine Cylinder #13 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65157

SPN 1426 (R) Engine Cylinder #14 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65157

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SPN 1427 (R) Engine Cylinder #15 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65157

SPN 1428 (R) Engine Cylinder #16 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65157

SPN 1429 (R) Engine Cylinder #17 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65158

SPN 1430 (R) Engine Cylinder #18 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65158

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SPN 1431 (R) Engine Cylinder #19 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65158

SPN 1432 (R) Engine Cylinder #20 Ignition Timing

The ignition timing of the cylinder.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65158

SPN 1433 (R) Engine Desired Ignition Timing #1

A programmable timing value specific to the engine's application. Factors affecting this value include both fuel type and the nature of the load being driven.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65159

SPN 1434 (R) Engine Desired Ignition Timing #2

A programmable timing value specific to the engine's application. Factors affecting this value include both fuel type and the nature of the load being driven.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65159

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SPN 1435 (R) Engine Desired Ignition Timing #3

A programmable timing value specific to the engine's application. Factors affecting this value include both fuel type and the nature of the load being driven.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65159

SPN 1436 (R) Engine Actual Ignition Timing

The actual ignition timing at the current engine conditions. This parameter may or may not be equal to one of the desired timing parameters (see SPNs 1433-1435), depending on the status of the engine.

Data Length: 2 bytes
Resolution: 1/128 deg/bit, -200 deg offset
Data Range: -200 to 301.99 deg Operational Range: same as data range
Type: Status
Supporting information:
PGN 65159

SPN 1437 (R) Road Speed Limit Status

Status (active or not active) of the system used to limit maximum vehicle velocity.

00 - Active
01 - Not Active

NOTE - While somewhat inconsistent with other J1939 status parameters, the states defining 00 = active and 01 = inactive for Road Speed Limit Status are NOT typographical errors, and should be implemented as stated.

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

SPN 1438 ABS/EBS Amber Warning Signal (Powered Vehicle)

This parameter commands the ABS/EBS amber/yellow optical warning signal

00 Off
01 On
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61441

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SPN 1439 EBS Red Warning Signal

This parameter commands the EBS red optical warning signal

00 Off
01 On
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61441

SPN 1440 (R) Engine Fuel Flow Rate 1

The rate at which the fuel is flowing through a fuel valve.

Data Length: 2 bytes
Resolution: 0.1 m^3/h per bit, 0 offset
Data Range: 0 to 6425.5 m^3/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65153

SPN 1441 (R) Engine Fuel Flow Rate 2

The rate at which the fuel is flowing through a fuel valve.

Data Length: 2 bytes
Resolution: 0.1 m^3/h per bit, 0 offset
Data Range: 0 to 6425.5 m^3/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65153

SPN 1442 (R) Engine Fuel Valve 1 Position

The position of a gaseous fuel valve that is metering the fuel flow to the engine. 0% indicates no fuel flow through valve and 100% means maximum fuel flow through valve.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65153

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SPN 1443 (R) Engine Fuel Valve 2 Position

The position of a gaseous fuel valve that is metering the fuel flow to the engine. 0% indicates no fuel flow through valve and 100% means maximum fuel flow through valve.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65153

SPN 1444 (R) Engine Cylinder #1 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65147

SPN 1445 (R) Engine Cylinder #2 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65147

SPN 1446 (R) Engine Cylinder #3 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65147

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SPN 1447 (R) Engine Cylinder #4 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65147

SPN 1448 (R) Engine Cylinder #5 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65148

SPN 1449 (R) Engine Cylinder #6 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65148

SPN 1450 (R) Engine Cylinder #7 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65148

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SPN 1451 (R) Engine Cylinder #8 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65148

SPN 1452 (R) Engine Cylinder #9 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65149

SPN 1453 (R) Engine Cylinder #10 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65149

SPN 1454 (R) Engine Cylinder #11 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65149

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SPN 1455 (R) Engine Cylinder #12 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65149

SPN 1456 (R) Engine Cylinder #13 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65150

SPN 1457 (R) Engine Cylinder #14 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65150

SPN 1458 (R) Engine Cylinder #15 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65150

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SPN 1459 (R) Engine Cylinder #16 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65150

SPN 1460 (R) Engine Cylinder #17 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65151

SPN 1461 (R) Engine Cylinder #18 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65151

SPN 1462 (R) Engine Cylinder #19 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65151

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SPN 1463 (R) Engine Cylinder #20 Combustion Time

The amount of time from when the ignition of the fuel is initiated to when the fuel is completely ignited (i.e., the flame front has propagated across the cylinder).

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65151

SPN 1464 (R) Engine Desired Combustion Time

The desired combustion time based upon engine load and speed lookup maps.

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65152

SPN 1465 (R) Engine Average Combustion Time

The average combustion time of all cylinders of an engine.

Data Length: 2 bytes
Resolution: 0.01 ms/bit, 0 offset
Data Range: 0 to 642.55 ms Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65152

SPN 1466 Steer Channel Mode

Indicates the functional mode of steer channel of the tire pressure control system.

0000 Maintain
0001 Inflate
0010 Deflate
0011 Confirm
0100 Inflate Wait – System will inflate when conditions allow
0101 Deflate Wait – System will deflate when conditions allow
0110 Pressure Check
0111-1101 Reserved
1110 Error Condition
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

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SPN 1467 Trailer/tag Channel Mode

Indicates the functional mode of trailer/tag channel of the tire pressure control system.

0000 Maintain
0001 Inflate
0010 Deflate
0011 Confirm
0100 Inflate Wait – System will inflate when conditions allow
0101 Deflate Wait – System will deflate when conditions allow
0110 Pressure Check
0111-1101 Reserved
1110 Error Condition
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

SPN 1468 Drive Channel Mode

Indicates the functional mode of trailer/tag channel of the tire pressure control system.

0000 Maintain
0001 Inflate
0010 Deflate
0011 Confirm
0100 Inflate Wait – System will inflate when conditions allow
0101 Deflate Wait – System will deflate when conditions allow
0110 Pressure Check
0111-1101 Reserved
1110 Error Condition
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

SPN 1469 PCU Drive Solenoid Status

Current state of the drive solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

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SPN 1470 PCU Steer Solenoid Status

Current state of the steer solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

SPN 1471 Tire Pressure Supply Switch Status

Current state of an open/closed type switch used to determine if adequate pressure exists for system implementation.

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

SPN 1472 PCU Deflate Solenoid Status

Current state of the deflate solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

SPN 1473 PCU Control Solenoid Status

Current state of the control solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

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SPN 1474 PCU Supply Solenoid Status

Current state of the supply solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

SPN 1475 PCU Trailer, Tag or Push Solenoid Status

Current state of the trailer, tag, or push solenoid used to implement a tire pressure control system in its pneumatic control unit (PCU).

00 - Off
01 - On

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65144

SPN 1480 Source Address of Controlling Device for Retarder Control

The source address of the SAE J1939 device currently controlling the retarder. It is used to expand the torque mode parameter (see SPN 899) in cases where control is in response to an ECU that is not listed in Table SPN899_A. Its value may be the source address of the ECU transmitting the message (which means that no external SAE J1939 message is providing the active command) or the source address of the SAE J1939 ECU that is currently providing the active command in a TSC1 (see PGN 0) or similar message. Note that if this parameter value is the same as the source address of the device transmitting it, the control may be due to a message on a non-SAE J1939 data link such as SAE J1922 or a

Data Length: 1 byte
Resolution: 1 source address/bit, 0 offset
Data Range: 0 to 255 Operational Range: 0 to 253
Type: Status
Supporting information:
PGN 61440

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SPN 1481 Source Address of Controlling Device for Brake Control

The source address of the SAE J1939 device currently controlling the brake system. Its value may be the source address of the ECU transmitting the message (which means that no external SAE J1939 message is providing the active command) or the source address of the SAE J1939 ECU that is currently providing the active command in a TSC1 (see PGN 0) or similar message. Note that if this parameter value is the same as the source address of the device transmitting it, the control may be due to a message on a non-SAE J1939 data link such as SAE J1922 or a proprietary link.

Data Length: 1 byte
Resolution: 1 source address/bit, 0 offset
Data Range: 0 to 255 Operational Range: 0 to 253
Type: Status
Supporting information:
PGN 61441

SPN 1482 Source Address of Controlling Device for Transmission Control

The source address of the SAE J1939 device currently controlling the transmission. Its value may be the source address of the ECU transmitting the message (which means that no external SAE J1939 message is providing the active command) or the source address of the SAE J1939 ECU that is currently providing the active command in a TSC1 (see PGN 0) or similar message. Note that if this parameter value is the same as the source address of the device transmitting it, the control may be due to a message on a non-SAE J1939 data link such as SAE J1922 or a proprietary link.

Data Length: 1 byte
Resolution: 1 source address/bit, 0 offset
Data Range: 0 to 255 Operational Range: 0 to 253
Type: Status
Supporting information:
PGN 61442

SPN 1483 Source Address of Controlling Device for Engine Control

The source address of the SAE J1939 device currently controlling the engine. It is used to expand the torque mode parameter (see SPN 899) in cases where control is in response to an ECU that is not listed in Table SPN899_A. Its value may be the source address of the ECU transmitting the message (which means that no external SAE J1939 message is providing the active command) or the source address of the SAE J1939 ECU that is currently providing the active command in a TSC1 (see PGN 0) or similar message. Note that if this parameter value is the same as the source address of the device transmitting it, the control may be due to a message on a non-J1939 data link such as SAE J1922 or a

Data Length: 1 byte
Resolution: 1 source address/bit, 0 offset
Data Range: 0 to 255 Operational Range: 0 to 253
Type: Status
Supporting information:
PGN 61444

SPN 1487 Illumination Brightness Percent

Commanded backlight brightness level for all cab displays
Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 53248

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SPN 1573 LED Display Data #1

Informs display devices how to display the current vertical position.

00000010 High Coarse LED on
00000100 High Fine LED on
00001000 On-grade LED on
00010000 Low Fine LED on
00100000 Low Coarse LED on
All other values Reserved

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65142

SPN 1574 Laser Strike Vertical Deviation

The calculated distance from the laser strike position to the current land leveling system reference point.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: -3200 to +3200 mm, negative values are below grade, positive values are above grade, zero is on grade, 0xFE03 indicates that the sensor can not sense the laser
Type: Measured

Supporting information:
PGN 65141

SPN 1575 Modify Set Point

Used to control and coordinate the set point for the leveling system.

Operating Range: -3200 to +3200 mm, negative values are below current position, positive values are above current position, zero is no change.
Parameter specific parameter:
0xFE01 indicates Stop modifying the set point
0xFE03 indicates Raise the current set point by 5 mm
0xFE11 indicates Lower the current set point by 5 mm
0xFE13 indicates Search for laser or target
0xFE15 indicates go to the Park position
0xFE17 indicates go to the Bench position

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65140

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SPN 1576 Mast Position

Used to monitor the position of the sensor attached to the land leveling mast.

Data Length: 2 bytes

Resolution: 0.1 mm/bit, -3,200 mm offset

Data Range: -3,200 to 3,225.5 mm Operational Range: -3200 to +3200 mm, negative values are below current position, positive values are above current position, zero is no change.

Type: Measured

Supporting information:

PGN 65139

SPN 1577 Blade Duration and Direction

Used to indicate the duration and direction that the land leveling system blade moves.

Data Length: 2 bytes

Resolution: 0.1 sec/bit, -3,276.8 sec offset

Data Range: -3276.8 to 3148.7 sec Operational Range: -3276.8 to 3276.8 sec, negative values indicate move the blade up, positive values idicate move the blade down, zero indicates no change

Type: Status

Supporting information:

PGN 65138

SPN 1578 Blade Control Mode

Allows the user to select the type of blade control for the land leveling system.

00000000 Manual mode
00000001 Automatic mode
00000010 Inactive automatic mode
All other values Reserved

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255 Operational Range: same as data range

Type: Status

Supporting information:

PGN 65138

SPN 1579 Laser Tracer Target Deviation

The calculated distance for the laser target to the current laser tracer reference point.

Parameter specific parameter: 0xFE03 indicates that the sensor can not sense the laser

Data Length: 2 bytes

Resolution: 0.1 mm/bit, -3,200 mm offset

Data Range: -3,200 to 3,225.5 mm Operational Range: –3200 to +3200 mm, negative values are below setpoint, positive values are above setpoint, zero is on grade.

Type: Measured

Supporting information:

PGN 65137

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SPN 1580 Laser Tracer Vertical Distance

The elevation of the laser tracer sensor in a laser leveling system.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, 0 offset
Data Range: 0 to 6,425.5 mm Operational Range: 0 to 6400 mm
Type: Measured
Supporting information:
PGN 65137

SPN 1581 Laser Tracer Horizontal Deviation

The calculated percent deviation between the target distance and the center of the laser tracer.

Data Length: 1 byte
Resolution: 1 %/bit, 0 offset
Data Range: 0 to 250 % Operational Range: 0 to 200%, 0 to 99% indicates target is left of center, 101 to 200% indicates target is right of center, 100% indicates target is centered, 0xFF indicates previous pass mode and thus no horizontal deviation
Type: Measured
Supporting information:
PGN 65137

SPN 1582 LED Display Data #2

Informs display devices how to display the current position of the laser tracer.

00000001 On-grade “A” LED on
00000010 On-grade “B” LED on
00000100 On-grade “C” LED on
00001000 Up LED on
00010000 Down LED on
00100000 Left LED on
01000000 Right LED on
All other values Reserved

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65137

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SPN 1583 Laser Tracer Information

Provides the status of the laser tracer to the operator.

00000001 Laser power is on
00000010 Laser is ready
00000100 Valid target (1 = yes)
00001000 Previous pass (1 = yes)
00010000 Stringline (1 = yes)
00100000 Curb (1 = yes)
All other values Reserved

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65137

SPN 1584 Service Component Identification

Identification of component needing service. See Table SPN911_A.

Data Length: 1 byte
Resolution: 1 ID/bit, 0 offset
Data Range: 0 to 250 ID Operational Range: same as data range
Type: Measured
Supporting information:
PGN 56832

SPN 1585 Powered Vehicle Weight

Total mass imposed by the tires of the powered vehicle on the road surface. Does not include the trailer.

Data Length: 2 bytes
Resolution: 10 kg/bit, 0 offset
Data Range: 0 to 642,550 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65136

SPN 1586 Speed of forward vehicle

Absolute velocity of the preceding vehicle situated within 250 m in the same lane and moving in the same direction.

Data Length: 1 byte
Resolution: 1 km/h per bit, 0 offset
Data Range: 0 to 250 km/h Operational Range: 0xFF = no vehicle detected
Type: Measured
Supporting information:
PGN 65135

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SPN 1587 Distance to forward vehicle

Distance to the preceding vehicle situated within 250 m in the same lane and moving in the same direction.

Data Length: 1 byte
Resolution: 1 m/bit, 0 offset
Data Range: 0 to 250 m Operational Range: 0xFF = no vehicle detected
Type: Measured
Supporting information:
PGN 65135

SPN 1588 Adaptive Cruise Control Set Speed

Value of the desired (chosen) velocity of the adaptive cruise control system.

Data Length: 1 byte
Resolution: 1 km/h per bit, 0 offset
Data Range: 0 to 250 km/h Operational Range: 0 to 120 km/h
Type: Status
Supporting information:
PGN 65135

SPN 1589 Adaptive cruise control set distance mode

Selected distance mode for adaptive cruise control.

000 ACC Distance mode #1 (largest distance)
001 ACC Distance mode #2
010 ACC Distance mode #3
011 ACC Distance mode #4
100 ACC Distance mode #5 (shortest distance)
101 Conventional cruise control mode
110 Error condition
111 Not available/not valid

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65135

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SPN 1590 Adaptive Cruise Control Mode

This parameter is used to indicate the current state, or mode, of operation by the Adaptive Cruise Control (ACC) device. The states characterize independent system states (e.g., it is not possible to express distance control active and overtake mode simultaneously). ACC must not switch itself off while active because the driver expects it to work. So if an error occurs, the ACC must signal that to the driver so that the driver knows that he has to switch off the ACC.

000 Off (Standby, enabled, ready for activation)
001 Speed control active
010 Distance control active
011 Overtake mode
100 Hold mode
101 Finish mode
110 Disabled or error condition
111 Not available/not valid

000b - Off—Used to indicate the ACC is enabled in calibration or configuration and there are no faults that would prevent the system from operating.
001b - Speed Control Active—Used to indicate that ACC is on but not currently sending control messages. In other words, there is no target ahead and regular vehicle cruise control is controlling the vehicle speed to the driver's set speed.
010b - Distance Control Active—Used to indicate that ACC is on and actively sending control messages to maintain the appropriate following interval.
011b - Overtake Mode—Used to indicate that ACC is on but temporarily disabled because the driver is manually overriding cruise control by using either the accelerator pedal or the cruise control "accel" switch.
100b - Hold Mode—Used to indicate that the ACC has lost the previous target vehicle and is in HOLD mode. In this mode, the ACC shall limit the speed to the speed held when the target was lost. For example, if the driver activates the typical cruise buttons (Resume/Inc/Dec) the HOLD mode shall be exited and normal cruise functionality resumed. If a new target is detected, the Distance Control Active mode (010b) is again entered, unless existing conditions prohibit this.
101b - Finish Mode—Used to indicate that ACC is on with no target ahead, and ACC is currently sending control messages to return to the driver's set speed. This occurs when the target the ACC system was tracking moves out of the way so ACC returns the vehicle to the driver's set speed.
110b - Disabled or Error Condition—Used to indicate that ACC is in an error state and can not operate.

Data Length:	3 bits		
Resolution:	8 states/3 bit, 0 offset		
Data Range:	0 to 7	Operational Range:	same as data range
Type:	Status		
Supporting information:			
PGN	65135		

SPN 1591 Road curvature

Estimated value of the current road curvature for use by the adaptive cruise control system. Positive values are used for left curves. Curvature is the inverse of the radius and is zero for straight roads.

Data Length:	2 bytes		
Resolution:	1/128 1/km per bit, -250 1/km offset		
Data Range:	-250 to 251.992 1/km	Operational Range:	same as data range
Type:	Status		
Supporting information:			
PGN	65135		

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SPN 1592 Front Axle, Left Wheel Speed

High resolution measurement of the speed of the left wheel on the front axle.

Data Length: 2 bytes
Resolution: 1/256 km/h per bit, 0 offset
Data Range: 0 to 250.996 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65134

SPN 1593 Front axle, right wheel speed

High resolution measurement of the speed of the right wheel on the front axle.

Data Length: 2 bytes
Resolution: 1/256 km/h per bit, 0 offset
Data Range: 0 to 250.996 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65134

SPN 1594 Rear axle, left wheel speed

High resolution measurement of the speed of the left wheel on the rear axle.

Data Length: 2 bytes
Resolution: 1/256 km/h per bit, 0 offset
Data Range: 0 to 250.996 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65134

SPN 1595 Rear axle, right wheel speed

High resolution measurement of the speed of the right wheel on the rear axle.

Data Length: 2 bytes
Resolution: 1/256 km/h per bit, 0 offset
Data Range: 0 to 250.996 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65134

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SPN 1601 Local minute offset

Local offset in minutes from a reference time.

Data Length: 1 byte
Resolution: 1 min/bit, -125 mins offset
Data Range: -125 to 125 mins Operational Range: -59 to +59 min
Type: Measured
Supporting information:
PGN 65254

SPN 1602 (R) Local hour offset

Local offset in hours from a reference time

Data Length: 1 byte
Resolution: 1 hr/bit, -125 hr offset
Data Range: -125 to 125 hr Operational Range: -23 to +23 h
Type: Measured
Supporting information:
PGN 65254

SPN 1603 Adjust seconds

Part of the parameter used to set the time.

Data Length: 1 byte
Resolution: 0.25 s/bit, 0 offset
Data Range: 0 to 62.5 s Operational Range: 0 to 59.75 s
Type: Measured
Supporting information:
PGN 54528

SPN 1604 Adjust minutes

Part of the parameter used to set the time.

Data Length: 1 byte
Resolution: 1 min/bit, 0 offset
Data Range: 0 to 250 mins Operational Range: 0 to 59 min
Type: Measured
Supporting information:
PGN 54528

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SPN 1605 Adjust hours

Part of the parameter used to set the time.

Data Length: 1 byte
Resolution: 1 hr/bit, 0 offset
Data Range: 0 to 250 hr Operational Range: 0 to 23 h
Type: Measured
Supporting information:
PGN 54528

SPN 1606 Adjust month

Part of a parameter used to set a calendar date.

NOTE - A value of 0 for the month is null. The value 1 identifies January; 2 identifies February; etc.

Data Length: 1 byte
Resolution: 1 month/bit, 0 offset
Data Range: 0 to 250 months Operational Range: 1 to 12 month
Type: Measured
Supporting information:
PGN 54528

SPN 1607 Adjust day

Part of a parameter used to set a calendar date.

NOTE - A value of 0 for the date is null. The values 1, 2, 3, and 4 are used to identify the first day of the month; 5, 6, 7, and 8 identify the second day of the month; etc.

Data Length: 1 byte
Resolution: 0.25 days/bit, 0 offset
Data Range: 0 to 62.5 days Operational Range: 0.25 to 31.75 day
Type: Measured
Supporting information:
PGN 54528

SPN 1608 Adjust year

Part of a parameter used to set a calendar date.

NOTE - A value of 0 for the year identifies the year 1985; a value of 1 identifies 1986; etc.

Data Length: 1 byte
Resolution: 1 year/bit, 1985 years offset
Data Range: 1985 to 2235 years Operational Range: 1985 to 2235 year
Type: Measured
Supporting information:
PGN 54528

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SPN 1609 Adjust local minute offset

Used to set the local offset in minutes from a reference time.

Data Length: 1 byte
Resolution: 1 min/bit, -125 mins offset
Data Range: -125 to 125 mins Operational Range: -59 to +59 min
Type: Measured
Supporting information:
PGN 54528

SPN 1610 Adjust local hour offset

Used to set the local offset in hours from a reference time

Data Length: 1 byte
Resolution: 1 hr/bit, -125 hr offset
Data Range: -125 to 125 hr Operational Range: -24 to +23 h
Type: Measured
Supporting information:
PGN 54528

SPN 1611 Drive recognize

Indicates whether motion of the vehicle is detected or not.

00 Vehicle motion not detected
01 Vehicle motion detected

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65132

SPN 1612 Driver 1 working state

State of work of the driver.

000 Rest - sleeping
001 Driver available – short break
010 Work – loading, unloading, working in an office
011 Drive – behind wheel
100-101 Reserved
110 Error
111 Not available

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65132

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SPN 1613 Driver 2 working state

State of work of the driver.

000 Rest - sleeping
001 Driver available – short break
010 Work – loading, unloading, working in an office
011 Drive – behind wheel
100-101 Reserved
110 Error
111 Not available

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65132

SPN 1614 Overspeed

Indicates whether the vehicle is exceeding the legal speed limit set in the tachograph.

00 No overspeed
01 Overspeed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65132

SPN 1615 Driver card, driver 1

Indicates the presence of a driver card

00 - Driver card not present
01 - Driver card present

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65132

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SPN 1616 Driver card, driver 2

Indicates the presence of a driver card

00 - Driver card not present
01 - Driver card present

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65132

SPN 1617 Driver 1 Time Related States

Indicates if the driver approaches or exceeds working time limits (or other limits).

0000 Normal/No limits reached
0001 Limit #1 – 15 min before 4 ½ h
0010 Limit #2 – 4 ½ h reached
0011 Limit #3 – 15 min before 9 h
0100 Limit #4 – 9 h reached
0101 Limit #5 – 15 min before 16 h (not having 8h rest during the last 24h)
0110 Limit #6 – 16 h reached
0111-1100 Reserved
1101 Other
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65132

SPN 1618 Driver 2 Time Related States

Indicates if the driver approaches or exceeds working time limits (or other limits).

0000 Normal/No limits reached
0001 Limit #1 – 15 min before 4 ½ h
0010 Limit #2 – 4 ½ h reached
0011 Limit #3 – 15 min before 9 h
0100 Limit #4 – 9 h reached
0101 Limit #5 – 15 min before 16 h (not having 8h rest during the last 24h)
0110 Limit #6 – 16 h reached
0111-1100 Reserved
1101 Other
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65132

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SPN 1619 Direction indicator

Indicates the direction of the vehicle.

00 - Forward
01 - Reverse

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65132

SPN 1620 Tachograph performance

Indicates the tachograph performance; including electronic or mechanical analysis, instrument analysis, speed sensor analysis, mass storage analysis, and printer analysis.

00 - Normal performance
01 - Performance analysis

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65132

SPN 1621 Handling information

Indicates that handling information is present. Information could include “no printer paper”, “no driver card”, etc.

00 - No handling information
01 - Handling information

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65132

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SPN 1622 System event

Indicates that a tachograph event has occurred. This may include power supply interruption, interruption of the speed sensor, incorrect data on the driver card, driving without a driver card, illegal removal of a driver card, insertion of a driver card during driving, and time adjustment.

00 - No tachograph event
01 - Tachograph event

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65132

SPN 1623 Tachograph output shaft speed

Calculated speed of the transmission output shaft.

Data Length: 2 bytes
Resolution: 0.125 rpm/bit, 0 offset
Data Range: 0 to 8,031.875 rpm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65132

SPN 1624 Tachograph vehicle speed

Speed of the vehicle registered by the tachograph.

Data Length: 2 bytes
Resolution: 1/256 km/h per bit, 0 offset
Data Range: 0 to 250.996 km/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65132

SPN 1625 Driver 1 identification

Used to obtain the driver identity.

Data Length: Variable ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65131

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SPN 1626 Driver 2 identification

Used to obtain the driver identity.

Data Length: Variable ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65131

SPN 1632 (R) Engine Torque Limit Feature

Torque limit rating described in the current record.

000 Reserved
001 Highest torque rating
010 First torque rating
011 Previous torque rating (rating prior to the current rating)
100 Current torque rating
101-110 Reserved
111 Not available

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65168

SPN 1633 Cruise Control Pause Switch

Switch signal which indicates the position of the Cruise Control Pause Switch used on Remote Cruise Control applications. The Cruise Control Pause Switch signal temporarily disables the Cruise Control function.

00 - Off
01 - On
10 - Error Indicator
11 -Take No Action

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

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SPN 1636 (R) Engine Intake Manifold 1 Air Temperature (High Resolution)

Temperature of pre-combustion air found in intake manifold of engine air supply system. The higher resolution is required for control purposes.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65129

SPN 1637 Engine Coolant Temperature (High Resolution)

Temperature of liquid found in engine cooling system. The higher resolution is required for control purposes.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65129

SPN 1638 Hydraulic Temperature

Temperature of hydraulic fluid.

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65128

SPN 1639 Fan Speed

The speed of the fan associated with engine coolant system.

Data Length: 2 bytes
Resolution: 0.125 rpm/bit, 0 offset
Data Range: 0 to 8,031.875 rpm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65213

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SPN 1653 Vehicle Limiting Speed Governor Enable Switch

Switch signal which enables the Vehicle Limiting Speed Governor (VLSG) such that the vehicle speed may be either increased or decreased when the engine is off idle.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 57344

SPN 1654 Vehicle Limiting Speed Governor Increment Switch

Switch signal which increases the Vehicle Limiting Speed Governor (VLSG).

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 57344

SPN 1655 Vehicle Limiting Speed Governor Decrement Switch

Switch signal which decreases the Vehicle Limiting Speed Governor (VLSG).

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 57344

SPN 1656 Engine Automatic Start Enable Switch

Switch signal which enables the idle management system to be enabled. When this system is enabled with the engine in an idle mode and safe operating conditions existing, then the engine may be started or stopped automatically.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 57344

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SPN 1665 (R) Engine Turbocharger Oil Level Switch

Switch signal which indicates the presence of oil at the turbocharger

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65245

SPN 1666 Automatic Gear Shifting Enable Switch

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 57344

SPN 1667 Retarder Requesting Brake Light

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

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SPN 1675 Engine Starter Mode

There are several phases in a starting action and different reasons why a start cannot take place.

0000 start not requested
0001 starter active, gear not engaged
0010 starter active, gear engaged
0011 start finished; starter not active after having been actively engaged (after 50ms mode goes to 0000)
0100 starter inhibited due to engine already running
0101 starter inhibited due to engine not ready for start (preheating)
0110 starter inhibited due to driveline engaged or other transmission inhibit
0111 starter inhibited due to active immobilizer
1000 starter inhibited due to starter over-temp
1001-1011 Reserved
1100 starter inhibited - reason unknown
1101 error (legacy implementation only, use 1110)
1110 error
1111 not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61444

SPN 1676 Auxilary Heater Water Pump Status

Parameter indicating whether the auxilary heater water pump is running

00 Water Pump is not running
01 Water Pump is running
10 Reserved
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65133

SPN 1677 Auxiliary Heater Mode

State of the auxiliary heater

0000 Heater not active
0001 Off due to ADR per European Regulations for Transport of hazardous materials
0010 Economy mode
0011 Normal mode
0100-1101 Not defined
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65133

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SPN 1678 Cab Ventilation

Indicates whether the cab is being ventilated or not.

00 Cab not ventilated
01 Cab is ventilated
10 Reserved
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65133

SPN 1679 Engine Heating Zone

Parameter indicating whether the engine zone is being heated.

00 Engine heating zone off
01 Engine heating zone on
10 Reserved
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65133

SPN 1680 Cab Heating Zone

Parameter indicating whether the cab zone is being heated.

00 Cab heating zone off
01 Cab heating zone on
10 Reserved
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65133

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SPN 1681 Battery Main Switch Hold State

Parameter indicating whether the battery main switch is held due to an external request or not. The state battery main switch held indicates that the battery main switch is about to switch off.

00 Battery main switch not held
01 Battery main switch held
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65126

SPN 1682 Battery Main Switch Hold Request

Request to hold the battery main switch.

00 Release Battery Main Switch
01 Hold Battery Main Switch
10 undefined
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 57344

SPN 1683 Auxiliary Heater Mode Request

Request to activate the auxiliary heater.

0000 De-activate auxiliary heater
0001 Off due to ADR per European Regulations for Transport of hazardous materials
0010 Economy mode
0011 Normal mode
0100-1101 Not defined
1110 Reserved
1111 Don't care/take no action

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 57344

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SPN 1684 Auxiliary Heater Coolant Pump Request

Indicates whether to activate the auxiliary heater coolant water pump.

00 Deactivate water pump
01 Activate water pump
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 57344

SPN 1685 Request Engine Zone Heating

Request to activate engine zone heating.

00 Do not heat engine zone
01 Heat engine zone
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 57344

SPN 1686 Request Cab Zone Heating

Request to activate cab zone heating.

00 Do not cab engine zone
01 Heat cab zone
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 57344

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SPN 1687 Auxiliary Heater Output Coolant Temperature

Temperature of the auxiliary heater output coolant (I.e. water in a water heater system.)

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65133

SPN 1688 Auxiliary Heater Input Air Temperature

Temperature of the input air in an auxiliary heater system.

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65133

SPN 1689 Auxiliary Heater Output Power Percent

Current auxiliary heater output power, relative to the auxiliary heater maximum output power.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65133

SPN 1690 Auxiliary Heater Maximum Output Power

The maximum output power of the auxiliary heater.

Data Length: 2 bytes
Resolution: 2 W/bit, 0 offset
Data Range: 0 to 128,510 W Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65127

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SPN 1691 Cab Interior Temperature Command

Parameter used to command a certain cab interior temperature.

Note: See SPN 1662 and SPN 170.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Status
Supporting information:
PGN 57344

SPN 1692 (R) Engine Desired Absolute Intake Manifold Pressure (Turbo Boost Limit)

The desired absolute intake manifold pressure of the engine.

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Status
Supporting information:
PGN 65194

SPN 1693 (R) Engine Turbocharger Wastegate Valve Position

The position of the turbocharger wastegate valve (not the electronic wastegate control valve).

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65194

SPN 1694 (R) Engine Gas Mass Flow Sensor Fueling Correction

The amount of fuel the Gas Mass Flow Sensor is sensing should be added or subtracted compared to the maximum amount of fuel the control system allows the sensor to add or subtract.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65194

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SPN 1695 (R) Engine Exhaust Gas Oxygen Sensor Fueling Correction

The amount of fueling change required by the system based on the measured Exhaust Oxygen value compared to the maximum fueling change permitted by the system, expressed as percentages.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65193

SPN 1696 (R) Engine Exhaust Gas Oxygen Sensor Closed Loop Operation

Indicates whether the engine is using the Exhaust Gas Oxygen sensor to control the air/fuel ratio.

00 Command to disable function
01 Command to enable function
10 Reserved
11 Don't Care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65193

SPN 1697 CTI Wheel End Electrical Fault

Indicates the status of electrical fault on CTI wheel interface.

00 Ok (No Fault)
01 Not Defined
10 Error
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65268

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SPN 1698 CTI Tire Status

Indicates the status of the tire.

00 Ok (no fault)
01 Tire leak detected
10 Error
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65268

SPN 1699 CTI Wheel Sensor Status

Indicates whether the wheel is being monitored by the CTI controller.

00 Off / isolated from CTI Pressure Controller
01 On (tire is polled)
10 Not Defined
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65268

SPN 1700 Lane Departure Imminent, Left Side

Indicates departure imminent on left side of lane.

00 Not imminent
01 Imminent
10 Reserved
11 Not used

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61447

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SPN 1701 Lane Departure Imminent, Right Side

Indicates departure imminent on right side of lane.

00 Not imminent
01 Imminent
10 Reserved
11 Not Used

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61447

SPN 1702 Lane Departure Indication Enable Status

Indicates whether lane departure indication is active.

00 Lane Departure indication disabled
01 Lane Departure Indication enabled
10 Reserved
11 Not Used

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65115

SPN 1710 Lane Tracking Status Left Side

Indicates whether the left side is tracking lane.

00 Not Tracking Left side
01 Tracking Left side
10 Reserved
11 Don't care/Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65115

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SPN 1711 Lane Tracking Status Right Side

Indicates whether right side is tracking lane.

00 Not Tracking Right side
01 Tracking Right side
10 Reserved
11 Don't Care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65115

SPN 1712 (R) Engine Extended Range Requested Speed Control Range Upper Limit (Engine configuration)

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

When the limit is higher that 2500 RPM the 'Requested Speed Control Range Upper Limit (Engine Configuration)' parameter (see SPN 536) will be transmitted with a value of 2500 RPM.

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

SPN 1713 Hydraulic Oil Filter Restriction Switch

This switch indicates whether hydraulic oil filter is clogged.

00 No restriction
01 Restriction exists on oil fitler
10 Error
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65128

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SPN 1714 Operator Seat Direction Switch

Senses whether the operator seat is in the forward driving position

00 Operator seat not facing forward
01 Operator seat is facing forward
10 Error
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 57344

SPN 1715 Drivers Demand Retarder - Percent Torque

The Drivers demand retarder – percent torque is the maximum torque selected by the driver when one or more modes are selected by the driver, such as hand lever, switch, constant torque, constant velocity, etc.

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

SPN 1716 Retarder Selection, non-engine

The “Retarder Selection, non-engine” is the position of the driver’s selector for retarders that are not part of the engine system, expressed as percent and determined by the ratio of current position to the maximum possible position. The physical device may be a lever, rotary dial, combination of switches, or other device that the driver can use to select the type or amount of retardation needed.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61440

SPN 1717 Actual Maximum Available Retarder - Percent Torque

This is the maximum amount of torque that the retarder can immediately deliver. It is the same as the maximum torque shown in the Retarder’s Configuration message, but allows for a much faster rate of change than could be communicated by reissuing the configuration message.
Application Note: The purpose for this parameter is to allow a “Master” retarder controller to more accurately allocate the vehicle’s retarder requirements among multiple retarders. Its value should be the same as the value in the Configuration message at the time that message is assembled for broadcast, but may vary between those broadcasts.

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

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SPN 1718 Damper Stiffness Request Front Axle

Demand value for the shock absorber control at the front axle.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

SPN 1719 Damper Stiffness Request Rear Axle

Demand value for the shock absorber control at the rear axle.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

SPN 1720 Damper Stiffness Request Lift / Tag Axle

Demand value for the shock absorber control at the lift or tag axle

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

SPN 1721 Relative Level Front Axle Left

Information of the height at the left side of the front axle referred to normal level 1. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65113

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SPN 1722 Relative Level Front Axle Right

Information of the height at the right side of the front axle referred to normal level 1. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65113

SPN 1723 Relative Level Rear Axle Right

Information of the height at the left side of the rear axle referred to normal level 1. For explanations of normal level 1 see parameter SPN 1734 - Nominal Level Front Axle.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65113

SPN 1724 Relative Level Rear Axle Left

Information of the height at the left side of the rear axle referred to normal level 1. For explanations of normal level 1 see parameter SPN 1734 - Nominal Level Front Axle.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65113

SPN 1725 Bellow Pressure Front Axle Left

Information of the pressure of the air suspension bellow at the left side of the front axle

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65112

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SPN 1726 Bellow Pressure Front Axle Right

Information of the pressure of the air suspension bellow at the right side of the front axle

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65112

SPN 1727 Bellow Pressure Rear Axle Left

Information of the pressure of the air suspension bellow at the left side of the rear axle

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65112

SPN 1728 Bellow Pressure Rear Axle Right

Information of the pressure of the air suspension bellow at the right side of the rear axle

Data Length: 2 bytes
Resolution: 0.1 kPa/bit, 0 offset
Data Range: 0 to 6,425.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65112

SPN 1729 Damper Stiffness Front Axle

Damper stiffness information of the shock absorber control at the front axle

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65111

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SPN 1730 Damper Stiffness Rear Axle

Damper stiffness information of the shock absorber control at the rear axle

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65111

SPN 1731 Damper Stiffness Lift / Tag Axle

Damper stiffness information of the shock absorber control at the lift of tag axle

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65111

SPN 1732 Level Preset Front Axle Left

Set value for nominal level 'preset level' at the left side of the front axle. This value is referred to 'Normal level 1'. For explanations of normal level 1 see parameter SPN 1734 - Nominal Level Front Axle.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: same as data range
Type: Status
Supporting information:
PGN 53504

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SPN 1733 Nominal Level Rear Axle

Signal which indicates the nominal (desired) height of the rear axle to be controlled by the suspension system.

For further explanations see SPN 1734 - Nominal Level Front Axle.

0000 Level not specified,(i.e. the nominal level is none of the specified levels, no error condition)
0001 "Normal Level 1,(i.e. the level prescribed for normal driving, given by design)
0010 "Normal Level 2,(i.e. a level permitted for driving, for example to lower the vehicle in case of high speed)
0011 "Normal Level 3,(i.e. a level permitted for driving, for example to lift the vehicle in case of offroad)
0100 "Preset Level,(i.e. a level to be defined externally via CAN)
0101 "Customer Level,(i.e. a level to be defined by customer via parameter setting)
0110 "Upper Level,(i.e. the highest level to be controlled)
0111 "Lower Level,(i.e. the lowest level to be controlled)
1000-1101 Not defined
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

SPN 1734 Nominal Level Front Axle

Signal which indicates the nominal (desired) height of the front axle to be controlled by the suspension system.

These heights are discrete levels. They are the upper level, lower level, normal level 1, normal level 2, normal level 3, customer level, and preset level. Refer to Figure SPN1734_A.

· Upper Level is the highest mechanically available height of the vehicle.
· Lower Level is the lowest mechanically available height of the vehicle.

Normal Levels 1, 2 and 3 are heights normally used during driving.
· Normal Level 1 is most often used and is given by design.
· Normal Level 2 may be chosen, for example, to be lower than Normal Level 1 for the purpose of reducing fuel consumption while driving on highways.
· Normal Level 3 may be chosen above Normal Level 1 for driving off road.

The preset level has to be set by means of ASC 6 (PGN: 53504).

0000 Level not specified,(i.e. the nominal level is none of the specified levels, no error condition)
0001 "Normal Level 1,(i.e. the level prescribed for normal driving, given by design)
0010 "Normal Level 2,(i.e. a level permitted for driving, for example to lower the vehicle in case of high speed)
0011 "Normal Level 3,(i.e. a level permitted for driving, for example to lift the vehicle in case of offroad)
0100 "Preset Level,(i.e. a level to be defined externally via CAN)
0101 "Customer Level,(i.e. a level to be defined by customer via parameter setting)
0110 "Upper Level,(i.e. the highest level to be controlled)
0111 "Lower Level,(i.e. the lowest level to be controlled)
1000-1101 Not defined
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information: See Appendix D - SPN 1734
PGN 65114

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SPN 1735 Level Preset Rear Axle Right

Set value for nominal level 'preset level' at the right side of the rear axle. This value is referred to 'Normal level 1'. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: same as data range
Type: Status
Supporting information:
PGN 53504

SPN 1736 Above Nominal Level Rear Axle

Signal which indicates whether the actual height of the rear axle is above the nominal (desired) level of the rear axle. For explanations of nominal level see parameter SPN 1734 - Nominal Level Front Axle.

00 Not above
01 Above
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65114

SPN 1737 Above Nominal Level Front Axle

Signal which indicates whether the actual height of the front axle is above the nominal (desired) level of the front axle. For explanations of nominal level see SPN 1734 - Nominal Level Front Axle.

00 Not above
01 Above
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65114

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SPN 1738 Below Nominal Level Front Axle

Signal which indicates whether the actual height of the front axle is below the nominal (desired) level for the front axle. For explanations of nominal level see parameter SPN 1734 - Nominal Level Front Axle.

00 Not below
01 Below
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65114

SPN 1739 Lifting Control Mode Front Axle

Signal which indicates the actual lifting level change at the front axle

00 Lifting not active
01 Lifting active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

SPN 1740 Lowering Control Mode Front Axle

Signal which indicates the actual lowering level change at the front axle

00 Lowering not active
01 Lowering active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

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SPN 1741 (R) Level Control Mode

Signal which indicates the actual control mode of the air suspension system

0000 Normal operation; i.e. the system performs a ""pure"" control of the vehicle height
0001 Traction help (load transfer); i.e. the driven axle is loaded to a maximum value given by legislation or design
0010 Load fixing; i.e. the driven axlen is loaded to a value defined by the driver
0011 Pressure ratio 1; i.e. the ratio between the pressures at the driven axle and at the third axle is controlled, so that the ratio equals a fixed value 1
0100 Pressure ratio 2; i.e. the ratio between the pressures at the driven axle and at the third axle is controlled, so that the ratio equals a fixed value 2
0101 Optimum traction 1; i.e. the pressure at the driven axle is controlled at a fixed value 1
0110 Optimum traction 2; i.e. the pressure at the driven axle is controlled at a fixed value 2
0111 Traction help - load reduce; (i.e. the driven axle load is reduced to normal load condition)
1000 Exhausting bellow function; i.e. the bellows are exhausted totally
1001-1101 Not defined
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

SPN 1742 Kneeling Information

Signal which indicates the actual level change in case of kneeling function

0000 Not active,(i.e. the kneeling function is not active")
0001Lowering active,(i.e. the vehicle is lowered due to a kneeling request)
0010 Kneeling level reached,(i.e. the vehicle is at the fixed kneeling level)
0011 Lifting active,(i.e. the vehicle is lifted due to a recover request)
0100 Kneeling aborted,(i.e. in case of manual actuation the request was dropped before the kneeling level was reached)
0101-1101 Not defined
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

SPN 1743 Lift Axle 1 Position

Signal which indicates the position / load condition of lift axle / tag axle #1. Numbering of lift/tag axles starts at front axle.

00 Lift axle position down / tag axle laden
01 Lift axle position up / tag axle unladen
10 Error

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65114

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SPN 1744 Door Release

Signal which indicates that the doors may be opened. [Please note: doors instead of door!]
In case a kneeling request is active the ASC indicates during lowering the vehicle „doors shall not be opened“ as a security information until the kneeling level is reached. Then "doors may be opened" is sent.

00 Doors may not be opened
01 Doors may be opened
10 Error
11 Not available

Data Length:	2 bits		
Resolution:	4 states/2 bit, 0 offset		
Data Range:	0 to 3	Operational Range:	same as data range
Type:	Status		
Supporting information:			
PGN	65114		

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SPN 1745 Vehicle Motion Inhibit

Signal which indicates whether vehicle motion is inhibited.

00 Vehicle may be moved
01 Vehicle motion is inhibited
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

SPN 1746 Security Device

The signal which indicates the status of the security device. An example of a security device is a curbstone feeler installed beneath the doors of a bus. If the security device becomes active during kneeling the kneeling process (lowering) is stopped and the vehicle lifts back to the starting level.

00 Not active
01 Active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

SPN 1747 Kneeling Control Mode Request

Command signal to select the kneeling functionality

00 Automatically actuated
01 Manually actuated
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

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SPN 1748 Kneeling Request Right Side

Command signal to activate the kneeling functionality on the right side of the vehicle

00 No kneeling request
01 Kneeling request
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

SPN 1749 Kneeling Request Left Side

Command signal to activate the kneeling functionality on the left side of the vehicle

00 No kneeling request
01 Kneeling request
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

SPN 1750 Nominal Level Request Rear Axle

Command signal to activate a level of the rear axle programmed and/or memorised in the ECU. For explanations of nominal level see SPN 1734 - Nominal Level Front Axle.

0000 No level request
0001 Normal Level 1,(i.e. the level prescribed for normal driving, given by design)
0010 Normal Level 2,(i.e. a level permitted for driving, for example to lower the vehicle in case of high speed)
0011 Normal Level 3,(i.e. a level permitted for driving, for example to lift the vehicle in case of offroad)
0100 Preset Level,(i.e. a level to be defined externally via CAN)
0101 Customer Level,(i.e. a level to be defined by customer via parameter setting)
0110 Upper Level,(i.e. the highest level to be controlled)
0111 Lower Level,(i.e. the lowest level to be controlled)
1000 Stop level change,(i.e. the level change in process shall be stopped immediately)
1001-1101 Not defined
1110 Reserved
1111 Don't care/take no action

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

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SPN 1751 Nominal Level Request Front Axle

Command signal to activate a level of the front axle programmed and/or memorised in the ECU For explanations of nominal level see SPN 1734 - Nominal Level Front Axle.

0000 No level request
0001 Normal Level 1,(i.e. the level prescribed for normal driving, given by design)
0010 Normal Level 2,(i.e. a level permitted for driving, for example to lower the vehicle in case of high speed)
0011 Normal Level 3,(i.e. a level permitted for driving, for example to lift the vehicle in case of offroad)
0100 Preset Level,(i.e. a level to be defined externally via CAN)
0101 Customer Level,(i.e. a level to be defined by customer via parameter setting)
0110 Upper Level,(i.e. the highest level to be controlled)
0111 Lower Level,(i.e. the lowest level to be controlled)
1000 Stop level change,(i.e. the level change in process shall be stopped immediately)
1001-1101 Not defined
1110 Reserved
1111 Don't care/take no action

Data Length:	4 bits		
Resolution:	16 states/4 bit, 0 offset		
Data Range:	0 to 15	Operational Range:	same as data range
Type:	Status		
Supporting information:			
PGN	53760		

SPN 1752 Lift Axle 1 Position Command

Signal to command the position/load condition of lift/tag axle #1. Numbering of lift/tag axles starts at front axle.

00 Lift axle position down / tag axle laden
01 Lift axle position up / tag axle unladen
10 Reserved
11 Don't care/take no action

Data Length:	2 bits		
Resolution:	4 states/2 bit, 0 offset		
Data Range:	0 to 3	Operational Range:	same as data range
Type:	Status		
Supporting information:			
PGN	53760		

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SPN 1753 (R) Level Control Mode Request

Command signal to activate a level control mode

0000 Normal operation; i.e. the system performs a ""pure"" control of the vehicle height
0001 Traction help (load transfer); i.e. the driven axle is loaded to a maximum value given by legislation or design
0010 Load fixing; i.e. the driven axlen is loaded to a value defined by the driver
0011 Pressure ratio 1; i.e. the ratio between the pressures at the driven axle and at the third axle is controlled, so that the ratio equals a fixed value 1
0100 Pressure ratio 2; i.e. the ratio between the pressures at the driven axle and at the third axle is controlled, so that the ratio equals a fixed value 2
0101 Optimum traction 1; i.e. the pressure at the driven axle is controlled at a fixed value 1
0110 Optimum traction 2; i.e. the pressure at the driven axle is controlled at a fixed value 2
0111 Traction help - load reduce; (i.e. reduce axle load of driven axle to normal load condition)
1000 Exhaust bellows
1001 -1101 Not defined
1110 Reserved
1111 Don't care/take no action

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

SPN 1754 Below Nominal Level Rear Axle

Signal which indicates whether the actual height of the rear axle is below the nominal (desired) level for the rear axle. For explanations of nominal level see SPN 1734 - Nominal Level Front Axle.

00 Not below
01 Below
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

SPN 1755 Lowering Control Mode Rear Axle

Signal which indicates the actual lowering level change at the rear axle

00 Lowering not active
01 Lowering active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

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SPN 1756 Lifting Control Mode Rear Axle

Signal which indicates the actual lifting level change at the rear axle

00 Lifting not active
01 Lifting active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

SPN 1757 Level Preset Front Axle Right

Set value for nominal level 'preset level' at the right side of the front axle. This value is referred to 'Normal level 1'. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: same as data range
Type: Status
Supporting information:
PGN 53504

SPN 1758 Level Preset Rear Axle Left

Set value for nominal level 'preset level' at the left side of the rear axle. This value is referred to 'Normal level 1'. For explanations of normal level 1 see SPN 1734 - Nominal Level Front Axle.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, -3,200 mm offset
Data Range: -3,200 to 3,225.5 mm Operational Range: same as data range
Type: Status
Supporting information:
PGN 53504

SPN 1759 Blade Height Set Point - High Resolution

High resolution for the laser guided blade set point. The high resolution required for more accurate control and 'accurate' unit conversions.

Negative values are below grade, positive values are above grade, zero is on grade.

Data Length: 4 bytes
Resolution: 100 mm/bit, -209.7152 m offset
Data Range: -209.7152 m to 211.3929215 Operational Range: -209.7152m to 209.7152m
Type: Measured
Supporting information:
PGN 65140

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SPN 1760 Gross Combination Vehicle Weight

The total weight of the truck and all attached trailers.

Data Length: 2 bytes
Resolution: 10 kg/bit, 0 offset
Data Range: 0 to 642,550 kg Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65136

SPN 1761 Catalyst Tank Level

A special catalyst uses chemical substance to reach legal requirement for NOX emissions. This parameter indicates the level within that catalyst tank.

0 % = Empty
100% = Full

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65110

SPN 1762 Hydraulic Pressure

Hydraulic pressure measured at the output of the hydraulic pump.

Data Length: 2 bytes
Resolution: 2 kPa/bit, 0 offset
Data Range: 0 to 128,510 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61448

SPN 1763 (R) Engine Hydraulic Pressure Governor Mode Indicator

Mode for governor operation is hydraulic pressure control.

00 Disabled
01 Enabled
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61448

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SPN 1764 (R) Engine Hydraulic Pressure Governor Switch

Switch that sets the mode of hydraulic governor

00 Pressure Mode Inactive
01 Pressure Mode Active
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61448

SPN 1765 (R) Engine Requested Fuel Valve 1 Position

The requested position of a gaseous fuel valve 1 that is metering the fuel flow to the engine.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65153

SPN 1766 (R) Engine Requested Fuel Valve 2 Position

The requested position of a gaseous fuel valve 2 that is metering the fuel flow to the engine, as requested by the Engine Control Unit.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65153

SPN 1767 Specific Heat Ratio

The specific heat ratio of the fuel.

Data Length: 2 bytes
Resolution: 0.001/bit, 0 offset
Data Range: 0 to 64.255 Operational Range: 0 to 2.0000
Type: Status
Supporting information:
PGN 65109

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SPN 1768 (R) Engine Low Limit Threshhold for Maximum RPM from Engine

Minimum allowable value for maximum continuous RPM from engine

Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 65108

SPN 1769 (R) Engine High Limit Threshhold for Minimum Continuous Engine RPM

Maximum allowable value for minimum continuous RPM from engine

Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 65108

SPN 1770 (R) Engine Low Limit Threshold for Maximum Torque from Engine

Minimum allowable value for maximum continuous torque. From engine

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65108

SPN 1771 (R) Engine High Limit Threshhold for Minimum Continuous Torque from Engine

Maximum allowable value for minimum continuous torque. From engine

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65108

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SPN 1772 (R) Engine Maximum Continuous RPM

Applied limit for maximum continuous engine RPM
Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 65108

SPN 1773 (R) Engine Minimum Continuous RPM

Applied limit for minimum continuous engine RPM
Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 65108

SPN 1774 (R) Engine Maximum Continuous Torque

Applied limit for maximum continuous engine torque.
Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65108

SPN 1775 (R) Engine Minimum Continuous Torque

Applied limit for minimum continuous engine torque
Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65108

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SPN 1776 Low Limit Threshhold for Maximum RPM from Retarder

Minimum allowable value for maximum continuous retarder speed

Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 65107

SPN 1777 High Limit Threshhold for Minimum Continuous RPM from Retarder

Maximum allowable value for minimum continuous retarder speed

Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 65107

SPN 1778 Low Limit Threshhold for Maximum Torque from Retarder

Minimum allowable value for maximum continuous retarder torque.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65107

SPN 1779 High Limit Threshhold for Minimum Continuous Torque from Retarder

Maximum allowable value for minimum continuous retarder torque.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65107

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SPN 1780 Maximum Continuous Retarder Speed

Applied limit for maximum continuous retarder RPM
Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 65107

SPN 1781 Minimum Continuous Retarder Speed

Applied limit for minimum continuous retarder RPM
Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 65107

SPN 1782 Maximum Continuous Retarder Torque

Applied limit for maximum continuous retarder torque.
Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65107

SPN 1783 Minimum Continuous Retarder Torque

Applied limit for minimum continuous retarder torque
Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65107

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SPN 1784 (R) Engine Speed Limit Request - Minimum Continuous

Requested minimum continuous engine speed
Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 52992

SPN 1785 (R) Engine Speed Limit Request - Maximum Continuous

Requested maximum continuous engine speed
Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 52992

SPN 1786 (R) Engine Torque Limit Request - Minimum Continuous

Requested minimum continuous engine torque (operating range: 0 to 125%)
Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: 0 to 125%
Type: Status
Supporting information:
PGN 52992

SPN 1787 (R) Engine Torque Limit Request - Maximum Continuous

Requested maximum continuous engine torque (operating range: 0 to 125%)
Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: 0 to 125%
Type: Status
Supporting information:
PGN 52992

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SPN 1788 Minimum Continuous Retarder Speed Limit Request

Requested minimum continuous retarder speed
Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 52992

SPN 1789 Maximum Continuous Retarder Speed Limit Request

Requested maximum continuous retarder speed
Data Length: 1 byte
Resolution: 32 rpm/bit, 0 offset
Data Range: 0 to 8,000 rpm Operational Range: same as data range
Type: Status
Supporting information:
PGN 52992

SPN 1790 Minimum Continuous Retarder Torque Limit Request

Requested minimum continuous retarder torque (operating range: -125 to 0%)
Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: -125 to 0%
Type: Status
Supporting information:
PGN 52992

SPN 1791 Maximum Continuous Retarder Torque Limit Request

Requested maximum continuous retarder torque (operating range: -125 to 0%)
Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: -125 to 0%
Type: Status
Supporting information:
PGN 52992

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SPN 1792 Tractor-Mounted Trailer ABS Warning Signal

This parameter commands the tractor-mounted trailer ABS optical warning signal.

00 Off
01 On
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61441

SPN 1793 ATC/ASR Information Signal

This parameter commands the ATC/ASR driver information signal, for example a dash lamp.

00 Off
01 On
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61441

SPN 1794 Engine Moment of Inertia

Moment of inertia for the engine, including items driven full-time by the engine such as fuel, oil and cooling pumps. The inertia from the following items are not included: flywheel, alternator, compressor, fan, and other engine-driven accessories.

Data Length: 2 bytes
Resolution: 0.004 kg-m^2/bit, 0 offset
Data Range: 0 to 257.02 kg-m^2 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65251

SPN 1795 Alternator Current (High Range/Resolution)

This parameter indicates the amount of electrical current output from the alternator of the main vehicle. Alternator Current (SPN 115) has a lower range and resolution.

Data Length: 2 bytes
Resolution: 0.05 A/bit, -1600 A offset
Data Range: -1600 to 1612.75 A Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65106

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SPN 1796 ACC Distance Alert Signal

Signal to indicate to the operator that the ACC system is not able to maintain the distance to the target. Example: Target stopping rapidly. This signal may be used to activate warning sounds or indicators.

00 ACC DAS Not Active
01 ACC DAS Active
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65135

SPN 1797 ACC System Shutoff Warning

Signal to warn the driver of system deactivation due to non-driver actions. Example: Attempting to control vehicle speed below or above limits of ACC. This signal may be used to activate warning sounds or indicators.

00 ACC SSOW Not Active
01 ACC SSOW Active
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65135

SPN 1798 ACC Target Detected

Signal to indicate to the driver that the ACC system has detected a target.

00 No targets detected
01 Target detected
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65135

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SPN 1799 Requested ACC Distance Mode

The Requested Distance Control Mode to the ACC system from the operators interface.

The ACC Set Distance Mode (SPN 1589) indicates the selected Distance Control Mode for the ACC system. This parameter is the driver requested setting for this.

000 Requested ACC Distance Mode #1 (largest distance)
001 Requested ACC Distance Mode #2
010 Requested ACC Distance Mode #3
011 Requested ACC Distance Mode #4
100 Requested ACC Distance Mode #5 (shortest distance)
101 not defined
110 error condition
111 not available

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65105

SPN 1800 Battery 1 Temperature

Temperature of the battery 1. The relation to physical location is determined by the equipment manufacturer.
Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65104

SPN 1801 Battery 2 Temperature

Temperature of the battery 2. The relation to physical location is determined by the equipment manufacturer.
Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65104

SPN 1802 (R) Engine Intake Manifold 5 Temperature

Temperature of pre-combustion air found in intake manifold number 5 of engine air supply system.
Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65189

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SPN 1803 (R) Engine Intake Manifold 6 Temperature

Temperature of pre-combustion air found in intake manifold number 6 of engine air supply system.

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65189

SPN 1804 (R) Engine Start Enable Device 2

Devices that assist an engine in starting, e.g. intake heaters, ether, or an alternate/secondary starting aid. May be of the same type or different than Start Enable Device 1 (SPN 626). Parameter indicating whether the start enable device 2 is ON or OFF.

00 - start enable OFF
01 - start enable ON
10 - reserved

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

SPN 1805 LED Display Mode Control

This parameter informs the system what the selected Display mode will be.

0000 - Center On-Grade Display Mode 1 (5 CHANNEL)
0001 - Offset On-Grade Display Mode
0010 - Center On-Grade Display Mode 2 (7 CHANNEL)
0011 - 1110 Reserved
1111 - Not Available or Not Applicable

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65142

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SPN 1806 LED Display Deadband Control

This parameter informs the system what the selected Display deadband will be.

0000 +/- 4.5 mm (0.015 feet, 0.18 inches)
0001 +/- 12 mm (0.040 feet, 0.45 inches)
0010 +/- 24 mm (0.080 feet, 0.96 inches)
0011 +/- 5 mm (0.017 feet, 0.2 inches)
0100 +/- 1 mm (0.003 feet, 0.04 inches)
0101 - 1110 Reserved
1111 Not Available or Not applicable

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65142

SPN 1807 Steering Wheel Angle

The main operator`s steering wheel angle (on the steering column, not the actual wheel angle). The vehicle being steered to the left results in a positive steering wheel angle.

Data Length: 2 bytes
Resolution: 1/1024 rad per bit, -31.374 rad offset
Data Range: -31.374 to +31.374 rad Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61449

SPN 1808 Yaw Rate

Indicates the rotation about the vertical axis. A positive yaw rate signal results when the vehicle turns counter-clockwise.

Data Length: 2 bytes
Resolution: 1/8192 rad/s per bit, -3.92 rad/s offset
Data Range: -3.92 to +3.92 rad/s Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61449

SPN 1809 Lateral Acceleration

Indicates a lateral acceleration of the vehicle. A positive lateral acceleration signal results when the vehicle is accelerated to the left.

Data Length: 2 bytes
Resolution: 1/2048 m/s² per bit, -15.687 m/s² offset
Data Range: -15.687 to +15.687 m/s² Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61449

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SPN 1810 Longitudinal Acceleration

Indicates the longitudinal acceleration of the vehicle. A positive longitudinal acceleration signal results when the vehicle speed increases, regardless of driving the vehicle forward or backward.

Data Length: 1 byte
Resolution: 0.1 m/s² per bit, -12.5 m/s² offset
Data Range: -12.5 to +12.5 m/s² Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61449

SPN 1811 Steering Wheel Turn Counter

Indicates number of steering wheel turns, absolute position or relative position at ignition on. Positive values indicate left

Data Length: 6 bits
Resolution: 1 turn/bit, -32 turns offset
Data Range: -32 to 29 turns Operational Range: -10 to +10 Turns
Type: Measured
Supporting information:
PGN 61449

SPN 1812 Steering Wheel Angle Sensor Type

Indicates whether the steering wheel angle sensor is capable of absolute measuring of the number of steering wheel turns or not (relative measuring to position at ignition on).

00 Relative measuring principle
01 Absolute measuring principle
10 Reserved
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61449

SPN 1813 VDC Information Signal

This parameter commands the VDC information signal, for example a dash lamp.

00 Off
01 On
10 Reserved
11 Don't care/Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65103

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SPN 1814 VDC Fully Operational

Signal that indicates whether VDC is fully operational or whether its functionality is reduced by a permanent or temporary (e.g. low voltage) defect, by intended action (e.g. disabled by a switch or during special diagnostic procedures), not configured or not yet fully initialized (e.g. missing initialization or configuration message). VDC contains ROP and YC.

00 Not fully operational
01 Fully operational
10 Reserved
11 Don't care/Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65103

SPN 1815 VDC brake light request

Indicates whether VDC requests to turn the vehicle brake lights on

00 Turn brake light not on
01 Turn brake light on
10 Reserved
11 Don't care/Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65103

SPN 1816 ROP Engine Control active

State Signal which indicates that the Roll Over Prevention (ROP) has commanded engine control to be active. Within the physical limits, ROP attempts to prevent rolling over of the vehicle. Active means that ROP actually tries to control the engine. This state signal is independent of other control commands to the engine which may have higher priority.

00 ROP engine control passive but installed
01 ROP engine control active
10 Reserved
11 Don't care/Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65103

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SPN 1817 YC Engine Control active

State Signal which indicates that the Yaw Control (YC) has commanded engine control to be active. Within the physical limits, YC attempts to prevent yawing of the vehicle. Active means that YC actually tries to control the engine. This state signal is independent of other control commands to the engine which may have higher priority.

00 YC engine control passive but installed
01 YC engine control active
10 Reserved
11 Don't care/Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65103

SPN 1818 ROP Brake Control active

State signal which indicates that Roll over Prevention (ROP) has activated brake control. Active means that ROP actually controls wheel brake pressure at one or more wheels of the vehicle or vehicle combination. Within the physical limits, ROP attempts to prevent rolling over of the vehicle.

00 ROP brake control passive but installed
01 ROP brake control active
10 Reserved
11 Don't care/Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65103

SPN 1819 YC Brake Control active

State signal which indicates that Yaw Control (YC) has activated brake control. Active means that YC actually controls wheel brake pressure at one or more wheels of the vehicle or vehicle combination. Within the physical limits, YC attempts to prevent yawing of the vehicle.

00 YC brake control passive but installed
01 YC brake control active
10 Reserved
11 Don't care/Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65103

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SPN 1820 Ramp / Wheel Chair Lift Position

Signal which indicates the actual position of the ramp / wheel chair lift.

00 Inside bus
01 Outside bus
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65102

SPN 1821 Position of doors

Signal which indicates the actual position of the doors.

0000 At least 1 door is open
0001 Closing last door
0010 All doors closed
0011-1101 Not defined
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65102

SPN 1822 Lift Axle 2 Position

Signal which indicates the position / load condition of lift axle / tag axle #2. Numbering of lift/tag axles starts at front axle.

00 Lift axle position down / tag axle laden
01 Lift axle position up / tag axle unladen
10 Error

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65114

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SPN 1823 Rear Axle in Bumper Range

Signal which indicates that the vehicle height at the rear axle (SPNs 1723 and 1724) is within the bumper range.

00 Actual level out of bumper range
01 Actual level within bumper range
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65114

SPN 1824 Front Axle in Bumper Range

Signal which indicates that the vehicle height at the front axle (SPNs 1721 and 1722) is within the bumper range.

00 Actual level out of bumper range
01 Actual level within bumper range
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65114

SPN 1825 Suspension Remote control 2

Signal which indicates that the suspension system is controlled by remote control #2. Remote control is an external unit to operate the suspension system.

00 Not active
01 Active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65114

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SPN 1826 Suspension Remote Control 1

Signal which indicates that the suspension system is controlled by remote control #1. Remote control is an external unit to operate the suspension system.

00 Not active
01 Active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65114

SPN 1827 (R) Suspension Control Refusal Information

Signal which indicates that the air suspension control cannot perform a request due to the operating conditions. It also provides a reason for the refusal.

0000 Actual request not refused
0001 Axle load limit reached (load transfer)
0010 Would exceed axle load limit (tag axle)
0011 Bogie differential not locked
0100 Above speed limit
0101 Below speed limit
0110 General reject; i.e. no specified reason applies
0111 - 1101 Not defined
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65114

SPN 1828 Lift Axle 2 Position Command

Signal to command the position / load condition of lift / tag axle #2. Numbering of lift/tag axles starts at front axle.

00 Lift axle position down / tag axle laden
01 Lift axle position up / tag axle unladen
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

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SPN 1829 Kneeling Command - Rear Axle

Command signal to activate the kneeling functionality at the rear axle of the vehicle.

00 Deactivate kneeling
01 Activate kneeling
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

SPN 1830 Kneeling Command - Front Axle

Command signal to activate the kneeling functionality at the front axle of the vehicle

00 Deactivate kneeling
01 Activate kneeling
10 Reserved
11 Don't care/take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

SPN 1831 Electronic Shock Absorber Control Mode - Lift/Tag Axle

Signal which indicates the current mode of operation of the electronic shock absorber control at the lift/tag axle.

00 Normal operation dampers passive
01 Normal operation dampers active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65111

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SPN 1832 Electronic Shock Absorber Control Mode - Rear Axle

Signal which indicates the current mode of operation of the electronic shock absorber control at the rear axle.

00 Normal operation dampers passive
01 Normal operation dampers active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65111

SPN 1833 Electronic Shock Absorber Control Mode - Front Axle

Signal which indicates the current mode of operation of the electronic shock absorber control at the front axle.

00 Normal operation dampers passive
01 Normal operation dampers active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65111

SPN 1834 (R) Engine Total Average Fuel Rate

Average fuel rate, equal to total fuel used divided by total engine hours, over the life of the engine

Data Length: 2 bytes
Resolution: 0.05 L/h per bit, 0 offset
Data Range: 0 to 3,212.75 L/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65101

SPN 1835 (R) Engine Total Average Fuel Economy

Average fuel economy, equal to total vehicle distance divided by total fuel used, over the life of the engine

Data Length: 2 bytes
Resolution: 1/512 km/L per bit, 0 offset
Data Range: 0 to 125.5 km/L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65101

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SPN 1836 Trailer ABS Status

State signal which indicates that ABS in the trailer is actively controlling the brakes. A message is sent to the tractor from the trailer (i.e. by PLC). The receiving device in the tractor transfers this information to the J1939 network. At the beginning of power on the message is sent by the trailer to indicate if this status information is supported. Timeout of the trailer ABS active can be done by monitoring of the Trailer warning light information.

00 Trailer ABS Status Information Available But Not Active
01 Trailer ABS Active
10 Reserved
11 Trailer ABS Status Information Not Available or Parameter Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61441

SPN 1837 Convoy Driving Lamp Select

Black Out Convoy Driving Lamp Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65100

SPN 1838 Convoy Lamp Select

Black Out Convoy Lamp Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65100

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SPN 1839 Front Black Out Marker Lamp Select

Front Black Out Marker Lamp Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65100

SPN 1840 Rear Black Out Marker Select

Rear Black Out Marker Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65100

SPN 1841 Black Out Brake/Stop Lamp Select

Black Out Brake/Stop Lamp Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65100

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SPN 1842 Black Out Work Lamp Select

Black Out Work Lamp Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65100

SPN 1843 Night Vision Illuminator Select

Night Vision Illuminator Selection

00 Off
01 On
10 Reserved
11 Not Supported

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65100

SPN 1844 Operators Black Out Intensity Selection

Operators Selection of lamp intensity in black out mode. This parameter provides the operators selected illumination intensity as a percentage of available full scale. This parameter would be typically used as a dash or instrument cluster

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Status
Supporting information:
PGN 65100

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SPN 1845 Transmission Torque Limit

Parameter provided to the engine from the transmission as a torque limit to be invoked by the engine in the event that J1939 communication with the transmission is lost.

The intention is to protect transmissions that use a continuous torque limit during torque converter mode or operation in specific lower gears, where stall or drivetrain torque may reach levels higher than the gearbox capacity. If communication is lost during torque limited operation, unrestricted engine torque output could harm the transmission.

It is recommended that engines use reception of the ETC#1 message as a transmission “heartbeat”. In the event that the ETC#1 message is not received in a time period of 5 times its’ broadcast rate (5 x 10 ms = 50 ms), the engine should invoke a torque limit holding the engine to less than or equal to the value of the Transmission Torque Limit parameter. The engine may release the limit when transmission-to-engine communication is re-established.

A value of 0xFF00 to 0xFFFF indicates that no transmission torque limit is desired.

It is expected that the engine will record this torque value in non-volatile memory and will include this in the engine configuration PGN as parameter Engine Default Torque Limit (SPN 1846)

If the engine observes change in this parameter value on power-up, the engine should record the new value.

Data Length: 2 bytes
Resolution: 1 Nm/bit, 0 offset
Data Range: 0 to 64,255 Nm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65099

SPN 1846 (R) Engine Default Torque Limit

Companion parameter to Transmission Torque Limit (SPN 1845). This “echo” parameter provides confirmation to the transmission that the engine has received and will invoke the requested Transmission Torque Limit in the event that J1939 communication is lost between the two devices.

If the engine supports this protection logic, the Engine Default Torque Limit parameter should be set equal to the Transmission Torque Limit parameter as received in the Transmission Configuration message (PGN 65250). Otherwise, a Engine Default Torque Limit value of FF00 to FFFF indicates that no engine default torque limit has been received or set.

The intention is to protect transmissions that use a continuous torque limit during torque converter mode or operation in specific lower gears, where stall or drivetrain torque may reach levels higher than the gearbox capacity. If communication is lost during torque limited operation, unrestricted engine torque output could harm the transmission.

It is recommended that engines use reception of the ETC#1 message as a transmission “heartbeat”. In the event that the ETC#1 message is not received in a time period of 5 times its’ broadcast rate (5 x 10 ms = 50 ms), the engine should invoke a torque limit holding the engine to less than or equal to the value of the Transmission Torque Limit parameter. The engine may release the limit when engine-to-transmission communication is re-established.

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

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SPN 1849 Transmission Requested Range Display Flash State

State signal indicating a transmission request for the display of the Transmission Requested Range parameter (SPN 162) to flash or not to flash. The 'Transmission Requested Range Display Flash State' indicator can be utilized by (but not limited to) the shift console, instrument cluster, or cab display. Definition of the cause of this state is at the discretion of the transmission manufacturer. The flash period shall be 700 ms @ 50% duty cycle.

Transmission manufacturers may want to flash the Transmission Requested Range display depending on certain events. It could be because a gear could not be attained, or because fluid is low, etc. Indicator should be on for 350 ms and off for 350 ms.

Transmissions supporting both this parameter and the Transmission Requested Range Display Blank
State should treat the active states of these parameters as mutually exclusive; both parameters should not indicate "active" at the same time.

00 Inactive; Transmission Requested Range display should not be flashing
01 Active; Transmission Requested Range display should be flashing
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

SPN 1850 Transmission Requested Range Display Blank State

State signal indicating a transmission request for the display of the Transmission Requested Range parameter (SPN162) to be blanked or not blanked. The 'Transmission Requested Range Display Blank State' indicator can be utilized by (but not limited to) the shift console, instrument cluster, or cab display. Definition of the cause of this state is at the discretion of the transmission manufacturer

Transmission manufacturers may want to blank the Transmission Requested Range display depending on certain events. Typically it is an indication of a shift selector problem.

Transmissions supporting both this parameter and the Transmission Requested Range Display Flash
State should treat the active states of these parameters as mutually exclusive; both parameters should not indicate "active" at the same time.

00 Inactive; Transmission Requested Range display should not be blanked
01 Active; Transmission Requested Range display should be blanked
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

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SPN 1851 (R) Transmission Shift Inhibit Indicator

State signal indicating a transmission request for the Shift Inhibit Indicator to be active or inactive. The shift inhibit indicator can be of lamp or text form, located on (but not limited to) the shift console, instrument cluster, or cab display. Definition of the cause of the 'range inhibit' state is at the discretion of the transmission manufacturer.

Transmission manufacturers may want to indicate that they currently cannot make a requested shift. This could be due to inappropriate vehicle speed or other restrictions.

00 Inactive; shift is not inhibited
01 Active; shift is inhibited
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

SPN 1852 Transmission Mode 1

Indicates whether transmission mode 1 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also 2536.

00 Disable
01 Enable
10 Reserved
11 Take no action

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

SPN 1853 Transmission Mode 2

Indicates whether transmission mode 2 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 2537.

00 Disable
01 Enable
10 Reserved
11 Take no action

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

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SPN 1854 Transmission Mode 3

Indicates whether transmission mode 3 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 2538.

00 Disable
01 Enable
10 Reserved
11 Take no action

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

SPN 1855 Transmission Mode 4

Indicates whether transmission mode 4 is enabled. Modes are manufacturer specific and are not necessarily mutually exclusive. See also SPN 2539.

00 Disable
01 Enable
10 Reserved
11 Take no action

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

SPN 1856 Seat Belt Switch

State of switch used to determine if Seat Belt is buckled

00 NOT Buckled
01 OK - Seat Belt is buckled
10 Error - Switch state cannot be determined
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 57344

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SPN 1857 Winch Oil Pressure Switch

State of switch used to determine if Winch Oil Pressure is above desired minimum

00 NOT OK- Oil pressure is too low
01 OK - Oil pressure is above minimum
10 Error - Switch state cannot be determined
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65128

SPN 2347 High Beam Head Light Command

Command to activate or de-activate the tractor high beam head light lamps.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2348 High Beam Head Light Data

This parameter provides measured data from the tractor high beam head light lamps.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2349 Low Beam Head Light Command

Command to activate or de-activate the tractor low beam head light lamps.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2350 Low Beam Head Light Data

This parameter provides measured data from the tractor low beam head light lamps.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2351 Alternate Beam Head Light Command

Command to activate or de-activate the tractor alternate head lights (only low beam is available on alternate head lights). The alternate position lights are intended for use with loader and snow plows that tend to block the primary head lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2352 Alternate Beam Head Light Data

This parameter provides measured data from the tractor alternate beam head light lamps.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2353 Tractor Front Low Mounted Work Lights Command

Command to activate or de-activate the tractor front low mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2354 Tractor Front Low Mounted Work Lights

This parameter provides measured data from the tractor front low mounted work lights.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2355 Tractor Front High Mounted Work Lights Command

Command to activate or de-activate the tractor front high mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2356 Tractor Front High Mounted Work Lights

This parameter provides measured data from the tractor front high mounted work lights.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2357 Tractor Underside Mounted Work Lights Command

Command to activate or de-activate the tractor underside mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2358 Tractor Underside Mounted Work Lights

This parameter provides measured data from the tractor underside mounted work lights.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2359 Tractor Rear Low Mounted Work Lights Command

Command to activate or de-activate the tractor rear low mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2360 Tractor Rear Low Mounted Work Lights

This parameter provides measured data from the tractor rear low mounted work lights.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2361 Tractor Rear High Mounted Work Lights Command

Command to activate or de-activate the tractor rear high mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2362 Tractor Rear High Mounted Work Lights

This parameter provides measured data from the tractor rear high mounted work lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2363 Tractor Side Low Mounted Work Lights Command

Command to activate or de-activate the tractor side low mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2364 Tractor Side Low Mounted Work Lights

This parameter provides measured data from the tractor side low mounted work lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2365 Tractor Side High Mounted Work Lights Command

Command to activate or de-activate the tractor side high mounted work lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2366 Tractor Side High Mounted Work Lights

This parameter provides measured data from the tractor side high mounted work lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2367 Left Turn Signal Lights Command

Command to activate or de-activate left turn signal lights on the tractor and all connected implements

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2368 Left Turn Signal Lights

This parameter provides measured data from the tractor and attached implement left turn signal lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2369 Right Turn Signal Lights Command

Command to activate or de-activate right turn signal lights on the tractor and all connected implements

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2370 Right Turn Signal Lights

This parameter provides measured data from the tractor and attached implement right turn signal lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2371 Left Stop Light Command

Command to activate or de-activate the tractor and implement left stop lights

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2372 Left Stop Light

This parameter provides measured data from the tractor and attached implement left stop lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2373 Right Stop Light Command

Command to activate or de-activate the tractor and implement right stop light

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2374 Right Stop Light

This parameter provides measured data from the tractor and attached implement right stop lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2375 Center Stop Light Command

Command to activate or de-activate the tractor and implement center stop light

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2376 Center Stop Light

This parameter provides measured data from the tractor and attached implement center stop lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2377 Tractor Marker Light Command

Command to activate or de-activate tractor and implement front position lights, rear red tail lights, side amber running lights, license plate lights and instrument and switch back lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2378 Tractor Marker Light

This parameter provides measured data from the tractor and attached implement marker lights, including front position lights, rear tail lights, side running lights, license plate lights and instruments and switch back lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2379 Implement Marker Light Command

Command to activate or de-activate implement front position lights, rear red tail lights, side amber running lights, license plate lights and instrument and switch back lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2380 Implement Marker Light

This parameter provides measured data from an attached implement marker lights, including front position lights, rear tail lights, side running lights, license plate lights and instruments and switch back lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2381 Tractor Clearance Light Command

Command to activate or de-activate the tractor high mounted clearance and center ID lights

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2382 Tractor Clearance Light

This parameter provides measured data from the tractor high mounted clearance and center ID lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2383 Implement Clearance Light Command

Command to activate or de-activate the implement high mounted clearance and lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2384 Implement Clearance Light

This parameter provides measured data from an attached implement high mounted clearance lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2385 Rotating Beacon Light Command

Command to activate or de-activate slow moving vehicle indicator lights on tractor and/or implements. Activation of the slow moving vehicle lights implies that the controller should manipulate the lighting as appropriate to provide the slow moving vehicle lighting function.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2386 Rotating Beacon Light

This parameter provides measured data from the beacon light on tractor or attached implements.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2387 Tractor Front Fog Lights Command

Command to activate or de-activate tractor front fog lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2388 Tractor Front Fog Lights

This parameter provides measured data from the tractor front fog lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2389 Rear Fog Light Command

Command to activate or de-activate tractor or implement rear fog lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2390 Rear Fog Lights

This parameter provides measured data from the tractor and/or implement rear fog lights.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2391 Back Up Light and Alarm Horn Command

Command to activate or de-activate the back up lights and/ or associated alarm if required

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2392 Back Up Light and Alarm Horn

This parameter provides measured data from the back up lights and/ or associated alarm.

00 De-activated
01 Activated
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2393 Lighting Data Request Command

Command to provide a response of the light state

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2394 Implement Rear Work Light

This parameter provides measured data from the implement rear work lamps.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2395 Implement OEM Option 1 Light Command

Command to activate or de-activate an implement OEM option 1 light. This is provided to meet special needs on implements, such as tank inspection or filling lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2396 Implement OEM Option 1 Light

This parameter provides measured data from the implement OEM option 1 light.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2397 Implement OEM Option 2 Light Command

Command to activate or de-activate an implement OEM option 2 light. This is provided to meet special needs on implements, such as tank inspection or filling lights.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2398 Implement OEM Option 2 Light

This parameter provides measured data from the implement OEM option 2 light.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2399 Implement Left Forward Work Light Command

Command to activate or de-activate the forward facing work lights toward the left end of the implement.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2400 Implement Left Forward Work Light

This parameter provides measured data from the forward facing work lights toward the left end of the implement.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2401 Implement Right Forward Work Light Command

Command to activate or de-activate the forward facing work lights toward the right end of the implement.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2402 Implement Right Forward Work Light

This parameter provides measured data from the forward facing work lights toward the right end of the implement.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

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SPN 2403 Running Light Command

Command to activate or de-activate the tractor or powered vehicle running lights. Usually only used for on road vehicles.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2404 Running Light

This parameter provides measured data from the vehicle's running lights.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2405 Implement Rear Work Light Command

Command to activate or de-activate implement rear work lights. (This is also the same as Reversing Lights for truck applications.)

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

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SPN 2406 Implement Right Facing Work Light Command

Command to activate or de-activate work lights mounted on an implement to illuminate beyond right end of the implement.

00 De-activate
01 Activate
10 Reserved
11 Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65089

SPN 2407 Implement Right Facing Work Light

This parameter provides measured data from the work lights mounted on an implement to illuminate beyond right end of the implement.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2432 Engine Demand – Percent Torque

The requested torque output of the engine by all dynamic internal inputs, including smoke control, noise control and low and high speed governing.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: -125% to +125%
Type: Measured
Supporting information: See Appendix D - SPN 2432
PGN 61444

SPN 2433 (R) Engine Exhaust Exhaust Gas Temperature - Right Manifold

Temperature of combustion byproducts within the right engine exhaust manifold. Single manifold engines should use exhaust temperature (SPN 173).

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65031

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SPN 2434 (R) Engine Exhaust Exhaust Gas Temperature - Left Manifold

Temperature of combustion byproducts within the left engine exhaust manifold. Single manifold engines should use exhaust temperature (SPN 173).

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65031

SPN 2435 Sea Water Pump Outlet Pressure

Gauge pressure of liquid found at outlet of sea water pump in sea water cooling system.

Data Length: 1 byte
Resolution: 2 kPa/bit, 0 offset
Data Range: 0 to 500 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65172

SPN 2536 Transmission Mode 1 Indicator

This state signal is the transmission's indication that it is operating under transmission mode 1 (SPN 1852) as commanded via the TC1 message (PGN 256). The definition of the transmission mode is left to the discretion of the transmission manufacturer.

00 Transmission Mode 1 not active
01 Transmission Mode 1 Active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

SPN 2537 Transmission Mode 2 Indicator

This state signal is the transmission's indication that it is operating under transmission mode 2 (SPN 1853) as commanded via the TC1 message (PGN 256). The definition of the transmission mode is left to the discretion of the transmission manufacturer.

00 Transmission Mode 2 not active
01 Transmission Mode 2 Active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

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SPN 2538 Transmission Mode 3 Indicator

This state signal is the transmission's indication that it is operating under transmission mode 3 (SPN 1854) as commanded via the TC1 message (PGN 256). The definition of the transmission mode is left to the discretion of the transmission manufacturer.

00 Transmission Mode 3 not active
01 Transmission Mode 3 Active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

SPN 2539 Transmission Mode 4 Indicator

This state signal is the transmission's indication that it is operating under transmission mode 4 (SPN 1855) as commanded via the TC1 message (PGN 256). The definition of the transmission mode is left to the discretion of the transmission manufacturer.

00 Transmission Mode 4 not active
01 Transmission Mode 4 Active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

SPN 2576 Laser Receiver Type

Identifies which type of Laser Receiver transmitted the message.

0 = Reserved
1 = Linear Laser Receiver
2 = 1 Meter Survey Receiver
3 = 2 Meter Survey Receiver
4 = 2.5 Meter Survey Receiver
5-250 = Reserved

Data Length: 1 byte
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 250 Operational Range: 1-4
Type: Status
Supporting information:
PGN 65141

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SPN 2577 Display Deadbands

Sets Display Deadbands mode.

0000 - Narrow = +/- 4.5mm
0001 - Standard = +/- 12mm
0010 - Wide = +/- 24mm
0011 - 1110 Reserved
1111 Not Available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65142

SPN 2578 LED Pattern Control

Sets LED Pattern control mode on laser leveling systems.

0000 - 5 Channel
0001 - Offset
0010 - 7 Channel
0011 - 1110 Reserved
1111 Not Available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65142

SPN 2579 Net Battery Current (High Range/Resolution)

Net flow of electrical current into/out-of the battery or batteries. This parameter is the high range and resolution of SPN 114 - Net Battery Current.

Data Length: 2 bytes
Resolution: 0.05 A/bit, -1600 A offset
Data Range: -1600 to 1612.75 A Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65106

SPN 2580 Hydraulic Brake Pressure Circuit 1

Gage hydraulic pressure in circuit 1 of the hydraulic brake system

Data Length: 1 byte
Resolution: 100 kPa/bit, 0 offset
Data Range: 0 to 25 MPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64998

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SPN 2581 Hydraulic Brake Pressure Circuit 2

Gage hydraulic pressure in circuit 2 of the hydraulic brake system

Data Length: 1 byte
Resolution: 100 kPa/bit, 0 offset
Data Range: 0 to 25 MPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64998

SPN 2582 Hydraulic Brake Pressure Supply State Circuit 1

Signal which indicates whether the hydraulic brake pressure supply of circuit 1 is reliable; that is, able to support continued braking.

00 Supply is not reliable
01 Supply is reliable
10 Error indicator
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64998

SPN 2583 Hydraulic Brake Pressure Supply State Circuit 2

Signal which indicates whether the hydraulic brake pressure supply of circuit 2 is reliable; that is, able to support continued braking.

00 Supply is not reliable
01 Supply is reliable
10 Error indicator
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64998

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SPN 2584 Hydraulic Brake Pressure Warning State Circuit 1

Signal which indicates whether the hydraulic brake pressure of circuit 1 is below the warning level

00 Pressure level sufficient
01 Pressure level below warning level
10 Error indicator
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64998

SPN 2585 Hydraulic Brake Pressure Warning State Circuit 2

Signal which indicates whether the hydraulic brake pressure of circuit 2 is below the warning level

00 Pressure level sufficient
01 Pressure level below warning level
10 Error indicator
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64998

SPN 2586 Tire Air Leakage Rate

The pressure loss rate of a tire.
Data Length: 2 bytes
Resolution: 0.1 Pa/s per bit, 0 offset
Data Range: 0 Pa/s to 6425.5 Pa/s Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65268

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SPN 2587 Tire Pressure Threshold Detection

Signal indicating the pressure level of the tire. The levels defined represent different pressure conditions of the tire:

000 Extreme over pressure - The tire pressure is at a level where the safety of the vehicle may be jeopardised.
001 Over pressure - The tire pressure is higher than the pressure defined by the vehicle or tire manufacturer.
010 No warning pressure - The tire pressure is within the thresholds defined by the vehicle or tire manufacturer.
011 Under pressure - The tire pressure is lower than the pressure defined by the vehicle or tire manufacturer.
100 Extreme under pressure - The tire pressure is at a level where the safety of the vehicle may be jeopardised.
101 Not defined
110 Error indicator
111 Not available

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65268

SPN 2588 Maximum Vehicle Speed Limit 1

The lowest Maximum Vehicle Speed Limit. This value is the similar to SPN 74. However, SPN 74 was not specifically defined to convey the applied vehicle speed limit or what was possible to be applied. This new SPN is the lowest vehicle speed limit that is possible. Additionally, the lowest vehicle speed limit shall be applied when the J1939 network is no longer providing input regarding the Selected Maximum Vehicle Speed Limit. Exceptions to this exist when the device performing the maximum vehicle speed limiting function has methods of selecting the thresholds separately from the Selected Maximum Vehicle Speed Limit parameter.

Data Length: 1 byte
Resolution: 1 km/h per bit, 0 offset
Data Range: 0 to 250 km/h Operational Range: same as data range
Type: Status
Supporting information:
PGN 64997

SPN 2589 Maximum Vehicle Speed Limit 2

The highest of the two lowest vehicle speed limits
Data Length: 1 byte
Resolution: 1 km/h per bit, 0 offset
Data Range: 0 to 250 km/h Operational Range: same as data range
Type: Status
Supporting information:
PGN 64997

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SPN 2590 Maximum Vehicle Speed Limit 3

The highest of the three lowest vehicle speed limits

Data Length: 1 byte
Resolution: 1 km/h per bit, 0 offset
Data Range: 0 to 250 km/h Operational Range: same as data range
Type: Status
Supporting information:
PGN 64997

SPN 2591 Maximum Vehicle Speed Limit 4

The highest of the four lowest vehicle speed limits

Data Length: 1 byte
Resolution: 1 km/h per bit, 0 offset
Data Range: 0 to 250 km/h Operational Range: same as data range
Type: Status
Supporting information:
PGN 64997

SPN 2592 Maximum Vehicle Speed Limit 5

The highest of the five lowest vehicle speed limits

Data Length: 1 byte
Resolution: 1 km/h per bit, 0 offset
Data Range: 0 to 250 km/h Operational Range: same as data range
Type: Status
Supporting information:
PGN 64997

SPN 2593 Maximum Vehicle Speed Limit 6

The highest of the six lowest vehicle speed limits

Data Length: 1 byte
Resolution: 1 km/h per bit, 0 offset
Data Range: 0 to 250 km/h Operational Range: same as data range
Type: Status
Supporting information:
PGN 64997

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SPN 2594 Maximum Vehicle Speed Limit 7

The highest of the seven lowest vehicle speed limits

Data Length: 1 byte

Resolution: 1 km/h per bit, 0 offset

Data Range: 0 to 250 km/h Operational Range: same as data range

Type: Status

Supporting information:

PGN 64997

SPN 2595 Applied Vehicle Speed Limit

The vehicle speed limit in effect.

Data Length: 1 byte

Resolution: 1 km/h per bit, 0 offset

Data Range: 0 to 250 km/h Operational Range: same as data range

Type: Status

Supporting information:

PGN 64997

SPN 2596 Selected Maximum Vehicle Speed Limit

User selected maximum vehicle speed, must equal one of the maximum vehicle speeds #1-#7 from PGN 64997 - maximum vehicle speed limit status . If different maximum vehicle speed requests are present from different devices, the lowest requested value should be used.

Data Length: 1 byte

Resolution: 1 count/bit, 0 offset

Data Range: 0 to 250 Operational Range: 1 through 7 are allowed. 8 through 250 are not allowed.

Type: Status

Supporting information:

PGN 57344

SPN 2597 Implement Left Facing Work Light Command

Command to activate or de-activate work lights mounted on an implement to illuminate beyond left end of the implement.

00 De-activate
01 Activate
10 Reserved
11 Don’t Care

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3 Operational Range: same as data range

Type: Status

Supporting information:

PGN 65089

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SPN 2598 Implement Left Facing Work Light

This parameter provides measured data from the work lights mounted on an implement to illuminate beyond left end of the implement.

00 De-activate
01 Activate
10 Fault Detected
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65088

SPN 2599 Fire Apparatus Pump Engagement

The measured status of the pump used to provide water in fire fighting apparatus for distribution of water through water cannons or fire hoses.

00 Pump not engaged
01 Pump engaged
10 Error
11 Not available or not installed

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61448

SPN 2600 Payload Percentage

The current payload of the equipment, reported as a percentage of the equipment's rated payload limit.

Data Length: 1 byte
Resolution: 1 %/bit, 0 offset
Data Range: 0 to 250 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64996

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SPN 2601 Travel Velocity Control Position

The position of the travel velocity control component reported as a percentage of the control's full displacement in each direction respectively. Positive position values indicate forward travel direction; negative position values indicate reverse, or backward, travel direction; and zero (0) percent position indicates the control device is in the neutral position. Higher percent for a particular travel direction indicates a higher desired travel speed in that direction.

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64995

SPN 2602 Hydraulic Oil Level

This parameter indicates the level of the hydraulic fluid in tank as a ratio of current volume to total tank volume. This parameter is intended for reporting the hydraulic fluid level in the system tank or reservoir. This hydraulic fluid is for the entire hydraulics system of a piece of equipment.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65128

SPN 2603 Pneumatic Supply Pressure Request

Command signal to influence the pneumatic pressure in the main reservoir. This parameter is the setpoint for the parameter SPN 46.

Data Length: 1 byte
Resolution: 8 kPa/bit, 0 offset
Data Range: 0 to 2,000 kPa Operational Range: same as data range
Type: Status
Supporting information:
PGN 64994

SPN 2604 Parking and/or Trailer Air Pressure Request

Command signal to influence the pneumatic pressure in the circuit or reservoir for the parking brake and/or the trailer supply. This parameter is the setpoint for the parameter SPN 1086.

Data Length: 1 byte
Resolution: 8 kPa/bit, 0 offset
Data Range: 0 to 2,000 kPa Operational Range: same as data range
Type: Status
Supporting information:
PGN 64994

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SPN 2605 Service Brake Air Pressure Request, Circuit #1

Command signal to influence the pneumatic pressure in the service brake circuit or reservoir #1. This parameter is the setpoint for the parameter SPN 1087.

Data Length: 1 byte
Resolution: 8 kPa/bit, 0 offset
Data Range: 0 to 2,000 kPa Operational Range: same as data range
Type: Status
Supporting information:
PGN 64994

SPN 2606 Service Brake Air Pressure Request, Circuit #2

Command signal to influence the pneumatic pressure in the service brake circuit or reservoir #2. This parameter is the setpoint for the parameter SPN 1088.

Data Length: 1 byte
Resolution: 8 kPa/bit, 0 offset
Data Range: 0 to 2,000 kPa Operational Range: same as data range
Type: Status
Supporting information:
PGN 64994

SPN 2607 Auxiliary Equipment Supply Pressure Request

Command signal to influence the pneumatic pressure in the auxiliary circuit. This parameter is the setpoint for the parameter SPN 1089.

Data Length: 1 byte
Resolution: 8 kPa/bit, 0 offset
Data Range: 0 to 2,000 kPa Operational Range: same as data range
Type: Status
Supporting information:
PGN 64994

SPN 2608 Air Suspension Supply Pressure Request

Command signal to influence the pneumatic pressure in the circuit for the electronically controlled air suspension system. This parameter is the setpoint for the parameter SPN 1090.

Data Length: 1 byte
Resolution: 8 kPa/bit, 0 offset
Data Range: 0 to 2,000 kPa Operational Range: same as data range
Type: Status
Supporting information:
PGN 64994

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SPN 2609 Cab A/C Refrigerant Compressor Outlet Pressure

This is the gage pressure at the compressor outlet in the cab air conditioning system.

Data Length: 1 byte
Resolution: 16 kPa/bit, 0 offset
Data Range: 0 to 4000 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64993

SPN 2610 Solar Intensity Percent

This is the solar radiation (power density) falling on the vehicle in percent of the maximum sensor value (SPN 2611). Currently this is in the infra-red spectrum.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64992

SPN 2611 Solar Sensor Maximum

This is the maximum value which can be reported by the sensor for the solar intensity. (This is a configuration parameter)

Data Length: 1 byte
Resolution: 0.4 mW/cm^2 per bit, 0 offset
Data Range: 0 to 100 mW/cm^2 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64992

SPN 2612 Front Wheel Drive Actuator Status

Feedback on the front wheel drive actuator.

00 Front Wheel Drive Actuator not engaged
01 Front Wheel Drive Actuator engaged
10 Error
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64991

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SPN 2613 Drive Axle Lube Pressure

The drive axle lubricant pressure with location determined by Drive Axle Location (SPN 930).

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

SPN 2614 Steering Axle Lube Pressure

The steering axle lubricant pressure.

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

SPN 2615 (R) Engine Throttle Synchronization Mode Status

The status of the Throttle Synchronization Mode. Throttle Synchronization Mode is used to indicate which throttle, if any, is currently being used for the sychronized throttle.

0000 Not Synchronized
0001 Synchronized Center
0010 Synchronized Port
0011 Synchronized Starboard
0100 Synchronized Master
0101-1110 Reserved
1111 Take no action

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64988

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SPN 2616 Trolling Mode Status

The status of the Trolling Mode. Trolling mode limits the top speed. Full range travel of the throttle level spans from low idle engine speed to maximum trolling speed.

00 Trolling mode is OFF.
01 Trolling mode is ACTIVE.
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64988

SPN 2617 Slow Vessel Mode Status

The status of the Slow Vessel Mode. Slow Vessel Mode puts the engine in a lower-than-normal low idle speed during docking or other slow vessel operations.

00 Slow vessel mode is OFF.
01 Slow vessel mode is ACTIVE.
10 Reserved
11 Take no action

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64988

SPN 2629 (R) Engine Turbocharger 1 Compressor Outlet Temperature

Temperature of the air exiting the turbocharger 1 compressor outlet
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64979

SPN 2659 (R) Engine Exhaust Gas Recirculation (EGR) Mass Flow Rate

Flow rate of gas through the EGR system. Flow rate of the exhaust gas being recirculated into the combustion air.
Data Length: 2 bytes
Resolution: 0.05 kg/h per bit, 0 offset
Data Range: 0 to 3212.75 kg/h Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61450

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SPN 2660 Joystick 1 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64982

SPN 2661 Joystick 1 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64982

SPN 2662 Joystick 1 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64983

SPN 2663 Joystick 1 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64983

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SPN 2664 Joystick 1 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64983

SPN 2665 Joystick 1 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2666 Joystick 1 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

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SPN 2667 Joystick 1 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

SPN 2668 Joystick 1 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

SPN 2669 Joystick 1 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

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SPN 2670 Joystick 1 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2671 Joystick 1 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2672 Joystick 1 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

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SPN 2673 Joystick 1 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

SPN 2674 Joystick 1 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

SPN 2675 Joystick 1 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

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SPN 2676 Joystick 1 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2677 Joystick 1 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

SPN 2678 Joystick 1 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

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SPN 2679 Joystick 1 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

SPN 2680 Joystick 1 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2681 Joystick 1 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

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SPN 2682 Joystick 1 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

SPN 2683 Joystick 1 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

SPN 2684 Joystick 1 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64983

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SPN 2685 Joystick 1 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2686 Joystick 1 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2687 Joystick 1 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

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SPN 2688 Joystick 1 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2689 Joystick 1 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2690 Joystick 1 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

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SPN 2691 Joystick 1 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2692 Joystick 1 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2693 Joystick 1 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

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SPN 2694 Joystick 1 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2695 Joystick 1 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

SPN 2696 Joystick 1 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64982

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SPN 2697 Joystick 2 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64984

SPN 2698 Joystick 2 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64984

SPN 2699 Joystick 2 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64985

SPN 2700 Joystick 2 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64985

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SPN 2701 Joystick 2 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64985

SPN 2702 Joystick 2 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2703 Joystick 2 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

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SPN 2704 Joystick 2 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

SPN 2705 Joystick 2 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

SPN 2706 Joystick 2 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

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SPN 2707 Joystick 2 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2708 Joystick 2 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2709 Joystick 2 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

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SPN 2710 Joystick 2 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

SPN 2711 Joystick 2 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

SPN 2712 Joystick 2 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

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SPN 2713 Joystick 2 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2714 Joystick 2 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

SPN 2715 Joystick 2 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

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SPN 2716 Joystick 2 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

SPN 2717 Joystick 2 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2718 Joystick 2 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

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SPN 2719 Joystick 2 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

SPN 2720 Joystick 2 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

SPN 2721 Joystick 2 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64985

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SPN 2722 Joystick 2 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2723 Joystick 2 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2724 Joystick 2 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

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SPN 2725 Joystick 2 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2726 Joystick 2 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2727 Joystick 2 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

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SPN 2728 Joystick 2 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2729 Joystick 2 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2730 Joystick 2 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

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SPN 2731 Joystick 2 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2732 Joystick 2 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

SPN 2733 Joystick 2 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64984

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SPN 2734 Joystick 3 X-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64986

SPN 2735 Joystick 3 Y-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64986

SPN 2736 Joystick 3 Grip X-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64987

SPN 2737 Joystick 3 Grip Y-Axis Position

The position of the joystick grip in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64987

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SPN 2738 Joystick 3 Theta-Axis Position

The position of the joystick in the relative motion of travel from the neutral position. Position value of 0 is Neutral and position value 1000 (100%) is the end of linear zone. Value of 1022 indicates an error has occurred.

Data Length: 10 bits
Resolution: 0.1 %/bit, 0 offset
Data Range: 0 to 102 % Operational Range: 0.0 to 100.0%
Type: Measured
Supporting information:
PGN 64987

SPN 2739 Joystick 3 X-Axis Lever Right Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2740 Joystick 3 Y-Axis Lever Forward Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

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SPN 2741 Joystick 3 Grip X-Axis Lever Right Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

SPN 2742 Joystick 3 Grip Y-Axis Lever Forward Positive Position Status

Reports when the current joystick grip position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

SPN 2743 Joystick 3 Theta-Axis Clockwise Positive Position Status

Reports when the current joystick position is on the positive travel side (forward, right, clockwise, up) relative to the neutral position for that axis of travel.

00 Not on Positive side of Neutral
01 On positive side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

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SPN 2744 Joystick 3 X-Axis Lever Left Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2745 Joystick 3 Y-Axis Lever Back Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2746 Joystick 3 Grip X-Axis Lever Left Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

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SPN 2747 Joystick 3 Grip Y-Axis Lever Back Negative Position Status

Reports when the current joystick grip position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

SPN 2748 Joystick 3 Theta-Axis Counter Clockwise Negative Position Status

Reports when the current joystick position is on the negative travel side (back, left, counterclockwise, down) relative to the neutral position for that axis of travel.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

SPN 2749 Joystick 3 X-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

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SPN 2750 Joystick 3 Y-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2751 Joystick 3 Grip X-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not on negative side of Neutral
01 On negative side of Neutral
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

SPN 2752 Joystick 3 Grip Y-Axis Neutral Position Status

Reports when the current joystick grip position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

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SPN 2753 Joystick 3 Theta-Axis Neutral Position Status

Reports when the current joystick position is in the neutral position for that axis of travel. The neutral position measurement must be determined from some mechanism other than the axis position measurement device.

00 Not in Neutral Position
01 In Neutral Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

SPN 2754 Joystick 3 X-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2755 Joystick 3 Y-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

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SPN 2756 Joystick 3 Grip X-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

SPN 2757 Joystick 3 Grip Y-Axis Detent Position Status

Reports when the current joystick grip position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

SPN 2758 Joystick 3 Theta-Axis Detent Position Status

Reports when the current joystick position is in the detent position for that axis of travel.

00 Not in the Detent Position
01 In the Detent Position
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64987

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SPN 2759 Joystick 3 Button 1 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2760 Joystick 3 Button 2 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2761 Joystick 3 Button 3 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

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SPN 2762 Joystick 3 Button 4 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2763 Joystick 3 Button 5 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2764 Joystick 3 Button 6 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

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SPN 2765 Joystick 3 Button 7 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2766 Joystick 3 Button 8 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2767 Joystick 3 Button 9 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

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SPN 2768 Joystick 3 Button 10 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2769 Joystick 3 Button 11 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

SPN 2770 Joystick 3 Button 12 Pressed Status

Reports when the joystick button has been pressed.

00 Button not pressed
01 Button pressed
10 Error Indicator
11 Not Available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64986

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SPN 2789 (R) Engine Turbocharger 1 Calculated Turbine Inlet Temperature

Calculated value of turbine inlet temperature based on engine operating conditions, such as intake manifold temperature, charge fuel ratio, injection timing, and engine speed. Use SPN 1180 for actual measured inlet temperature.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Status
Supporting information:
PGN 64981

SPN 2790 (R) Engine Turbocharger 1 Calculated Turbine Outlet Temperature

Calculated value of turbocharger compressor outlet air temperature. Temperature of air exiting the turbocharger compressor and before entering charge air cooler. The estimate is based on turbo speed and measured turbocharger compressor inlet temperature. Use SPN 1184 for actual measured outlet temperature.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Status
Supporting information:
PGN 64981

SPN 2791 (R) Engine Exhaust Gas Recirculation (EGR) Valve Control

Desired percentage of maximum Exhaust Gas Recirculation (EGR) valve opening. 0% means valve is closed. 100% means maximum valve opening (full gas flow).

Data Length: 2 bytes
Resolution: 0.0025 %/bit, 0 offset
Data Range: 0 to 160.6375 % Operational Range: 0 to 100%
Type: Status
Supporting information:
PGN 64981

SPN 2792 (R) Engine Variable Geometry Turbocharger (VGT) Air Control Shutoff Valve

Isolates vehicle brake air from the Variable Geometry Turbocharger (VGT) system when engine is not running. This valve prevents vehicle air from bleeding off through the VGT Control Valve when engine is not in use. Primary vehicle air system from air tanks feed the VGT Air Control Shutoff Valve, which in turn provides air to the VGT Control Valve when the keyswitch is 'ON'. The VGT Control Valve delivers air to the VGT actuator to adjust turbocharger geometry.

00 VGT Air Control Shutoff Valve is Off
01 VGT Air Control Shutoff Valve is On
10 Reserved
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64981

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SPN 2793 Laser Strike Data Latency

Time from laser strike to CAN message transmission. This parameter will be reported by survey receiver type devices only. Byte 3 (SPN 2576) of PGN 65141 identifies the type of Laser Receiver.

Data Length: 2 bytes
Resolution: 51.2 us/bit, 0 offset
Data Range: 0 to 3.289856 s Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65141

SPN 2794 Absolute Laser Strike Position

Laser Strike location on the survey type laser receiver.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, 0 offset
Data Range: 0 to 6,425.5 mm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65141

SPN 2795 (R) Engine Variable Geometry Turbocharger (VGT) 1 Actuator Position

Sensor that measures the position of the variable geometry turbocharger actuator. A position of 0% indicates the actuator is in the position creating the smallest geometry turbocharger. A position of 100% represents the largest geometry

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64981

SPN 2796 Transfer Case Selector Switch

Operator switch to select the condition of the transfer case. The possible states are 2 wheel drive, 4 wheel drive and neutral .

000 2 wheel
001 4 wheel
010 Neutral
011 - 101 Reserved for SAE assignment
110 Error indicator
111 Not available

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64980

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SPN 2799 (R) Engine Turbocharger 2 Compressor Outlet Temperature

Temperature of the air exiting the turbocharger 2 compressor outlet
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64979

SPN 2800 (R) Engine Turbocharger 3 Compressor Outlet Temperature

Temperature of the air exiting the turbocharger 3 compressor outlet
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64979

SPN 2801 (R) Engine Turbocharger 4 Compressor Outlet Temperature

Temperature of the air exiting the turbocharger 4 compressor outlet
Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64979

SPN 2802 Data Memory Usage

The used storage capacity of the data buffer memory internal to an ECU, such as a data logger.
Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64978

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SPN 2803 Keep-Alive Battery Consumption

The capacity consumed from the direct battery connection since the key was last turned off. This value is maintained and does not accumulate while the key switch is on. The value is reset to 0 when the key switch is turned to the off position.

Data Length: 2 bytes
Resolution: 1 mAhr/bit, 0 mAhr offset
Data Range: 0 to 64255mAhr (64.255Ahr) Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64978

SPN 2804 FMS-standard Diagnostics Supported

Status signal which indicates if the FMS Vehicle Interface (FMS Gateway) supports the handling of diagnostic messages from the vehicle network onto the FMS network.

The FMS gateway does NOT support the re-broadcast of diagnostics messages present on the vehicle network.

If this 'FMS-standard Diagnostics Supported' feature is supported by the FMS Gateway, the FMS Gateway will support the requests for diagnostics information (from the FMS device) onto the vehicle network and pass the responses onto the FMS network.

Note: This feature of the FMS Gateway is independent of the 'FMS-standard Requests Supported'. The FMS Gateway may support diagnostics without supporting the 'FMS-standard Requests Supported' function, or visa-versa.

00 Diagnostics Is Not Supported
01 Diagnostics Is Supported
10 Reserved
11 Don't care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64977

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SPN 2805 FMS-standard Requests Supported

Status signal which indicates if the FMS Vehicle Interface (FMS Gateway) will respond to requests from the FMS device for the PGNs listed in the FMS Interface Specification.

This mode is to support FMS gateway devices that only operate in a 'Request' mode.

The FMS PGNs may also be broadcast periodically in this mode.

The FMS Gateway will NOT support the requests for information not included in the FMS Interface Specification onto the vehicle network."

00 On request mode is not supported
01 On request mode is supported
10 Reserved
11 Don't care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64977

SPN 2806 FMS-standard SW-version supported.

Information that identifies which issue level of the FMS-standard document the software included in the FMS gateway supports. Four bytes, representing xx.yy type revision level identification.

Information to be ASCII equivalent of the numeric revision level of the FMS document, 00.01 to 99.99. The first released version will be 01.00.

Note: the first 2 bytes contain the high order number of the spec, the second 2 bytes contain the lower order number of the spec. For example, FMS-standard version 02.06 would have 0 in the first byte, 2 in the second byte, 0 in the third byte and 6 in the fourth byte.

Data Length: 4 bytes
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64977

SPN 2809 (R) Engine Air Filter 2 Differential Pressure

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

This is for monitoring the air filter on the inlet to the second turbocharger. Filter numbering follows the guidelines noted in section Naming Convention For Engine Parameters.

Data Length: 1 byte
Resolution: 0.05 kPa/bit, 0 offset
Data Range: 0 to 12.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64976

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SPN 2810 (R) Engine Air Filter 3 Differential Pressure

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

This is for monitoring the air filter on the inlet to the third turbocharger. Filter numbering follows the guidelines noted in section Naming Convention For Engine Parameters.

Data Length: 1 byte
Resolution: 0.05 kPa/bit, 0 offset
Data Range: 0 to 12.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64976

SPN 2811 (R) Engine Air Filter 4 Differential Pressure

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

This is for monitoring the air filter on the inlet to the fourth turbocharger. Filter numbering follows the guidelines noted in section Naming Convention For Engine Parameters.

Data Length: 1 byte
Resolution: 0.05 kPa/bit, 0 offset
Data Range: 0 to 12.5 kPa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64976

SPN 2812 (R) Engine Overspeed Test

The engine overspeed test signal as measured by the reporting ECM. Engine Overspeed Test is a mechanism to simulate engine overspeed situations, while operating the engine within the engine's safe operating range.

State signal which indicates when the overspeed test input to the ECM is being driven.

00 Engine Overspeed Test Not Active
01 Engine Overspeed Test Active
10 Reserved
11 Not Available

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

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SPN 2813 (R) Engine Air Shutoff Command Status

State signal which indicates when the Air Shutoff driver output is being driven. Disabled means controller wants air flowing to the engine. Status of the airflow shutoff as being commanded by the ECU.

00 Air Shutoff Disabled, not attempting to shutoff engine air supply
01 Air Shutoff Enabled, attempting to shutoff engine air supply
10 Reserved
11 Not Available

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

SPN 2814 (R) Engine Alarm Output Command Status

State signal which indicates when the Alarm driver output is being driven. Not active means the Controller has no alarm level conditions.

00 Engine Alarm Output Command Not Active
01 Engine Alarm Output Command Active
10 Reserved
11 Not Available

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

SPN 2815 (R) Engine Alarm Acknowledge

The Engine Alarm Acknowledge Input signal as measured by the reporting ECM. The Engine Alarm Acknowledge is a mechanism for external acknowledgement of the SPN 2814, Engine Alarm Output Command.

00 Engine Alarm Acknowledge Not Active
01 Engine Alarm Acknowledge Active
10 Error
11 Not Available

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

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SPN 2863 (R) Front Operator Wiper Switch

State of operation selected by operator switch for the Wiper in front of the operator position. This parameter, 'Front Operator Wiper Switch' should be used for the control information if either of the other wiper switch parameters is 'Not Available' and the associated wiper still needs to be controlled.

0 Off
1 Low
2 Medium
3 High
4 Delayed 1 (used for the first delay choice when the wiper switch position controls the delay)
5 Delayed 2 (used for the second delay choice when the wiper switch position controls the delay)
6 Mist (position where external sensor controls wiper rate)
7 Reserved
8 Reserved
9 Reserved
10 Reserved
11 Reserved
12 Reserved
13 Reserved
14 Reserved
15 Not available (do not change)

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64973

SPN 2864 (R) Front Non-operator Wiper Switch

State of operation selected by operator switch for the front wiper not in front of the operator position. The parameter, 'Front Operator Washer Switch' should be used for the control information if this parameter is 'Not Available' and the associated washer still needs to be controlled.

0 Off
1 Low
2 Medium
3 High
4 Delayed 1 (used for the first delay choice when the wiper switch position controls the delay)
5 Delayed 2 (used for the second delay choice when the wiper switch position controls the delay)
6 Mist (position where external sensor controls wiper rate)
7 Reserved
8 Reserved
9 Reserved
10 Reserved
11 Reserved
12 Reserved
13 Reserved
14 Reserved
15 Not available (do not change)

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64973

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SPN 2865 (R) Rear Wiper Switch

State of operation selected by operator switch for the rear wiper. The parameter, 'Front Operator Washer Switch' should be used for the control information if this parameter is 'Not Available' and the associated washer still needs to be controlled.

0 Off
1 Low
2 Medium
3 High
4 Delayed 1 (used for the first delay choice when the wiper switch position controls the delay)
5 Delayed 2 (used for the second delay choice when the wiper switch position controls the delay)
6 Mist (position where external sensor controls wiper rate)
7 Reserved
8 Reserved
9 Reserved
10 Reserved
11 Reserved
12 Reserved
13 Reserved
14 Reserved
15 Not available (do not change)

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64973

SPN 2866 (R) Front Operator Washer Switch

State of operation selected by operator switch for the washer in front of the operator position. This parameter, 'Front Operator Washer Switch' should be used for the control information if either of the other washer switch parameters is 'Not Available' and the associated washer still needs to be controlled.

0 Off
1 Low
2 Medium
3 High
4 Reserved
5 Reserved
6 Reserved
7 Not available (do not change)

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64973

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SPN 2867 (R) Front Non-operator Washer Switch

State of operation selected by operator switch for the front washer not in front of the operator position. The parameter, 'Front Operator Washer Switch' should be used for the control information if this parameter is 'Not Available' and the associated washer still needs to be controlled.

0 Off
1 Low
2 Medium
3 High
4 Reserved
5 Reserved
6 Reserved
7 Not available (do not change)

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64973

SPN 2868 (R) Rear Washer Function

State of operation selected by operator switch for the rear washer. The parameter, 'Front Operator Washer Switch' should be used for the control information if this parameter is 'Not Available' and the associated washer still needs to be controlled.

0 Off
1 Low
2 Medium
3 High
4 Reserved
5 Reserved
6 Reserved
7 Not available (do not change)

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64973

SPN 2869 (R) Front Operator Wiper Delay Control

Time between cycles of the front operator side wiper (i.e. from end of cycle 'n' to start of cycle 'n+1') as selected by the operator control (switch, etc.) in percentage of position with maximum position corresponding to maximum delay selectable. This parameter, 'Front Operator Wiper Delay Control' should be used for the delay information if either of the other delay parameters is 'Not Available' and the function needs to be provided.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64973

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SPN 2870 (R) Front Non-operator Wiper Delay Control

Time between cycles of the front non-operator side wiper (i.e. from end of cycle 'n' to start of cycle 'n+1') as selected by the operator control (switch, etc.) in percentage of position with maximum position corresponding to maximum delay selectable. The parameter, 'Front Operator Wiper Delay Control' should be used for the delay information if this parameter is 'Not Available' and the function needs to be provided.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64973

SPN 2871 (R) Rear Wiper Delay Control

Time between cycles of the rear wiper (i.e. from end of cycle 'n' to start of cycle 'n+1') as selected by the operator control (switch, etc.) in percentage of position with maximum position corresponding to maximum delay selectable. The parameter, 'Front Operator Wiper Delay Control' should be used for the delay information if this parameter is 'Not Available' and the function needs to be provided.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64973

SPN 2872 (R) Main Light Switch

A 4 bit parameter to indicate the selected position of the operator's main light switch.

0 Off - The position by which the operator selects that none of the lamps are to be on.
1 Park On - The position by which the operator selects that the park lamps are to be on.
2 Headlight On - The position by which the operator selects that the headlamps are to be on.
3 Headlight and Park On - The position by which the operator selects that Both the Headlamps and the Park lamps are to be on.
4 Reserved
5 Reserved
6 Reserved
7 Reserved
8 Delayed Off - The position by which the operator selects that a certain set of lamps are to come On and then are to be turned Off following a delay time (Operators Desired - Delayed Lamp Off Time).
9 Reserved
10 Reserved
11 Reserved
12 Reserved
13 Reserved
14 Error
15 Not available (do not change)

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64972

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SPN 2873 (R) Work Light Switch

A 4 bit parameter to indicate the selected position of the operator's work light switch. In Ag applications the work lights are often refereed to as field lights. In on-highway applications the work lights are often referred to as clearance lights and may or may not be operated by a switch separate from the main light switch.

0 Off - The position by which the operator selects that none of the work lamps are to be on.
1 Work Light Combination #1 On - The position by which the operator selects that the lamps in the combination defined as Work Light Combination #1 are to be on.
2 Work Light Combination #2 On - The position by which the operator selects that the lamps in the combination defined as Work Light Combination #2 are to be on.
3 Work Light Combination #3 On - The position by which the operator selects that the lamps in the combination defined as Work Light Combination #3 are to be on.
4 Work Light Combination #4 On - The position by which the operator selects that the lamps in the combination defined as Work Light Combination #4 are to be on.
5 Reserved
6 Reserved
7 Reserved
8 Reserved
9 Reserved
10 Reserved
11 Reserved
12 Reserved
13 Reserved
14 Error
15 Not available (do not change)

Data Length:	4 bits		
Resolution:	16 states/4 bit, 0 offset		
Data Range:	0 to 15	Operational Range:	same as data range
Type:	Measured		
Supporting information:			
PGN	64972		

SPN 2874 (R) High-Low Beam Switch

A 2 bit parameter to indicate the selected position of the operator's high/low beam select switch.

0 Low Beam Selected
1 High Beam Selected
2 Error
3 Not available (do not change)

Data Length:	2 bits		
Resolution:	4 states/2 bit, 0 offset		
Data Range:	0 to 3	Operational Range:	same as data range
Type:	Measured		
Supporting information:			
PGN	64972		

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SPN 2875 (R) Hazard Light Switch

A 2 bit parameter to indicate the selected position of the operator's hazard light switch.

0 Hazard Lamps to be Off
1 Hazard Lamps to be Flashing
2 Error
3 Not available (do not change)

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64972

SPN 2876 (R) Turn Signal Switch

A 4 bit parameter to indicate the selected position of the operator's turn signal switch.

0 No Turn being signaled
1 Left Turn to be Flashing
2 Right turn to be Flashing
3 Reserved
4 Reserved
5 Reserved
6 Reserved
7 Reserved
8 Reserved
9 Reserved
10 Reserved
11 Reserved
12 Reserved
13 Reserved
14 Error (to include both left and right selected simultaneously)
15 Not available (do not change)

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64972

SPN 2877 (R) Operators Desired - Delayed Lamp Off Time

A 16 bit parameter to be associated with Delayed Off position (1000 binary) of the Main Light Switch. This parameter indicates the time the operator wishes to have elapse following the Main Light switch being placed in Delayed Off position before the defined lights turn back off. The Operator's definition as to which lamps are to turn On (and then Off of course) when the Main Light Switch is in the Delayed Off position. The specific lamps are not identified within this message, but are to be stored by whatever device (ecu) is planning to send the lamp command message for said lamps. Said device must also provide the means for the operator to enter and/or adjust said definition.

Data Length: 2 bytes
Resolution: 1 s/bit, 0 offset
Data Range: 0 to 64,255 s Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64972

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SPN 2878 (R) Operators Desired Back-light

A 8 bit parameter to indicate the level of back lighting the operator has selected for displays. This is to be differentiated from the Illumination Brightness Percent (SPN:1487 PGN:53248 Cab Illumination Message) which is sent to the displays to tell them what level to be at. This is the operator desired level (as sensed by operator controls) for those system where the operator controls are monitored by an ecu separate from the ecu sending the command to the displays. Note each display (if appropriate) will need to have its own balance function to compensate its nominal brightness to the same level of that of all other displays. This is especially important for systems with back-lights which may change noticeable with aging. In other words it will be necessary within a vehicle to scale all of the displays down to the same level as the dimmest display (since, obviously you can not make the dimmest brighter).

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64972

SPN 2879 (R) Engine Alternate Droop Accelerator 2 Select

Same description as Engine Alternate Droop Accelerator 1 Select (SPN 2881) except that the selections may apply to Accelerator 2.

0000 – Normal Droop Setting is selected
0001 thru 1101 – One of Alternate Droop Setting 1 through 13 (in sequential order) is selected
1110 – Error condition
1111 – Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64971

SPN 2880 (R) Engine Operator Primary Intermediate Speed Select

Allows the operator to select one of 13 preprogrammed Intermediate Speed Control settings. If no speed setting is requested, the engine operates normally. The Intermediate Speed Control is widely used in the Industrial application to control the engine to an intermediate speed setting which can either replace the accelerator position control altogether, or limit the accelerator position control to a selectable speed point minimum or maximum.

0000 – indicates that the ISC functionality is not requested, engine operates normally
0001 thru 1101 – indicates that the ISC Setting 1 thru 13 (in sequential order) is selected
1110 – error condition
1111 – not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64970

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SPN 2881 (R) Engine Alternate Droop Accelerator 1 Select

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to Accelerator 1.

0000 – Normal Droop Setting is selected
0001 thru 1101 – One of Alternate Droop Setting 1 through 13 (in sequential order) is selected
1110 – Error condition

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64971

SPN 2882 (R) Engine Alternate Rating Select

In some off-highway applications it may be desirable to have multiple engine ratings available for selection by the operator. There is the default engine rating, which provides the maximum available power across the range of operation. There are additional engine ratings which the user can select that allow for alternate fueling across the operational range. Engine rating selection number 1 is the maximum rating. Selection number 2 is the next highest, selection 3 next highest, etc. The selection impacts the operating points in the Engine Configuration.

00 – indicates that Maximum Power Fueling is selected
01 – indicates that the Alternate Power Fueling 1 is selected
02 – indicates that the Alternate Power Fueling 2 is selected
03 – indicates that theAlternate Power Fueling 3 is selected
04 thru 253 - indicates that the Alternate Power Fueling 4 thru 253 (in sequential order) is selected.
254 – Error condition.
255 – Not available

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64971

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SPN 2883 (R) Engine Alternate Low Idle Switch

Operator switch which selects between two low idle speeds, default and alternate.

The normal programmed low idle is the default low idle, and when the Alternate Low Idle switch is activated, a alternate preprogrammed low idle speed is selected. The accelerator position control operates as normal but is now bounded to a different low idle speed. This selection impacts Point 1 on the Engine Configuration.

00 Default low idle point is selected
01 Alternate low idle point is selected
10 Error
11 Not available or Unused

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64971

SPN 2884 (R) Engine Auxiliary Governor Switch

This is the On/Off operation of the Auxiliary Governor feature switch. This feature is used to allow engine speed to be controlled by an auxiliary input such as pressure or tailshaft speed. This switch position indicates whether this feature is requested or not.

00 – Auxiliary Governor is disabled
01 – Auxiliary Governor is enabled
10 – Error condition
11 – Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64971

SPN 2885 (R) Engine Alternate Droop Auxiliary Input Select

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to the Alternate Droop Auxiliary Input.

0000 – Normal Droop Setting is selected
0001 thru 1101 – One of Alternate Droop Setting 1 through 13 (in sequential order) is selected
1110 – Error condition
1111 – Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64971

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SPN 2886 (R) Engine Alternate Droop Remote Accelerator Select

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to the Remote Accelerator.

0000 – Normal Droop Setting is selected
0001 thru 1101 – One of Alternate Droop Setting 1 through 13 (in sequential order) is selected
1110 – Error condition
1111 – Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64971

SPN 2887 (R) Total Count of Configuration Changes Made

Total number of times changes have been made to any of the configurable parameters.

Data Length: 2 bytes
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 64,255 counts Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64969

SPN 2888 (R) Engine Alternate Rating Select State

In some off-highway applications it may be desirable to have multiple engine ratings available for selection by the operator. There is the default engine rating, which provides the maximum available power across the range of operation. There are additional engine ratings which the engine controller may use that allow for alternate fueling across the operational range. Engine rating number 1 is the maximum rating. Rating number 2 is the next highest, rating 3 next highest, etc.

00 – Control state is Maximum Power Fueling
01 – Control state is Alternate Power Fueling 1
02 – Control state is Alternate Power Fueling 2
03 – Control state is Alternate Power Fueling 3
04 thru 253 - Control state is Alternate Power Fueling 4 thru 253 (in sequential order)
254 – SAE reserved
255 – Not available

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64967

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SPN 2889 (R) Engine Alternate Droop Accelerator 1 Select State

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections may apply to Accelerator 1. This parameter indicates which state has been selected by the controlling ECM.

0000 – Control state is Normal Droop Setting
0001 thru 1101 – Control state is one of Alternate Droop Setting 1 through 13 (in sequential order)
1110 – SAE reserved
1111 – Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64967

SPN 2890 (R) Engine Multi-Unit Sync State

This feature is widely used in Industry to operate multiple engines from a single command source. A master engine will "synchronize" one or more slave engines to operate at the same speed. This feature is requested by an operator switch, this parameter indictes the state of the feature as determined by the controlling ECM.

00 Control State is Functionality disabled (off)
01 Control State is Functionality enabled (on)
10 SAE reserved
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64967

SPN 2891 (R) Engine Alternate Low Idle Select State

In many applications, it is desirable that an alternate low idle speed setting be made available via switch input. The normal programmed low idle is the default low idle, and when the Alternate Low Idle feature is activated, an alternate preprogrammed low idle speed is selected. The accelerator position control operates as normal but is now bounded to a different low idle speed. This selection impacts Point 1 on the Engine Configuration.

00 – Normal idle state
01 – Alternate idle state
10 – SAE reserved
11 – not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64967

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SPN 2892 (R) Engine Operator Primary Intermediate Speed Select State

13 preprogrammed intermediate speed control settings are availible for the contolling ECM to select. If no speed setting is requested, the engine operates normally. The Intermediate Speed Control is widely used in the Industrial application to control the engine to an intermediate speed setting which can either replace the accelerator position control altogether, or limit the accelerator position control to a selectable speed point minimum or maximum. This parameter indicates which state has been selected by the controlling ECM.

0000 – Control state is ISC functionality is not requested, engine operates normally
0001 thru 1101 – Control state is ISC Setting 1 thru 13 (in sequential order)
1110 – SAE reserved
1111 – not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64968

SPN 2893 (R) Engine Alternate Droop Accelerator 2 Select State

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to Accelerator 2.

0000 – Control's state is Normal Droop Setting
0001 thru 1101 – Control's state is One of Alternate Droop Setting 1 through 13 (in sequential order)
1110 – SAE reserved

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64967

SPN 2894 (R) Engine Alternate Droop Remote Accelerator Select State

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to Remote Accelerator.

0000 – Control state is Normal Droop Setting
0001 thru 1101 – Control state is One of Alternate Droop Setting 1 through 13 (in sequential order)
1110 – SAE reserved
1111 – Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64967

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SPN 2895 (R) Engine Alternate Droop Auxiliary Input Select State

In some off-highway applications it may be desirable to have multiple droop settings available across the range of engine operation. For example, in an agricultural tractor application, this functionality allows a higher engine speed during low load so as to maximize vehicle speed driven between fields on the road. Another use of the alternate droop settings would be to provide functionality for maintaining an engine speed independent of the applied load on demand. There is a normal droop setting, and up to 13 additional preprogrammed droop settings which are user selectable by switching. The selections apply to Auxiliary Input.

0000 – Control state is Normal Droop Setting
0001 thru 1101 – Control state is One of Alternate Droop Setting 1 through 13 (in sequential order)
1110 – SAE reserved

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64967

SPN 2896 (R) Engine Auxiliary Governor State

This is the Engine Auxiliary Governor feature. This feature is used to allow engine speed to be controlled by an auxiliary input such as pressure or tailshaft speed. This feature is requested by an operator switch, this parameter indicates the state of the feature as determined by the controlling ECM.

00 – Control State is Auxiliary Governor disabled
01 – Control State is Auxiliary Governor enabled
10 – SAE reserved
11 – Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64967

SPN 2897 (R) Operator PTO Memory Select Switch

Measured state of the operator PTO memory select switch. This switch selects which of the two available memory locations is to be used to store the dynamically assigned value. This speed will be set using the PTO set switch and modified using the PTO accelerate and coast/decelerate switches.

00 PTO set speed memory 1 selected
01 PTO set speed memory 2 selected
10 error
11 not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65264

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SPN 2898 (R) Engine Start Enable Device 2 Configuration

The start enable device installed for start enable device 2.

0000 - no start enable device 2 installed
0001 - glow plugs installed
0010 - fuelled start installed
0011 - ether injection installed
0100 - electric inlet air heater installed
0101 - 1110 - reserved
1111 - not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64966

SPN 2899 (R) Engine Start Enable Device 1 Configuration

The start enable device installed for start enable device 1.

0000 - no start enable device 1 installed
0001 - glow plugs installed
0010 - fuelled start installed
0011 - ether injection installed
0100 - electric inlet air heater installed
0101 - 1110 - reserved
1111 - not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64966

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SPN 2900 (R) Transmission Engine Crank Enable

State signal from the transmission indicating if the transmission's status is such that engine cranking is allowed (i.e. at a minimum, transmission is in neutral and the driveline is disengaged). As sender of this information, the transmission is responsible for correct indication immediately upon first broadcast of this parameter.

As with hard-wired neutral start implementations, those utilizing this parameter should consider the impact of the transmission or other controllers 'resetting' due to voltage drops during the engine start sequence.

The vehicle system design should also consider the impact of timing latency in the engine starting sequence. For example, the turn of an ignition key from 'off' to 'start' may happen more quickly than the transmission controller can boot up, determine its' current state of being, and begin broadcasting information over the J1939 datalink.

00 - Cranking disabled; engine cranking is prohibited by the transmission
01 - Cranking enabled; engine cranking is allowed by the transmission
10 - Error
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

SPN 2901 (R) ECU Part Number

The part number of the physical ECU.
Data Length: Variable - up to 200 characters ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64965

SPN 2902 (R) ECU Serial Number

The serial number of the physical ECU.
Data Length: Variable - up to 200 characters ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64965

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SPN 2903 (R) ECU Location

The location of the ECU within a network.

Data Length: Variable - up to 200 characters ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64965

SPN 2904 (R) ECU Type

The type of ECU. One example of a use of the ECU type could be for classifying ECU capabilities, such as I/O.

Data Length: Variable - up to 200 characters ("*" delimited)
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64965

SPN 2911 (R) Halt brake switch

Switch signal which indicates the position of the halt brake switch.

00 Halt brake switch passive
01 Halt brake switch active
10 Error
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61441

SPN 2912 (R) Hill holder mode

Signal which indicates the current mode of the hill holder function.

000 Inactive
001 Active
010 Active, but will change to inactive in a short time. (This mode may be used to warn the driver)
011 - 101 Not defined
110 Reserved
111 Not available

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64964

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SPN 2913 (R) Halt brake mode

Signal which indicates the current mode of the halt brake function.

000 Inactive
001 Active
010 Active, but not functioning properly. (This mode may be used to warn the driver)
011 - 101 Not defined
110 Reserved
111 Not available

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64964

SPN 2914 (R) XBR EBI Mode

The XBR EBI (Endurance Brake Integration) Mode is used as an input for the brake system to prescribe the use of endurance brakes like retarders or engine brakes.

00 - No Endurance Brake Integration allowed
The demanded acceleration must be realized by the brake system by using only the foundation brakes. During an active XBR request, the brake system must not actively demand brake torque from other braking devices like retarders or engine brakes.
01 - Only Endurance Brakes allowed
The demanded acceleration must be realized by the brake system by demanding brake torque from other brake devices like retarders or engine brakes. The foundation brake itself must not be used (e.g. to reduce brake lining wear).
10 - Endurance Brake Integration allowed
The demanded acceleration may be realized by the brake system by using the foundation brakes and/or by demanding brake torque from other brake devices like retarders or engine brakes.
11 - Not defined

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 1024

SPN 2915 (R) XBR Priority

The XBR Priority is used as an input to the brake system to manage the priority of overlapping external and internal requests.

00 - Highest priority – used for emergency situations, e.g. for future Collision Avoidance System. This mode overrides any brake protection measures of the brake system.
01 - High priority – not defined
10 - Medium priority – used for ACC-Systems. This mode does not override brake protection measures of the brake
11 – Low priority – used in “override disabled” XBR Control Mode

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 1024

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SPN 2916 (R) XBR Control Mode

The XBR Control Mode is used as an input to the brake system and defines how the external acceleration demand has to be realized.

00 - Override disabled – Disable any existing control commanded by the source of this command.
01 - Acceleration control with addition mode - Add the XBR acceleration demand to the driver's acceleration demand.
10 - Acceleration control with maximum mode - Execute the XBR acceleration demand if it is higher than the driver's acceleration demand.
11 - Not defined

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 1024

SPN 2917 (R) XBR System State

This parameter indicates which external brake control is allowed.

00 - Any external brake demand will be accepted (brake system fully operational)
01 - Only external brake demand of highest XBR Priority (00) will be accepted (e.g. because the temperature limit of the brake system is exceeded)
10 - No external brake demand will be accepted (e.g. because of fault in brake system)
11 - not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64964

SPN 2918 (R) XBR Active Control Mode

This parameter indicates which XBR Control Mode is executed by the brake system.

0000 No brake demand being executed (default mode)
0001 Driver's brake demand being executed, no external brake demand
0010 Addition mode of XBR acceleration control being executed
0011 Maximum mode of XBR acceleration control being executed
0100 - 1110 Reserved for SAE assignment
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64964

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SPN 2919 (R) Foundation Brake Use

This parameter indicates if the brake system presently uses the foundation brakes.

00 Foundation brakes not in use
01 Foundation brakes in use
10 Reserved
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64964

SPN 2920 (R) External Acceleration Demand

Parameter provided to the brake system from external sources. This is the acceleration which the brake system is expected to realize. It is specified as an absolute acceleration in reference to the road. Positive values lead to increasing vehicle speed, negative values lead to decreasing vehicle speed. Note: Normally only the negative data range is used, but e.g. in case of downhill driving also positive values are possible.

Data Length: 2 bytes
Resolution: 1/2048 m/s² per bit, -15.687 m/s² offset
Data Range: -15.687 to +15.687 m/s² Operational Range: -10.0 to +10.0 m/s²
Type: Status
Supporting information:
PGN 1024

SPN 2921 (R) XBR Acceleration Limit

The brake system may temporarily or generally limit the maximum brake performance available for external systems. A temporary limit may be necessary due to high brake temperature; a general limit may be defined by the vehicle manufacturer, e.g. a value of -2.5 m/s² due to liability reasons. The actual limit is communicated to the external systems that request braking. The limit is only effective in the XBR Priorities 01 to 11. It is specified as an absolute acceleration in reference to the road.

Data Length: 1 byte
Resolution: 0.1 m/s² per bit, -12.5 m/s² offset
Data Range: -12.5 to +12.5 m/s² Operational Range: -10.0 to +10.0 m/s²
Type: Status
Supporting information:
PGN 64964

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SPN 2922 (R) Steerable Lift Axle Lowering Inhibit

A signal which indicates if lowering of lifted axle is allowed or inhibited.

00 Lowering allowed
01 Lowering inhibited
10 Reserved
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61451

SPN 2923 (R) Status of Steering Axle

A signal which indicates different states of the steering axle

0000 Axle steering not active (adhesion steering)
0001 Axle steering active
0010 Axle centered
0011 Axle centered, because of an error
0100 Axle not active because of an error (adhesion steering)
0101 Axle steering in special mode (diagnosis, calibration mode)
0110-1110 Reserved for SAE Assignment
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61451

SPN 2924 (R) Steering Type

Indicates the different types of steering systems (ref. ECE Regulation 79 paragraph 2.5)

0000 Main steering system
0001 Auxiliary steering equipment
0010-1110 Reserved for Assignment by SAE
1111 Not Available

0000 Main steering system - The steering equipment of a vehicle which is mainly responsible for determining the direction of travel.

0001 Auxiliary steering equipment - A system in which the wheels on axle(s) of vehicles of categories M and N are steered in addition to the wheels of the main steering equipment in the same or opposite direction to those of the main steering equipment and/or the steering angle of the front and/or the rear wheels may be adjusted relative to vehicle behaviour.

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61451

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SPN 2925 (R) Type of Steering Forces

Type of Steering Forces (Ref. ECE Regulation 79 paragraph 2.5)

0000 Manual steering equipment
0001 Power assisted steering equipment
0010 Full power steering equipment
0011 Self tracking steering equipment
0100-1110 Reserved for SAE assignment
1111 Not Available

0000 Manual steering equipment - The steering forces result solely from the muscular effort of the driver.
0001 Power assisted steering equipment - The steering forces result from both the muscular effort of the driver and the energy supply or supplies.
0010 Full power steering equipment - The steering forces are provided solely by one or more energy supplies.
0011 Self tracking steering equipment - A system designed to create a change of steering angle on one or more wheels only when acted upon by forces and/or moments applied through the tire to road contact.

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61451

SPN 2926 (R) Type of Steering Transmission

Type of Steering Transmission (Ref. ECE Regulation 79 paragraph 2.6)

0000 Purely mechanical steering transmission
0001 Purely hydraulic steering transmission
0010 Purely electric steering transmission
0011 Hybrid steering transmission
0100-1110 Reserved for SAE assignment
1111 Not available

0000 Purely mechanical steering transmission - A steering transmission in which the steering forces are transmitted entirely by mechanical means.
0001 Purely hydraulic steering transmission - A steering transmission in which the steering forces, somewhere in the transmission, are transmitted only by hydraulic means.
0010 Purely electric steering transmission - A steering transmission in which the steering forces, somewhere in the transmission, are transmitted only through electric means.
0011 Hybrid steering transmission - A steering transmission in which part of the steering forces is transmitted through one and the other part through another of the above mentioned means. However, in the case where any mechanical part of the transmission is designed only to give position feedback and is too weak to transmit the total sum of the steering forces, this system shall be considered to be purely hydraulic or purely electric steering transmission.

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 61451

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SPN 2927 (R) Actual Inner wheel steering angle

Signal which indicates the actual inner wheel steering angle. See figure 2927A for explanation of positive and negative

Data Length: 2 bytes

Resolution: 1/256 deg/bit, -125 deg offset

Data Range: -125 to 125 deg Operational Range: same as data range

Type: Measured

Supporting information: See Appendix D - SPN 2927

PGN 61451

SPN 2928 (R) Axle Location

To identify to which of several similar devices (such as tires or fuel tanks) the information applies.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0016 would be left front tire.

Tire pressure for location 2316 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length: 8 bits

Resolution: 256 states/8 bit, 0 offset

Data Range: 0 to 255 Operational Range: same as data range

Type: Measured

Supporting information:

PGN 61451

SPN 2930 (R) Hydraulic Brake System Audible Warning Command

Signal which commands an audible warning by the hydraulic braking system.

00 Audible warning off
01 Audible warning on
10 Reserved
11 Don't care

Data Length: 2 bits

Resolution: 4 states/2 bit, 0 offset

Data Range: 0 to 3 Operational Range: same as data range

Type: Status

Supporting information:

PGN 64998

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SPN 2931 (R) Hydraulic Brake Fluid Level Switch

Signal which indicates whether the hydraulic fluid level in the reservoir(s) is sufficient.

00 Fluid level is not sufficient
01 Fluid level is sufficient
10 Error indicator
11 Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64998

SPN 2945 (R) Active Shift Console Indicator

Signal from transmission control unit indicating which shift console (primary or secondary) it currently considers as the active shift selector input.

00 Primary shift console is active
01 Secondary shift console is active
10 Reserved
11 Not available

Note: In some applications such as refuse trucks, the transmission can be operated from two positions in the vehicle. The transmission control unit will accept changes in transmission requested gear (SPN 525) from the operator only from the active shift console. The transmission control unit determines which shift console is active based on a switch input controlled by the operator and transmission system state criteria.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

SPN 2948 (R) Engine Intake Valve Actuation System Oil Pressure

The gage pressure of the oil in the hydraulic system that powers the engine intake valve actuation system

Data Length: 2 bytes
Resolution: 1/256 MPa/bit, 0 offset
Data Range: 0 to 251 Mpa Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64961

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SPN 2970 (R) Accelerator Pedal 2 Low Idle Switch

Switch signal which indicates the state of the accelerator pedal 2 low idle switch. The low idle switch is defined in SAE J1843.

00 Accelerator pedal 2 not in low idle condition
01 Accelerator pedal 2 in low idle condition
10 Error
11 Not available

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

SPN 2978 (R) Estimated Engine Parasitic Losses - Percent Torque

The calculated torque that indicates the estimated amount of torque loss due to engine parasitics, such as cooling fan, air compressor, air conditioning, etc. It is expressed as a percent of Engine Reference Torque.

When the data value of this parameter is equal to FB it means that all parasitic losses calculated by the engine are included in the Engine's Nominal Friction Percent Torque (SPN 514).

Data Length: 1 byte
Resolution: 1 %/bit, -125 % offset
Data Range: -125 to 125 % Operational Range: 0 to 125%
Type: Status
Supporting information:
PGN 65247

SPN 2979 (R) Vehicle Acceleration Rate Limit Status

Status (active or not active) of the system used to limit maximum forward vehicle acceleration.

00 Limit not active
01 Limit active
10 Reserved
11 Not available

NOTE: The effects of emission control limits, such as engine exhaust smoke control, are specifically excluded; they are not considered to be part of a function to limit vehicle acceleration.

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

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SPN 2983 (R) Clutch Life Remaining

Signal which indicates the actual clutch life remaining in percent. One hundred percent means the clutch is brand new and zero percent means the clutch is at the end of its life.

Data Length: 1 byte
Resolution: 0.4 %/bit, 0 offset
Data Range: 0 to 100 % Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65195

SPN 2984 (R) Automatic traction help (load transfer)

This signal enables the traction help (load transfer) in case of an active ASR function

00 Disable automatic traction help
01 Enable automatic traction help
10 Reserved
11 Don't care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 53760

SPN 2985 (R) Transmission Shift Selector Display Mode Switch

Status of the operator's switch used to 'toggle' through multiple display modes of a shift selector display.

When a shift selector display is capable of displaying more than just range information, this switch is toggled by the operator to move through the different display modes. If the selector has only two display modes, this switch may behave as a typical SPST switch. If the selector has more than two display modes, the switch may be momentary, where each activation indicates that the selector has scrolled through to the next subsequent display mode.

00 Off
01 On
10 Error
11 Not available

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

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SPN 2986 (R) Engine Intake Valve Actuation System Oil Temperature

The temperature of the oil in the hydraulic system that powers the intake valve actuation system.

Data Length: 2 bytes
Resolution: 0.03125 deg C/bit, -273 deg C offset
Data Range: -273 to 1735 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65129

SPN 3026 (R) Transmission Oil Level Measurement Status

Indicates if conditions are acceptable to obtain a valid transmission oil level measurement as conveyed in SPN 124 Transmission Oil Level or SPN 3027 Transmission Oil Level High / Low. If conditions are not acceptable, this parameter conveys to the operator what prevents conditions from being acceptable. Only one condition can be conveyed in this parameter at any given point in time. If multiple conditions exist, it is not important which condition is actually broadcast, as the driver must 'correct' each and every condition as it is presented before a valid oil level reading can be made. If multiple conditions exist that prevent a valid reading, the sender should broadcast one of those conditions until it is corrected; then the next condition can be conveyed to the operator, and so on.

0000 Conditions valid for transmission oil level measurement
0001 Conditions not valid – Settling timer still counting down
0010 Conditions not valid – Transmission in gear
0011 Conditions not valid – Transmission fluid temperature too low
0100 Conditions not valid – Transmission fluid temperature too high
0101 Conditions not valid – Vehicle moving; output shaft speed too high
0110 Conditions not valid – Vehicle not level
0111 Conditions not valid – Engine speed too low
1000 Conditions not valid – Engine speed too high
1001 Not defined
1010 Not defined
1011 Not defined
1100 Not defined
1101 Conditions not valid - Other
1110 Error
1111 Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65272

SPN 3027 (R) Transmission Oil Level High / Low

Amount of current volume of transmission sump oil compared to recommended volume. Positive values indicate overfill. Zero means the transmission fluild is filled to the recommended level.

Parameter Specific Indicator:
A value of FB hex indicates conditions are not acceptable for a valid fluid level measurement.

Data Length: 1 bytes
Resolution: 0.5 L/bit, -62.5 offset
Data Range: -62.5 to 62.5 L Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65272

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SPN 3028 (R) Transmission Oil Level Countdown Timer

Once all vehicle conditions (such as vehicle stopped, etc) are met, some transmissions may require a 'settling time' to allow the fluid level to normalize. This parameter indicates how much of the required settling time remains. When time reaches 0, a valid oil level measurement value will be broadcast in SPN 3027 Transmission Oil Level High / Low.

0000 less than 1 minute
0001 One minute
0010 Two minutes
0011 Three minutes
0100 Four minutes
0101 Five minutes
0110 Six minutes
0111 Seven minutes
1000 Eight minutes
1001 Nine minutes
1010 Ten minutes
1011 Eleven minutes
1100 Twelve minutes
1101 Thirteen minutes
1110 Error
1111 Not Available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: 0 to 13 minutes
Type: Measured
Supporting information:
PGN 65272

SPN 3030 (R) Transmission Torque Converter Ratio

Ratio of the transmissions torque converter output torque to torque converter input torque at current speed.

The ratio of 1.000 (03 E8 hex) indicates torque converter lockup.
If the ratio is less than 1 and the ratio can not be properly determined it shall be set to a value of FB00 hex.
Ratios above 1 indicate torque converter multiplication.

Data Length: 2 bytes
Resolution: 0.001/bit, 0 offset
Data Range: 0 to 64.255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61452

SPN 3031 (R) Catalyst Tank Temperature

Temperature of the reagent in the storage tank.

Data Length: 1 byte
Resolution: 1 deg C/bit, -40 deg C offset
Data Range: -40 to 210 deg C Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65110

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SPN 3038 (R) Flash Engine Malfunction Indicator Lamp (MIL)

This parameter provides the capability to flash the MIL

00 - Slow Flash (1 Hz, 50 % duty cycle)
01 - Fast Flash (2 Hz or faster, 50% duty cycle)
10 - Reserved
11 - Unavailable / Do Not Flash

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65226

SPN 3039 (R) Flash Engine Red Stop Lamp (RSL)

This parameter provides the capability to flash the RSL

00 - Slow Flash (1 Hz, 50 % duty cycle)
01 - Fast Flash (2 Hz or faster, 50% duty cycle)
10 - Reserved
11 - Unavailable / Do Not Flash

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65226

SPN 3040 (R) Flash Engine Amber Warning Lamp (AWL)

This parameter provides the capability to flash the AWL

00 - Slow Flash (1 Hz, 50 % duty cycle)
01 - Fast Flash (2 Hz or faster, 50% duty cycle)
10 - Reserved
11 - Unavailable / Do Not Flash

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65226

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SPN 3041 (R) Flash Engine Protect Lamp

This parameter provides the capability to flash the engine protect lamp

00 - Slow Flash (1 Hz, 50 % duty cycle)
01 - Fast Flash (2 Hz or faster, 50% duty cycle)
10 - Reserved
11 - Unavailable / Do Not Flash

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65226

SPN 3043 (R) Type of Passenger Count

Used to notify transit link devices of the type of passenger counting system used in the vehicle. Some passenger counting systems indicate real-time boarding and exiting data for other devices to accumulate. Other types of passenger counters report a current on-board total relative to a transit door status, a fare collection status, or other signal which can define the end of the boarding/exiting period and a stable underway totalized passenger count.

0 - absolute passenger count
1 - boarding passenger
2 - exiting passenger
3 - boarding passenger (second passenger stream)
4 - exiting passenger (second passenger stream)
5 to 250 - reserved for future assignment
251 to 253 - reserved
254 - error indicator
255 - not available

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64960

SPN 3044 (R) Silent Alarm Status

Used to report silent alarm push button status.

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

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64960

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SPN 3045 (R) Vehicle Use Status

Used to indicate the proper or unauthorized use of the vehicle. The administrative control device or any device issuing the vehicle use status PID should be sensitive to the run switch status (SPN 3046) and any other locally defined criteria for authorized use (i.e., driver log-ons) before the vehicle use status PID is used to generate an unauthorized use alarm.

00 - Normal use
01 - Unauthorized use
10 - Error condition
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64960

SPN 3046 (R) Transit Run Status

Status of the run switch for the vehicle.

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

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 64960

SPN 3047 (R) Patron Count

Count of the number of passengers on a transit vehicle. If the type of passenger count (SPN 3043) is 0, the patron count indicates the number of patrons currently on vehicle after the door has closed. If the type of passenger count is 1 to 4, the patron count indicates an incremental count of passengers since the last data transmittal.

Data Length: 1 byte
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 250 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64960

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SPN 3070 (R) Number of bytes in the Milepost Identification

Number of bytes in the Milepost Identification
Data Length: 1 byte
Resolution: 1 byte/bit, 0 offset
Data Range: 0 to 250 Operational Range: 0 to 100 bytes
Type: Measured
Supporting information:
PGN 64959

SPN 3071 (R) Number of bytes in the Transit Assigned Route Identity

Number of bytes in the Transit Assigned Route Identity
Data Length: 1 byte
Resolution: 1 byte/bit, 0 offset
Data Range: 0 to 250 Operational Range: 1 to 100 bytes
Type: Measured
Supporting information:
PGN 64958

SPN 3072 (R) Number of bytes in the Transit Assigned Run Identity

Number of bytes in the Transit Assigned Run Identity
Data Length: 1 byte
Resolution: 1 byte/bit, 0 offset
Data Range: 0 to 250 Operational Range: 1 to 100 bytes
Type: Measured
Supporting information:
PGN 64958

SPN 3073 (R) Number of bytes in the Transit Assigned Block Identity

Number of bytes in the Transit Assigned Block Identity
Data Length: 1 byte
Resolution: 1 byte/bit, 0 offset
Data Range: 0 to 250 Operational Range: 1 to 100 bytes
Type: Measured
Supporting information:
PGN 64958

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SPN 3074 (R) Transit Assigned Route Identity

Identifies the transit route assigned to a specific vehicle

Data Length: Variable - up to 100 characters
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64958

SPN 3075 (R) Transit Assigned Run Identity

Identifies the transit run assigned to a specific vehicle

Data Length: Variable - up to 100 characters
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64958

SPN 3076 (R) Transit Assigned Block Identity

Identifies the transit block assigned to a specific vehicle

Data Length: Variable - up to 100 characters
Resolution: ASCII, 0 offset
Data Range: 0 to 255 per byte Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64958

SPN 3078 (R) Agency

The identity of the agency involved in this transaction

Data Length: 1 byte
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64958

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SPN 3079 (R) Intersection Preemption Request/Response

Status of the intersection signal preemption

00 - Message is a request directed to the emitter
01 - Message is a response from the emitter
10 - Error condition
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64957

SPN 3080 (R) Transit Route ID Usage

Transit route ID usage

00 - Transit route ID not used for interleaved data
01 - Transit route ID used for interleaved data (if range code not enabled)
10 - Error condition
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64957

SPN 3081 (R) Range Code Enable

Range code enable

00 - Range code not used for interleaved data
01 - Range code used for interleaved data
10 - Error condition
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64957

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SPN 3082 (R) Strobe Activation Control Status

Strobe activation control status

00 - Deactive strobe
01 - Activate strobe
10 - Error condition
11 - Not available

Note: Strobe will flash if not overridden by transit door status, strobe is working, and emitter is in the normal mode.

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64957

SPN 3083 (R) Transit Door Enable

Transit door enable

00 - Ignore transit door status
01 - Transit door status will override strobe activation
10 - Error condition
11 - Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64957

SPN 3084 (R) Priority of Response Sent by Emitter

Priority of response sent by emitter

0000 - Reserved
0001 - Low priority
0010 - Probe priority
0011 - High priority
0100 to 1000 - Reserved
1001 - Priority set by hardware to low priority
1010 - Priority set by hardware to probe priority
1011 - Priority set by hardware to high priority
1100 to 1101 - Reserved
1110 - Error condition
1111 - Not available

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64957

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SPN 3085 (R) Vehicle ID

Numerical designation of the vehicle. 65535 is used to represent the vehicle ID is not available.

Data Length: 2 bytes
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 65,535 counts Operational Range: 0 to 65,534
Type: Measured
Supporting information:
PGN 64957

SPN 3086 (R) Transmission Ready for Brake Release

This parameter indicates that enough torque / motive force is available at the transmission output shaft to release all the brakes without a risk of unintentional movement in the opposite direction.

00 - Transmission Not Ready for Brake Release
01 - Transmission Ready for Brake Release
10 - Reserved
11 - Don't Care

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Status
Supporting information:
PGN 65098

SPN 3087 (R) Auxiliary Level

Level measured by a sensor.

Data Length: 2 bytes
Resolution: 0.1 mm/bit, 0 offset
Data Range: 0 to 6,425.5 mm Operational Range: same as data range
Type: Measured
Supporting information:
PGN 65164

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SPN 3156 (R) Blade Control Mode Switch

This parameter indicates the blade control mode switch state the user has set for the land leveling system. The switch value directly correlates to the current switch state, regardless of the switch being used. This parameter is intended for use in systems using only one parameter to control the blade movement (i.e. elevation). Systems using two independent parameters to control blade position, i.e. one blade edge maintains a constant elevation and the other blade edge maintains a constant blade angle, should use parameters specific to that usage. Only one of the following states will be active at a time. Below are the data values defined for each switch type that may be used in this application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. A toggle button with two states can be used, in which the button is either in the manual or the auto position at all times. Toggle button usage is as follows:
   Manual Position = 0010 Manual button pressed
   Auto Position = 0011 Automatic button pressed

2. The momentary rocker switch may be used, where the default is the no button pressed position. The user can press the rocker into the manual position, and when pressure is released, it will return to the no button pressed position. The user may also press the rocker into the auto position, and when pressure is released, it will return to the no button pressed position. Momentary rocker button usage is as follows:
   No Button Pressed = 0000 No button pressed
   Manual Button Pressed = 0010 Manual button pressed
   Auto Button Pressed = 0011 Automatic button pressed

3. The momentary contact button pair may be used, where the default is no buttons being pressed. The user can press the manual button, and when pressure is released, it will return to the no button pressed position. The user may press the auto button, and when pressure is released, it will return to the no button pressed position. Momentary contact buttons (button pair) usage is as follows:

   No Button Pressed = 0000 No button pressed
   Manual Button Pressed = 0010 Manual button pressed
   Auto Button Pressed = 0011 Automatic button pressed

4. The momentary contact single button may be used, where the default is no button being pressed. The user can press the button, which is the button pressed position, and when pressure is released, it will return to the no button pressed position. The controller receiving this command will keep track of what mode the blade is in, auto or manual. When the button is pressed, the "mode button pressed" state is reported and the receiving controller then changes the current mode to its opposite value (i.e. manual to automatic or vise-versa). Momentary contact button (single button) usage is as follows:

   No Button Pressed = 0000 No button pressed
   Button Pressed = 0001 Mode button pressed

Data Values and Descriptions:

0000 No button pressed
0001 Mode button pressed
0010 Manual button pressed
0011 Automatic button pressed
1110 Error Indicator
1111 Not Installed
All other values are reserved

Notes:

1. The switch state can be read in two ways. One method uses the direct analog switch input to determine the switch state, while the second method relies on a secondary control to read the analog input, then relay the information on the data link. The parameter is designed to provide the actual switch state to other controls that need the information.
2. Other systems with automated blade controls should be able to use this parameter, since it is a measured switch value.

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 61453

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SPN 3157 (R) Desired Grade Offset Switch

This parameter indicates the grade offset switch state the user has set for the land leveling system. The desired grade offset value is the vertical offset measured from a given elevation reference point to the bottom edge of the blade. This parameter is intended for use in systems using only elevation offset to control the blade movement (i.e. elevation). Systems using two independent parameters to control blade position, i.e. one edge maintains a constant elevation and the other blade edge maintains a constant angle, should use parameters specific to that usage. Only one of the following states will be active at a time. Below are the data values defined for each switch type that may be used in this application. The purpose of the following switch information is to define what data should be reported based on what type of switch is used.

1. The momentary rocker switch may be used, where the default is the no button pressed position. The user can press the rocker into the increment button pressed position, and when pressure is released, it will return to the no button pressed position. The user may also press the rocker into the decrement button pressed position, and when pressure is released, it will return to the no button pressed position. Momentary rocker button usage is as follows:

No Button Pressed = 0000 No button pressed
Increment Button Pressed = 0001 Increment button pressed
Decrement Button Pressed = 0010 Decrement button pressed

2. The momentary contact button pair may be used, where the default is the no buttons pressed position. The user can press the increment button, and when pressure is released, it will return to the no buttons pressed position. The user may press the decrement button, and when pressure is released, it will return to the no buttons pressed position. Momentary contact button (button pair) usage is as follows:

No Button Pressed = 0000 No button pressed
Increment Button Pressed = 0001 Increment button pressed
Decrement Button Pressed = 0010 Decrement button pressed

Data Values and Descriptions:
0000 No button pressed
0001 Increment button pressed
0010 Decrement button pressed
1110 Error Indicator
1111 Not installed
All other values are reserved

Notes:

1. The switch state can be read in two ways. One method uses the direct analog switch input to determine the switch state, while the second method relies on a secondary control to read the analog input, then relay the information on the data link. The parameter is designed to provide the actual switch state to other controls that need the information.
2. Other systems with automated blade controls should be able to use this parameter, since it is a measured switch value.

Data Length:	4 bits		
Resolution:	16 states/4 bit, 0 offset		
Data Range:	0 to 15	Operational Range:	same as data range
Type:	Measured		
Supporting information:			
PGN	61453		

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SPN 3158 (R) Blade Auto Mode Command

Allows other controllers to command to the primary control system what they think is the appropriate auto control mode to be engaged in, based on the information they have available to them. When in automatic mode, the blade automatically adjusts its position to the center of the blade to maintain a desired grade offset. Only one of the following states will be active at a time. Below is extended information describing each command. The purpose of this information is to define what command state should be reported based on what auto control mode command is deemed appropriate by the operational specifications of the system.

0000 Auto Allowed - Auto mode permitted as appropriate (auto button was pushed or directly returned from Suspend Auto condition)
0001 Activity Allows Auto - Auto mode permitted only if the primary control system detects operator activity. The control issuing this command does not have sufficient information/reason to absolutely allow Auto mode (state 0000) or not allow Auto mode (state 0100). The control issuing this command is permitting the primary control system to operate in auto mode only if the primary control system detects operator activity, such as direct input to the primary control system. If the primary control system does not detect operator activity, then the control issuing this command is not allowing auto mode. For example, the control issuing this command has detected no operator activity yet it acknowledges that there may be other sources of operator activity that might make auto mode permissible.
0010 Suspend Auto - Auto mode is temporarily not allowed and the control issuing this command wants the primary control system to automatically return to the previous state (Auto or Manual) when the suspend auto condition is removed.
0011 Service Mode - Auto mode is permitted only for special services such as calibrations.
0100 Auto Not Allowed - Auto mode is not allowed under any condition

Data Values and Descriptions:
0000 Auto Allowed
0001 Activity Allows Auto - must detect operator before auto allowed
0010 Suspend Auto - temporarily suspend auto mode
0011 Service Mode - auto allowed only during service modes
0100 Auto Not Allowed
1110 Error Indicator
1111 Not Supported
All other values are reserved

Note:
The control issuing this command is aware that it does not have access to all information that the primary controller of the Land Leveling System attachment has access to. Therefore, it commands the Land Leveling system to activate a auto blade mode based on the input it has access to. In some cases, like in the "Activity Allows Auto" situation, the control knows the Land Leveling system has access to an additional display (which has switches and several buttons) which may help determine if an operator is present. On the other hand, the control may also have information the primary controller of the Land Leveling System does not have access to, like the parking brake status.

Data Length:	4 bits		
Resolution:	16 states/4 bit, 0 offset		
Data Range:	0 to 15	Operational Range:	same as data range
Type:	Status		
Supporting information:			
PGN	61453		

SPN 3159 (R) Trip Number

The identity number assigned to this trip.

Data Length:	2 bytes		
Resolution:	1 count/bit, 0 offset		
Data Range:	0 to 65,535 counts	Operational Range:	same as data range
Type:	Measured		
Supporting information:			
PGN	64956		

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SPN 3160 (R) Assigned Route

The identity number assigned to this route.

Note: This is the numerical value for the route as opposed to the "Transit Assigned Route Identity" (SPN 3074) which is variable length ASCII or the "Route number" (SPN 3169) which is 12 bit numeric.

Data Length: 2 bytes
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 65,535 counts Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64956

SPN 3161 (R) Pattern Number

The agency defined pattern number for this trip
Data Length: 2 bytes
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 65,535 counts Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64956

SPN 3162 (R) Assigned Run

The agency defined run number for this trip
Data Length: 2 bytes
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 65,535 counts Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64956

SPN 3163 (R) Assigned Block

The agency defined block number for this trip
Data Length: 2 bytes
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 65,535 counts Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64956

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SPN 3164 (R) Driver's farebox security code

Security code for the farebox, numerical only.

Note: 0 = Farebox is in reporting status
1 - 65535 = security code

Data Length: 2 bytes
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 65,535 counts Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64956

SPN 3165 (R) Fare Validity

Agency defined value indicating validity of this fare

Data Length: 4 bits
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

SPN 3166 (R) Pass Category

Agency defined value indicating the category of the passenger associated with this fare

Data Length: 4 bits
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

SPN 3167 (R) Initial Fare Agency

Identifies where the initial fare is paid

Note: The definition of the agency numbering plan shall be agreed by the operating agency and the farebox manufacturer. The value of 0 is reserved, the usable range is 1 to 31.

Data Length: 5 bits
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 31 Operational Range: 1 to 31
Type: Measured
Supporting information:
PGN 64955

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SPN 3168 (R) Transfer Sold

Indicates that a transfer was sold or issued on this transaction including its type and/or restrictions. The final definitions of the transfer issued information shall be agreed by the operating agency and the farebox manufacturer.

Note: A non-zero value indicates that a transfer was sold or issued. The value of zero is reserved to indicate that no transfer has been sold or issued.

Data Length: 1 byte
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

SPN 3169 (R) Route Number

The route number issuing the transfer.
Data Length: 12 bits
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 4095 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

SPN 3170 (R) Transaction Type

Enumerated value representing the type of transaction completed

0000 = Cash
0001 = Token
0010 = Ticket
0011 = Pass
0100 = Card
0101 = Permit
0110 = Transfer
0111 = Free
1000-1011 = Reserved for assignment
1100-1111 = Agency defined

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

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SPN 3171 (R) Passenger Type

Enumerated value representing the type/class of passenger, as defined by the agency.

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

SPN 3172 (R) Type of Service

The type of service provided

000 = Local service
001 = Express service
010-111 = Agency defined

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

SPN 3173 (R) Transfer Type

The kind of transfer used

00000 = North
00001 = South
00010 = East
00011 = West
00100 = In
00101 = Out
00110-11111 = Agency defined

Data Length: 5 bits
Resolution: 32 states/5 bit, 0 offset
Data Range: 0 to 31 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

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SPN 3174 (R) Trip Direction

The general direction of travel for this trip.

0000 = North
0001 = South
0010 = East
0011 = West
0100 = In
0101 = Out
0110-1111 = Agency defined

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64956

SPN 3175 (R) Fare Presets

Fare Presets

00000000 to 00001111 = Agency defined
00010000 to 11111111 = Reserved for assignment

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64956

SPN 3176 (R) Type of Fare

Type of Fare

0000 = Cash/No detail
0001 = Token A
0010 = Token B
0011 = Ticket A
0100 = Ticket B
0101 = Pass A
0110 = Pass B
0111-1010 = Reserved for assignment
1011-1111 = Agency defined

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

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SPN 3177 (R) Payment Details

Payment details.

0000 = Not an upgrade
0001 = Cash
0010 = Token
0011 = Ticket
0100 = Pass
0101 = Card
0110-1010 = Reserved for assignment
1011-1111 = Agency defined

Data Length: 4 bits
Resolution: 16 states/4 bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64955

SPN 3178 (R) Farebox Service Status

Indicates if the farebox is in or out of service.

00 = Farebox out of service
01 = Farebox in service
10 = Error Condition
11 = Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64956

SPN 3179 (R) Farebox Emergency Status

Indicates if a farebox emergency condition exists.

00 = Non-emergency condition
01 = Emergency condition
10 = Error Condition
11 = Not available

Data Length: 2 bits
Resolution: 4 states/2 bit, 0 offset
Data Range: 0 to 3 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64954

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SPN 3180 (R) Trip Status

Trip Status

000 = Undefined
001 = Trip start
010 = Trip end
011 = Undefined
100 = Undefined
101 = Layover start
110 = Layover end
111 = Undefined

Data Length: 3 bits
Resolution: 8 states/3 bit, 0 offset
Data Range: 0 to 7 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64956

SPN 3181 (R) Farebox Alarm Identifier

Indicates the nature of the farebox alarm condition.

0000000 = Voltage dropout
0000001 = Voltage restored
0000010 = Probe started
0000011 = Probe completed
0000100 = Cashbox removed
0000101 = Cashbox restored
0000110 = Cashbox door timeout
0000111 = Cashbox opened in service, considered an alarm condition
0001000 = Insufficient fare accepted
0001001 = Coinbox 75% full
0001010 = Coinbox full
0001011 = Currency box 75% full
0001100 = Currency box less than 75% full
0001101 = Currency box full
0001110 = Card/pass box 75% full
0001111 = Card/pass box less than 75% full
0010000 = Card/pass box full
0010001 = Coin de-jam operated
0010010 = Farebox set in manual bypass
0010011 = Farebox reset to automatic mode
0010100 = Pass/transfer jam
0010101 = Pass/transfer jam cleared
0010110 = Paper currency jam
0010111 = Paper currency jam cleared
0011000 = Maintenance access in service, considered an alarm condition
0011001 = Maintenance access out of service
0011010-1100000 = Reserved - to be assigned
1100001-1111111 = Agency defined

Data Length: 7 bits
Resolution: 128 states/7 bit, 0 offset
Data Range: 0 to 127 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64954

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SPN 3188 (R) XBR Message Checksum

The XBR message checksum is used to verify the signal path from the demanding device to the brake controller on electronic brake systems. The support of this parameter is mandatory.

The 4 bit checksum is the sum of the high nibble and the low nibble of the sum of the identifier, the first 7 data bytes and the 4 bit message counter. It is calculated as follows:

Checksum = (Byte1 + Byte2 + Byte3 + Byte4 + Byte5 + Byte6 + Byte7 + message counter&0x0F + message ID low byte + message ID mid low byte + message ID mid high byte + message ID high byte)
Checksum = ((Checksum >> 4) + Checksum) & 0x0F

Note: A failure in the communication sets the XBR system state:
- to '01' for failed XBR 'priority 01, 10 or 11' messages
- to '10' for failed XBR 'priority 00' messages.

Data Length: 4 bits
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 1024

SPN 3189 (R) XBR Message Counter

The XBR message counter is to verify the signal path from the demanding device to the brake controller on electronic brake systems.. The support of this parameter is mandatory.

Note: The initial value of the 4 bit message counter for the first message during a driving cycle is arbitrary. In every following message the counter is incremented by 1 (0 follows 15).

Data Length: 4 bits
Resolution: 1 count/bit, 0 offset
Data Range: 0 to 15 Operational Range: same as data range
Type: Status
Supporting information:
PGN 1024

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SPN 3190 (R) Tire Location

Identifies which tire is associated with the parametric data in this PGN.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 64953

SPN 3191 (R) Reference Tire Pressure

Reference value of the tire pressure as basis for the tire pressure monitoring
Data Length: 1 byte
Resolution: 8 kPa/bit, 0 offset
Data Range: 0 to 2,000 kPa Operational Range: same as data range
Type: Status
Supporting information:
PGN 64953

SPN 3192 (R) Tire Location

Identifies which tire is associated with the parametric data in this PGN.

The low order 4 bits represent a position number, counting left to right when facing in the direction of normal vehicle travel (forward).

The high order 4 bits represent a position number, counting front to back on the vehicle.

The value 0xFF indicates not available.

It is recommended that output devices add 1 to the position number (range 1 to 15, not 0 to 14) for use by drivers and service technicians.

Examples: Tire pressure for location 0x00 would be left front tire.

Tire pressure for location 0x23 would be right outside rear rear on a 3-axle tractor with dual axle per side (3rd axle, 4th tire).

Data Length: 8 bits
Resolution: 256 states/8 bit, 0 offset
Data Range: 0 to 255 Operational Range: same as data range
Type: Measured
Supporting information:
PGN 44544

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SPN 3193 (R) Reference Tire Pressure Setting

Reference value of the tire pressure setting as basis for the tire pressure monitoring

Data Length: 1 byte

Resolution: 8 kPa/bit, 0 offset

Data Range: 0 to 2,000 kPa Operational Range: same as data range

Type: Status

Supporting information:

PGN 44544

SPN 3289 (R) Transmission Requested Gear Feedback

Feedback of the SPN 525 Transmission Requested Gear input as received from the shift selector, ABS or engine via PGN 256, Transmission Control #1 (TC1). Scaling, values and parameter specific indicators are identical to those listed for SPN 525 Transmission Requested Gear.

This feedback from the transmission allows shift selectors and other TC1 input devices to verify that their Transmission Requested Gear command has been properly received by the transmission. (This parameter is not intended for driver display purposes).

Data Length: 1 byte

Resolution: 1 gear value/bit, -125 offset

Data Range: -125 to 125 Operational Range: same as data range

Type: Status

Supporting information:

PGN 65098

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APPENDIX C
PGNs

PGN 0 Torque/Speed Control 1 - TSC1

NOTE - Retarder may be disabled by commanding a torque limit of 0%. Use of the limit mode allows the use of the retarder only up to the limit specified in the request. This can be used to permit retarding of up to 50%, for example, if that limit is required by some device such as an EBS, or it can disable the use of the retarder by others, as when an ABS controller detects wheel slip.

Transmission Repetition: when active; 10 ms to engine - 50 ms to retarder
Data Length: 8
Data Page: 0
PDU Format: 0
PDU Specific: DA PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 0 (0x0)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Override Control Mode	695
1.3	2 bits	Engine Requested Speed Control Conditions	696
1.5	2 bits	Override Control Mode Priority	897
2-3	2 bytes	Engine Requested Speed/Speed Limit	898
4	1 byte	Engine Requested Torque/Torque Limit	518

PGN 256 Transmission Control 1 - TC1

Transmission Repetition: when active; 50 ms to transmission and axles
Data Length: 8
Data Page: 0
PDU Format: 1
PDU Specific: DA PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 256 (0x100)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission Gear Shift Inhibit Request	681
1.3	2 bits	Torque Converter Lockup Disable Request	682
1.5	2 bits	Disengage Driveline Request	683
2	1 byte	Requested Percent Clutch Slip	684
3	1 byte	Transmission Requested Gear	525
4.1	2 bits	Disengage Differential Lock Request - Front Axle 1	685
4.3	2 bits	Disengage Differential Lock Request - Front Axle 2	686
4.5	2 bits	Disengage Differential Lock Request - Rear Axle 1	687
4.7	2 bits	Disengage Differential Lock Request - Rear Axle 2	688
5.1	2 bits	Disengage Differential Lock Request - Central	689
5.3	2 bits	Disengage Differential Lock Request - Central Front	690
5.5	2 bits	Disengage Differential Lock Request - Central Rear	691
6.1	2 bits	Transmission Mode 1	1852
6.3	2 bits	Transmission Mode 2	1853

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6.5	2 bits	Transmission Mode 3	1854
6.7	2 bits	Transmission Mode 4	1855
7.7	2 bits	Transmission Shift Selector Display Mode Switch	2985

PGN 1024 (R) External Brake Request - XBR

Used for brake control by an external device. The receiver is the brake system controlling the axle and/or wheel brakes. This system has to process the demanded acceleration. Note: This PGN shall not be used for external control of engine, engine brakes (engine retarders) or driveline retarders. Use TSC1 PGN instead.

Transmission Repetition: when active: 20 ms; else 200 ms
Data Length: 8
Data Page: 0
PDU Format: 4
PDU Specific: DA PGN Supporting Information: See Appendix D - PGN 1024
Default Priority: 3
Parameter Group Number: 1024 (0x400)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	External Acceleration Demand	2920
3.1	2 bits	XBR EBI Mode	2914
3.3	2 bits	XBR Priority	2915
3.5	2 bits	XBR Control Mode	2916
8.1	4 bits	XBR Message Counter	3189
8.5	4 bits	XBR Message Checksum	3188

PGN 44544 (R) Tire Pressure Reference Setting - TPRS

For setting the tire pressure reference values.

This message is the setpoint for the PGN 64153 Tire Pressure reference message.

Transmission Repetition: As needed
Data Length: 8
Data Page: 0
PDU Format: 174
PDU Specific: DA PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 44544 (0xAE00)

Start Position	Length	Parameter Name	SPN
1	8 bits	Tire Location	3192
2	1 byte	Reference Tire Pressure Setting	3193

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PGN 52992 Continuous Torque & Speed Limit Request - CTL

Transmission Repetition	5 s		
Data Length:	8		
Data Page:	0		
PDU Format:	207		
PDU Specific:	DA	PGN Supporting Information:	See Appendix D - PGN 52992
Default Priority:	6		
Parameter Group Number:	52992	(0xCF00)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Speed Limit Request - Minimum Continuous	1784
2	1 byte	Engine Speed Limit Request - Maximum Continuous	1785
3	1 byte	Engine Torque Limit Request - Minimum Continuous	1786
4	1 byte	Engine Torque Limit Request - Maximum Continuous	1787
5	1 byte	Minimum Continuous Retarder Speed Limit Request	1788
6	1 byte	Maximum Continuous Retarder Speed Limit Request	1789
7	1 byte	Minimum Continuous Retarder Torque Limit Request	1790
8	1 byte	Maximum Continuous Retarder Torque Limit Request	1791

PGN 53248 Cab Illumination Message - CL

This message contains information that controls illumination devices inside the vehicle's cab.

Transmission Repetition	on change of state, but not faster that 100 ms, and every 5 s		
Data Length:	8		
Data Page:	0		
PDU Format:	208		
PDU Specific:	DA	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	53248	(0xD000)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Illumination Brightness Percent	1487

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PGN 53504 Air Suspension Control 6 - ASC6

Used for suspension control

Transmission Repetition: 100 ms when active
Data Length: 8
Data Page: 0
PDU Format: 209
PDU Specific: DA PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 53504 (0xD100)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Level Preset Front Axle Left	1732
3-4	2 bytes	Level Preset Front Axle Right	1757
5-6	2 bytes	Level Preset Rear Axle Left	1758
7-8	2 bytes	Level Preset Rear Axle Right	1735

PGN 53760 (R) Air Suspension Control 2 - ASC2

Used for suspension control

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 210
PDU Specific: DA PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 53760 (0xD200)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Automatic traction help (load transfer)	2984
1.3	2 bits	Kneeling Request Left Side	1749
1.5	2 bits	Kneeling Request Right Side	1748
1.7	2 bits	Kneeling Control Mode Request	1747
2.1	4 bits	Nominal Level Request Front Axle	1751
2.5	4 bits	Nominal Level Request Rear Axle	1750
3.1	4 bits	Level Control Mode Request	1753
3.5	2 bits	Lift Axle 1 Position Command	1752
3.7	2 bits	Lift Axle 2 Position Command	1828
4	1 byte	Damper Stiffness Request Front Axle	1718
5	1 byte	Damper Stiffness Request Rear Axle	1719
6	1 byte	Damper Stiffness Request Lift / Tag Axle	1720
7.1	2 bits	Kneeling Command - Front Axle	1830
7.3	2 bits	Kneeling Command - Rear Axle	1829

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PGN 54528 Time/Date Adjust - TDA

Transmission Repetition	As needed		
Data Length:	8		
Data Page:	0		
PDU Format:	213		
PDU Specific:	DA	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	54528	(0xD500)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Adjust seconds	1603
2	1 byte	Adjust minutes	1604
3	1 byte	Adjust hours	1605
4	1 byte	Adjust month	1606
5	1 byte	Adjust day	1607
6	1 byte	Adjust year	1608
7	1 byte	Adjust local minute offset	1609
8	1 byte	Adjust local hour offset	1610

PGN 56320 Anti-theft Status - ATS

NOTE–See Figures PGN56320_A to PGN56320_F for examples of Anti-theft message transfers. Bit 1 is the right most bit in each byte.

Transmission Repetition	This message is transmitted in response to an Anti-Theft Request message. This message is also sent when the componentn has an abnormal power interuption. In this situation the Anti-Theft Status Report is sent without the Anti-Theft Request.		
Data Length:	8		
Data Page:	0		
PDU Format:	220		
PDU Specific:	DA	PGN Supporting Information:	See Appendix D - PGN 56320
Default Priority:	7		
Parameter Group Number:	56320	(0xDC00)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Anti-theft Encryption Seed Present Indicator	1194
1.3	2 bits	Anti-theft Password Valid Indicator	1195
1.5	2 bits	Anti-theft Component Status States	1196
1.7	2 bits	Anti-theft Modify Password States	1197
2-8	7 bytes	Anti-theft Random Number	1198

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PGN 56576 Anti-theft Request - ATR

NOTE–See Figures 20 to 25 for examples of Anti-theft message transfers. Bit 1 is the right most bit in each byte.

Transmission Repetition	Transmission of this message is interrupt driven. This message is also transmitted upon power-up of the interfacing device sending this message.	
Data Length:	8	
Data Page:	0	
PDU Format:	221	
PDU Specific:	DA	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	56576	(0xDD00)

Start Position	Length	Parameter Name	SPN
1.2	2 bits	Anti-theft Encryption Indicator States	1199
1.4	2 bits	Anti-theft Desired Exit Mode States	1200
1.6	3 bits	Anti-theft Command States	1201
2	7 bytes	Anti-theft Password Representation	1202

PGN 56832 Reset - RESET

NOTE—This message requires an Acknowledgement response (See J1939-21, PGN 59392) from the receiving node. The use of individual proprietary protocols can still be used instead of the "trip reset" PGN to maintain security.

Transmission Repetition	When needed	
Data Length:	8	
Data Page:	0	
PDU Format:	222	
PDU Specific:	DA	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	56832	(0xDE00)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Trip Group 1	988
1.3	2 bits	Trip Group 2 - Proprietary	989
2	1 byte	Service Component Identification	1584
3.1	2 bits	Engine Build Hours Reset	1211

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PGN 57344 Cab Message 1 - CM1

Message containing parameters originating from the vehicle cab.

Transmission Repetition 1 s
Data Length: 8
Data Page: 0
PDU Format: 224
PDU Specific: DA PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 57344 (0xE000)

Start Position	Length	Parameter Name	SPN
1	1 byte	Requested Percent Fan Speed	986
2-3	2 bytes	Cab Interior Temperature Command	1691
4.1	2 bits	Auxiliary Heater Coolant Pump Request	1684
4.3	2 bits	Battery Main Switch Hold Request	1682
4.5	2 bits	Operator Seat Direction Switch	1714
4.7	2 bits	Seat Belt Switch	1856
5.3	2 bits	Vehicle Limiting Speed Governor Decrement Switch	1655
5.5	2 bits	Vehicle Limiting Speed Governor Increment Switch	1654
5.7	2 bits	Vehicle Limiting Speed Governor Enable Switch	1653
6.5	2 bits	Automatic Gear Shifting Enable Switch	1666
6.7	2 bits	Engine Automatic Start Enable Switch	1656
7.1	4 bits	Auxiliary Heater Mode Request	1683
7.5	2 bits	Request Engine Zone Heating	1685
7.7	2 bits	Request Cab Zone Heating	1686
8	1 byte	Selected Maximum Vehicle Speed Limit	2596

PGN 61440 Electronic Retarder Controller 1 - ERC1

NOTE- This message will be transmitted by several types of retarding devices such as engine compression release brakes, exhaust system restriction brakes, and driveline retarders using hydraulic, electric, or mechanical friction to slow the vehicle. The source address of the message will indicate which one, and the type and location of the retarder are available in the Retarder Configuration Message (see PGN 65249) if that detail is important to the receiver.

Users should also be aware that the Shift Assist and Brake Assist switch status in the first byte of this message are to be used by other ECUs that might request retarding force from the retarder to know when such assistance is available. The state of the “switches” will NOT prevent the retarder from activating if requested, but should be honored by the requester (by not sending a request when the appropriate “switch” is not enabled) to prevent unwarranted noise.

Transmission Repetition 100 ms
Data Length: 8
Data Page: 0
PDU Format: 240
PDU Specific: 0 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 61440 (0xF000)

Start Position	Length	Parameter Name	SPN

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1.1	4 bits	Retarder Torque Mode	900
1.5	2 bits	Retarder Enable - Brake Assist Switch	571
1.7	2 bits	Retarder Enable - Shift Assist Switch	572
2	1 byte	Actual Retarder - Percent Torque	520
3	1 byte	Intended Retarder Percent Torque	1085
4.1	2 bits	Engine Coolant Load Increase	1082
4.3	2 bits	Retarder Requesting Brake Light	1667
5	1 byte	Source Address of Controlling Device for Retarder Control	1480
6	1 byte	Drivers Demand Retarder - Percent Torque	1715
7	1 byte	Retarder Selection, non-engine	1716
8	1 byte	Actual Maximum Available Retarder - Percent Torque	1717

PGN 61441 Electronic Brake Controller 1 - EBC1

Used for brake control information

Transmission Repetition 100 ms
Data Length: 8
Data Page: 0
PDU Format: 240
PDU Specific: 1 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 61441 (0xF001)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	ASR Engine Control Active	561
1.3	2 bits	ASR Brake Control Active	562
1.5	2 bits	Anti-Lock Braking (ABS) Active	563
1.7	2 bits	EBS Brake Switch	1121
2	1 byte	Brake Pedal Position	521
3.1	2 bits	ABS Off-road Switch	575
3.3	2 bits	ASR Off-road Switch	576
3.5	2 bits	ASR "Hill Holder" Switch	577
3.7	2 bits	Traction Control Override Switch	1238
4.1	2 bits	Accelerator Interlock Switch	972
4.3	2 bits	Engine Derate Switch	971
4.5	2 bits	Engine Auxiliary Engine Shutdown Switch	970
4.7	2 bits	Remote Accelerator Enable Switch	969
5	1 byte	Engine Retarder Selection	973
6.1	2 bits	ABS Fully Operational	1243
6.3	2 bits	EBS Red Warning Signal	1439
6.5	2 bits	ABS/EBS Amber Warning Signal (Powered Vehicle)	1438
6.7	2 bits	ATC/ASR Information Signal	1793
7	1 byte	Source Address of Controlling Device for Brake Control	1481
8.3	2 bits	Halt brake switch	2911
8.5	2 bits	Trailer ABS Status	1836
8.7	2 bits	Tractor-Mounted Trailer ABS Warning Signal	1792

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PGN 61442 Electronic Transmission Controller 1 - ETC1

Transmission Repetition: 10 ms
Data Length: 8
Data Page: 0
PDU Format: 240
PDU Specific: 2 PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 61442 (0xF002)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission Driveline Engaged	560
1.3	2 bits	Torque Converter Lockup Engaged	573
1.5	2 bits	Transmission Shift In Process	574
2-3	2 bytes	Transmission Output Shaft Speed	191
4	1 byte	Percent Clutch Slip	522
5.1	2 bits	Engine Momentary Overspeed Enable	606
5.3	2 bits	Progressive Shift Disable	607
6-7	2 bytes	Transmission Input Shaft Speed	161
8	1 byte	Source Address of Controlling Device for Transmission Control	1482

PGN 61443 (R) Electronic Engine Controller 2 - EEC2

Transmission Repetition: 50 ms
Data Length: 8
Data Page: 0
PDU Format: 240
PDU Specific: 3 PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 61443 (0xF003)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Accelerator Pedal 1 Low Idle Switch	558
1.3	2 bits	Accelerator Pedal Kickdown Switch	559
1.5	2 bits	Road Speed Limit Status	1437
1.7	2 bits	Accelerator Pedal 2 Low Idle Switch	2970
2	1 byte	Accelerator Pedal Position 1	91
3	1 byte	Engine Percent Load At Current Speed	92
4	1 byte	Remote Accelerator Pedal Position	974
5	1 byte	Accelerator Pedal Position 2	29
6.1	2 bits	Vehicle Acceleration Rate Limit Status	2979

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PGN 61444 Electronic Engine Controller 1 - EEC1

Engine related parameters

Transmission Repetition: engine speed dependent
Data Length: 8
Data Page: 0
PDU Format: 240
PDU Specific: 4 PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 61444 (0xF004)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Engine Torque Mode	899
2	1 byte	Driver's Demand Engine - Percent Torque	512
3	1 byte	Actual Engine - Percent Torque	513
4-5	2 bytes	Engine Speed	190
6	1 byte	Source Address of Controlling Device for Engine Control	1483
7.1	4 bits	Engine Starter Mode	1675
8	1 byte	Engine Demand – Percent Torque	2432

PGN 61445 Electronic Transmission Controller 2 - ETC2

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 240
PDU Specific: 5 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 61445 (0xF005)

Start Position	Length	Parameter Name	SPN
1	1 byte	Transmission Selected Gear	524
2-3	2 bytes	Transmission Actual Gear Ratio	526
4	1 byte	Transmission Current Gear	523
5-6	2 bytes	Transmission Requested Range	162
7-8	2 bytes	Transmission Current Range	163

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PGN 61446 Electronic Axle Controller 1 - EAC1

NOTE - Request has to be responded to with as many messages as necessary to transmit all available information.

Transmission Repetition: 500 ms
Data Length: 8
Data Page: 0
PDU Format: 240
PDU Specific: 6 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 61446 (0xF006)

Start Position	Length	Parameter Name	SPN
1	8 bits	Location	927
2.1	2 bits	Differential Lock State - Front Axle 1	567
2.3	2 bits	Differential Lock State - Front Axle 2	568
2.5	2 bits	Differential Lock State - Rear Axle 1	569
2.7	2 bits	Differential Lock State - Rear Axle 2	570
3.1	2 bits	Differential Lock State - Central	564
3.3	2 bits	Differential Lock State - Central Front	565
3.5	2 bits	Differential Lock State - Central Rear	566

PGN 61447 Forward Lane Image urgent msg - FLI1

Transmission Repetition: 50 ms (only when active)
Data Length: 8
Data Page: 0
PDU Format: 240
PDU Specific: 7 PGN Supporting Information:
Default Priority: 4
Parameter Group Number: 61447 (0xF007)

Start Position	Length	Parameter Name	SPN
1.5	2 bits	Lane Departure Imminent, Right Side	1701
1.7	2 bits	Lane Departure Imminent, Left Side	1700

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PGN 61448 Hydraulic Pressure Governor Info - HPG

Information to be used for a hydraulic pressure governing control system

Transmission Repetition	50 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	240	
PDU Specific:	8	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	61448	(0xF008)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Hydraulic Pressure	1762
3.1	2 bits	Engine Hydraulic Pressure Governor Mode Indicator	1763
3.3	2 bits	Engine Hydraulic Pressure Governor Switch	1764
3.5	2 bits	Fire Apparatus Pump Engagement	2599

PGN 61449 Vehicle Dynamic Stability Control 2 - VDC2

Contains information which relates to the vehicle's movement.

Transmission Repetition	10 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	240	
PDU Specific:	9	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	61449	(0xF009)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Steering Wheel Angle	1807
3.1	6 bits	Steering Wheel Turn Counter	1811
3.7	2 bits	Steering Wheel Angle Sensor Type	1812
4-5	2 bytes	Yaw Rate	1808
6-7	2 bytes	Lateral Acceleration	1809
8	1 byte	Longitudinal Acceleration	1810

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PGN 61450 Engine Gas Flow Rate - EGF1

Flow rates of Air and mixed gasses into the engine cylinders.

Transmission Repetition	50 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	240	
PDU Specific:	10	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	61450	(0xF00A)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Recirculation (EGR) Mass Flow Rate	2659
3-4	2 bytes	Engine Inlet Air Mass Flow Rate	132

PGN 61451 (R) Electronic Steering Control - ESC1

PGN which indicates the actual angle and the status of a steerable axle

Transmission Repetition	20 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	240	
PDU Specific:	11	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	61451	(0xF00B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Actual Inner wheel steering angle	2927
3	8 bits	Axle Location	2928
4.1	4 bits	Status of Steering Axle	2923
4.5	2 bits	Steerable Lift Axle Lowering Inhibit	2922
5.1	4 bits	Steering Type	2924
5.5	4 bits	Type of Steering Forces	2925
6.1	4 bits	Type of Steering Transmission	2926

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PGN 61452 (R) Electronic Transmission Controller #8 - ETC8

Electronic Transmission Controller #8

Transmission Repetition	20 ms when torque converter unlocked, 100 ms when torque converter locked	
Data Length:	8	
Data Page:	0	
PDU Format:	240	
PDU Specific:	12	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	61452	(0xF00C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Transmission Torque Converter Ratio	3030

PGN 61453 (R) Land Leveling System Operational Information - LOI

Group of operational parameters associated with the Land Leveling System, such as switch states. This is provided to the device controlling the blade, and is usually directed at the primary land leveling controller.

Notes:
1. The parameter group is filled with SPNs sent to the Land Leveling System controller. Similar PGNs exist, 65138 for example, but (65138) is sent out by the Land Leveling System primary controller to reflect the mode the land leveling system has been put into (auto, manual). This logical decision to put the system into auto/manual mode is based in part on the input from this proposed PGN, along with other various inputs. It makes more sense to create this new PGN filled with parameters sourced from the non-primary controller, rather than use the PGN sourced by the primary controller itself. In the future, other SPNs coming from the non-primary controller can be added to the proposed PGN. There are plans to add more switch values in the future.

2. Other systems with automated blade controls should be able to use this parameter group, since it contains measured switch values.

Transmission Repetition	100 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	240	
PDU Specific:	13	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	61453	(0xF00D)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Blade Control Mode Switch	3156
1.5	4 bits	Desired Grade Offset Switch	3157
2.1	4 bits	Blade Auto Mode Command	3158

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PGN 64945 (R) After Treatment Intake Gas 2-b - ATI2-b

The purpose of this PGN is to group the after treatment intake gas temperature messages for bank 2.

Transmission Repetition	500 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	177	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64945	(0xFDB1)

Start Position	Length	Parameter Name	SPN
1	2 bytes	Exhaust Gas Temperature 1 (bank 2)	3275
3	2 bytes	Particulate Trap Intake Gas Temperature (bank 2)	3276
5.1	5 bits	Exhaust Gas Temperature 1 Preliminary FMI (bank 2)	3277
6.1	5 bits	Particulate Trap Intake Gas Temperature Preliminary FMI (bank 2)	3278

PGN 64953 (R) Tire Pressure Reference Information - TPRI

Information on actual tire pressure reference value for monitoring.

NOTE–Message has to repeated as necessary to transmit all available information. This method of location identification requires individual SPNs to be assigned to report failures specific to each individual component (I.e. each tire, each axle, etc.).

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	185	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64953	(0xFDB9)

Start Position	Length	Parameter Name	SPN
1	8 bits	Tire Location	3190
2	1 byte	Reference Tire Pressure	3191

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PGN 64954 (R) Farebox Status - TR6

Used to report alarms of the fare collection unt.

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	186	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64954	(0xFDBA)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Farebox Emergency Status	3179
2.1	7 bits	Farebox Alarm Identifier	3181

PGN 64955 (R) Farebox Point of Sale - TR5

Used to report stop level point of sale detail.

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	187	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64955	(0xFDBB)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Transaction Type	3170
1.5	4 bits	Passenger Type	3171
2.1	4 bits	Type of Fare	3176
2.5	4 bits	Payment Details	3177
3.1	4 bits	Fare Validity	3165
3.5	4 bits	Pass Category	3166
4.1	5 bits	Initial Fare Agency	3167
5.1	3 bits	Type of Service	3172
5.4	5 bits	Transfer Type	3173
6, 7.1	12 bits	Route Number	3169
8	1 byte	Transfer Sold	3168

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PGN 64956 (R) Farebox Service Detail - TR4

Used to identify service, assignments, and fare preset detail of the fare collection unit.

Transmission Repetition: On request
Data Length: 15
Data Page: 0
PDU Format: 253
PDU Specific: 188 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64956 (0xFDBC)

Start Position	Length	Parameter Name	SPN
01.1	2 bits	Farebox Service Status	3178
01.3	3 bits	Trip Status	3180
02.1	4 bits	Trip Direction	3174
03	8 bits	Fare Presets	3175
04-05	2 bytes	Trip Number	3159
06-07	2 bytes	Pattern Number	3161
08-09	2 bytes	Assigned Route	3160
10-11	2 bytes	Assigned Run	3162
12-13	2 bytes	Assigned Block	3163
14-15	2 bytes	Driver's farebox security code	3164

PGN 64957 (R) Signal Preemption - TR3

Status and configuration of the device used for intersection preemption.

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 189 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64957 (0xFDBD)

Start Position	Length	Parameter Name	SPN
1.3	2 bits	Range Code Enable	3081
1.5	2 bits	Transit Route ID Usage	3080
1.7	2 bits	Intersection Preemption Request/Response	3079
2.1	4 bits	Priority of Response Sent by Emitter	3084
2.5	2 bits	Transit Door Enable	3083
2.7	2 bits	Strobe Activation Control Status	3082
3,4	2 bytes	Vehicle ID	3085

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PGN 64958 (R) Transit Route - TR1

The current route assigned to this transit vehicle. The transit route information may be entered into different devices by different authorities (fare collection, radio log, unit control panel, etc.).

Transmission Repetition: On request
Data Length: variable
Data Page: 0
PDU Format: 253
PDU Specific: 190 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64958 (0xFDBE)

Start Position	Length	Parameter Name	SPN
1	1 byte	Agency	3078
2	1 byte	Number of bytes in the Transit Assigned Route Identity	3071
3	1 byte	Number of bytes in the Transit Assigned Run Identity	3072
4	1 byte	Number of bytes in the Transit Assigned Block Identity	3073
5 to A	Variable - up to 100 characters	Transit Assigned Route Identity	3074
A+1 to B	Variable - up to 100 characters	Transit Assigned Run Identity	3075
B+1 to C	Variable - up to 100 characters	Transit Assigned Block Identity	3076

PGN 64959 (R) Transit Milepost - TR2

Identification of a transit route milepost

Transmission Repetition: On request
Data Length: variable
Data Page: 0
PDU Format: 253
PDU Specific: 191 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64959 (0xFDBF)

Start Position	Length	Parameter Name	SPN
1	1 byte	Number of bytes in the Milepost Identification	3070
2 to n	Variable - up to 100 characters	Milepost Identification	509

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PGN 64960 (R) Passenger Counter - TR7

Used to notify the transit link devices of real-time boarding and exiting passengers or to indicate the total number of passengers on vehicle referenced to the last transit stop.

Also transmits information on the use status of the vehicle.

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	192	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64960	(0xFDC0)

Start Position	Length	Parameter Name	SPN
1	8 bits	Type of Passenger Count	3043
2	1 byte	Patron Count	3047
3.1	2 bits	Silent Alarm Status	3044
3.3	2 bits	Vehicle Use Status	3045
3.5	2 bits	Transit Run Status	3046

PGN 64961 (R) Engine Fluid Level/Pressure 3 - EFL/P3

Transmission Repetition	.5 sec	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	193	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64961	(0xFDC1)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Intake Valve Actuation System Oil Pressure	2948

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PGN 64964 (R) Electronic Brake Controller 5 - EBC5

Used for information on brake control.

Transmission Repetition	100 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	196	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64964	(0xFDC4)

Start Position	Length	Parameter Name	SPN
1.3	3 bits	Halt brake mode	2913
1.6	3 bits	Hill holder mode	2912
2.1	2 bits	Foundation Brake Use	2919
2.3	2 bits	XBR System State	2917
2.5	4 bits	XBR Active Control Mode	2918
3	1 byte	XBR Acceleration Limit	2921

PGN 64965 (R) ECU Identification Information - ECUID

Message for reporting identification and information about the physical ECU and its hardware, such as the ECU's part number, serial number, build date, etc. Information about the software within the ECU should be reported using the Software Identification PGN 65242 and/or DM19.

NOTE - The fields in this message are optional and separated by an ASCII “*”. It is not necessary to include parametric data for all fields; however, the delimiter (“*”) is always required. An ASCII “*” is required at the end of the last included field, even if there is only one ECU identification designator. Any additional ECU identification fields defined in the future will be appended at the end, each separated by an ASCII “*” as a delimiter.

Transmission Repetition	On request	
Data Length:	Variable	
Data Page:	0	
PDU Format:	253	
PDU Specific:	197	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64965	(0xFDC5)

Start Position	Length	Parameter Name	SPN
a	Variable - up to 200 characters ("*" delimited)	ECU Part Number	2901
b	Variable - up to 200 characters ("*" delimited)	ECU Serial Number	2902

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c	Variable - up to 200 characters ("*" delimited)	ECU Location	2903
d	Variable - up to 200 characters ("*" delimited)	ECU Type	2904

PGN 64966 (R) Cold Start Aids -

Cold start aid information and settings.

Transmission Repetition: As required
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 198 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64966 (0xFDC6)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Start Enable Device 1	626
1.3	2 bits	Engine Start Enable Device 2	1804
2.1	4 bits	Engine Start Enable Device 1 Configuration	2899
2.5	4 bits	Engine Start Enable Device 2 Configuration	2898

PGN 64967 (R) Off-Highway Engine Control Selection States - OHCSS

Reports the states of off-highway engine control modes, as they apply to different modes of engine operation which may be used to aid particular working environments. These states provide the controls feedback for PGN 64971 which provides the operator inputs to the controller.

Transmission Repetition: 0.5 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 199 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64967 (0xFDC7)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Auxiliary Governor State	2896
1.3	2 bits	Engine Multi-Unit Sync State	2890
1.5	2 bits	Engine Alternate Low Idle Select State	2891
2	8 bits	Engine Alternate Rating Select State	2888
3.1	4 bits	Engine Alternate Droop Accelerator 1 Select State	2889
3.5	4 bits	Engine Alternate Droop Accelerator 2 Select State	2893
4.1	4 bits	Engine Alternate Droop Remote Accelerator Select State	2894
4.5	4 bits	Engine Alternate Droop Auxiliary Input Select State	2895

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PGN 64968 (R) Operator Primary Intermediate Speed Control state - ISCS

The Operator Primary Intermediate Speed Control State is used to provide the controller feedback to indicate the controls state achieved.

Transmission Repetition	1 s	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	200	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64968	(0xFDC8)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Engine Operator Primary Intermediate Speed Select State	2892

PGN 64969 (R) Electronic Control Module Information - CMI

Information relating to electronic control modules

Transmission Repetition	As required	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	201	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	64969	(0xFDC9)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Total Count of Configuration Changes Made	2887

PGN 64970 (R) Intermediate Speed Control - ISC

The Intermediate Speed Control is widely used in the Industrial application to control the engine to an intermediate speed setting which can bypass the accelerator position control. An example of this operation would be in an agricultural application where an external device is connected to an output shaft from the engine which must then be controlled to a constant speed. This is accomplished by activating a switch setting, thus eliminating the need for the operator to attempt to control this speed with the accelerator position.

Transmission Repetition	1 s	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	202	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	64970	(0xFDCA)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Engine Operator Primary Intermediate Speed Select	2880

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PGN 64971 (R) Off-Highway Engine Control Selection - OHECS

Allows for the selection of off-highway engine control modes, as they apply to different modes of engine operation which may be used to aid particular working environments. By offering characteristics suitable for the work in hand, the operator may select the desired mode (e.g. economy fuel ratings, droop settings, alternate idle points, multiple engine synchronization, etc.) to maximize performance under given conditions. The operator selects these inputs via hardwire switch operation, whereby an overall system control communicates the information to the engine controller.

Transmission Repetition 500 ms
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 203 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64971 (0xFDCB)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Auxiliary Governor Switch	2884
1.3	2 bits	Engine Synchronization Switch	1377
1.5	2 bits	Engine Alternate Low Idle Switch	2883
2	8 bits	Engine Alternate Rating Select	2882
3.1	4 bits	Engine Alternate Droop Accelerator 1 Select	2881
3.5	4 bits	Engine Alternate Droop Accelerator 2 Select	2879
4.1	4 bits	Engine Alternate Droop Remote Accelerator Select	2886
4.5	4 bits	Engine Alternate Droop Auxiliary Input Select	2885

PGN 64972 (R) Operators External Light Controls Message - OEL

The message containing the information about the position of the operator's external light control switch(s). Including switches for the Headlights, turn signals, hazard light, clearance lights, marker lights, etc.

Transmission Repetition On change of switch. Maximum period of 1 second between messages. No greater than 10 messages per second for all switches.
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 204 PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 64972 (0xFDCC)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Work Light Switch	2873
1.5	4 bits	Main Light Switch	2872
2.1	4 bits	Turn Signal Switch	2876
2.5	2 bits	Hazard Light Switch	2875
2.7	2 bits	High-Low Beam Switch	2874
3	1 byte	Operators Desired Back-light	2878
4-5	2 bytes	Operators Desired - Delayed Lamp Off Time	2877

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PGN 64973 (R) Operator Wiper and Washer Controls Message - OWW

Message for items related to the operators controls for the window wipers and washers on the front and rear cab windows

Transmission Repetition 200 ms
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 205 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64973 (0xFDCD)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Front Non-operator Wiper Switch	2864
1.5	4 bits	Front Operator Wiper Switch	2863
2.5	4 bits	Rear Wiper Switch	2865
3	1 byte	Front Operator Wiper Delay Control	2869
4	1 byte	Front Non-operator Wiper Delay Control	2870
5	1 byte	Rear Wiper Delay Control	2871
6.3	3 bits	Front Non-operator Washer Switch	2867
6.6	3 bits	Front Operator Washer Switch	2866
7.6	3 bits	Rear Washer Function	2868

PGN 64976 (R) Inlet/Exhaust Conditions 2 - IC2

Inlet/Exhaust Conditions 2 is a second PGN conveying this type of engine information. Also see PGN 65270.

Transmission Repetition 0.5 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 208 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64976 (0xFDD0)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Air Filter 2 Differential Pressure	2809
2	1 byte	Engine Air Filter 3 Differential Pressure	2810
3	1 byte	Engine Air Filter 4 Differential Pressure	2811

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PGN 64977 FMS-standard Interface Identity/Capabilities - FMS

Information which specifies the capabilities of the Fleet Management System (FMS) - standard interface device. This PGN typically is sourced from the network interconnect FMS - standard interface device.

Transmission Repetition: 10 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 209 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 64977 (0xFDD1)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	FMS-standard Diagnostics Supported	2804
1.3	2 bits	FMS-standard Requests Supported	2805
2-5	4 bytes	FMS-standard SW-version supported.	2806

PGN 64978 ECU Performance - EP

Message used to transfer ECU performance parameters.

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 210 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64978 (0xFDD2)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Keep-Alive Battery Consumption	2803
3	1 byte	Data Memory Usage	2802

PGN 64979 Turbocharger Information 6 - TCI6

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 211 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64979 (0xFDD3)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Compressor Outlet Temperature	2629
3-4	2 bytes	Engine Turbocharger 2 Compressor Outlet Temperature	2799

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5-6	2 bytes	Engine Turbocharger 3 Compressor Outlet Temperature	2800
7-8	2 bytes	Engine Turbocharger 4 Compressor Outlet Temperature	2801

PGN 64980 Cab Message 3 - CM3

Provides information from Cab mounted operator inputs.

Transmission Repetition: On-change or every 10 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 212 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64980 (0xFDD4)

Start Position	Length	Parameter Name	SPN
1.1	3 bits	Transfer Case Selector Switch	2796

PGN 64981 Electronic Engine Controller 5 - EEC5

Engine related parameters

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 213 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64981 (0xFDD5)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Calculated Turbine Inlet Temperature	2789
3-4	2 bytes	Engine Turbocharger 1 Calculated Turbine Outlet Temperature	2790
5-6	2 bytes	Engine Exhaust Gas Recirculation (EGR) Valve Control	2791
7.1	2 bits	Engine Variable Geometry Turbocharger (VGT) Air Control Shutoff Valve	2792
8	1 byte	Engine Variable Geometry Turbocharger (VGT) 1 Actuator Position	2795

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PGN 64982 Basic Joystick Message 1 - BJM1

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Transmission Repetition	100 ms or on change, not to exceed 20 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	214	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64982	(0xFDD6)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 1 X-Axis Neutral Position Status	2675
1.3	2 bits	Joystick 1 X-Axis Lever Left Negative Position Status	2670
1.5	2 bits	Joystick 1 X-Axis Lever Right Positive Position Status	2665
1.7-2	10 bits	Joystick 1 X-Axis Position	2660
3.1	2 bits	Joystick 1 Y-Axis Neutral Position Status	2676
3.3	2 bits	Joystick 1 Y-Axis Lever Back Negative Position Status	2671
3.5	2 bits	Joystick 1 Y-Axis Lever Forward Positive Position Status	2666
3.7-4	10 bits	Joystick 1 Y-Axis Position	2661
5.5	2 bits	Joystick 1 Y-Axis Detent Position Status	2681
5.7	2 bits	Joystick 1 X-Axis Detent Position Status	2680
6.1	2 bits	Joystick 1 Button 4 Pressed Status	2688
6.3	2 bits	Joystick 1 Button 3 Pressed Status	2687
6.5	2 bits	Joystick 1 Button 2 Pressed Status	2686
6.7	2 bits	Joystick 1 Button 1 Pressed Status	2685
7.1	2 bits	Joystick 1 Button 8 Pressed Status	2692
7.3	2 bits	Joystick 1 Button 7 Pressed Status	2691
7.5	2 bits	Joystick 1 Button 6 Pressed Status	2690
7.7	2 bits	Joystick 1 Button 5 Pressed Status	2689
8.1	2 bits	Joystick 1 Button 12 Pressed Status	2696
8.3	2 bits	Joystick 1 Button 11 Pressed Status	2695
8.5	2 bits	Joystick 1 Button 10 Pressed Status	2694
8.7	2 bits	Joystick 1 Button 9 Pressed Status	2693

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PGN 64983 Extended Joystick Message 1 - EJM1

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis.

This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition	100 ms or on change, not to exceed 20 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	215	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64983	(0xFDD7)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 1 Grip X-Axis Neutral Position Status	2677
1.3	2 bits	Joystick 1 Grip X-Axis Lever Left Negative Position Status	2672
1.5	2 bits	Joystick 1 Grip X-Axis Lever Right Positive Position Status	2667
1.7-2	10 bits	Joystick 1 Grip X-Axis Position	2662
3.1	2 bits	Joystick 1 Grip Y-Axis Neutral Position Status	2678
3.3	2 bits	Joystick 1 Grip Y-Axis Lever Back Negative Position Status	2673
3.5	2 bits	Joystick 1 Grip Y-Axis Lever Forward Positive Position Status	2668
3.7-4	10 bits	Joystick 1 Grip Y-Axis Position	2663
5.1	2 bits	Joystick 1 Theta-Axis Neutral Position Status	2679
5.3	2 bits	Joystick 1 Theta-Axis Counter Clockwise Negative Position Status	2674
5.5	2 bits	Joystick 1 Theta-Axis Clockwise Positive Position Status	2669
5.7-6	10 bits	Joystick 1 Theta-Axis Position	2664
7.3	2 bits	Joystick 1 Theta-Axis Detent Position Status	2684
7.5	2 bits	Joystick 1 Grip Y-Axis Detent Position Status	2683
7.7	2 bits	Joystick 1 Grip X-Axis Detent Position Status	2682

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PGN 64984 Basic Joystick Message 2 - BJM2

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Transmission Repetition	100 ms or on change, not to exceed 20 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	216	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64984	(0xFDD8)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 2 X-Axis Neutral Position Status	2712
1.3	2 bits	Joystick 2 X-Axis Lever Left Negative Position Status	2707
1.5	2 bits	Joystick 2 X-Axis Lever Right Positive Position Status	2702
1.7-2	10 bits	Joystick 2 X-Axis Position	2697
3.1	2 bits	Joystick 2 Y-Axis Neutral Position Status	2713
3.3	2 bits	Joystick 2 Y-Axis Lever Back Negative Position Status	2708
3.5	2 bits	Joystick 2 Y-Axis Lever Forward Positive Position Status	2703
3.7-4	10 bits	Joystick 2 Y-Axis Position	2698
5.5	2 bits	Joystick 2 Y-Axis Detent Position Status	2718
5.7	2 bits	Joystick 2 X-Axis Detent Position Status	2717
6.1	2 bits	Joystick 2 Button 4 Pressed Status	2725
6.3	2 bits	Joystick 2 Button 3 Pressed Status	2724
6.5	2 bits	Joystick 2 Button 2 Pressed Status	2723
6.7	2 bits	Joystick 2 Button 1 Pressed Status	2722
7.1	2 bits	Joystick 2 Button 8 Pressed Status	2729
7.3	2 bits	Joystick 2 Button 7 Pressed Status	2728
7.5	2 bits	Joystick 2 Button 6 Pressed Status	2727
7.7	2 bits	Joystick 2 Button 5 Pressed Status	2726
8.1	2 bits	Joystick 2 Button 12 Pressed Status	2733
8.3	2 bits	Joystick 2 Button 11 Pressed Status	2732
8.5	2 bits	Joystick 2 Button 10 Pressed Status	2731
8.7	2 bits	Joystick 2 Button 9 Pressed Status	2730

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PGN 64985 Extended Joystick Message 2 - EJM2

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis.

This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition	100 ms or on change, not to exceed 20 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	217	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64985	(0xFDD9)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 2 Grip X-Axis Neutral Position Status	2714
1.3	2 bits	Joystick 2 Grip X-Axis Lever Left Negative Position Status	2709
1.5	2 bits	Joystick 2 Grip X-Axis Lever Right Positive Position Status	2704
1.7-2	10 bits	Joystick 2 Grip X-Axis Position	2699
3.1	2 bits	Joystick 2 Grip Y-Axis Neutral Position Status	2715
3.3	2 bits	Joystick 2 Grip Y-Axis Lever Back Negative Position Status	2710
3.5	2 bits	Joystick 2 Grip Y-Axis Lever Forward Positive Position Status	2705
3.7-4	10 bits	Joystick 2 Grip Y-Axis Position	2700
5.1	2 bits	Joystick 2 Theta-Axis Neutral Position Status	2716
5.3	2 bits	Joystick 2 Theta-Axis Counter Clockwise Negative Position Status	2711
5.5	2 bits	Joystick 2 Theta-Axis Clockwise Positive Position Status	2706
5.7-6	10 bits	Joystick 2 Theta-Axis Position	2701
7.3	2 bits	Joystick 2 Theta-Axis Detent Position Status	2721
7.5	2 bits	Joystick 2 Grip Y-Axis Detent Position Status	2720
7.7	2 bits	Joystick 2 Grip X-Axis Detent Position Status	2719

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PGN 64986 Basic Joystick Message 3 - BJM3

Used to transfer information about the measured status of the 1st 2 axes and up to 12 buttons of a joystick. Additional handle information is available in the Expanded Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Transmission Repetition	100 ms or on change, not to exceed 20 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	218	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64986	(0xFDDA)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 3 X-Axis Neutral Position Status	2749
1.3	2 bits	Joystick 3 X-Axis Lever Left Negative Position Status	2744
1.5	2 bits	Joystick 3 X-Axis Lever Right Positive Position Status	2739
1.7-2	10 bits	Joystick 3 X-Axis Position	2734
3.1	2 bits	Joystick 3 Y-Axis Neutral Position Status	2750
3.3	2 bits	Joystick 3 Y-Axis Lever Back Negative Position Status	2745
3.5	2 bits	Joystick 3 Y-Axis Lever Forward Positive Position Status	2740
3.7-4	10 bits	Joystick 3 Y-Axis Position	2735
5.5	2 bits	Joystick 3 Y-Axis Detent Position Status	2755
5.7	2 bits	Joystick 3 X-Axis Detent Position Status	2754
6.1	2 bits	Joystick 3 Button 4 Pressed Status	2762
6.3	2 bits	Joystick 3 Button 3 Pressed Status	2761
6.5	2 bits	Joystick 3 Button 2 Pressed Status	2760
6.7	2 bits	Joystick 3 Button 1 Pressed Status	2759
7.1	2 bits	Joystick 3 Button 8 Pressed Status	2766
7.3	2 bits	Joystick 3 Button 7 Pressed Status	2765
7.5	2 bits	Joystick 3 Button 6 Pressed Status	2764
7.7	2 bits	Joystick 3 Button 5 Pressed Status	2763
8.1	2 bits	Joystick 3 Button 12 Pressed Status	2770
8.3	2 bits	Joystick 3 Button 11 Pressed Status	2769
8.5	2 bits	Joystick 3 Button 10 Pressed Status	2768
8.7	2 bits	Joystick 3 Button 9 Pressed Status	2767

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PGN 64987 Extended Joystick Message 3 - EJM3

Used to transfer information about the measured status of three additional axes of a joystick and switches of the joystick grip or handle. The joystick axial motion information is available in the Basic Joystick Message.

10-bit position parameters are broadcast over 2 bytes. The eight most significant bits are transmitted in the second byte, with the most significant bit at bit 8. The two least significant bits are transmitted in the first byte in bit positions 7 and 8, with the most significant of the two bits at bit 8.

10-bit position SPN	Location in PGN	
Bit 10	Byte n	Bit 8
Bit 9		Bit 7
Bit 8		Bit 6
Bit 7		Bit 5
Bit 6		Bit 4
Bit 5		Bit 3
Bit 4		Bit 2
Bit 3		Bit 1
Bit 2	Byte (n-1)	Bit 8
Bit 1		Bit 7

Note: The term Grip used here simply refers to another set of axes separate from the previously mentioned X and Y Axis.

This additional set of axes could in some cases be grip mounted sensors as opposed to the sensors mounted at the base of the handle.

Transmission Repetition	100 ms or on change, not to exceed 20 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	253	
PDU Specific:	219	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	64987	(0xFDDB)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Joystick 3 Grip X-Axis Neutral Position Status	2751
1.3	2 bits	Joystick 3 Grip X-Axis Lever Left Negative Position Status	2746
1.5	2 bits	Joystick 3 Grip X-Axis Lever Right Positive Position Status	2741
1.7-2	10 bits	Joystick 3 Grip X-Axis Position	2736
3.1	2 bits	Joystick 3 Grip Y-Axis Neutral Position Status	2752
3.3	2 bits	Joystick 3 Grip Y-Axis Lever Back Negative Position Status	2747
3.5	2 bits	Joystick 3 Grip Y-Axis Lever Forward Positive Position Status	2742
3.7-4	10 bits	Joystick 3 Grip Y-Axis Position	2737
5.1	2 bits	Joystick 3 Theta-Axis Neutral Position Status	2753
5.3	2 bits	Joystick 3 Theta-Axis Counter Clockwise Negative Position Status	2748
5.5	2 bits	Joystick 3 Theta-Axis Clockwise Positive Position Status	2743
5.7-6	10 bits	Joystick 3 Theta-Axis Position	2738
7.3	2 bits	Joystick 3 Theta-Axis Detent Position Status	2758
7.5	2 bits	Joystick 3 Grip Y-Axis Detent Position Status	2757
7.7	2 bits	Joystick 3 Grip X-Axis Detent Position Status	2756

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PGN 64988 Marine Control Information - MCI

This messages contains marine vessel control information for the engine

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 220 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64988 (0xFDDC)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Engine Throttle Synchronization Mode Status	2615
1.5	2 bits	Trolling Mode Status	2616
1.7	2 bits	Slow Vessel Mode Status	2617

PGN 64991 Front Wheel Drive Status - FWD

Front wheel drive ECU information

Transmission Repetition: 0.5 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 223 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 64991 (0xFDDF)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Front Wheel Drive Actuator Status	2612

PGN 64992 Ambient Conditions 2 - AMB2

This message contains measurement and configuration information about the vehicle ambient conditions.

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 224 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64992 (0xFDE0)

Start Position	Length	Parameter Name	SPN
1	1 byte	Solar Intensity Percent	2610
2	1 byte	Solar Sensor Maximum	2611

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PGN 64993 Cab A/C Climate System Information - CACI

This message contains measurement and condition information from cab air conditioning components.

Transmission Repetition 1 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 225 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64993 (0xFDE1)

Start Position	Length	Parameter Name	SPN
1	1 byte	Cab A/C Refrigerant Compressor Outlet Pressure	2609

PGN 64994 Supply Pressure Demand - SPR

Used for controlling the supply pressure. Often used to raise the pressure of a supply pressure circuit in situations where more pneumatic energy is needed.

This message is the setpoint for the PGN 65198 message.

Transmission Repetition 1 s, when active
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 226 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64994 (0xFDE2)

Start Position	Length	Parameter Name	SPN
1	1 byte	Pneumatic Supply Pressure Request	2603
2	1 byte	Parking and/or Trailer Air Pressure Request	2604
3	1 byte	Service Brake Air Pressure Request, Circuit #1	2605
4	1 byte	Service Brake Air Pressure Request, Circuit #2	2606
5	1 byte	Auxiliary Equipment Supply Pressure Request	2607
6	1 byte	Air Suspension Supply Pressure Request	2608

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PGN 64995 Equipment Operation and Control - EOAC

Parameters related to the operation and controls for equipment

Transmission Repetition 250 mS
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 227 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64995 (0xFDE3)

Start Position	Length	Parameter Name	SPN
1	1 byte	Travel Velocity Control Position	2601

PGN 64996 Equipment Performance Data - EPD

Parameters related to the performance characteristics of equipment

Transmission Repetition 500 mS
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 228 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64996 (0xFDE4)

Start Position	Length	Parameter Name	SPN
1	1 byte	Payload Percentage	2600

PGN 64997 Maximum Vehicle Speed Limit Status - MVS

Reports the possible maximum vehicle speed limits, one through seven, and the applied maximum vehicle speed limit.

Transmission Repetition 1 s
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 229 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 64997 (0xFDE5)

Start Position	Length	Parameter Name	SPN
1	1 byte	Maximum Vehicle Speed Limit 1	2588
2	1 byte	Maximum Vehicle Speed Limit 2	2589
3	1 byte	Maximum Vehicle Speed Limit 3	2590
4	1 byte	Maximum Vehicle Speed Limit 4	2591
5	1 byte	Maximum Vehicle Speed Limit 5	2592
6	1 byte	Maximum Vehicle Speed Limit 6	2593

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7	1 byte	Maximum Vehicle Speed Limit 7	2594
8	1 byte	Applied Vehicle Speed Limit	2595

PGN 64998 Hydraulic Braking System - HBS

Used for information on a hydraulic brake system

As an example: this PGN may be used for a two circuit hydraulic brake system with separate circuits for front and rear axle. The hydraulic energy is supplied via two independent electrically driven pumps. The energy is stored in gas filled hydraulic accumulators also separated for each circuit.

Transmission Repetition 100 ms
Data Length: 8
Data Page: 0
PDU Format: 253
PDU Specific: 230 PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 64998 (0xFDE6)

Start Position	Length	Parameter Name	SPN
1	1 byte	Hydraulic Brake Pressure Circuit 1	2580
2	1 byte	Hydraulic Brake Pressure Circuit 2	2581
3.1	2 bits	Hydraulic Brake Pressure Warning State Circuit 1	2584
3.3	2 bits	Hydraulic Brake Pressure Warning State Circuit 2	2585
3.5	2 bits	Hydraulic Brake Pressure Supply State Circuit 1	2582
3.7	2 bits	Hydraulic Brake Pressure Supply State Circuit 2	2583
4.1	2 bits	Hydraulic Brake System Audible Warning Command	2930
4.3	2 bits	Hydraulic Brake Fluid Level Switch	2931

PGN 65031 Exhaust Temperature - ET

Transmission Repetition 0.5 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 7 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65031 (0xFE07)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Exhaust Gas Temperature - Right Manifold	2433
3-4	2 bytes	Engine Exhaust Exhaust Gas Temperature - Left Manifold	2434

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PGN 65088 Lighting Data - LD

This lighting message is a response to the request for lighting data in the lighting command message. Each lighting controller on the tractor and attached implements must transmit this message to the Tractor ECU when requested. The tractor will use this information to determine which lighting systems are functioning. Lighting controllers that have lamp sensing capability will also report failed light bulbs. This is a legal requirement in many areas.

See PGN 65089 for the lighting command message.

Transmission Repetition: As requested.
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 64 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65088 (0xFE40)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Running Light	2404
1.3	2 bits	Alternate Beam Head Light Data	2352
1.5	2 bits	Low Beam Head Light Data	2350
1.7	2 bits	High Beam Head Light Data	2348
2.1	2 bits	Tractor Front Fog Lights	2388
2.3	2 bits	Rotating Beacon Light	2386
2.5	2 bits	Right Turn Signal Lights	2370
2.7	2 bits	Left Turn Signal Lights	2368
3.1	2 bits	Back Up Light and Alarm Horn	2392
3.3	2 bits	Center Stop Light	2376
3.5	2 bits	Right Stop Light	2374
3.7	2 bits	Left Stop Light	2372
4.1	2 bits	Implement Clearance Light	2384
4.3	2 bits	Tractor Clearance Light	2382
4.5	2 bits	Implement Marker Light	2380
4.7	2 bits	Tractor Marker Light	2378
5.1	2 bits	Rear Fog Lights	2390
5.3	2 bits	Tractor Underside Mounted Work Lights	2358
5.5	2 bits	Tractor Rear Low Mounted Work Lights	2360
5.7	2 bits	Tractor Rear High Mounted Work Lights	2362
6.1	2 bits	Tractor Side Low Mounted Work Lights	2364
6.3	2 bits	Tractor Side High Mounted Work Lights	2366
6.5	2 bits	Tractor Front Low Mounted Work Lights	2354
6.7	2 bits	Tractor Front High Mounted Work Lights	2356
7.1	2 bits	Implement OEM Option 2 Light	2398
7.3	2 bits	Implement OEM Option 1 Light	2396
7.5	2 bits	Implement Right Facing Work Light	2407
7.7	2 bits	Implement Left Facing Work Light	2598
8.3	2 bits	Implement Right Forward Work Light	2402
8.5	2 bits	Implement Left Forward Work Light	2400
8.7	2 bits	Implement Rear Work Light	2394

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PGN 65089 Lighting Command - LC

The lighting command message has been defined as a global message from the tractor to all lighting controllers on the tractor and attached implements. Separate messages are provided for tractor and implement work and driving lights. Additional commands have been provided for 3 optional lights on implements to meet the needs of speciality equipment. Common marking and signaling messages are provided.
This message is used to control the state of all lighting functions. The lighting command message shall be sent on each change of state of a lamp. The state values indicate the lights is to be turned ON or OFF. Flashing is accomplished by sending the lighting message with the state alternately ON or OFF. A lighting command message must be sent at least once per second. It is the responsibility of the tractor designer to provide the correct combination of lamp commands to meet local legislative directives.

See PGN 65088 for the message to provide feedback for this command message.

Transmission Repetition	On change of lamp on/ off state. Maximum period of 1 second between messages. No greater than 10 messages per second for all lights.
Data Length:	8
Data Page:	0
PDU Format:	254
PDU Specific:	65 PGN Supporting Information:
Default Priority:	3
Parameter Group Number:	65089 (0xFE41)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Running Light Command	2403
1.3	2 bits	Alternate Beam Head Light Command	2351
1.5	2 bits	Low Beam Head Light Command	2349
1.7	2 bits	High Beam Head Light Command	2347
2.1	2 bits	Tractor Front Fog Lights Command	2387
2.3	2 bits	Rotating Beacon Light Command	2385
2.5	2 bits	Right Turn Signal Lights Command	2369
2.7	2 bits	Left Turn Signal Lights Command	2367
3.1	2 bits	Back Up Light and Alarm Horn Command	2391
3.3	2 bits	Center Stop Light Command	2375
3.5	2 bits	Right Stop Light Command	2373
3.7	2 bits	Left Stop Light Command	2371
4.1	2 bits	Implement Clearance Light Command	2383
4.3	2 bits	Tractor Clearance Light Command	2381
4.5	2 bits	Implement Marker Light Command	2379
4.7	2 bits	Tractor Marker Light Command	2377
5.1	2 bits	Rear Fog Light Command	2389
5.3	2 bits	Tractor Underside Mounted Work Lights Command	2357
5.5	2 bits	Tractor Rear Low Mounted Work Lights Command	2359
5.7	2 bits	Tractor Rear High Mounted Work Lights Command	2361
6.1	2 bits	Tractor Side Low Mounted Work Lights Command	2363
6.3	2 bits	Tractor Side High Mounted Work Lights Command	2365
6.5	2 bits	Tractor Front Low Mounted Work Lights Command	2353
6.7	2 bits	Tractor Front High Mounted Work Lights Command	2355
7.1	2 bits	Implement OEM Option 2 Light Command	2397
7.3	2 bits	Implement OEM Option 1 Light Command	2395

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7.5	2 bits	Implement Right Facing Work Light Command	2406
7.7	2 bits	Implement Left Facing Work Light Command	2597
8.1	2 bits	Lighting Data Request Command	2393
8.3	2 bits	Implement Right Forward Work Light Command	2401
8.5	2 bits	Implement Left Forward Work Light Command	2399
8.7	2 bits	Implement Rear Work Light Command	2405

PGN 65098 (R) Electronic Transmission Controller 7 - ETC7

Transmission status information from the transmission controller to network.

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 74 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65098 (0xFE4A)

Start Position	Length	Parameter Name	SPN
1.5	2 bits	Transmission Requested Range Display Blank State	1850
1.7	2 bits	Transmission Requested Range Display Flash State	1849
2.1	2 bits	Transmission Ready for Brake Release	3086
2.3	2 bits	Active Shift Console Indicator	2945
2.5	2 bits	Transmission Engine Crank Enable	2900
2.7	2 bits	Transmission Shift Inhibit Indicator	1851
3.1	2 bits	Transmission Mode 4 Indicator	2539
3.3	2 bits	Transmission Mode 3 Indicator	2538
3.5	2 bits	Transmission Mode 2 Indicator	2537
3.7	2 bits	Transmission Mode 1 Indicator	2536
4	1 byte	Transmission Requested Gear Feedback	3289

PGN 65099 Transmission Configuration 2 - TCFG2

Contains transmission configuration information.

Transmission Repetition: On request or sender may transmit every 5 seconds until acknowlegded by reception of the engine configuration message PGN 65251 SPN 1846.
Data Length: Variable
Data Page: 0
PDU Format: 254
PDU Specific: 75 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65099 (0xFE4B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Transmission Torque Limit	1845

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PGN 65100 Military Lighting Command - ML

The message contains parameters that control military specific lights.

Transmission Repetition: 500ms or upon state change, but not faster than 100 ms.
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 76 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65100 (0xFE4C)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Rear Black Out Marker Select	1840
1.3	2 bits	Front Black Out Marker Lamp Select	1839
1.5	2 bits	Convoy Lamp Select	1838
1.7	2 bits	Convoy Driving Lamp Select	1837
3.7	2 bits	Black Out Brake/Stop Lamp Select	1841
4.1	2 bits	Night Vision Illuminator Select	1843
4.7	2 bits	Black Out Work Lamp Select	1842
8	1 byte	Operators Black Out Intensity Selection	1844

PGN 65101 Total Averaged Information - TAVG

Averages of information accumulated over the life of the engine

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 77 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65101 (0xFE4D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Total Average Fuel Rate	1834
3-4	2 bytes	Engine Total Average Fuel Economy	1835

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PGN 65102 Door Control - DC

Used for door information.

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 78 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65102 (0xFE4E)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Position of doors	1821
1.5	2 bits	Ramp / Wheel Chair Lift Position	1820

PGN 65103 Vehicle Dynamic Stability Control 1 - VDC1

Contains information which relates to the VDC system status.

Transmission Repetition: 100ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 79 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65103 (0xFE4F)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	VDC Information Signal	1813
1.3	2 bits	VDC Fully Operational	1814
1.5	2 bits	VDC brake light request	1815
2.1	2 bits	ROP Engine Control active	1816
2.3	2 bits	ROP Brake Control active	1818
2.5	2 bits	YC Engine Control active	1817
2.7	2 bits	YC Brake Control active	1819

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PGN 65104 Battery Temperature - BT1

Contains battery temperature information.

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 80 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65104 (0xFE50)

Start Position	Length	Parameter Name	SPN
1	1 byte	Battery 1 Temperature	1800
2	1 byte	Battery 2 Temperature	1801

PGN 65105 Adaptive Cruise Control, Operator Input - ACC2

The operator requested characteristics for the ACC systems operation.

Transmission Repetition: 250 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 81 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65105 (0xFE51)

Start Position	Length	Parameter Name	SPN
1.6	3 bits	Requested ACC Distance Mode	1799

PGN 65106 Vehicle Electrical Power 3 - VP3

This contains high resolution/range parameters reported from the allternator or power generation components.

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 82 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65106 (0xFE52)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Alternator Current (High Range/Resolution)	1795
3-4	2 bytes	Net Battery Current (High Range/Resolution)	2579

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PGN 65107 Retarder Continuous Torque & Speed Limit - RTC1

Transmission Repetition: 5 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 83 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65107 (0xFE53)

Start Position	Length	Parameter Name	SPN
1	1 byte	Low Limit Threshhold for Maximum RPM from Retarder	1776
2	1 byte	High Limit Threshhold for Minimum Continuous RPM from Retarder	1777
3	1 byte	Low Limit Threshhold for Maximum Torque from Retarder	1778
4	1 byte	High Limit Threshhold for Minimum Continuous Torque from Retarder	1779
5	1 byte	Maximum Continuous Retarder Speed	1780
6	1 byte	Minimum Continuous Retarder Speed	1781
7	1 byte	Maximum Continuous Retarder Torque	1782
8	1 byte	Minimum Continuous Retarder Torque	1783

PGN 65108 Engine Continuous Torque & Speed Limit - ECT1

Transmission Repetition: 5 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 84 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65108 (0xFE54)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Low Limit Threshhold for Maximum RPM from Engine	1768
2	1 byte	Engine High Limit Threshhold for Minimum Continuous Engine RPM	1769
3	1 byte	Engine Low Limit Threshold for Maximum Torque from Engine	1770
4	1 byte	Engine High Limit Threshhold for Minimum Continuous Torque from Engine	1771
5	1 byte	Engine Maximum Continuous RPM	1772
6	1 byte	Engine Minimum Continuous RPM	1773
7	1 byte	Engine Maximum Continuous Torque	1774
8	1 byte	Engine Minimum Continuous Torque	1775

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PGN 65109 Gaseous Fuel Properties - GFD

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 85 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65109 (0xFE55)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Specific Heat Ratio	1767

PGN 65110 Tank Information 1 - TI1

Contains information on various tank levels

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 86 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65110 (0xFE56)

Start Position	Length	Parameter Name	SPN
1	1 byte	Catalyst Tank Level	1761
2	1 byte	Catalyst Tank Temperature	3031

PGN 65111 Air Suspension Control 5 - ASC5

Used for damper stiffness information

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 87 PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 65111 (0xFE57)

Start Position	Length	Parameter Name	SPN
1	1 byte	Damper Stiffness Front Axle	1729
2	1 byte	Damper Stiffness Rear Axle	1730
3	1 byte	Damper Stiffness Lift / Tag Axle	1731
4.1	2 bits	Electronic Shock Absorber Control Mode - Front Axle	1833
4.3	2 bits	Electronic Shock Absorber Control Mode - Rear Axle	1832
4.5	2 bits	Electronic Shock Absorber Control Mode - Lift/Tag Axle	1831

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PGN 65112 Air Suspension Control 4 - ASC4

Used for bellow pressure information

Transmission Repetition 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 88 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65112 (0xFE58)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Bellow Pressure Front Axle Left	1725
3-4	2 bytes	Bellow Pressure Front Axle Right	1726
5-6	2 bytes	Bellow Pressure Rear Axle Left	1727
7-8	2 bytes	Bellow Pressure Rear Axle Right	1728

PGN 65113 Air Suspension Control 3 - ASC3

Used for height information

Transmission Repetition 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 89 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65113 (0xFE59)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Relative Level Front Axle Left	1721
3-4	2 bytes	Relative Level Front Axle Right	1722
5-6	2 bytes	Relative Level Rear Axle Left	1724
7-8	2 bytes	Relative Level Rear Axle Right	1723

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PGN 65114 Air Suspension Control 1 - ASC1

Used for suspension control control information

Transmission Repetition 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 90 PGN Supporting Information:
Default Priority: 3
Parameter Group Number: 65114 (0xFE5A)

Start Position	Length	Parameter Name	SPN
1.1	4 bits	Nominal Level Front Axle	1734
1.5	4 bits	Nominal Level Rear Axle	1733
2.1	2 bits	Below Nominal Level Front Axle	1738
2.3	2 bits	Below Nominal Level Rear Axle	1754
2.5	2 bits	Above Nominal Level Front Axle	1737
2.7	2 bits	Above Nominal Level Rear Axle	1736
3.1	2 bits	Lowering Control Mode Front Axle	1740
3.3	2 bits	Lowering Control Mode Rear Axle	1755
3.5	2 bits	Lifting Control Mode Front Axle	1739
3.7	2 bits	Lifting Control Mode Rear Axle	1756
4.1	4 bits	Kneeling Information	1742
4.5	4 bits	Level Control Mode	1741
5.1	2 bits	Security Device	1746
5.3	2 bits	Vehicle Motion Inhibit	1745
5.5	2 bits	Door Release	1744
5.7	2 bits	Lift Axle 1 Position	1743
6.1	2 bits	Front Axle in Bumper Range	1824
6.3	2 bits	Rear Axle in Bumper Range	1823
6.7	2 bits	Lift Axle 2 Position	1822
7.1	2 bits	Suspension Remote Control 1	1826
7.3	2 bits	Suspension Remote control 2	1825
8.1	4 bits	Suspension Control Refusal Information	1827

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PGN 65115 Forward Lane Image - FLI2

Transmission Repetition	100 ms		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	91	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65115	(0xFE5B)	

Start Position	Length	Parameter Name	SPN
1.3	2 bits	Lane Tracking Status Right Side	1711
1.5	2 bits	Lane Tracking Status Left Side	1710
1.7	2 bits	Lane Departure Indication Enable Status	1702

PGN 65126 Battery Main Switch Information - BM

Transmission Repetition	1 s		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	102	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65126	(0xFE66)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Battery Main Switch Hold State	1681

PGN 65127 Climate Control Configuration - CCC

Transmission Repetition	On request		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	103	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65127	(0xFE67)	

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Auxiliary Heater Maximum Output Power	1690

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PGN 65128 Vehicle Fluids - VF

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 104 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65128 (0xFE68)

Start Position	Length	Parameter Name	SPN
1	1 byte	Hydraulic Temperature	1638
2.1	2 bits	Hydraulic Oil Filter Restriction Switch	1713
2.3	2 bits	Winch Oil Pressure Switch	1857
3	1 byte	Hydraulic Oil Level	2602

PGN 65129 (R) Engine Temperature 3 - ET3

This parameter group is used to transit high resolution engine temperatures for control purposes.

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 105 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65129 (0xFE69)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Intake Manifold 1 Air Temperature (High Resolution)	1636
3-4	2 bytes	Engine Coolant Temperature (High Resolution)	1637
5-6	2 bytes	Engine Intake Valve Actuation System Oil Temperature	2986

PGN 65130 Engine Fuel/lube systems - EFS

Transmission Repetition: 0.5 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 106 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65130 (0xFE6A)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Oil Level Remote Reservoir	1380

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2	1 byte	Engine Fuel Supply Pump Inlet Pressure	1381
3	1 byte	Engine Fuel Filter (suction side) Differential Pressure	1382

PGN 65131 Driver's Identification - DI

Field:
a Driver 1 Identification
Delimiter (ASCII "*")
b Driver 2 Identification
Delimiter (ASCII "*")

NOTE - If only driver card 1 is present, only the parameter driver 1 identification and two delimiters shall be transmitted. If only driver card 2 is present, a delimiter followed by parameter driver 2 identification and the second delimiter shall be transmitted. If no driver cards are present, only the two delimiters shall be sent.

Transmission Repetition	On request		
Data Length:	Variable		
Data Page:	0		
PDU Format:	254		
PDU Specific:	107	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65131	(0xFE6B)	

Start Position	Length	Parameter Name	SPN
1-2	Variable ("*" delimited)	Driver 1 identification	1625
3-4	Variable ("*" delimited)	Driver 2 identification	1626

PGN 65132 Tachograph - TCO1

Transmission Repetition	50 ms		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	108	PGN Supporting Information:	
Default Priority:	3		
Parameter Group Number:	65132	(0xFE6C)	

Start Position	Length	Parameter Name	SPN
1.1	3 bits	Driver 1 working state	1612
1.4	3 bits	Driver 2 working state	1613
1.7	2 bits	Drive recognize	1611
2.1	4 bits	Driver 1 Time Related States	1617
2.5	2 bits	Driver card, driver 1	1615
2.7	2 bits	Overspeed	1614
3.1	4 bits	Driver 2 Time Related States	1618
3.5	2 bits	Driver card, driver 2	1616
4.1	2 bits	System event	1622

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4.3	2 bits	Handling information	1621
4.5	2 bits	Tachograph performance	1620
4.7	2 bits	Direction indicator	1619
5-6	2 bytes	Tachograph output shaft speed	1623
7-8	2 bytes	Tachograph vehicle speed	1624

PGN 65133 Heater Information - HTR

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 109 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65133 (0xFE6D)

Start Position	Length	Parameter Name	SPN
1	1 byte	Auxiliary Heater Output Coolant Temperature	1687
2	1 byte	Auxiliary Heater Input Air Temperature	1688
3	1 byte	Auxiliary Heater Output Power Percent	1689
4.1	4 bits	Auxiliary Heater Mode	1677
5.1	2 bits	Auxilary Heater Water Pump Status	1676
5.3	2 bits	Cab Ventilation	1678
5.5	2 bits	Engine Heating Zone	1679
5.7	2 bits	Cab Heating Zone	1680

PGN 65134 High Resolution Wheel Speed - HRW

Transmission Repetition: 20 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 110 PGN Supporting Information:
Default Priority: 2
Parameter Group Number: 65134 (0xFE6E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Front Axle, Left Wheel Speed	1592
3-4	2 bytes	Front axle, right wheel speed	1593
5-6	2 bytes	Rear axle, left wheel speed	1594
7-8	2 bytes	Rear axle, right wheel speed	1595

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PGN 65135 Adaptive Cruise Control - ACC1

NOTE—The ACC1 message is required whenever the engine is running and ACC is powered on and not faulted. The timeout for ACC1 message will be between 2.5 times to 5 times the update rate.

The ACC1 message is intended primarily for engines and driver display units. The receiving device should identify the ACC device based on ACC function value of 32 (headway controller) or source address of 42 (headway controller).
In the event that the engine is running, the ACC is installed and the ACC1 message is not present, the engine will disable cruise control and return to non-cruise mode; also, the driver display unit will notify the driver that ACC operation is no longer available. In addition to the ACC1 timeout, engine cruise control will also be disabled if parameter "Adaptive Cruise Control State" in ACC1 is 110b (ACC disabled or in error). In some cases, it may be possible for the driver to restart cruise control (without ACC capability) during ACC/J1939 fault by performing a reset function. See Figure PGN65135_A.

It is possible that engines and driver display units may require calibration settings in order to know if the present vehicle configuration includes an ACC system or not. A calibration setting may also be needed for defining the driver reset function.

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 111 PGN Supporting Information: See Appendix D - PGN 65135
Default Priority: 4
Parameter Group Number: 65135 (0xFE6F)

Start Position	Length	Parameter Name	SPN
1	1 byte	Speed of forward vehicle	1586
2	1 byte	Distance to forward vehicle	1587
3	1 byte	Adaptive Cruise Control Set Speed	1588
4.1	3 bits	Adaptive Cruise Control Mode	1590
4.4	3 bits	Adaptive cruise control set distance mode	1589
5-6	2 bytes	Road curvature	1591
7.1	2 bits	ACC Target Detected	1798
7.3	2 bits	ACC System Shutoff Warning	1797
7.5	2 bits	ACC Distance Alert Signal	1796

PGN 65136 Combination Vehicle Weight - CVW

Transmission Repetition: On request
Data Length: Variable
Data Page: 0
PDU Format: 254
PDU Specific: 112 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65136 (0xFE70)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Powered Vehicle Weight	1585
3-4	2 bytes	Gross Combination Vehicle Weight	1760

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PGN 65137 Laser Tracer Position - LTP

Transmission Repetition	50 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	113	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	65137	(0xFE71)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Laser Tracer Target Deviation	1579
3-4	2 bytes	Laser Tracer Vertical Distance	1580
5	1 byte	Laser Tracer Horizontal Deviation	1581
6	8 bits	LED Display Data #2	1582
7	8 bits	Laser Tracer Information	1583

PGN 65138 Laser Leveling System Blade Control - LBC

Transmission Repetition	50 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	114	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	65138	(0xFE72)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Blade Duration and Direction	1577
3	8 bits	Blade Control Mode	1578

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PGN 65139 Laser Receiver Mast Position - LMP

Transmission Repetition	50 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	115	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	65139	(0xFE73)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Mast Position	1576

PGN 65140 Modify Leveling System Control Set Point - LSP

Transmission Repetition	50 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	116	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	65140	(0xFE74)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Modify Set Point	1575
3-6	4 bytes	Blade Height Set Point - High Resolution	1759

PGN 65141 Laser Leveling System Vertical Deviation - LVD

Transmission Repetition	50 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	117	PGN Supporting Information:
Default Priority:	3	
Parameter Group Number:	65141	(0xFE75)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Laser Strike Vertical Deviation	1574
3	1 byte	Laser Receiver Type	2576
4-5	2 bytes	Laser Strike Data Latency	2793
6-7	2 bytes	Absolute Laser Strike Position	2794

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PGN 65142 Laser Leveling System Vertical Position Display Data - LVDD

Transmission Repetition	100 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	118	PGN Supporting Information:
Default Priority:	4	
Parameter Group Number:	65142	(0xFE76)

Start Position	Length	Parameter Name	SPN
1	8 bits	LED Display Data #1	1573
2.1	4 bits	LED Display Mode Control	1805
2.5	4 bits	LED Display Deadband Control	1806
3.1	4 bits	LED Pattern Control	2578
3.5	4 bits	Display Deadbands	2577

PGN 65143 Auxiliary Pressures - AP

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	119	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	65143	(0xFE77)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Auxiliary Vacuum Pressure Reading	136
3-4	2 bytes	Auxiliary Gage Pressure Reading 1	137
5-6	2 bytes	Auxiliary Absolute Pressure Reading	138

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PGN 65144 Tire Pressure Control Unit Mode and Status - TP1

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 120 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65144 (0xFE78)

Start Position	Length	Parameter Name	SPN
1	1 byte	Tire Pressure Check Interval	39
2.1	4 bits	Steer Channel Mode	1466
3.1	4 bits	Trailer/tag Channel Mode	1467
3.5	4 bits	Drive Channel Mode	1468
4.1	2 bits	PCU Drive Solenoid Status	1469
4.3	2 bits	PCU Steer Solenoid Status	1470
4.5	2 bits	Tire Pressure Supply Switch Status	1471
5.1	2 bits	PCU Deflate Solenoid Status	1472
5.3	2 bits	PCU Control Solenoid Status	1473
5.5	2 bits	PCU Supply Solenoid Status	1474
5.7	2 bits	PCU Trailer, Tag or Push Solenoid Status	1475

PGN 65145 Tire Pressure Control Unit Target Pressures - TP2

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 121 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65145 (0xFE79)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trailer, Tag Or Push Channel Tire Pressure Target	141
3-4	2 bytes	Drive Channel Tire Pressure Target	142
5-6	2 bytes	Steer Channel Tire Pressure Target	143

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PGN 65146 Tire Pressure Control Unit Current Pressures - TP3

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 122 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65146 (0xFE7A)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trailer, Tag Or Push Channel Tire Pressure	144
3-4	2 bytes	Drive Channel Tire Pressure	145
5-6	2 bytes	Steer Channel Tire Pressure	146

PGN 65147 Combustion Time 1 - CT1

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 123 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65147 (0xFE7B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #1 Combustion Time	1444
3-4	2 bytes	Engine Cylinder #2 Combustion Time	1445
5-6	2 bytes	Engine Cylinder #3 Combustion Time	1446
7-8	2 bytes	Engine Cylinder #4 Combustion Time	1447

PGN 65148 Combustion Time 2 - CT2

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 124 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65148 (0xFE7C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #5 Combustion Time	1448

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3-4	2 bytes	Engine Cylinder #6 Combustion Time	1449
5-6	2 bytes	Engine Cylinder #7 Combustion Time	1450
7-8	2 bytes	Engine Cylinder #8 Combustion Time	1451

PGN 65149 Combustion Time 3 - CT3

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 125 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65149 (0xFE7D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #9 Combustion Time	1452
3-4	2 bytes	Engine Cylinder #10 Combustion Time	1453
5-6	2 bytes	Engine Cylinder #11 Combustion Time	1454
7-8	2 bytes	Engine Cylinder #12 Combustion Time	1455

PGN 65150 Combustion Time 4 - CT4

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 126 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65150 (0xFE7E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #13 Combustion Time	1456
3-4	2 bytes	Engine Cylinder #14 Combustion Time	1457
5-6	2 bytes	Engine Cylinder #15 Combustion Time	1458
7-8	2 bytes	Engine Cylinder #16 Combustion Time	1459

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PGN 65151 Combustion Time 5 - CT5

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 127 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65151 (0xFE7F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #17 Combustion Time	1460
3-4	2 bytes	Engine Cylinder #18 Combustion Time	1461
5-6	2 bytes	Engine Cylinder #19 Combustion Time	1462
7-8	2 bytes	Engine Cylinder #20 Combustion Time	1463

PGN 65152 Combustion Time 6 - CT6

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 128 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65152 (0xFE80)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Desired Combustion Time	1464
3-4	2 bytes	Engine Average Combustion Time	1465

PGN 65153 Fuel Information 2 (Gaseous) - GFI2

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 129 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65153 (0xFE81)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Fuel Flow Rate 1	1440
3-4	2 bytes	Engine Fuel Flow Rate 2	1441

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5	1 byte	Engine Fuel Valve 1 Position	1442
6	1 byte	Engine Fuel Valve 2 Position	1443
7	1 byte	Engine Requested Fuel Valve 1 Position	1765
8	1 byte	Engine Requested Fuel Valve 2 Position	1766

PGN 65154 Ignition Timing 1 - IT1

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 130 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65154 (0xFE82)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #1 Ignition Timing	1413
3-4	2 bytes	Engine Cylinder #2 Ignition Timing	1414
5-6	2 bytes	Engine Cylinder #3 Ignition Timing	1415
7-8	2 bytes	Engine Cylinder #4 Ignition Timing	1416

PGN 65155 Ignition Timing 2 - IT2

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 131 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65155 (0xFE83)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #5 Ignition Timing	1417
3-4	2 bytes	Engine Cylinder #6 Ignition Timing	1418
5-6	2 bytes	Engine Cylinder #7 Ignition Timing	1419
7-8	2 bytes	Engine Cylinder #8 Ignition Timing	1420

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PGN 65156 Ignition Timing 3 - IT3

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 132 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65156 (0xFE84)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #9 Ignition Timing	1421
3-4	2 bytes	Engine Cylinder #10 Ignition Timing	1422
5-6	2 bytes	Engine Cylinder #11 Ignition Timing	1423
7-8	2 bytes	Engine Cylinder #12 Ignition Timing	1424

PGN 65157 Ignition Timing 4 - IT4

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 133 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65157 (0xFE85)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #13 Ignition Timing	1425
3-4	2 bytes	Engine Cylinder #14 Ignition Timing	1426
5-6	2 bytes	Engine Cylinder #15 Ignition Timing	1427
7-8	2 bytes	Engine Cylinder #16 Ignition Timing	1428

PGN 65158 Ignition Timing 5 - IT5

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 134 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65158 (0xFE86)

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Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Cylinder #17 Ignition Timing	1429
3-4	2 bytes	Engine Cylinder #18 Ignition Timing	1430
5-6	2 bytes	Engine Cylinder #19 Ignition Timing	1431
7-8	2 bytes	Engine Cylinder #20 Ignition Timing	1432

PGN 65159 Ignition Timing 6 - IT6

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 135 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65159 (0xFE87)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Desired Ignition Timing #1	1433
3-4	2 bytes	Engine Desired Ignition Timing #2	1434
5-6	2 bytes	Engine Desired Ignition Timing #3	1435
7-8	2 bytes	Engine Actual Ignition Timing	1436

PGN 65160 Ignition Transformer Secondary Output 1 - ISO1

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 136 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65160 (0xFE88)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Cylinder #1 Ignition Transformer Secondary Output	1393
2	1 byte	Engine Cylinder #2 Ignition Transformer Secondary Output	1394
3	1 byte	Engine Cylinder #3 Ignition Transformer Secondary Output	1395
4	1 byte	Engine Cylinder #4 Ignition Transformer Secondary Output	1396
5	1 byte	Engine Cylinder #5 Ignition Transformer Secondary Output	1397
6	1 byte	Engine Cylinder #6 Ignition Transformer Secondary Output	1398
7	1 byte	Engine Cylinder #7 Ignition Transformer Secondary Output	1399
8	1 byte	Engine Cylinder #8 Ignition Transformer Secondary Output	1400

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PGN 65161 Ignition Transformer Secondary Output 2 - ISO2

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	137	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	65161	(0xFE89)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Cylinder #9 Ignition Transformer Secondary Output	1401
2	1 byte	Engine Cylinder #10 Ignition Transformer Secondary Output	1402
3	1 byte	Engine Cylinder #11 Ignition Transformer Secondary Output	1403
4	1 byte	Engine Cylinder #12 Ignition Transformer Secondary Output	1404
5	1 byte	Engine Cylinder #13 Ignition Transformer Secondary Output	1405
6	1 byte	Engine Cylinder #14 Ignition Transformer Secondary Output	1406
7	1 byte	Engine Cylinder #15 Ignition Transformer Secondary Output	1407
8	1 byte	Engine Cylinder #16 Ignition Transformer Secondary Output	1408

PGN 65162 Ignition Transformer Secondary Output 3 - ISO3

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	138	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	65162	(0xFE8A)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Cylinder #17 Ignition Transformer Secondary Output	1409
2	1 byte	Engine Cylinder #18 Ignition Transformer Secondary Output	1410
3	1 byte	Engine Cylinder #19 Ignition Transformer Secondary Output	1411
4	1 byte	Engine Cylinder #20 Ignition Transformer Secondary Output	1412

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PGN 65163 Gaseous Fuel Pressure - GFP

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 139 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65163 (0xFE8B)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Fuel Valve Inlet Absolute Pressure	1390
3-4	2 bytes	Engine Fuel Valve Differential Pressure	1391
5-6	2 bytes	Engine Air to Fuel Differential Pressure	1392

PGN 65164 (R) Auxiliary Analog Information - AAI

Auxiliary Analog Information

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 140 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65164 (0xFE8C)

Start Position	Length	Parameter Name	SPN
1	1 byte	Auxiliary Temperature 1	441
2	1 byte	Auxiliary Temperature 2	442
3	1 byte	Auxiliary Pressure #1	1387
4	1 byte	Auxiliary Pressure #2	1388
5-6	2 bytes	Auxiliary Level	3087

PGN 65165 Vehicle Electrical Power 2 - VP2

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 141 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65165 (0xFE8D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Battery 2 Potential (Voltage)	444

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PGN 65166 Service 2 - S2

NOTE - There are two acceptable formats for the Service PGN. Format 1 has only 8 bytes of data and reports the component most in need of service for each of the three categories. Format 2, however, uses the transport layer as necessary in order to repeat these 8 bytes of service component information until all supported service components in each category have been transmitted.

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	142	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	65166	(0xFE8E)

Start Position	Length	Parameter Name	SPN
1	1 byte	Service Component Identification	1379
2-3	2 bytes	Time Since Last Service	1350

PGN 65167 Supply Pressure 2 - SP2

Transmission Repetition	1 s	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	143	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65167	(0xFE8F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine External Shutdown Air Supply Pressure	1320

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PGN 65168 Engine Torque History - ETH

NOTE - The torque history PGN is variable in length and may contain up to 125 torque history records. Each torque history record MUST BE 38 bytes in length. Any unused bytes must be 0xFF.

The last six bytes of each record are not currently defined and shall be transmitted as “not available” (0xff). In the first record, these are byte positions 34-39.

Transmission Repetition	On request	
Data Length:	Variable	
Data Page:	0	
PDU Format:	254	
PDU Specific:	144	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65168	(0xFE90)

Start Position	Length	Parameter Name	SPN
01	1 byte	Number of Engine Torque History Records	1246
02-03	2 bytes	Engine Power	1247
04-05	2 bytes	Engine Peak Torque 1	1248
06-07	2 bytes	Engine Peak Torque 2	1249
08	1 byte	Calibration Record Start Month	1250
09	1 byte	Calibration Record Start Day	1251
10	1 byte	Calibration Record Start Year	1252
11-14	4 bytes	Calibration Record Duration Time	1253
15.1	2 bits	Torque Limiting Feature Status	1254
15.3	3 bits	Engine Torque Limit Feature	1632
16-17	2 bytes	Transmission Gear Ratio 1	1255
18-19	2 bytes	Engine Torque Limit 1, Transmission	1256
20-21	2 bytes	Transmission Gear Ratio 2	1257
22-23	2 bytes	Engine Torque Limit 2, Transmission	1258
24-25	2 bytes	Transmission Gear Ratio 3	1259
26-27	2 bytes	Engine Torque Limit 3, Transmission	1260
28-29	2 bytes	Engine Torque Limit 4, Transmission	1261
30-31	2 bytes	Engine Torque Limit 5, Switch	1262
32-33	2 bytes	Engine Torque Limit 6, Axle Input	1263

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PGN 65169 Fuel Leakage - FL

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 145 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65169 (0xFE91)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Fuel Leakage 1	1239
1.3	2 bits	Engine Fuel Leakage 2	1240

PGN 65170 Engine Information - EI

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 146 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65170 (0xFE92)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Pre-filter Oil Pressure	1208
2-3	2 bytes	Engine Exhaust Gas Pressure	1209
4	1 byte	Engine Fuel Rack Position	1210
5-6	2 bytes	Engine Mass Flow (Gaseous)	1241
7-8	2 bytes	Instantaneous Estimated Brake Power	1242

PGN 65171 Engine Electrical System/Module Information - EES

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 147 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65171 (0xFE93)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Electrical Load	1204

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3.1	2 bits	Safety Wire Status	1205
3.3	2 bits	Turning Gear Engaged	1206

PGN 65172 Engine Auxiliary Coolant - EAC

Transmission Repetition: 0.5 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 148 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65172 (0xFE94)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Auxiliary Coolant Pressure	1203
2	1 byte	Engine Auxiliary Coolant Temperature	1212
3	1 byte	Sea Water Pump Outlet Pressure	2435

PGN 65173 Rebuild Information - RBI

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 149 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65173 (0xFE95)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Engine Operation Time Since Rebuild	1193

PGN 65174 Turbocharger Wastegate - TCW

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 150 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65174 (0xFE96)

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Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Turbocharger 1 Wastegate Drive	1188
2	1 byte	Engine Turbocharger 2 Wastegate Drive	1189
3	1 byte	Engine Turbocharger 3 Wastegate Drive	1190
4	1 byte	Engine Turbocharger 4 Wastegate Drive	1191
5	1 byte	Engine Turbocharger Wastegate Actuator Control Air Pressure	1192

PGN 65175 Turbocharger Information 5 - TCI5

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 151 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65175 (0xFE97)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Turbine Outlet Temperature	1184
3-4	2 bytes	Engine Turbocharger 2 Turbine Outlet Temperature	1185
5-6	2 bytes	Engine Turbocharger 3 Turbine Outlet Temperature	1186
7-8	2 bytes	Engine Turbocharger 4 Turbine Outlet Temperature	1187

PGN 65176 Turbocharger Information 4 - TCI4

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 152 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65176 (0xFE98)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Turbine Inlet Temperature	1180
3-4	2 bytes	Engine Turbocharger 2 Turbine Inlet Temperature	1181
5-6	2 bytes	Engine Turbocharger 3 Turbine Inlet Temperature	1182
7-8	2 bytes	Engine Turbocharger 4 Turbine Inlet Temperature	1183

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PGN 65177 Turbocharger Information 3 - TCI3

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 153 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65177 (0xFE99)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Compressor Inlet Pressure	1176
3-4	2 bytes	Engine Turbocharger 2 Compressor Inlet Pressure	1177
5-6	2 bytes	Engine Turbocharger 3 Compressor Inlet Pressure	1178
7-8	2 bytes	Engine Turbocharger 4 Compressor Inlet Pressure	1179

PGN 65178 Turbocharger Information 2 - TCI2

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 154 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65178 (0xFE9A)

Start Position	Length	Parameter Name	SPN
1	2 bytes	Engine Turbocharger 1 Compressor Inlet Temperature	1172
2	2 bytes	Engine Turbocharger 2 Compressor Inlet Temperature	1173
3	2 bytes	Engine Turbocharger 3 Compressor Inlet Temperature	1174
4	2 bytes	Engine Turbocharger 4 Compressor Inlet Temperature	1175

PGN 65179 Turbocharger Information 1 - TCI1

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 155 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65179 (0xFE9B)

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Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Turbocharger Lube Oil Pressure 2	1168
2-3	2 bytes	Engine Turbocharger 2 Speed	1169
4-5	2 bytes	Engine Turbocharger 3 Speed	1170
6-7	2 bytes	Engine Turbocharger 4 Speed	1171

PGN 65180 Main Bearing Temperature 3 - MBT3

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 156 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65180 (0xFE9C)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Main Bearing 9 Temperature	1165
3-4	2 bytes	Engine Main Bearing 10 Temperature	1166
5-6	2 bytes	Engine Main Bearing 11 Temperature	1167

PGN 65181 Main Bearing Temperature 2 - MBT2

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 157 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65181 (0xFE9D)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Main Bearing 5 Temperature	1161
3-4	2 bytes	Engine Main Bearing 6 Temperature	1162
5-6	2 bytes	Engine Main Bearing 7 Temperature	1163
7-8	2 bytes	Engine Main Bearing 8 Temperature	1164

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PGN 65182 Main Bearing Temperature 1 - MBT1

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 158 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65182 (0xFE9E)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Main Bearing 1 Temperature	1157
3-4	2 bytes	Engine Main Bearing 2 Temperature	1158
5-6	2 bytes	Engine Main Bearing 3 Temperature	1159
7-8	2 bytes	Engine Main Bearing 4 Temperature	1160

PGN 65183 Exhaust Port Temperature 5 - EPT5

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 159 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65183 (0xFE9F)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 17 Temperature	1153
3-4	2 bytes	Engine Exhaust Gas Port 18 Temperature	1154
5-6	2 bytes	Engine Exhaust Gas Port 19 Temperature	1155
7-8	2 bytes	Engine Exhaust Gas Port 20 Temperature	1156

PGN 65184 Exhaust Port Temperature 4 - EPT4

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 160 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65184 (0xFEA0)

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Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 13 Temperature	1149
3-4	2 bytes	Engine Exhaust Gas Port 14 Temperature	1150
5-6	2 bytes	Engine Exhaust Gas Port 15 Temperature	1151
7-8	2 bytes	Engine Exhaust Gas Port 16 Temperature	1152

PGN 65185 Exhaust Port Temperature 3 - EPT3

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 161 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65185 (0xFEA1)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 9 Temperature	1145
3-4	2 bytes	Engine Exhaust Gas Port 10 Temperature	1146
5-6	2 bytes	Engine Exhaust Gas Port 11 Temperature	1147
7-8	2 bytes	Engine Exhaust Gas Port 12 Temperature	1148

PGN 65186 Exhaust Port Temperature 2 - EPT2

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 162 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65186 (0xFEA2)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 5 Temperature	1141
3-4	2 bytes	Engine Exhaust Gas Port 6 Temperature	1142
5-6	2 bytes	Engine Exhaust Gas Port 7 Temperature	1143
7-8	2 bytes	Engine Exhaust Gas Port 8 Temperature	1144

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PGN 65187 Exhaust Port Temperature 1 - EPT1

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 163 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65187 (0xFEA3)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Exhaust Gas Port 1 Temperature	1137
3-4	2 bytes	Engine Exhaust Gas Port 2 Temperature	1138
5-6	2 bytes	Engine Exhaust Gas Port 3 Temperature	1139
7-8	2 bytes	Engine Exhaust Gas Port 4 Temperature	1140

PGN 65188 Engine Temperature 2 - ET2

Transmission Repetition: 1s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 164 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65188 (0xFEA4)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Oil Temperature 2	1135
3-4	2 bytes	Engine ECU Temperature	1136
5-6	2 bytes	Engine Exhaust Gas Recirculation Differential Pressure	411
7-8	2 bytes	Engine Exhaust Gas Recirculation Temperature	412

PGN 65189 Intake Manifold Information 2 - IMT2

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 165 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65189 (0xFEA5)

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Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Intake Manifold 2 Temperature	1131
2	1 byte	Engine Intake Manifold 3 Temperature	1132
3	1 byte	Engine Intake Manifold 4 Temperature	1133
4	1 byte	Engine Intake Manifold 5 Temperature	1802
5	1 byte	Engine Intake Manifold 6 Temperature	1803

PGN 65190 Intake Manifold Information 1 - IMT1

Transmission Repetition: 0.5 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 166 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65190 (0xFEA6)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Turbocharger 1 Boost Pressure	1127
3-4	2 bytes	Engine Turbocharger 2 Boost Pressure	1128
5-6	2 bytes	Engine Turbocharger 3 Boost Pressure	1129
7-8	2 bytes	Engine Turbocharger 4 Boost Pressure	1130

PGN 65191 Alternator Temperature - AT

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 167 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65191 (0xFEA7)

Start Position	Length	Parameter Name	SPN
1	1 byte	Alternator Bearing 1 Temperature	1122
2	1 byte	Alternator Bearing 2 Temperature	1123
3	1 byte	Alternator Winding 1 Temperature	1124
4	1 byte	Alternator Winding 2 Temperature	1125
5	1 byte	Alternator Winding 3 Temperature	1126

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PGN 65192 Articulation Control - AC

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 168 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65192 (0xFEA8)

Start Position	Length	Parameter Name	SPN
1	1 byte	Articulation Angle	1120

PGN 65193 Exhaust Oxygen 1 - EO1

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 169 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65193 (0xFEA9)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Desired Rated Exhaust Oxygen	1117
3-4	2 bytes	Engine Desired Exhaust Oxygen	1118
5-6	2 bytes	Engine Actual Exhaust Oxygen	1119
7	1 byte	Engine Exhaust Gas Oxygen Sensor Fueling Correction	1695
8.7	2 bits	Engine Exhaust Gas Oxygen Sensor Closed Loop Operation	1696

PGN 65194 Alternate Fuel 2 - AF2

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 170 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65194 (0xFEAA)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Gaseous Fuel Correction Factor	1116
2-3	2 bytes	Engine Desired Absolute Intake Manifold Pressure (Turbo Boost Limit)	1692

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4	1 byte	Engine Turbocharger Wastegate Valve Position	1693
5	1 byte	Engine Gas Mass Flow Sensor Fueling Correction	1694

PGN 65195 Electronic Transmission Controller 6 - ETC6

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 171 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65195 (0xFEAB)

Start Position	Length	Parameter Name	SPN
1	1 byte	Recommended Gear	1113
2	1 byte	Highest Possible Gear	1115
3	1 byte	Lowest Possible Gear	1114
4	1 byte	Clutch Life Remaining	2983

PGN 65196 Wheel Brake Lining Remaining Information - EBC4

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 172 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65196 (0xFEAC)

Start Position	Length	Parameter Name	SPN
1	1 byte	Brake Lining Remaining, Front Axle, Left Wheel	1099
2	1 byte	Brake Lining Remaining, Front Axle, Right Wheel	1100
3	1 byte	Brake Lining Remaining, Rear Axle #1, Left Wheel	1101
4	1 byte	Brake Lining Remaining, Rear Axle #1, Right Wheel	1102
5	1 byte	Brake Lining Remaining, Rear Axle #2, Left Wheel	1103
6	1 byte	Brake Lining Remaining, Rear Axle #2, Right Wheel	1104
7	1 byte	Brake Lining Remaining, Rear Axle #3, Left Wheel	1105
8	1 byte	Brake Lining Remaining, Rear Axle #3, Right Wheel	1106

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PGN 65197 Wheel Application Pressure High Range Information - EBC3

Transmission Repetition	100 ms		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	173	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65197	(0xFEAD)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Brake Application Pressure High Range, Front Axle, Left Wheel	1091
2	1 byte	Brake Application Pressure High Range, Front Axle, Right Wheel	1092
3	1 byte	Brake Application Pressure High Range, Rear Axle #1, Left Wheel	1093
4	1 byte	Brake Application Pressure High Range, Rear Axle #1, Right Wheel	1094
5	1 byte	Brake Application Pressure High Range, Rear Axle #2, Left Wheel	1095
6	1 byte	Brake Application Pressure High Range, Rear Axle #2, Right Wheel	1096
7	1 byte	Brake Application Pressure High Range, Rear Axle #3, Left Wheel	1097
8	1 byte	Brake Application Pressure High Range, Rear Axle #3, Right Wheel	1098

PGN 65198 Air Supply Pressure - AIR1

Air Supply Pressure

Transmission Repetition	1 s		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	174	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65198	(0xFEAE)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Pneumatic Supply Pressure	46
2	1 byte	Parking and/or Trailer Air Pressure	1086
3	1 byte	Service Brake Air Pressure Circuit #1	1087
4	1 byte	Service Brake Air Pressure Circuit #2	1088
5	1 byte	Auxiliary Equipment Supply Pressure	1089
6	1 byte	Air Suspension Supply Pressure	1090

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PGN 65199 Fuel Consumption (Gaseous) - GFC

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 175 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65199 (0xFEAF)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Trip Fuel (Gaseous)	1039
5-8	4 bytes	Total Fuel Used (Gaseous)	1040

PGN 65200 Trip Time Information 2 - TTI2

Transmission Repetition: On request
Data Length: 20
Data Page: 0
PDU Format: 254
PDU Specific: 176 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65200 (0xFEB0)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Cruise Time	1034
05-08	4 bytes	Trip PTO Time	1035
09-12	4 bytes	Trip Engine Running Time	1036
13-16	4 bytes	Trip Idle Time	1037
17-20	4 bytes	Trip Air Compressor On Time	1038

PGN 65201 ECU History - EH

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 177 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65201 (0xFEB1)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Total ECU Distance	1032
5-8	4 bytes	Total ECU Run Time	1033

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PGN 65202 Fuel Information 1 (Gaseous) - GFI1

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 178 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65202 (0xFEB2)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Total Engine PTO Fuel Used (Gaseous)	1030
5-6	2 bytes	Trip Average Fuel Rate (Gaseous)	1031
7-8	2 bytes	Engine Fuel Specific Gravity	1389

PGN 65203 Fuel Information (Liquid) - LFI

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 179 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65203 (0xFEB3)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Total Engine PTO Fuel Used	1028
5-6	2 bytes	Trip Average Fuel Rate	1029

PGN 65204 Trip Time Information 1 - TTI1

Transmission Repetition: On request
Data Length: 16
Data Page: 0
PDU Format: 254
PDU Specific: 180 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65204 (0xFEB4)

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Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Time in VSL	1024
05-08	4 bytes	Trip Time in Top Gear	1025
09-12	4 bytes	Trip Time in Gear Down	1026
13-16	4 bytes	Trip Time in Derate by Engine	1027

PGN 65205 Trip Shutdown Information - TSI

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 181 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65205 (0xFEB5)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trip Number of Hot Shutdowns	1020
3-4	2 bytes	Trip Number of Idle Shutdowns	1021
5-6	2 bytes	Trip Number of Idle Shutdown Overrides	1022
7-8	2 bytes	Trip Sudden Decelerations	1023

PGN 65206 Trip Vehicle Speed/Cruise Distance Information - TVI

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 182 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65206 (0xFEB6)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trip Maximum Vehicle Speed	1018
3-6	4 bytes	Trip Cruise Distance	1019

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PGN 65207 Engine Speed/Load Factor Information - LF

Transmission Repetition	On request	
Data Length:	10	
Data Page:	0	
PDU Format:	254	
PDU Specific:	183	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	65207	(0xFEB7)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Trip Maximum Engine Speed	1013
3-4	2 bytes	Trip Average Engine Speed	1014
5	1 byte	Trip Drive Average Load Factor	1015
6	1 byte	Total Drive Average Load Factor	1016
7-10	4 bytes	Total Engine Cruise Time	1017

PGN 65208 Trip Fuel Information (Gaseous) - GTFI

Transmission Repetition	On request	
Data Length:	22	
Data Page:	0	
PDU Format:	254	
PDU Specific:	184	PGN Supporting Information:
Default Priority:	7	
Parameter Group Number:	65208	(0xFEB8)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Drive Fuel Used (Gaseous)	1007
05-08	4 bytes	Trip PTO Moving Fuel Used (Gaseous)	1008
09-12	4 bytes	Trip PTO Non-moving Fuel Used (Gaseous)	1009
13-16	4 bytes	Trip Vehicle Idle Fuel Used (Gaseous)	1010
17-20	4 bytes	Trip Cruise Fuel Used (Gaseous)	1011
21-22	2 bytes	Trip Drive Fuel Economy (Gaseous)	1012

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PGN 65209 Trip Fuel Information (Liquid) - LTFI

Transmission Repetition	On request		
Data Length:	22		
Data Page:	0		
PDU Format:	254		
PDU Specific:	185	PGN Supporting Information:	
Default Priority:	7		
Parameter Group Number:	65209	(0xFEB9)	

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Drive Fuel Used	1001
05-08	4 bytes	Trip PTO Moving Fuel Used	1002
09-12	4 bytes	Trip PTO Non-moving Fuel Used	1003
13-16	4 bytes	Trip Vehicle Idle Fuel Used	1004
17-20	4 bytes	Trip Cruise Fuel Used	1005
21-22	2 bytes	Trip Drive Fuel Economy	1006

PGN 65210 Trip Distance Information - TDI

Transmission Repetition	On request		
Data Length:	12		
Data Page:	0		
PDU Format:	254		
PDU Specific:	186	PGN Supporting Information:	
Default Priority:	7		
Parameter Group Number:	65210	(0xFEBA)	

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Trip Distance on VSL	998
5-8	4 bytes	Trip Gear Down Distance	999
9-12	4 bytes	Trip Distance in Top Gear	1000

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PGN 65211 Trip Fan Information - TFI

Transmission Repetition: On request
Data Length: 16
Data Page: 0
PDU Format: 254
PDU Specific: 187 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65211 (0xFEBB)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Trip Fan On Time	994
05-08	4 bytes	Trip Fan On Time Due to the Engine System	995
09-12	4 bytes	Trip Fan On Time Due to a Manual Switch	996
13-16	4 bytes	Trip Fan On Time Due to the A/C System	997

PGN 65212 Compression/Service Brake Information - CBI

Transmission Repetition: On request
Data Length: 16
Data Page: 0
PDU Format: 254
PDU Specific: 188 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65212 (0xFEBC)

Start Position	Length	Parameter Name	SPN
01-04	4 bytes	Total Compression Brake Distance	990
05-08	4 bytes	Trip Compression Brake Distance	991
09-12	4 bytes	Trip Service Brake Distance	992
13-16	4 bytes	Trip Service Brake Applications	993

PGN 65213 Fan Drive - FD

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 189 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65213 (0xFEBD)

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Start Position	Length	Parameter Name	SPN
1	1 byte	Estimated Percent Fan Speed	975
2.1	4 bits	Fan Drive State	977
3-4	2 bytes	Fan Speed	1639

PGN 65214 Electronic Engine Controller 4 - EEC4

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 190 PGN Supporting Information:
Default Priority: 7
Parameter Group Number: 65214 (0xFEBE)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Rated Power	166
3-4	2 bytes	Engine Rated Speed	189

PGN 65215 Wheel Speed Information - EBC2

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 191 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65215 (0xFEBF)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Front Axle Speed	904
3	1 byte	Relative Speed; Front Axle, Left Wheel	905
4	1 byte	Relative Speed; Front Axle, Right Wheel	906
5	1 byte	Relative Speed; Rear Axle #1, Left Wheel	907
6	1 byte	Relative Speed; Rear Axle #1, Right Wheel	908
7	1 byte	Relative Speed; Rear Axle #2, Left Wheel	909
8	1 byte	Relative Speed; Rear Axle #2, Right Wheel	910

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PGN 65216 Service Information - SERV

Transmitted with the service component identification that has the shortest distance or nearest time until the next service inspection.

NOTE - There are two acceptable formats for the Service PGN. Format 1 has only 8 bytes of data and reports the component most in need of service for each of the three categories. Format 2, however, uses the transport layer as necessary in order to repeat these 8 bytes of service component information until all supported service components in each category have been transmitted.

Transmission Repetition	On request	
Data Length:	8 bytes or variable	
Data Page:	0	
PDU Format:	254	
PDU Specific:	192	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65216	(0xFEC0)

Start Position	Length	Parameter Name	SPN
1	1 byte	Service Component Identification	911
2-3	2 bytes	Service Distance	914
4	1 byte	Service Component Identification	912
5	1 byte	Service Delay/Calendar Time Based	915
6	1 byte	Service Component Identification	913
7-8	2 bytes	Service Delay/Operational Time Based	916

PGN 65217 High Resolution Vehicle Distance - VDHR

Transmission Repetition	1 s	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	193	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65217	(0xFEC1)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	High Resolution Total Vehicle Distance	917
5-8	4 bytes	High Resolution Trip Distance	918

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PGN 65218 Electronic Retarder Controller 2 - ERC2

Transmission Repetition	1 s when active; or on change of state		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	194	PGN Supporting Information:	
Default Priority:	7		
Parameter Group Number:	65218	(0xFEC2)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission Output Retarder	748

PGN 65219 Electronic Transmission Controller 5 - ETC5

Transmission Repetition	On request		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	195	PGN Supporting Information:	
Default Priority:	7		
Parameter Group Number:	65219	(0xFEC3)	

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Transmission High Range Sense Switch	778
1.3	2 bits	Transmission Low Range Sense Switch	779
2.1	2 bits	Transmission Reverse Direction Switch	767
2.3	2 bits	Transmission Neutral Switch	604
2.5	2 bits	Transmission Forward Direction Switch	903

PGN 65221 Electronic Transmission Controller 4 - ETC4

Transmission Repetition	On request		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	197	PGN Supporting Information:	
Default Priority:	7		
Parameter Group Number:	65221	(0xFEC5)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Transmission Synchronizer Clutch Value	53
2	1 byte	Transmission Synchronizer Brake Value	54

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PGN 65223 Electronic Transmission Controller 3 - ETC3

Transmission Repetition	On request		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	199	PGN Supporting Information:	
Default Priority:	7		
Parameter Group Number:	65223	(0xFEC7)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Transmission Shift Finger Gear Position	59
2	1 byte	Transmission Shift Finger Rail Position	60
3.1	2 bits	Transmission Shift Finger Neutral Indicator	780
3.3	2 bits	Transmission Shift Finger Engagement Indicator	781
3.5	2 bits	Transmission Shift Finger Center Rail Indicator	782
4.1	2 bits	Transmission Shift Finger Rail Actuator 1	772
4.3	2 bits	Transmission Shift Finger Gear Actuator 1	773
4.5	2 bits	Transmission Shift Finger Rail Actuator 2	783
4.7	2 bits	Transmission Shift Finger Gear Actuator 2	784
5.1	2 bits	Transmission Range High Actuator	768
5.3	2 bits	Transmission Range Low Actuator	769
5.5	2 bits	Transmission Splitter Direct Actuator	770
5.7	2 bits	Transmission Splitter Indirect Actuator	771
6.1	2 bits	Transmission Clutch Actuator	788
6.3	2 bits	Transmission Lockup Clutch Actuator	740
6.5	2 bits	Transmission Defuel Actuator	786
6.7	2 bits	Transmission Inertia Brake Actuator	787

PGN 65237 Alternator Speed - AS

Transmission Repetition	1 s		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	213	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65237	(0xFED5)	

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Alternator Speed	589

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PGN 65241 Auxiliary Input/Output Status - AUXIO

Transmission Repetition: manufacturer defined, not faster than 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 217 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65241 (0xFED9)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Auxiliary I/O #04	704
1.3	2 bits	Auxiliary I/O #03	703
1.5	2 bits	Auxiliary I/O #02	702
1.7	2 bits	Auxiliary I/O #01	701
2.1	2 bits	Auxiliary I/O #08	708
2.3	2 bits	Auxiliary I/O #07	707
2.5	2 bits	Auxiliary I/O #06	706
2.7	2 bits	Auxiliary I/O #05	705
3.1	2 bits	Auxiliary I/O #12	712
3.3	2 bits	Auxiliary I/O #11	711
3.5	2 bits	Auxiliary I/O #10	710
3.7	2 bits	Auxiliary I/O #09	709
4.1	2 bits	Auxiliary I/O #16	716
4.3	2 bits	Auxiliary I/O #15	715
4.5	2 bits	Auxiliary I/O #14	714
4.7	2 bits	Auxiliary I/O #13	713
5-6	2 bytes	Auxiliary I/O Channel #1	1083
7-8	2 bytes	Auxiliary I/O Channel #2	1084

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PGN 65242 Software Identification - SOFT

Byte: 1 Number of software identification fields
2-n Software identification(s)
Delimiter (ASCII "*")

NOTE- The software identification field is variable in length and may contain up to 125 software identification designators. An ASCII "*" is used as a delimiter to separate multiple software identifications. Additional software identification fields may be added at the end, each separated by an ASCII "*" as a delimiter. An ASCII "*" is required at the end of the last software identification field, even if there is only one software identification designator.

Transmission Repetition	On request		
Data Length:	Variable		
Data Page:	0		
PDU Format:	254		
PDU Specific:	218	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65242	(0xFEDA)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Number of Software Identification Fields	965
2-N	Variable - up to 200 characters ("*" delimited)	Software Identification	234

PGN 65243 Engine Fluid Level/Pressure 2 - EFL/P2

Transmission Repetition	0.5 s		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	219	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65243	(0xFEDB)	

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Injection Control Pressure	164
3-4	2 bytes	Engine Injector Metering Rail 1 Pressure	157
5-6	2 bytes	Engine Injector Timing Rail 1 Pressure	156
7-8	2 bytes	Engine Injector Metering Rail 2 Pressure	1349

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PGN 65244 Idle Operation - IO

Transmission Repetition	On request	
Data Length:	Variable	
Data Page:	0	
PDU Format:	254	
PDU Specific:	220	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65244	(0xFEDC)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Engine Total Idle Fuel Used	236
5-8	4 bytes	Engine Total Idle Hours	235

PGN 65245 Turbocharger - TC

Transmission Repetition	1 s	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	221	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65245	(0xFEDD)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Turbocharger Lube Oil Pressure 1	104
2-3	2 bytes	Engine Turbocharger 1 Speed	103
4.7	2 bits	Engine Turbocharger Oil Level Switch	1665

PGN 65246 Air Start Pressure - AIR2

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	222	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65246	(0xFEDE)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Air Start Pressure	82

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PGN 65247 (R) Electronic Engine Controller 3 - EEC3

Transmission Repetition: 250 msecs
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 223 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65247 (0xFEDF)

Start Position	Length	Parameter Name	SPN
1	1 byte	Nominal Friction - Percent Torque	514
2-3	2 bytes	Engine's Desired Operating Speed	515
4	1 byte	Engine's Desired Operating Speed Asymmetry Adjustment	519
5	1 byte	Estimated Engine Parasitic Losses - Percent Torque	2978

PGN 65248 Vehicle Distance - VD

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 224 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65248 (0xFEE0)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Trip Distance	244
5-8	4 bytes	Total Vehicle Distance	245

PGN 65249 Retarder Configuration - RC

This map describes the stationary behavior of the retarder.

Transmission Repetition: On change of torque/speed points of more than 10% since last transmission, or every 5 s.
Data Length: 19
Data Page: 0
PDU Format: 254
PDU Specific: 225 PGN Supporting Information: See Appendix D - PGN 65249
Default Priority: 6
Parameter Group Number: 65249 (0xFEE1)

Start Position	Length	Parameter Name	SPN
01.1	4 bits	Retarder Type	901

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01.5	4 bits	Retarder Location	902
02	1 byte	Retarder Control Method (Retarder Configuration)	557
03-04	2 bytes	Retarder Speed At Idle, Point 1 (Retarder Configuration)	546
05	1 byte	Percent Torque At Idle, Point 1 (Retarder Configuration)	551
06-07	2 bytes	Maximum Retarder Speed, Point 2 (Retarder Configuration)	548
08	1 byte	Percent Torque At Maximum Speed, Point 2 (Retarder Configuration)	552
09-10	2 bytes	Retarder Speed At Point 3 (Retarder Configuration)	549
11	1 byte	Percent Torque At Point 3 (Retarder Configuration)	553
12-13	2 bytes	Retarder Speed At Point 4 (Retarder Configuration)	550
14	1 byte	Percent Torque At Point 4 (Retarder Configuration)	554
15-16	2 bytes	Retarder Speed At Peak Torque, Point 5 (Retarder Configuration)	547
17-18	2 bytes	Reference Retarder Torque (Retarder Configuration)	556
19	1 byte	Percent Torque At Peak Torque, Point 5 (Retarder Configuration)	555

PGN 65250 (R) Transmission Configuration - TCFG

Total message length depends on total number of forward and reverse gear ratios.

NOTE: The first gear ratio transmitted in bytes 3,4 will be the highest reverse gear ratio. Additional 2-byte gear ratios will follow:

3,4 Highest reverse gear ratio
.
.
a,b Lowest reverse gear ratio
c,d Lowest forward gear ratio
.
.
e,f Highest forward gear ratio

Transmission Repetition	On request	
Data Length:	Variable	
Data Page:	0	
PDU Format:	254	
PDU Specific:	226	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65250	(0xFEE2)

Start Position	Length	Parameter Name	SPN
1	1 byte	Number of Reverse Gear Ratios	958
2	1 byte	Number of Forward Gear Ratios	957
3-4	2 bytes	Transmission Gear Ratio	581

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PGN 65251 Engine Configuration - EC

This map describes the stationary behavior of the engine and the speed dependent available indicated torque. This map should reflect the effect of changes due to barometric pressure, engine temperature, and any other stationary changes (sensor failures, etc.) which influence the engine torque curve more than 10%. This map is only valid for maximum boost pressure. At low boost pressures the torque limit may be much lower.

The engine configuration message must be sent at any time that the engine configuration map has changed by more than 10% of speed or torque (due to events other than boost pressure) since that last time the message was transmitted. As an alternative, it may be sent periodically, once every 5 s. It shall also be sent on response to a configuration request message.

The engine characteristic can be described in one of three modes. Mode 1 provides a complete curve of speed and torque points (see Figure PGN65251_A). Modes 2 and 3 provide a partial curve of speed and torque points and a separate endspeed governor characteristic. In modes 2 and 3, the receiver of the engine configuration message has to calculate the minimum of the engine torque curve and the endspeed governor characteristic to get the final available engine torque.

Mode 2 provides a high idle point where torque equals zero (point 6) and the endspeed governor gain Kp (see Figure PGN65251_B). Mode 3 provides the kick-in point of the endspeed governor (point 2) and the governor gain Kp (see Figure PGN65251_C).

The selection of the three modes can be done by setting the parameters as shown in Table PGN65251_A.

Transmission Repetition: On change of torque/speed points of more than 10% since last transmission. Alternatively , or every 5 s.
Data Length: 34
Data Page: 0
PDU Format: 254
PDU Specific: 227 PGN Supporting Information: See Appendix D - PGN 65251
Default Priority: 6
Parameter Group Number: 65251 (0xFEE3)

Start Position	Length	Parameter Name	SPN
01-02	2 bytes	Engine Speed At Idle, Point 1 (Engine Configuration)	188
03	1 byte	Engine Percent Torque At Idle, Point 1 (Engine Configuration)	539
04-05	2 bytes	Engine Speed At Point 2 (Engine Configuration)	528
06	1 byte	Engine Percent Torque At Point 2 (Engine Configuration)	540
07-08	2 bytes	Engine Speed At Point 3 (Engine Configuration)	529
09	1 byte	Engine Percent Torque At Point 3 (Engine Configuration)	541
10-11	2 bytes	Engine Speed At Point 4 (Engine Configuration)	530
12	1 byte	Engine Percent Torque At Point 4 (Engine Configuration)	542
13-14	2 bytes	Engine Speed At Point 5 (Engine Configuration)	531
15	1 byte	Engine Percent Torque At Point 5 (Engine Configuration)	543
16-17	2 bytes	Engine Speed At High Idle, Point 6 (Engine Configuration)	532
18-19	2 bytes	Engine Gain (Kp) Of The Endspeed Governor (Engine Configuration)	545
20-21	2 bytes	Engine Reference Torque (Engine Configuration)	544
22-23	2 bytes	Engine Maximum Momentary Override Speed, Point 7 (Engine Configuration)	533
24	1 byte	Engine Maximum Momentary Override Time Limit (Engine Configuration)	534
25	1 byte	Engine Requested Speed Control Range Lower Limit (Engine Configuration)	535
26	1 byte	Engine Requested Speed Control Range Upper Limit (Engine Configuration)	536
27	1 byte	Engine Requested Torque Control Range Lower Limit (Engine Configuration)	537
28	1 byte	Engine Requested Torque Control Range Upper Limit (Engine Configuration)	538
29-30	2 bytes	Engine Extended Range Requested Speed Control Range Upper Limit (Engine configuration)	1712
31-32	2 bytes	Engine Moment of Inertia	1794
33-34	2 bytes	Engine Default Torque Limit	1846

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PGN 65252 (R) Shutdown - SHUTDOW

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 228 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65252 (0xFEE4)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Engine Idle Shutdown has Shutdown Engine	593
1.3	2 bits	Engine Idle Shutdown Driver Alert Mode	594
1.5	2 bits	Engine Idle Shutdown Timer Override	592
1.7	2 bits	Engine Idle Shutdown Timer State	590
2.7	2 bits	Engine Idle Shutdown Timer Function	591
3.1	2 bits	A/C High Pressure Fan Switch	985
3.3	2 bits	Refrigerant Low Pressure Switch	875
3.5	2 bits	Refrigerant High Pressure Switch	605
4.1	2 bits	Engine Wait to Start Lamp	1081
5.1	2 bits	Engine Protection System has Shutdown Engine	1110
5.3	2 bits	Engine Protection System Approaching Shutdown	1109
5.5	2 bits	Engine Protection System Timer Override	1108
5.7	2 bits	Engine Protection System Timer State	1107
6.7	2 bits	Engine Protection System Configuration	1111
7.1	2 bits	Engine Alarm Acknowledge	2815
7.3	2 bits	Engine Alarm Output Command Status	2814
7.5	2 bits	Engine Air Shutoff Command Status	2813
7.7	2 bits	Engine Overspeed Test	2812

PGN 65253 Engine Hours, Revolutions - HOURS

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 229 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65253 (0xFEE5)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Engine Total Hours of Operation	247
5-8	4 bytes	Engine Total Revolutions	249

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PGN 65254 Time/Date - TD

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	230	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65254	(0xFEE6)

Start Position	Length	Parameter Name	SPN
1	1 byte	Seconds	959
2	1 byte	Minutes	960
3	1 byte	Hours	961
4	1 byte	Month	963
5	1 byte	Day	962
6	1 byte	Year	964
7	1 byte	Local minute offset	1601
8	1 byte	Local hour offset	1602

PGN 65255 Vehicle Hours - VH

Transmission Repetition	On request	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	231	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65255	(0xFEE7)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Total Vehicle Hours	246
5-8	4 bytes	Total Power Takeoff Hours	248

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PGN 65256 Vehicle Direction/Speed - VDS

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 232 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65256 (0xFEE8)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Compass Bearing	165
3-4	2 bytes	Navigation-Based Vehicle Speed	517
5-6	2 bytes	Pitch	583
7-8	2 bytes	Altitude	580

PGN 65257 Fuel Consumption (Liquid) - LFC

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 233 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65257 (0xFEE9)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Engine Trip Fuel	182
5-8	4 bytes	Engine Total Fuel Used	250

PGN 65258 Vehicle Weight - VW

NOTE–Request has to be responded to with as many messages as necessary to transmit all available information.

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 234 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65258 (0xFEEA)

Start Position	Length	Parameter Name	SPN
1	8 bits	Axle Location	928
2-3	2 bytes	Axle Weight	582

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4-5	2 bytes	Trailer Weight	180
6-7	2 bytes	Cargo Weight	181

PGN 65259 Component Identification - CI

NOTE - The make, model, serial number and unit number fields in this message are optional and separated by an ASCII "*". It is not necessary to include all fields; however, the delimiter ("*") is always required.

Field:
a Make
Delimiter (ASCII "*")
b Model
Delimiter (ASCII "*")
c Serial number
Delimiter (ASCII "*")
d Unit number (Power unit)
Delimiter (ASCII "*")

Transmission Repetition	On request		
Data Length:	Variable		
Data Page:	0		
PDU Format:	254		
PDU Specific:	235	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65259	(0xFEEB)	

Start Position	Length	Parameter Name	SPN
a	5 bytes	Make	586
b	Variable - up to 200 characters ("*" delimited)	Model	587
c	Variable - up to 200 characters ("*" delimited)	Serial Number	588
d	Variable - up to 200 characters ("*" delimited)	Unit Number (Power Unit)	233

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PGN 65260 Vehicle Identification - VI

Byte: 1-n Vehicle Identification Number
Delimiter (ASCII "*")

Transmission Repetition: On request
Data Length: Variable
Data Page: 0
PDU Format: 254
PDU Specific: 236 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65260 (0xFEEC)

Start Position	Length	Parameter Name	SPN
1	Variable - up to 200 characters ("*" delimited)	Vehicle Identification Number	237

PGN 65261 Cruise Control/Vehicle Speed Setup - CCSS

Transmission Repetition: On request
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 237 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65261 (0xFEED)

Start Position	Length	Parameter Name	SPN
1	1 byte	Maximum Vehicle Speed Limit	74
2	1 byte	Cruise Control High Set Limit Speed	87
3	1 byte	Cruise Control Low Set Limit Speed	88

PGN 65262 Engine Temperature 1 - ET1

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 238 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65262 (0xFEEE)

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Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Coolant Temperature	110
2	1 byte	Engine Fuel Temperature	174
3-4	2 bytes	Engine Oil Temperature 1	175
5-6	2 bytes	Engine Turbocharger Oil Temperature	176
7	1 byte	Engine Intercooler Temperature	52
8	1 byte	Engine Intercooler Thermostat Opening	1134

PGN 65263 Engine Fluid Level/Pressure 1 - EFL/P1

Transmission Repetition: 0.5 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 239 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65263 (0xFEEF)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Fuel Delivery Pressure	94
2	1 byte	Engine Extended Crankcase Blow-by Pressure	22
3	1 byte	Engine Oil Level	98
4	1 byte	Engine Oil Pressure	100
5-6	2 bytes	Engine Crankcase Pressure	101
7	1 byte	Engine Coolant Pressure	109
8	1 byte	Engine Coolant Level	111

PGN 65264 (R) Power Takeoff Information - PTO

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 240 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65264 (0xFEF0)

Start Position	Length	Parameter Name	SPN
1	1 byte	Power Takeoff Oil Temperature	90
2-3	2 bytes	Power Takeoff Speed	186
4-5	2 bytes	Power Takeoff Set Speed	187
6.1	2 bits	Engine PTO Enable Switch	980
6.3	2 bits	Engine Remote PTO Preprogrammed Speed Control Switch	979
6.5	2 bits	Engine Remote PTO Variable Speed Control Switch	978
7.1	2 bits	Engine PTO Set Switch	984

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7.3	2 bits	Engine PTO Coast/Decelerate Switch	983
7.5	2 bits	Engine PTO Resume Switch	982
7.7	2 bits	Engine PTO Accelerate Switch	981
8.1	2 bits	Operator PTO Memory Select Switch	2897

PGN 65265 Cruise Control/Vehicle Speed - CCVS

Transmission Repetition: 100 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 241 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65265 (0xFEF1)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Two Speed Axle Switch	69
1.3	2 bits	Parking Brake Switch	70
1.5	2 bits	Cruise Control Pause Switch	1633
2-3	2 bytes	Wheel-Based Vehicle Speed	84
4.1	2 bits	Cruise Control Active	595
4.3	2 bits	Cruise Control Enable Switch	596
4.5	2 bits	Brake Switch	597
4.7	2 bits	Clutch Switch	598
5.1	2 bits	Cruise Control Set Switch	599
5.3	2 bits	Cruise Control Coast (Decelerate) Switch	600
5.5	2 bits	Cruise Control Resume Switch	601
5.7	2 bits	Cruise Control Accelerate Switch	602
6	1 byte	Cruise Control Set Speed	86
7.1	5 bits	PTO State	976
7.6	3 bits	Cruise Control States	527
8.1	2 bits	Engine Idle Increment Switch	968
8.3	2 bits	Engine Idle Decrement Switch	967
8.5	2 bits	Engine Test Mode Switch	966
8.7	2 bits	Engine Shutdown Override Switch	1237

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PGN 65266 Fuel Economy (Liquid) - LFE

Transmission Repetition	100 ms	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	242	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65266	(0xFEF2)

Start Position	Length	Parameter Name	SPN
1-2	2 bytes	Engine Fuel Rate	183
3-4	2 bytes	Engine Instantaneous Fuel Economy	184
5-6	2 bytes	Engine Average Fuel Economy	185
7	1 byte	Engine Throttle Position	51

PGN 65267 Vehicle Position - VP

Transmission Repetition	5 s	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	243	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65267	(0xFEF3)

Start Position	Length	Parameter Name	SPN
1-4	4 bytes	Latitude	584
5-8	4 bytes	Longitude	585

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PGN 65268 Tire Condition - TIRE

Tire Condition Message

NOTE–Message has to repeated as necessary to transmit all available information. This method of location identification requires individual SPNs to be assigned to report failures specific to each individual component (I.e. each tire, each axle, etc.).

Transmission Repetition 10 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 244 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65268 (0xFEF4)

Start Position	Length	Parameter Name	SPN
1	8 bits	Tire Location	929
2	1 byte	Tire Pressure	241
3-4	2 bytes	Tire Temperature	242
5.1	2 bits	CTI Wheel Sensor Status	1699
5.3	2 bits	CTI Tire Status	1698
5.5	2 bits	CTI Wheel End Electrical Fault	1697
6-7	2 bytes	Tire Air Leakage Rate	2586
8.6	3 bits	Tire Pressure Threshold Detection	2587

PGN 65269 Ambient Conditions - AMB

Transmission Repetition 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 245 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65269 (0xFEF5)

Start Position	Length	Parameter Name	SPN
1	1 byte	Barometric Pressure	108
2-3	2 bytes	Cab Interior Temperature	170
4-5	2 bytes	Ambient Air Temperature	171
6	1 byte	Engine Air Inlet Temperature	172
7-8	2 bytes	Road Surface Temperature	79

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PGN 65270 Inlet/Exhaust Conditions 1 - IC1

Transmission Repetition: 0.5 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 246 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65270 (0xFEF6)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Particulate Trap Inlet Pressure	81
2	1 byte	Engine Turbocharger Boost Pressure	102
3	1 byte	Engine Intake Manifold 1 Temperature	105
4	1 byte	Engine Air Inlet Pressure	106
5	1 byte	Engine Air Filter 1 Differential Pressure	107
6-7	2 bytes	Engine Exhaust Gas Temperature	173
8	1 byte	Engine Coolant Filter Differential Pressure	112

PGN 65271 Vehicle Electrical Power - VEP

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 247 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65271 (0xFEF7)

Start Position	Length	Parameter Name	SPN
1	1 byte	Net Battery Current	114
2	1 byte	Alternator Current	115
3-4	2 bytes	Alternator Potential (Voltage)	167
5-6	2 bytes	Electrical Potential (Voltage)	168
7-8	2 bytes	Battery Potential (Voltage), Switched	158

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PGN 65272 (R) Transmission Fluids - TF

Transmission Repetition	1 s		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	248	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65272	(0xFEF8)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Clutch Pressure	123
2	1 byte	Transmission Oil Level	124
3	1 byte	Transmission Filter Differential Pressure	126
4	1 byte	Transmission Oil Pressure	127
5-6	2 bytes	Transmission Oil Temperature	177
7	1 bytes	Transmission Oil Level High / Low	3027
8.1	4 bits	Transmission Oil Level Countdown Timer	3028
8.5	4 bits	Transmission Oil Level Measurement Status	3026

PGN 65273 Axle Information - AI

Axle information message

NOTE–Message must be repeated as necessary to transmit all available information. This method of location identification requires individual SPNs to be assigned to report failures specific to each individual component (I.e. each tire, each axle, etc.).

Transmission Repetition	1 s		
Data Length:	8		
Data Page:	0		
PDU Format:	254		
PDU Specific:	249	PGN Supporting Information:	
Default Priority:	6		
Parameter Group Number:	65273	(0xFEF9)	

Start Position	Length	Parameter Name	SPN
1	1 byte	Steering Axle Temperature	75
2	8 bits	Drive Axle Location	930
3	1 byte	Drive Axle Lift Air Pressure	579
4	1 byte	Drive Axle Temperature	578
5	1 byte	Drive Axle Lube Pressure	2613
8	1 byte	Steering Axle Lube Pressure	2614

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PGN 65274 Brakes - B

Transmission Repetition	1 s	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	250	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65274	(0xFEFA)

Start Position	Length	Parameter Name	SPN
1	1 byte	Brake Application Pressure	116
2	1 byte	Brake Primary Pressure	117
3	1 byte	Brake Secondary Pressure	118
4.1	2 bits	Parking Brake Actuator	619

PGN 65275 Retarder fluids - RF

Transmission Repetition	1 s	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	251	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65275	(0xFEFB)

Start Position	Length	Parameter Name	SPN
1	1 byte	Hydraulic Retarder Pressure	119
2	1 byte	Hydraulic Retarder Oil Temperature	120

PGN 65276 Dash Display - DD

Transmission Repetition	1s	
Data Length:	8	
Data Page:	0	
PDU Format:	254	
PDU Specific:	252	PGN Supporting Information:
Default Priority:	6	
Parameter Group Number:	65276	(0xFEFC)

Start Position	Length	Parameter Name	SPN
1	1 byte	Washer Fluid Level	80
2	1 byte	Fuel Level	96

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3	1 byte	Engine Fuel Filter Differential Pressure	95
4	1 byte	Engine Oil Filter Differential Pressure	99
5-6	2 bytes	Cargo Ambient Temperature	169

PGN 65277 Alternate Fuel 1 - A1

Transmission Repetition: 500 ms
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 253 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65277 (0xFEFD)

Start Position	Length	Parameter Name	SPN
1	1 byte	Engine Blower Bypass Valve Position	72
2-3	2 bytes	Engine Gas Supply Pressure	159

PGN 65278 Auxiliary Water Pump Pressure - AWPP

Transmission Repetition: 1 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 254 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65278 (0xFEFE)

Start Position	Length	Parameter Name	SPN
1	1 byte	Auxiliary Pump Pressure	73

PGN 65279 Water in Fuel Indicator - WFI

Transmission Repetition: 10 s
Data Length: 8
Data Page: 0
PDU Format: 254
PDU Specific: 255 PGN Supporting Information:
Default Priority: 6
Parameter Group Number: 65279 (0xFEFF)

Start Position	Length	Parameter Name	SPN
1.1	2 bits	Water In Fuel Indicator	97

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APPENDIX D
SUPPORTING INFORMATION

SPN 16 – Fuel Filter (Suction Side) Differential Pressure

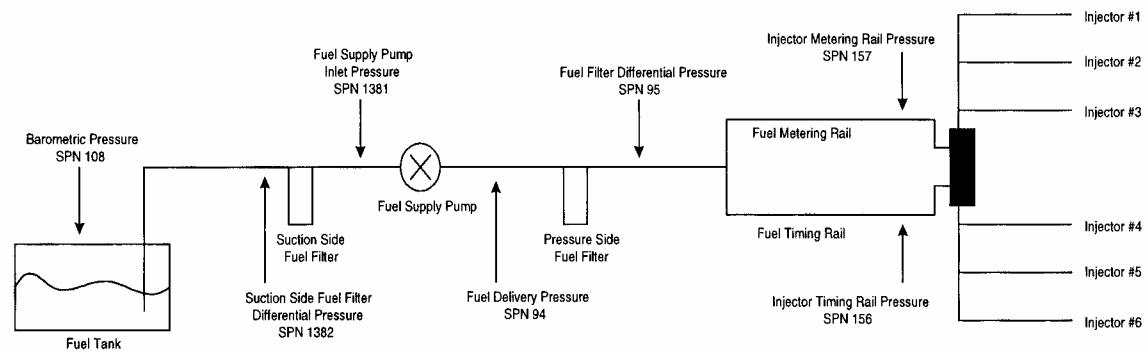


FIGURE SPN16_A—FUEL SYSTEM WITH RAILS

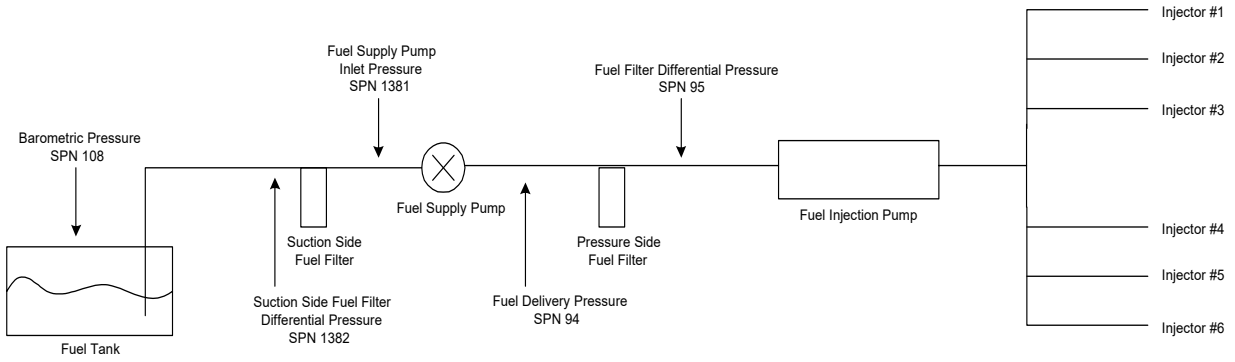


FIGURE SPN16_B—FUEL SYSTEM WITH PUMP

SPN 512 – Driver's Demand Engine – Percent Torque

Figure SPN512_A and Figure SPN512_B show two typical torque calculations in an engine controller. On the left side of the figures there are single engine controller functions. The output torque signals of these functions are connected in the manner shown. The result is the actual engine percent torque which is realized by the engine.

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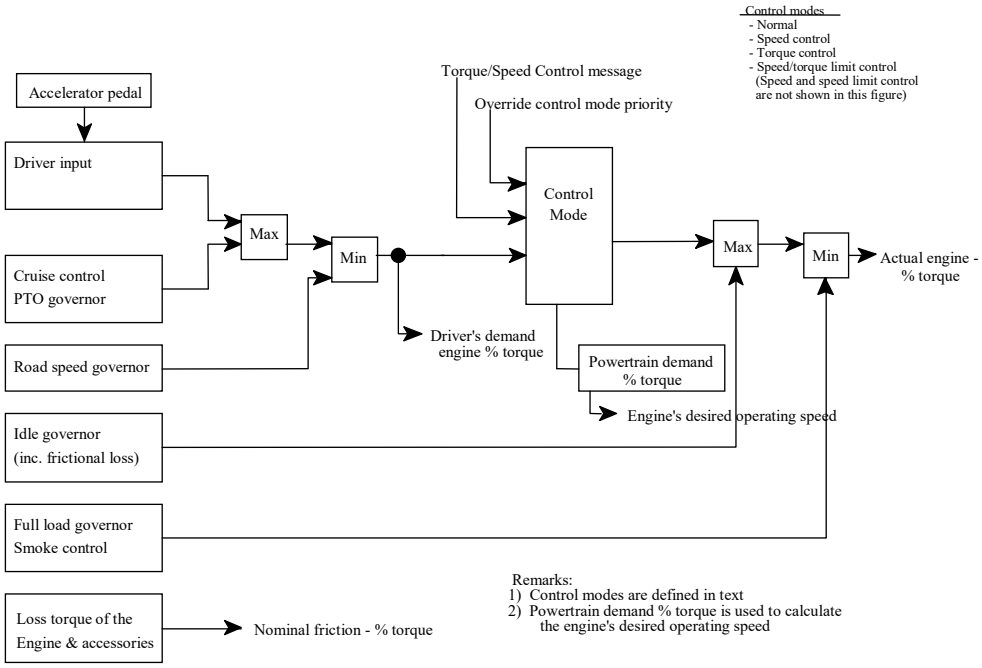


FIGURE SPN512_A —TORQUE COMMANDS AND CALCULATIONS WHEN A “MAXIMUM SELECTION FOR LOW IDLE” TECHNIQUE IS USED

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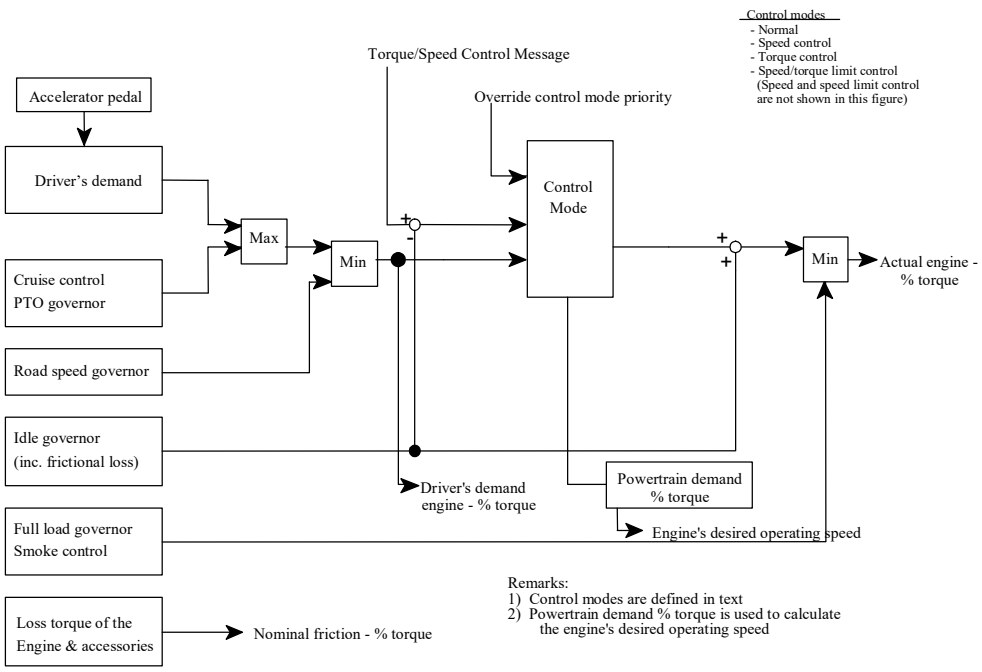


FIGURE SPN512_B —TORQUE COMMANDS AND CALCULATIONS WHEN A “SUMMATION WITH LOW IDLE” TECHNIQUE IS USED

On top of the figures, external torque commands (e.g., traction and transmission control) can control the engine. These commands can influence the engine torque by four control modes. Four engine internal signals are transmitted to the network:

a. Driver’s demand engine - percent torque
b. Actual engine - percent torque
c. Nominal friction - percent torque
d. Engine's desired operating speed

The difference between Figure SPN512_A and Figure SPN512_B is the connection of the idle governor output to the torque calculation. In Figure SPN512_A there is a maximum selection, while in Figure SPN512_B a summation is used. The summation method needs a subtraction point for each external command input because the starting point of an ASR or a shift operation should be the present actual engine - percent torque value. As the actual engine - percent torque signal contains the idle governor output and the external commands are compared with the driver’s demand engine - percent torque or the powertrain demand which don't contain the idle governor output, the external commands must be subtracted by the idle governor output to get the correct signals for comparison.

The advantage of the maximum selection (Figure SPN512_A) is that no other speed controller can work parallel to the idle governor. This allows for a better optimization of the different speed control loops. The advantage of the summation method (Figure SPN512_B) is that changes of the idle governor output influence the engine directly (no dead zones exist).

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SPN 518 – Engine Requested Torque/Torque Limit

When preparing to send a request to a retarder, the states of the Retarder Enable - Shift Assist Switch and the Retarder Enable - Brake Assist Switch must be checked by the requesting device to determine whether the request may be sent to the Retarder. Figure SPN518_A shows how those switches and other operator and network inputs are used to create the actual retarder operating point on a system-wide basis. The Retarder may or may not be the device reading the actual switches; even if it is, it will not accept or reject a request based on its knowledge of the switch states. Its function is to send the switch states via J1939 (in its ERC1 message) and it expects other J1939 nodes to honor those switch states by refraining from sending inappropriate commands.

Several elements affect the retarder besides the Requested Torque parameter in the TSC1 message. These elements are not looked at by the retarder itself, but are used by various other devices to determine if they may ask the retarder to be engaged. These are the Retarder Enable Shift Assist Switch, and the Retarder Enable Brake Assist Switch. The relationship between those switches and the retarder (as well as that between the operator and retarder) is described in Figure SPN518_A.

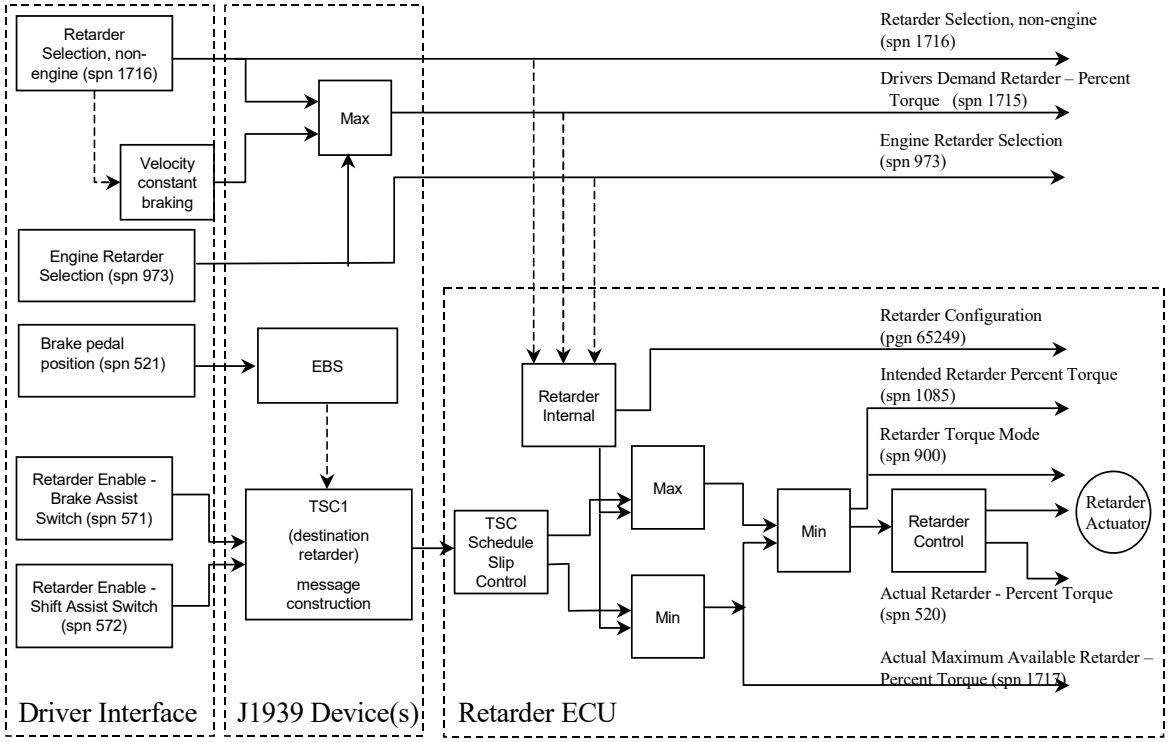


FIGURE SPN518_A—RELATIONSHIP BETWEEN OPERATOR/SWITCH INPUTS AND RETARDERS

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Tables SPN518_A and SPN518_B identify many use cases. Each row is the summary of one or more uses. One of the primary communications provided by these tables is that the retarder can be activated by the J1939 TSC1 message, although the operator input is “off.”

TABLE SPN518_A—PRIMARY RETARDER – BEFORE TRANSMISSION
(Compression Release Engine Retarder)

Operator Inputs				Outputs	
J1939 Inputs[1] (TSC1)	**Cruise Control[2]**	**Accel Pedal[3]**	**Torque Request Via "Retarder Selection, Engine"[4]**	**May Retarder Provide Brake Torque?**	**Retarder Torque Mode (base 2)**
T	Any	Any	Any	No	0000
R	Any	Any	Any	Yes	> 0001
NTR	Any	T	Any	No	0000
NTR	R	ZR	R	Yes	> 0001
NTR	R	ZR	ZR	Yes	0010
NTR	NTR	ZR	R[5]	Yes[5]	0001
NTR	NTR	ZR	ZR	No	0000
ZR	Any	Any	Any	No	0000

Key:
T = request positive Torque
R = request Retarder torque
NTR = No Torque Request
ZR = Zero torque Requested by retarder
Any = This value has no bearing whether or not the Retarder is available. The retarder will NOT be available because some other entity is requesting positive torque.

Footnotes:
1. Note that the TSC1 inputs will override Operator Torque Selection. The J1939 devices that generate the TSC1 messages will assure that the Retarder Enable Brake Assist Switch and Retarder Enable Shift Assist Switch are enabled as appropriate before commanding the Retarder to engage. See parameters SPN 571 and 572 for descriptions of these switches. Also, for the purposes of this table, it is assumed that if the TSC1, Destination Retarder message is requesting Retarder Torque, no other TSC1, Destination Engine messages are requesting engine fueling. That arbitration is beyond the scope of this section.
2. This refers to the torque requested by the cruise control, and does not refer to the cruise switches. Cruise control is defined to be on and engaged in this column. The cruise control should not request retarder torque unless the Retarder Enable - Brake Assist Switch is enabled.
3. The Accelerator Pedal is inherently incapable of requesting negative torque. It may have no particular torque demands, or it may request some engine fueling, which prevents the retarder from engaging. Consequently, the chart is complete even though no rows exist for the AP to request retarder torque.
4. The Operator Torque Request is incapable of requesting positive torque. The table is complete without the Operator Torque Request asking for positive Engine Torque
5. This description assumes no other switch (such as brake pedal depressed) is needed in order for the operator torque request to initiate retarder braking. Other implementation specific rules would apply if such a catalyst were needed.

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Table SPN518_B shows the relationship between various inputs and an after engine retarder. The biggest difference between this type of retarder and an engine brake is that the exhaust brake may be engaged while the engine is still being fueled. Also, if cruise control is communicating with the retarder, it would do so using the TSC1 message.

Consequently, columns for accelerator pedal input and cruise control input would only serve to confuse the issue of retarder availability in Table SPN518_B.

TABLE SPN518_B—PRIMARY RETARDER – AFTER ENGINE (EXHAUST BRAKE, HYDRAULIC RETARDER)

Operator Inputs		Outputs	
J1939 Inputs[1] (TSC1)	**Torque Request Via operator torque request[2]**	**May Retarder Provide Brake Torque?**	**Retarder Torque Mode (base 2)**
R	R	Yes	> 0001
R	ZR	Yes	> 0001
NTR	R[3]	Yes[3]	0001
NTR	ZR	No	0000
ZR	Any	No	0000

Key:
R = request Retarder torque - some amount of braking torque is requested of the retarder.
ZR = Zero Retarder request - Zero percent torque is requested of the retarder
NTR = No retarder Torque Request - No request is being made of the retarder one way or another.
Any = This value has no bearing whether or not the retarder is available. In fact, because of what some other entity is requesting, the retarder will NOT be available.

Footnotes:
1. Note that the TSC1 inputs will override Operator Torque Selection. The J1939 devices that generate the TSC1 messages will assure that the Retarder Enable Brake Assist Switch and Retarder Enable Shift Assist Switch are enabled before commanding the Retarder to engage. Also, for the purposes of this table, it is assumed that if the TSC1, Destination Retarder message is requesting Retarder Torque, no other TSC1, Destination Engine messages are requesting engine fueling. That arbitration is beyond the scope of this section.
2. The Operator Torque Request is incapable of requesting positive torque. The table is complete without the Operator Torque Request asking for positive Engine Torque
3. This description assumes no other switch (such as brake pedal depressed) is needed in order for the operator torque request to initiate retarder braking. Other implementation specific rules would apply if such a requirement were needed.

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SPN 519 – Desired Operating Speed Asymmetry Adjustment

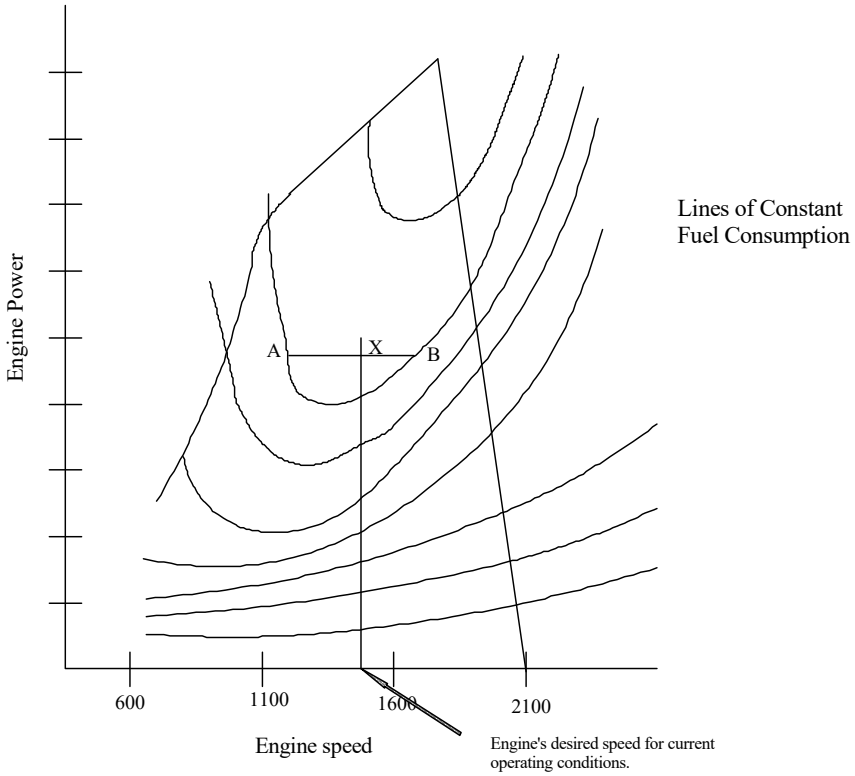


FIGURE SPN519_A—DESIRED OPERATING SPEED ASYMMETRY ADJUSTMENT

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SPN 527 – Cruise Control States

TABLE SPN527_A —CRUISE CONTROL STATES

Bit States	Cruise Control State
000	Off/Disabled
001	Hold
010	Accelerate
011	Decelerate/Coast
100	Resume
101	Set
110	Accelerator override
111	Not available

State Descriptions:
000b Off/Disabled —Used to indicate that the cruise control device is off or on standby. Note that the cruise control system switch does not necessarily have to be off to be in this mode.

001b Hold —Used to indicate that the cruise control device is active and currently maintaining a captured operating speed.

010b Accelerate —Used to indicate that the cruise control device is in the process of ramping up the operating speed.
011b Decelerate —Used to indicate that the cruise control device is in the process of ramping down, or coasting, the operating speed.

100b Resume —Used to indicate that the cruise control device is in the process of resuming the operating speed to a previously captured value.

101b Set —Used to indicate that the cruise control device is establishing the current vehicle speed as the operating speed (captured value).

110b Accelerator Override —Used to indicate that the cruise control device is active but not currently maintaining the captured operating speed.

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SPN 564 – Differential Lock Positions

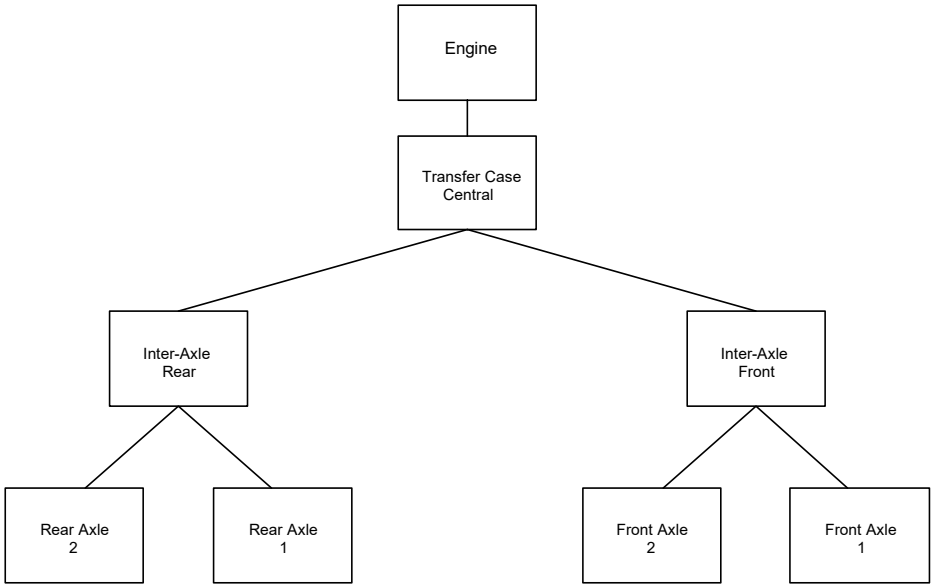


FIGURE SPN564_A—DIFFERENTIAL LOCK POSITIONS

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SPN 574 – Shift in Process

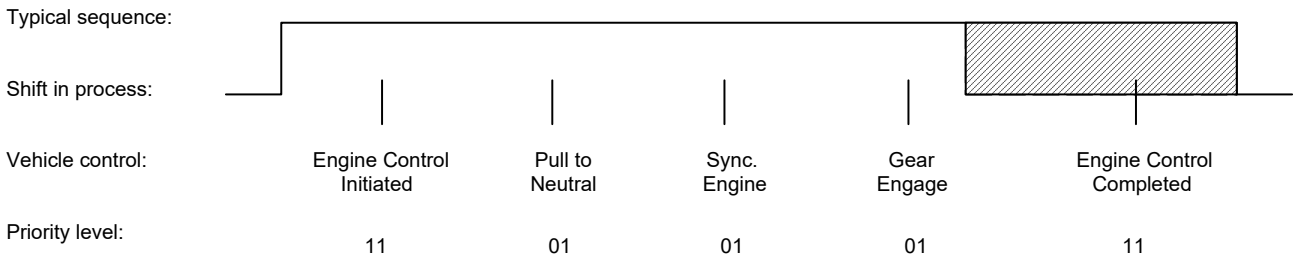


FIGURE SPN574_A —SHIFT IN PROCESS

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SPN 590 – Idle Shutdown

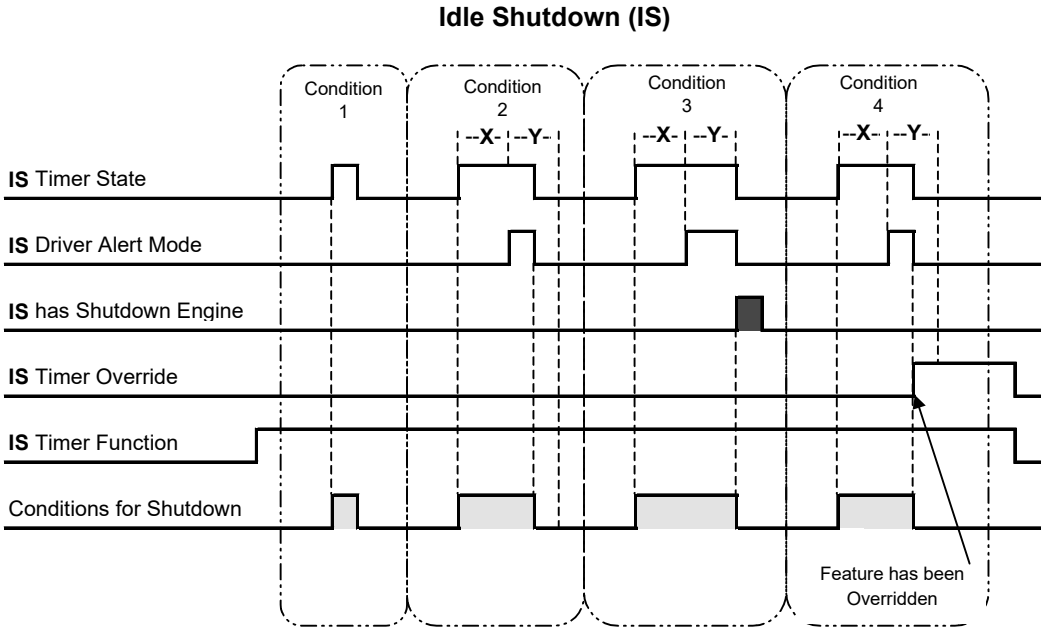


FIGURE 590_A —IDLE SHUTDOWN (IS)

Condition 1 - When the IS Timer Override is inactive, the IS Timer State will become inactive if the conditions for shutdown no longer exist before the “X” time interval has expired or IS Driver Alert Mode is activated.

Condition 2 - When the IS Timer Override is inactive, the IS Timer State will become inactive if the conditions for shutdown no longer exist before the IS Driver Alert Mode “Y” time interval has expired.

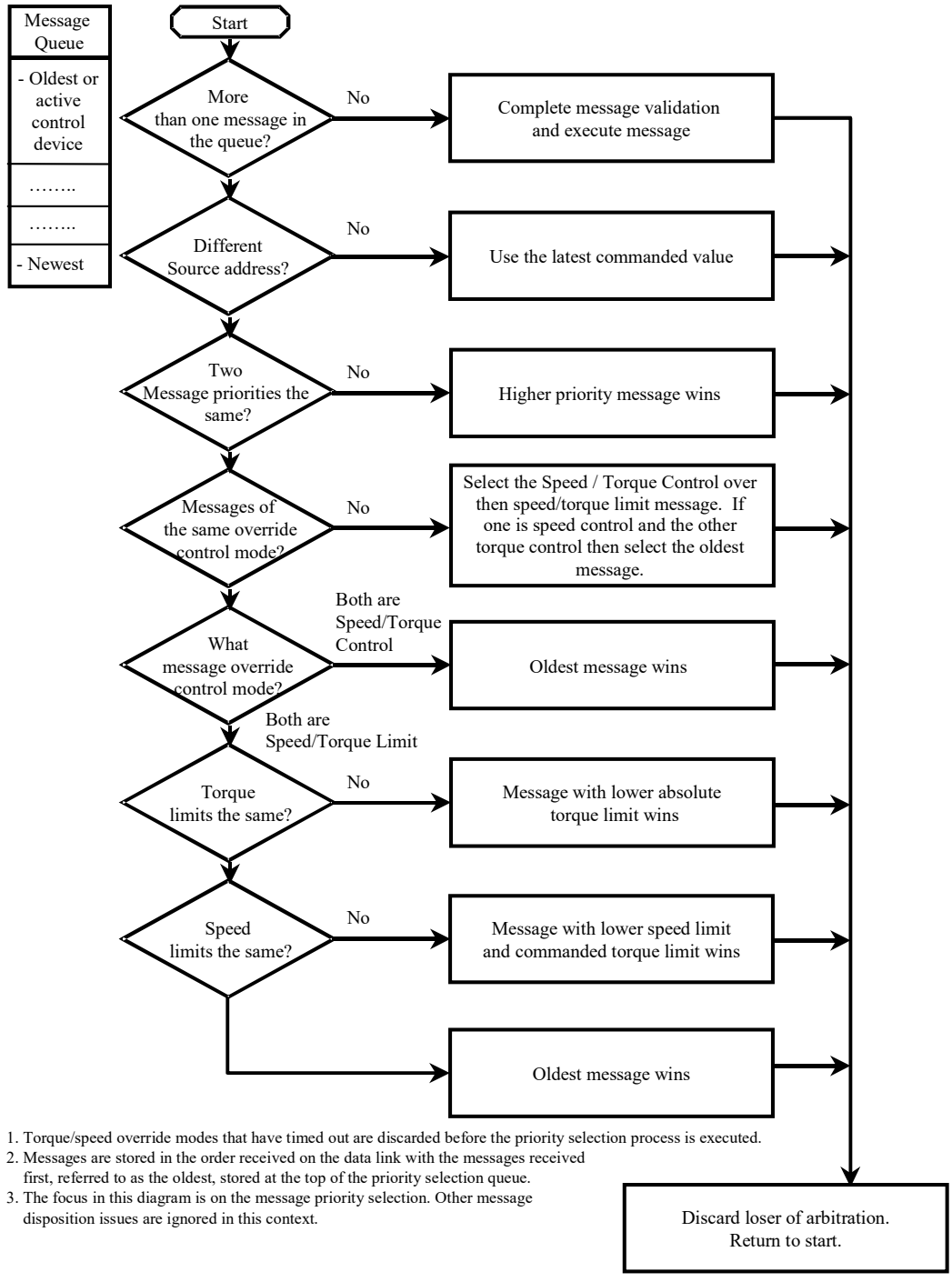
Condition 3 - When the IS Timer Override is inactive, then the IS has Shutdown Engine will be active after the “Y” time interval has expired.

Condition 4 - When the IS Timer Override is active during the “Y” time interval, then the IS feature shall be overridden and will no longer be available until the system has been re-initated.

NOTE —0 State – Inactive, disabled in calibration, or conditions for idle shutdown do not exist.
1 State – Active, enabled in calibration, or conditions for idle shutdown do exist.

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SPN 695 – Engine Override Control Mode



1. Torque/speed override modes that have timed out are discarded before the priority selection process is executed.
2. Messages are stored in the order received on the data link with the messages received first, referred to as the oldest, stored at the top of the priority selection queue.
3. The focus in this diagram is on the message priority selection. Other message disposition issues are ignored in this context.

FIGURE SPN695_A—TORQUE/SPEED CONTROL PRIORITY SELECTION LOGIC

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SPN 899 – Engine/Retarder Torque Modes

TABLE SPN899_A—ENGINE/RETARDER TORQUE MODES

Bit States	Engine/Retarder Torque Mode
0000	Low idle governor/no request (default mode)
0001	Accelerator pedal/operator selection
0010	Cruise control
0011	PTO governor
0100	Road speed governor
0101	ASR control
0110	Transmission control
0111	ABS control
1000	Torque limiting
1001	High speed governor
1010	Braking system
1011	Remote accelerator
1100	Service procedure
1101	not defined
1110	Other
1111	Not available

State Descriptions:
0000b Low Idle Governor/No request (Default mode) - This mode is active if the accelerator pedal (not necessarily the torque output of the driver input, see Figure SPN512_A and Figure SPN512_B) is zero. This is the default mode. At low speed, the low idle governor may be active while at higher speed, it is zero.

0001b Accelerator Pedal - This mode is active if the accelerator pedal position is active (being followed). This mode is active for the retarder if it is turned on by the operator. Note that it may be disabled by the accelerator pedal or clutch switches (operator selection).

0010b Cruise Control - This mode is active if cruise control is active and greater than the accelerator pedal request.

0011b PTO Governor - This mode is active if the PTO governor is active.

0100b Road Speed Governing - Indicates that road speed governing is active and limiting torque.

0101b ASR Control - Indicates that the ASR command is active (Speed, Torque, or Speed/Torque Limit Control).

0110b Transmission Control - Indicates that the transmission command is active (Speed, Torque, or Speed/Torque Limit Control).

0111b ABS Control - Indicates that the ABS is controlling torque.

1000b Torque Limiting - This mode is active if the demanded or commanded engine torque is limited by internal logic due to full load, smoke and/or emissions control, engine protection and/or other factors. A reduced torque limit may be necessary for engine protection if the engine temperature is too high or a sensor fails (speed, timing, or boost pressure), as examples.

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1001b High Speed Governor - This mode is active if the engine is controlled by the high speed governor due to normal operation.

1010b Brake System (Electronic) - This indicates that the brake pedal is controlling the torque. Note that this may include enabling of the retarder when the brake pedal is depressed (touched).

Note that if there is a request to the retarder but operating conditions do not allow braking, this situation will be reflected by the Percent Retarder Torque = 0 when broadcast.

1011b Remote Accelerator - This mode is active if the remote accelerator is controlling engine speed.

1100b Service procedure - This mode is active if the engine is operating in a specific service mode. For example, fuel injection may be disabled to allow a service procedure to crank the engine without fuel injection occurring.

1110b Other - Torque control by a type of device which is different than those defined in states 0000b to 1100b.

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SPN 901 – Retarder Type

TABLE SPN901_A —RETARDER TYPES

Bit States	Retarder Type
0000	Electric/Magnetic
0001	Hydraulic
0010	Cooled Friction
0011	Compression Release (Engine retarder)
0100	Exhaust
0101-1101	Not defined
1110	Other
1111	Not available

Electric/Magnetic Retarder - The electric/magnetic retarder functions by creating eddy currents generated in a conductive armature when placed in a variable magnetic field. Currently, electric retarders have a stator on which field coils are mounted. The rotors, mounted on both sides of the drive shaft, are ribbed for heat dissipation. In order to brake the vehicle, voltage is applied to the field coils which generate a magnetic field inducing eddy currents in the rotors as they pass through the field. Magnetic retarders use a permanent magnet to generate the eddy currents. Braking-torque is dependent on stator excitation and on the air gap between the rotor and the stator.

Hydraulic Retarder - The hydraulic retarder is a hydrodynamic coupling device. Two impellers which face each other, a rotor and a stator, are filled with oil. When the rotor, which is connected to the vehicle drive shaft rotates, it drives the oil in the direction of rotation. The mechanical energy produced by the rotor is converted into kinetic energy in the operating fluid. Hydrodynamic coupling between the rotor and stator converts the kinetic energy into heat and the rotor is retarded. This retardation effect is transmitted to the drive shaft and the vehicle is retarded.

Cooled Friction Brake - The cooled friction brake uses air or hydraulic fluid to dissipate heat from the friction surface of the service brake. By controlling the friction surface temperature, retarding torque is improved, along with a reduced rate of wear.

Compression Release Engine Retarder - The compression release engine retarder converts a power-producing diesel engine into a power-absorbing retarding mechanism by opening the exhaust valve near the top dead center in the engine compression cycle. No positive power will be produced, since the compressed air mass is released. The vehicle is retarded as it must provide energy to compress the cylinder air charge and subsequently to return the piston to the bottom position.

Exhaust Brake - The exhaust brake restricts the escape of the exhaust gas from the exhaust manifold. Each succeeding exhaust stroke builds up a back pressure in the manifold which exerts a retarding effect to the pistons during the exhaust stroke. The engine turns against this back pressure creating a braking effect to the vehicle.

Auxiliary Retarder - Fans, air conditioners, or any power-absorbing device in the vehicle can also function as retarders as they impose parasitic loading on the engine or vehicle.

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SPN 902 – Retarder Location

TABLE SPN902_A—RETARDER LOCATION

Bit States	Retarder Location
0000 (Primary)	Engine Compression Release Brake (Engine rpm)
0001 (Primary)	Engine Exhaust Brake (Exhaust pressure)
0010 (Primary)	Transmission Input (Engine rpm)
0011 (Secondary)	Transmission Output (Output Shaft rpm)
0100 (Secondary)	Driveline (Output Shaft rpm)
0101	Trailer (Vehicle speed)
0110-1101	Not defined
1110	Other
1111	Not available

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SPN 911 – Service Component Identification

TABLE SPN911_A—SERVICE COMPONENT IDENTIFICATION

Identification	Component
0	Service check for entire vehicle
1	Brake lining; left front axle
2	Brake lining; right front axle
3	Brake lining; left rear axle
4	Brake lining; right rear axle
5	Clutch lining
6-10	Not defined
11	Brake lining; left rear axle #2
12	Brake lining; right rear axle #2
13	Brake lining; left rear axle #3
14	Brake lining; right rear axle #3
15	Brake lining: general
16	Regulated general check for entire vehicle
17	Brake system special check
18	In-between check
19	Check trip recorder
20	Check exhaust gas
21	Check vehicle speed limiter
22-29	Not defined
30	Engine coolant change
31	Engine coolant filter change
32	Engine oil—engine #1
33	Engine oil—engine #2
34	Not defined
35	Steering oil
36	Not defined
37	Transmission oil—transmission #1
38	Transmission oil—transmission #2
39	Not defined
40	Intermediate transmission oil
41	Not defined
42	Front axle oil
43	Rear axle oil
44-47	Not defined
48	Tires
49	Engine air filter
50	Engine oil filter
51	Engine Fuel Filter
52-60	Not defined
61	Tachograph
62	Driver card #1
63	Driver card #2
64-239	Not defined
240-249	Manufacturer specific
250-251	Reserved
252	Reset all components
253	No action to be taken
254	Error
255	Component identification not available

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SPN 976 – PTO States

TABLE SPN976_A—PTO STATES

Bit States	PTO State
00000	Off/Disabled
00001	Hold
00010	Remote Hold
00011	Standby
00100	Remote Standby
00101	Set
00110	Decelerate/Coast
00111	Resume
01000	Accelerate
01001	Accelerator Override
01010	Preprogrammed set speed 1
01011	Preprogrammed set speed 2
01100	Preprogrammed set speed 3
01101	Preprogrammed set speed 4
01110	Preprogrammed set speed 5
01111	Preprogrammed set speed 6
10000	Preprogrammed set speed 7
10001	Preprogrammed set speed 8
10010	PTO set speed memory 1
10011	PTO set speed memory 2
10100-11110	Not defined
11111	Not available

Off/Disabled 00000b - Used to indicate that the PTO enable switch is in the off position.

Hold 00001b - Used to indicate that the PTO device is active and currently maintaining a captured operating speed.

Remote Hold 00010b - Used to indicate that the remote PTO device is active and currently maintaining a captured operating speed.

Standby 00011b - Used to indicate that the PTO device enable switch is in the ON position and it is possible to manage the PTO device.

Remote Standby 00100b - Used to indicate that the remote PTO device enable switch is in the ON position and it is possible to manage the PTO device.

Set 00101b - Used to indicate that the PTO device is establishing current speed as the operating speed (captured value).

Decelerate/Coast 00110b - Used to indicate that the PTO device is in the process of ramping down, or coasting, from the current operating speed.

Resume 00111b - Used to indicate that the PTO device is in the process of resuming the operating speed to a previously captured value.

Accelerate 01000b - Used to indicate that the PTO device is in the process of ramping up the operating speed.

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Accelerator Override 01001b - Used to indicate that the PTO device is active but for the present time the engine is controlled by a large driver's demand.

Preprogrammed Set Speed 1 01010b - Used to indicate that the PTO device is establishing a first preprogrammed set speed (user programmable) as the current operating speed.

Preprogrammed Set Speed 2 01011b - Used to indicate that the PTO device is establishing a second preprogrammed set speed (user programmable) as the current operating speed.

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SPN 988 – Trip Group 1

TABLE 988_A—TRIP GROUP 1

Parameter	SPN
Trip distance	244
Trip fuel	182
High resolution trip distance	918
Trip compression brake distance	990
Trip service brake applications	993
Trip maximum engine speed	1013
Trip average engine speed	1014
Trip drive average load factor	1015
Trip average fuel rate	1029
Trip average fuel rate (Gaseous)	1031
Parameter Group	**PGN**
Trip time information #2	65,200
Trip time information #1	65,204
Trip shutdown information	65,205
Trip vehicle speed/cruise distance information	65,206
Trip fuel information (Gaseous)	65,208
Trip fuel information	65,209
Trip distance information	65,210
Trip fan information	65,211

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SPN 1014 – Trip Average Engine Speed

The equation is as follows:

$$\text{Trip average engine speed} = \frac{\sum_{i=0}^{N} \text{RPM}(i)}{N} \qquad \text{(Eq.SPN1014\_A)}$$

where:

RPM is the engine speed at sample i, N is the number of samples of engine speed and is proportional to the current trip elapsed time

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SPN 1085 – Intended Retarder Percent Torque

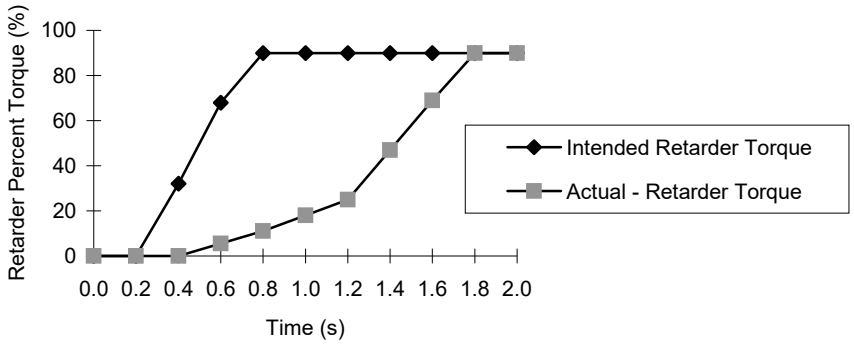
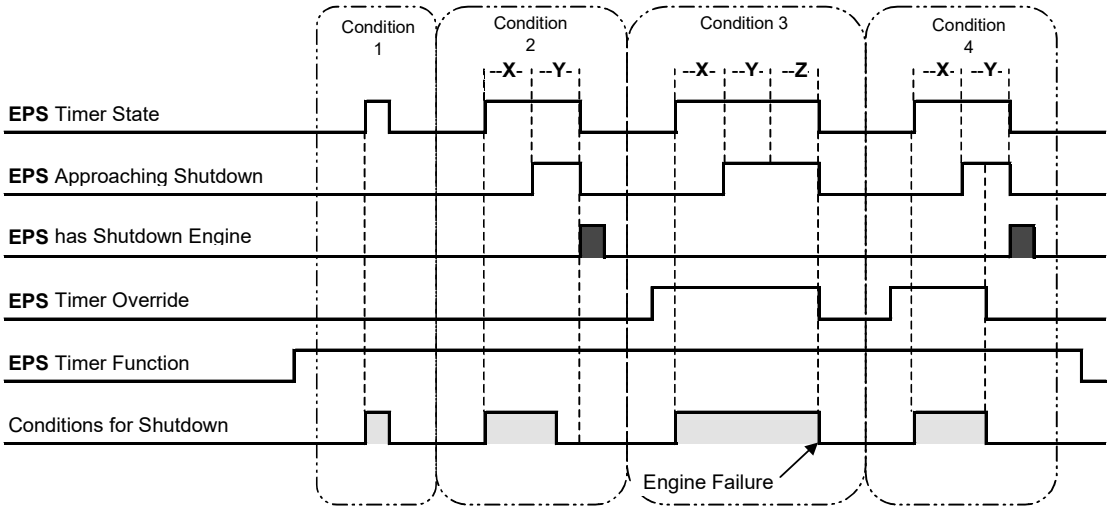


FIGURE SPN1085_A—INTENDED RETARDER PERCENT TORQUE

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Engine Protection System (EPS)



SPN 1107 – Engine Protection System Timer State

FIGURE SPN1107_A—ENGINE PROTECTION SYSTEM (EPS)

Condition 1 – When the EPS Timer Override is inactive, the EPS Timer State will become inactive if the conditions for shutdown no longer exist before the "X" time interval has expired or EPS Approaching Shutdown is activated.

Condition 2 – When the EPS Timer Override is inactive and conditions for shutdown exist during the "Y" time interval, then the Engine will shutdown, even though shutdown conditions subside before the "Y" time interval has expired.

Condition 3 – When the EPS Timer Override is active, then the EPS feature shall be overridden allowing for an engine failure when the "Z" time interval has expired.

Condition 4 – When the EPS Timer Override is active and then allowed to go inactive during the "Y" time interval, the response by the EPS shall be the same as condition 2. The time intervals for "X" and "Y" shall always start when conditions for shutdown first commence regardless whether the EPS Timer Override is enabled or not.

NOTE —0 State – Inactive, disabled in calibration, or conditions for Engine Protection do not exist.
1 State – Active, enabled in calibration, or conditions for Engine Protection do exist.

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SPN 1734 – Nominal Level Front Axle

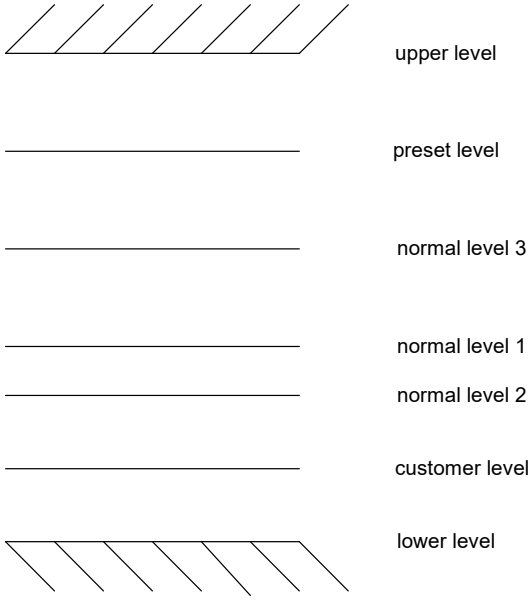


FIGURE SPN1734_A: EXAMPLE FOR NOMINAL LEVELS

If the vehicle height, to be controlled by the ASC, is not within the tolerances of the defined nominal levels, the nominal level is set to not specified.

The defined vehicle heights can be activated via the ASC 2 (PGN: 53760) message or via a remote control (see figure SPN1734_B). The remote control is an external unit to operate the suspension system.

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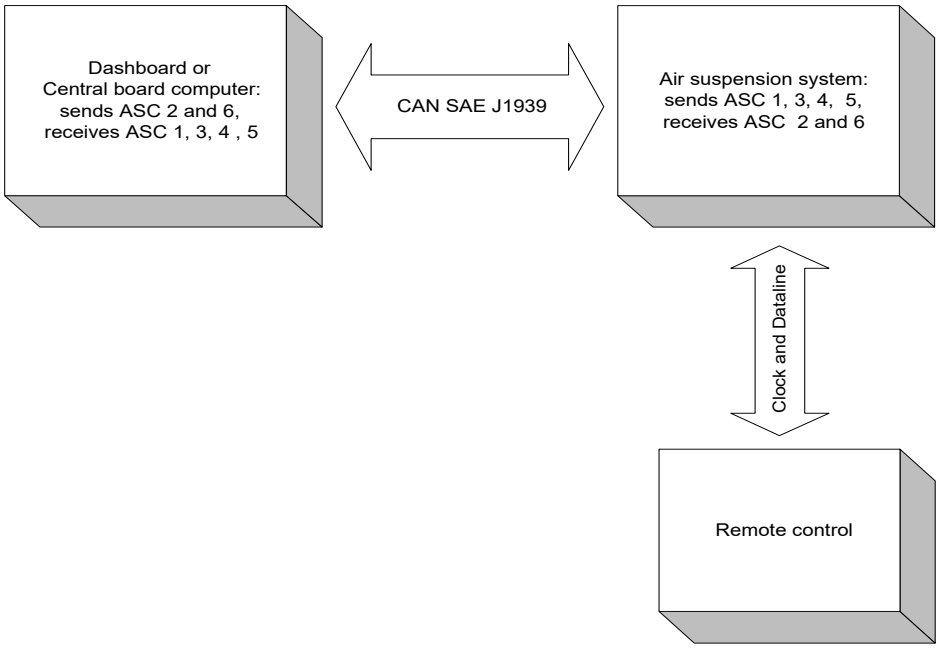


FIGURE SPN1734_B: POSSIBLE INTEGRATION OF ASC SYSTEM INTO VEHICLE NETWORK

An example: The nominal level is the normal level 1. Via remote control a new nominal level (for instance upper level) is requested. The nominal level is then set to upper level and during the height modification the ASC is indicating that the actual level is below nominal level until the upper level is reached.

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SPN 2432 – Engine Demand - Percent Torque

Background:

During periods of TSC#1 engine control, other devices on the J1939 network may wish to know where the engine wants to go once it is released from TSC#1 control. In order for option transitions of driveline torque between different devices, it becomes necessary to understand the *engine's* desired torque for all phases of a TSC#1 control sequence.

Driver's Demand Engine – Percent Torque (SPN 512) provides a partial prediction of the torque the engine wishes to produce after a TSC#1 command is removed. Included in Driver's Demand Torque are external requestors to the powertrain such as accelerator pedal, cruise control, and road speed limit governors. However, *excluded* from DDT are (1) dynamic commands within the powertrain such as smoke control, noise control, and low and high speed engine governing, and (2) external TSC#1 commands to the engine such as those generated by traction control.

For a controller to properly determine the engine's desired output torque during a TSC#1 sequence, it needs knowledge of the torque being scheduled by all active controls within the engine. Since DDT excludes many of these active controllers from its calculation, it cannot be used to accurately predict the desired output torque. The effects of the external TSC#1 commands can be approximated by other devices by means of monitoring TSC#1 messages to the engine; however the effects of the engine's internal dynamic commands are completely unknown and cannot be estimated.

Actual Engine – Percent Torque (SPN 513) provides a window to the engine's desired torque output when no TSC#1 commands are actively controlling the engine. However, when the engine is responding to TSC#1 commands, the Actual Engine – Percent Torque parameter is no longer indicative of the torque that the engine will produce once those TSC#1 commands are removed.

In simplest terms, Engine Demand – Percent Torque (or "EDT") contains the engine's internal dynamic commands that are excluded from the Driver's Demand Engine – Percent Torque definition, including smoke control, noise control, and low and high speed governing. With this additional piece of information, devices on the network that are controlling the engine via TSC#1 messages can determine the torque direction of the engine once the current TSC#1 command is relinquished.

It is important to note that the proposed EDT parameter is used as information. The addition of the EDT parameter should in no way cause a change to the engine's actual torque command architecture.

EDT Calculation:

When no devices are controlling the engine via TSC#1 messages, the value of EDT is equal to the Actual Engine – Percent Torque parameter. When the engine is being controlled via a TSC#1 message, it is necessary for the engine controller to calculate what its' target torque *would be* if there were no external commands being received. This "runner up" in engine control will come from internal dynamic engine commands.

In the calculation of Actual Engine – Percent Torque, the output of the engine's idle governor must be considered, along with the impact of the engine's full load governor, smoke controls and other internal limiting logic. In the determination of the Engine Demand Torque parameter, these same engine logic components are needed, as indicated in Figure SPN 2432_A. However, there is a significant difference: These components only affect the Actual Engine – Percent Torque parameter determination if they are the component *actively* controlling the engine. In EDT, any of these components will be used to calculate EDT if they are the *"runner up"* for engine control. Even though these components may lose in the

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engine's internal control arbitration, the engine output torque that they would produce if in command needs to be found to determine EDT.

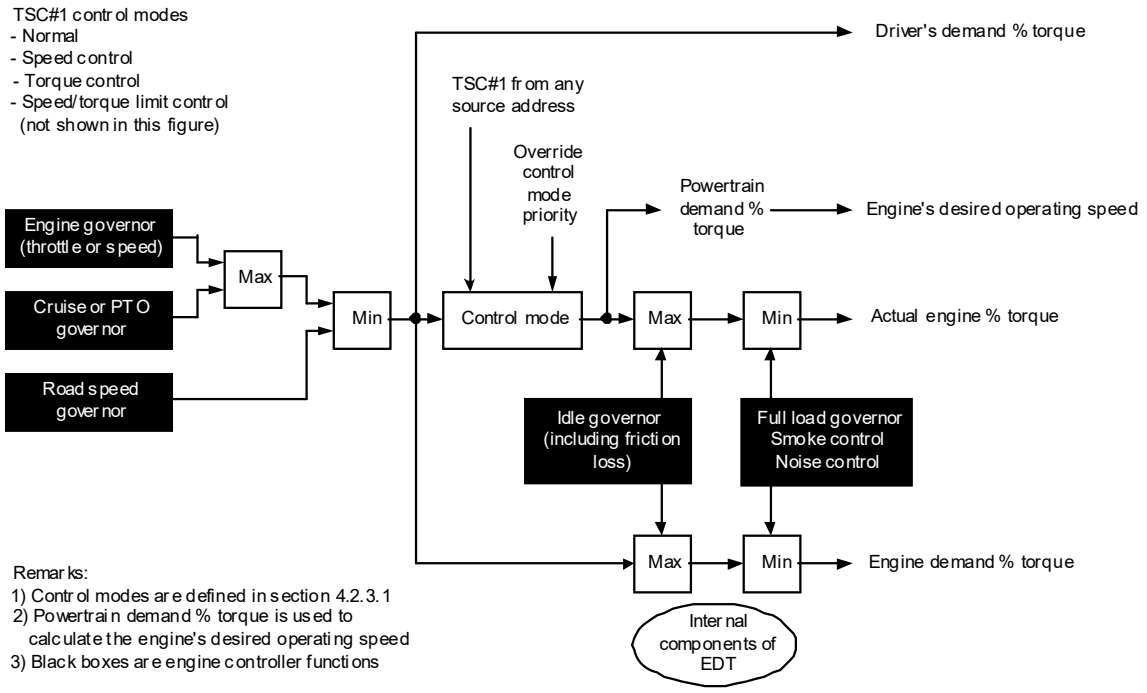


FIGURE SPN2432_A – TORQUE COMMANDS AND CALCULATIONS WHEN A "MAXIMUM LOW IDLE" TECHNIQUE IS USED

If speed governors are involved in determining these components of the EDT calculation, any of the following 3 special cases may need to be addressed:

Special Case #1: Speed Governors

If the engine governor referenced in Figure SPN2432_A is a speed-based governor instead of a throttle table arrangement, a new challenge is presented in determining EDT. Since the speed governor output is directly influenced by the TSC#1 command in control (for example, integrator anti-windup logic), the speed governor's output during TSC#1 commands cannot be used to calculate EDT.

Instead, an *approximation* of the speed governor output without the effects of any TSC#1 commands is required for use in the EDT calculation. "Approximation" refers to removing the effects of integrator terms and any other dynamic components that result from the controlling TSC#1 commands. All elements affecting the speed governor reference should be included before the reference is translated into terms of torque.

All control algorithms with dynamic elements (e.g., speed governors) that execute during TSC#1 commands need to have their outputs replaced by "steady-state" approximations for use in the EDT

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calculation. Again note that these approximations are for use only in the EDT calculation; the actual engine control logic remains unchanged.

Figure SPN2432_B illustrates EDT and speed governor output during a typical control sequence. The output of the speed governor may tend to lag the engine's torque trace during and after the TSC#1 command sequence. Note however that the TSC#1's influence is not factored into EDT; only when the command sequence ends or is no longer winning in terms of engine control arbitration do the dynamic effects of the speed governor(s) appear in the EDT signal.

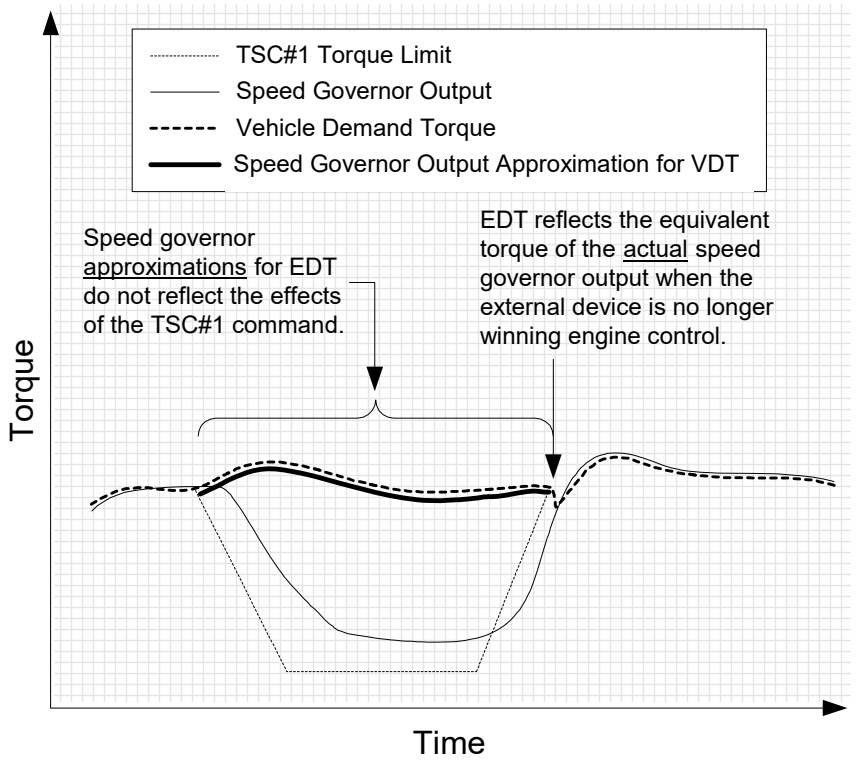


FIGURE SPN2432_B – EDT AND SPEED GOVERNOR OUTPUT RELATIONSHIP DURING A CONTROL SEQUENCE

One method of converting the speed governor reference to torque is shown in Figure SPN2432_C. The inputs of current engine speed, accelerator pedal position and the shape of the governor droop curves can be used to find the equivalent torque output of the governor. A lookup table or calculation could be used.

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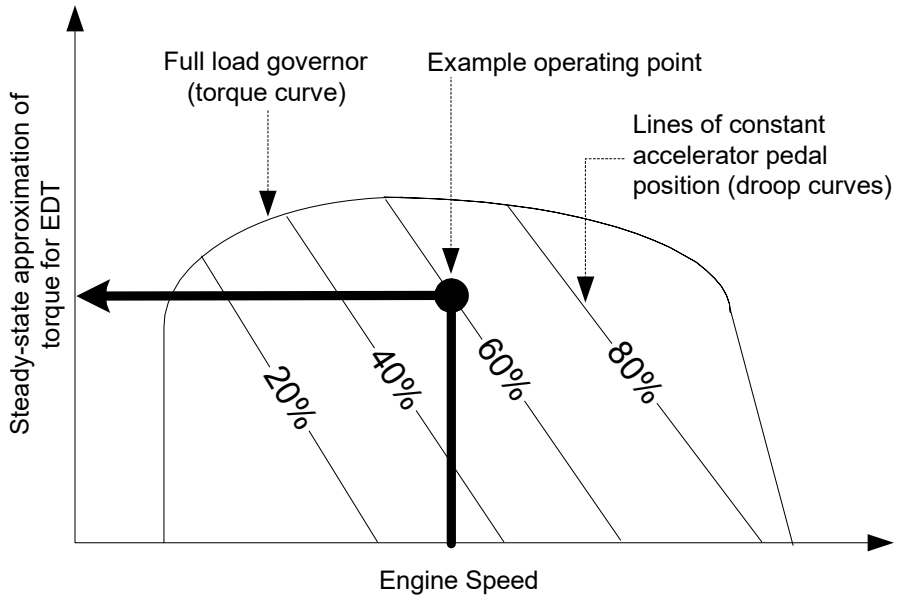


FIGURE SPN2432_C - FINDING EDT TORQUE APPROXIMATION FOR A SPEED GOVERNOR

Special Case #2: “Steep” or zero droop speed governors

Using a steady-state approximation with a “steep” or zero droop speed governor can cause large EDT changes over small speed changes. For example, if a cruise control governor has a zero droop and the vehicle speed is just below the cruise set speed, the steady-state torque approximation using the method described previously is very large. If vehicle speed increases a small amount to above the cruise set speed, the steady-state torque approximation becomes very small or zero.

As a result, a more accurate steady-state torque approximation is needed when steep droop governors are involved. A steep droop speed governor is defined as having a droop slope greater than 0.2% actual torque per rpm as seen below in Figure SPN2432_D.

The following method can be used to determine a steady-state torque approximation for steep or zero droop governors with fast responding integrator anti-windup / integrator resetting:

Upon a TSC#1 message actively controlling engine torque, save the last value of torque commanded by the speed governor (τ_{SGo}) and the last value of speed governor error (ε_{SGo}).

During this control sequence, calculate speed governor error (ε_{SGi})

Calculate an estimated torque for EDT determination use: $\tau_{SGestimated} = \tau_{SGo} + Kp_{SG} * (\varepsilon_{SGo} - \varepsilon_{SGi})$

where Kp_{SG} is the speed governor proportional gain

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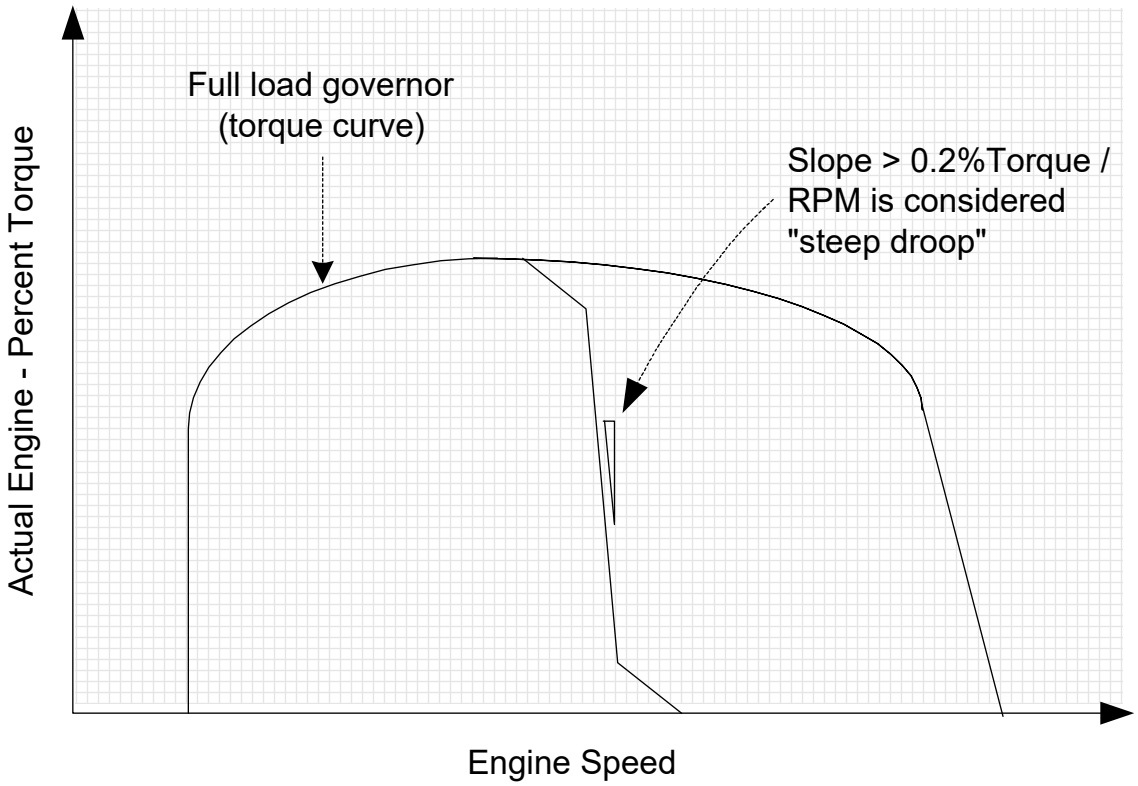


FIGURE SPN2432_D - EXAMPLE OF "STEEP DROOP" SPEED GOVERNOR

Special Case #3: “Slow Response” Speed Governors

If the speed governor dynamic elements are slow to respond to a 1 second torque derate, then the speed governor can simply be executed during the TSC#1 event and the output used directly in determining EDT. This is an alternative for a speed governor which does not contain an integrator, or if the integrator anti-windup logic is slow to respond. A guideline for “slow response” is that the governor output after 1 second of torque limiting has only moved 1/3 of the way to the limit, as shown for example in Figure SPN2432_E.

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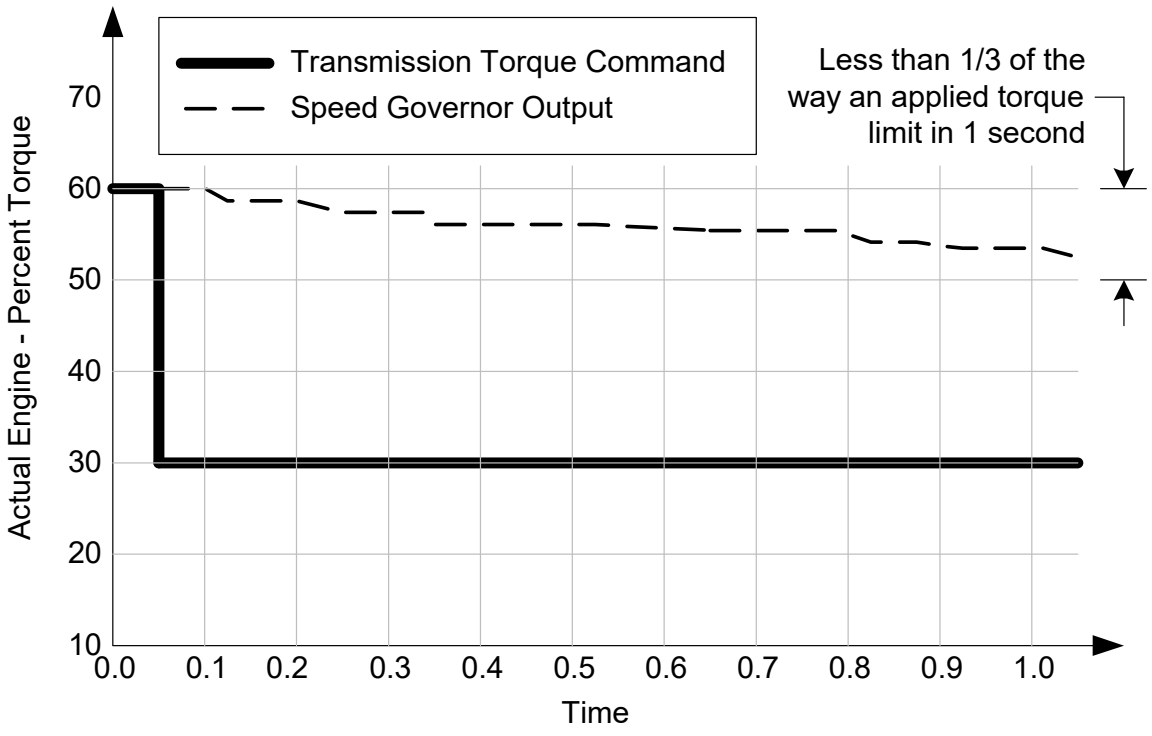


FIGURE SPN2432_E – EXAMPLE OF “SLOW TO RESPOND” SPEED GOVERNOR

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SPN 2927 - Actual Inner wheel steering angle

Following sketch shows an example for the actual inward wheel angles of the steering axles in the requested PGN :

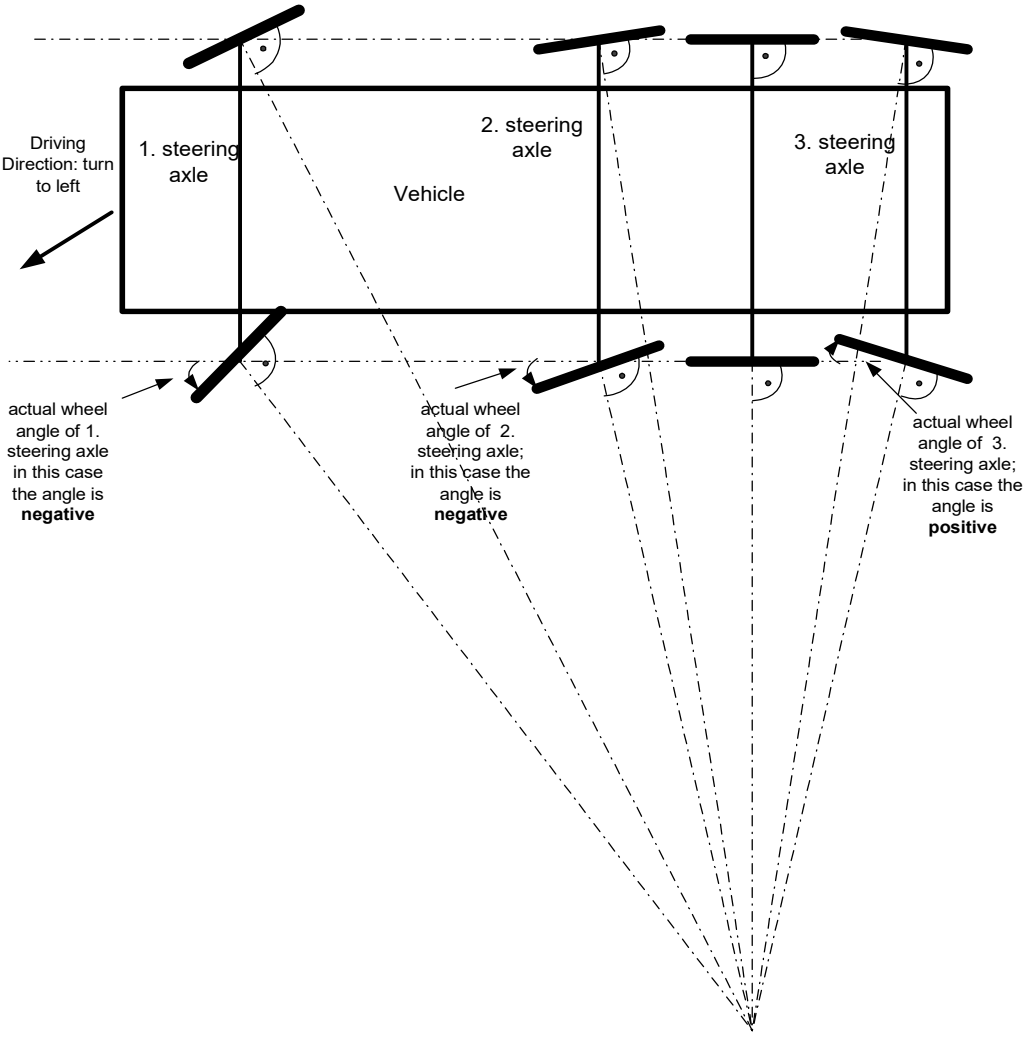


FIGURE SPN2927_A: STEERING AXLE ORIENTATION

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PGN 1024 – External Brake Request

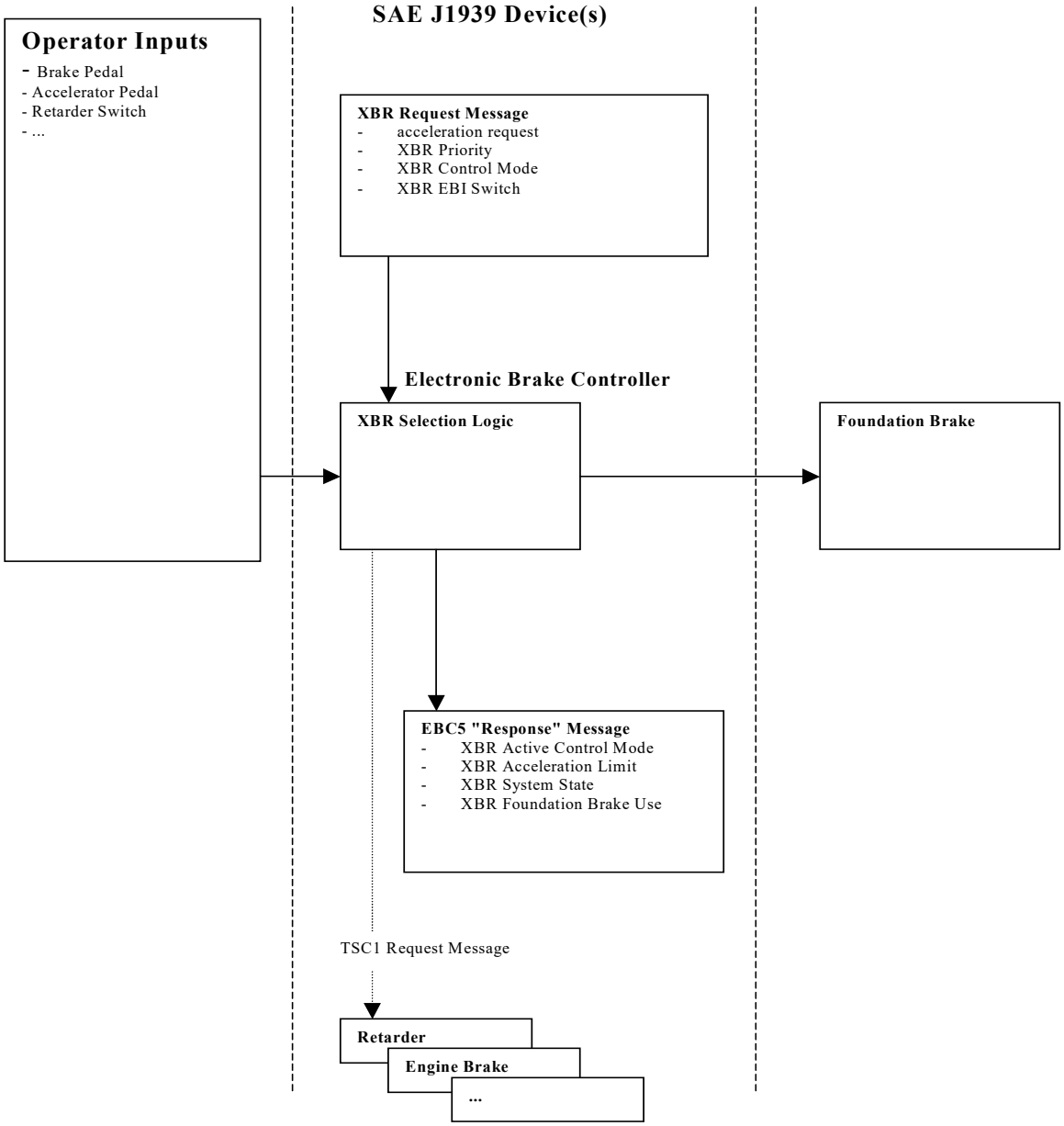
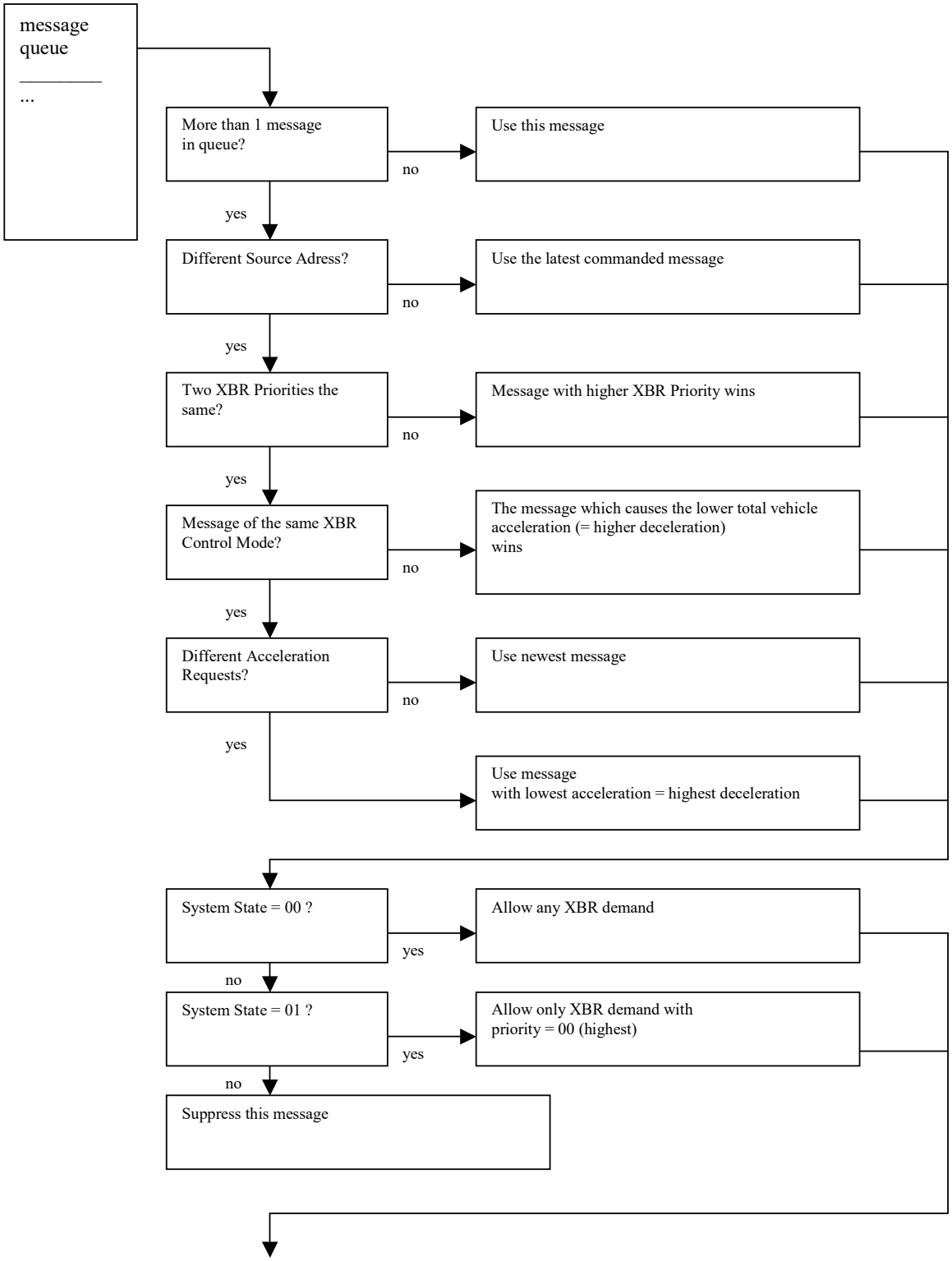


FIGURE PGN1024_A - DATA FLOW DIAGRAM FOR EXTERNAL BRAKE REQUEST

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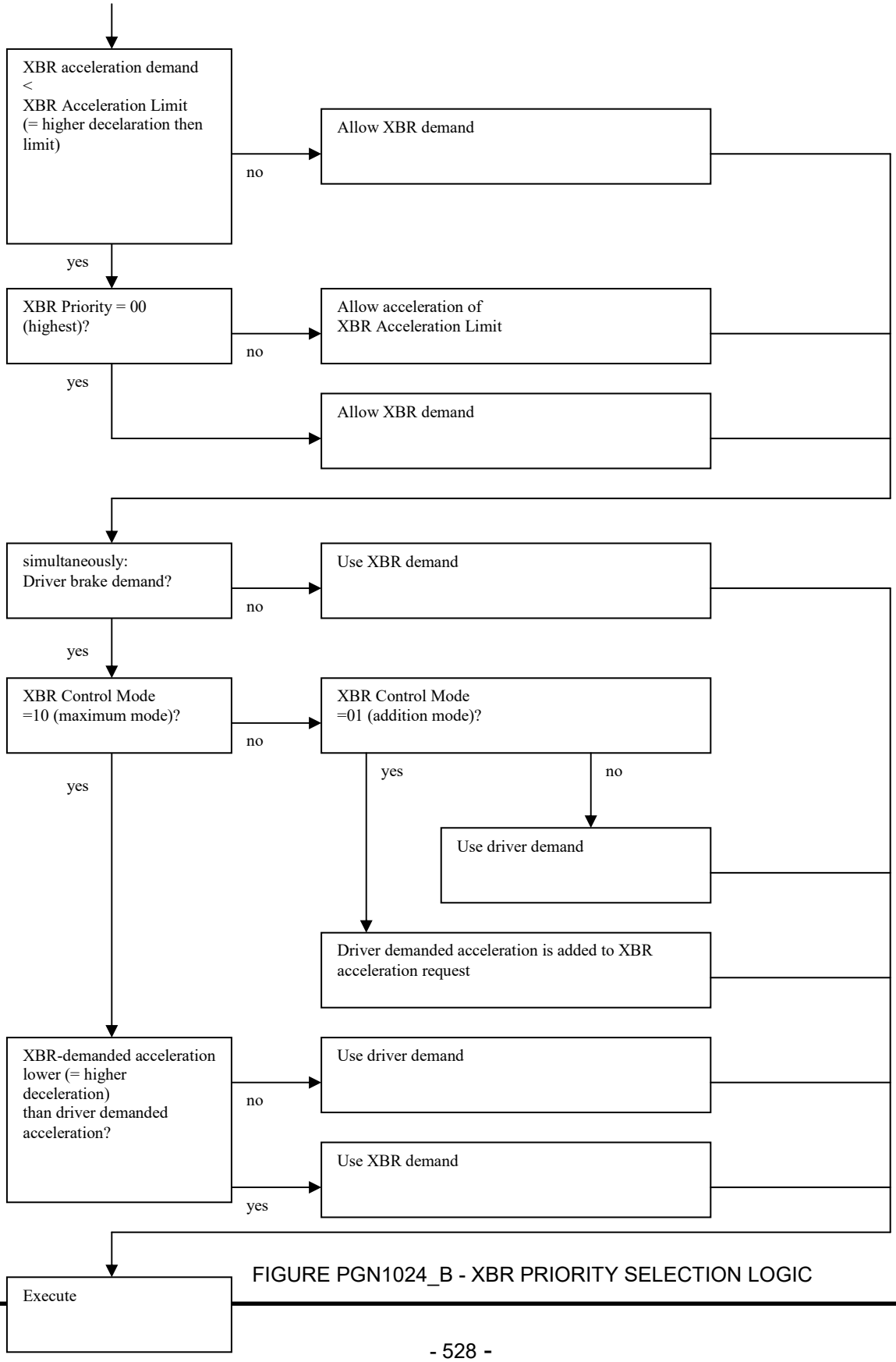


FIGURE PGN1024_B - XBR PRIORITY SELECTION LOGIC

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PGN 52992 – Continuous Torque & Speed Limit Request

The TSC1 message allows J1939 network devices to temporarily control engine and retarder speed and torque. This approach allows engine (and retarder) speed to be controlled by one device for a limited period of time. This may need to happen for brief emergency conditions (as requested by an anti-lock braking system for example) or in order to synchronize engine speed with some other device such as a transmission in order to allow a shift. Conflicting speed and torque requests from different devices are resolved by a predefined arbitration scheme.

Not every torque or speed need is satisfactorily addressed by this plan, however. Occasionally a network device may wish to impose longer lasting limits on speed and torque. For instance, as long as a transmission is in third gear, it may not be able to withstand all the torque the engine (or retarder) can produce. Or, an auxiliary device such as a pump may only operate correctly if engine speed and torque are kept within some fairly limited range *but not necessarily at one precise speed/torque!* In these cases, the network device does not need to command the precise speed or torque, but does have a legitimate desire to keep it within some boundary for an extended period of time. The TSC1 message doesn't provide this ability.

How: The ECM and retarder controller(s) first must define a "window" within the torque map. The window should be chosen carefully, and shouldn't be any larger than necessary. Any requests for continuous limits that attempt to intrude on this window will succeed only in setting limits at the very threshold of the window. For example, if the ECM declares that minimum continuous torque limits must be less than 900 lb-ft, and some device attempts to set a minimum continuous torque of 1000 lb-ft, the actual applied continuous limit will be 900 lb-ft (thus 900 lb-ft is the *minimum continuous* torque). When this limit is applied, the engine will always produce at least 900 lb-ft of torque. Similarly, if the engine declares that minimum continuous engine speed cannot be more than 1100 RPM, any attempts at setting a minimum continuous engine speed of over 1100 RPM will result in a minimum continuous engine speed of 1100 RPM. That is, the engine has declared beforehand that it will *always* be able to operate at least at 1100 RPM.

Periodically, the ECM and retarder controller(s) will transmit the dimensions of this window, as well as what actual continuous limits have been applied. This allows the engine to adjust the size and shape of the "window" to allow for derates and provides feedback to the various devices requesting continuous torque and/or speed limits.

The following figure shows an example torque curve with a "window" inside.

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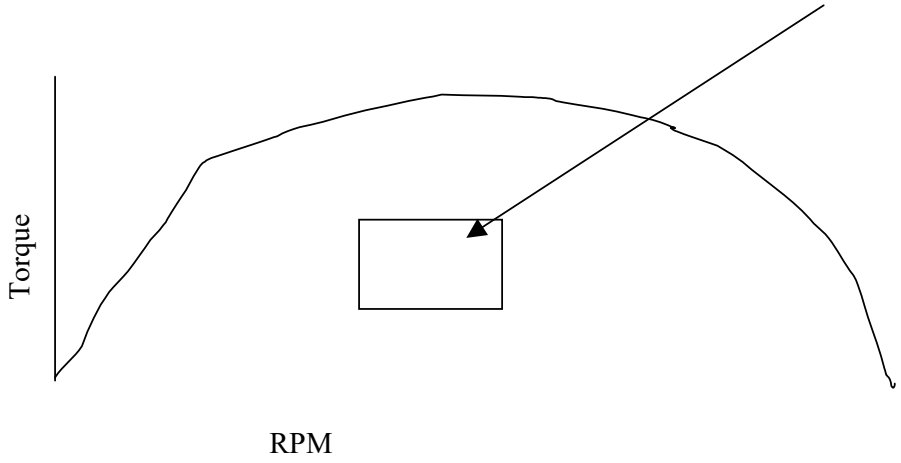


FIGURE PGN52992_A

The following figure shows how the ECM will treat requests that are outside of the bounds set by the "window." Note that the ECM has declared a "maximum allowable minimum" and a "minimum allowable maximum" for both speed and torque. These limits form a sort of rectangular "window" within the torque. The engine **must** be free to operate within this window; no continuous limits will be accepted that would intrude on it. In the diagram, some network device has ignored those values and attempted to set a minimum continuous speed higher than allowed. Remember, a minimum continuous speed means that the engine must always maintain an RPM of that value or greater. The ECM cannot accept the requested limit, so it applies a continuous limit as close as possible: right at the boundary set by "maximum value allowed for minimum continuous speed." Requests for Minimum Continuous Speed and Max/Min continuous torque are handled the same way.

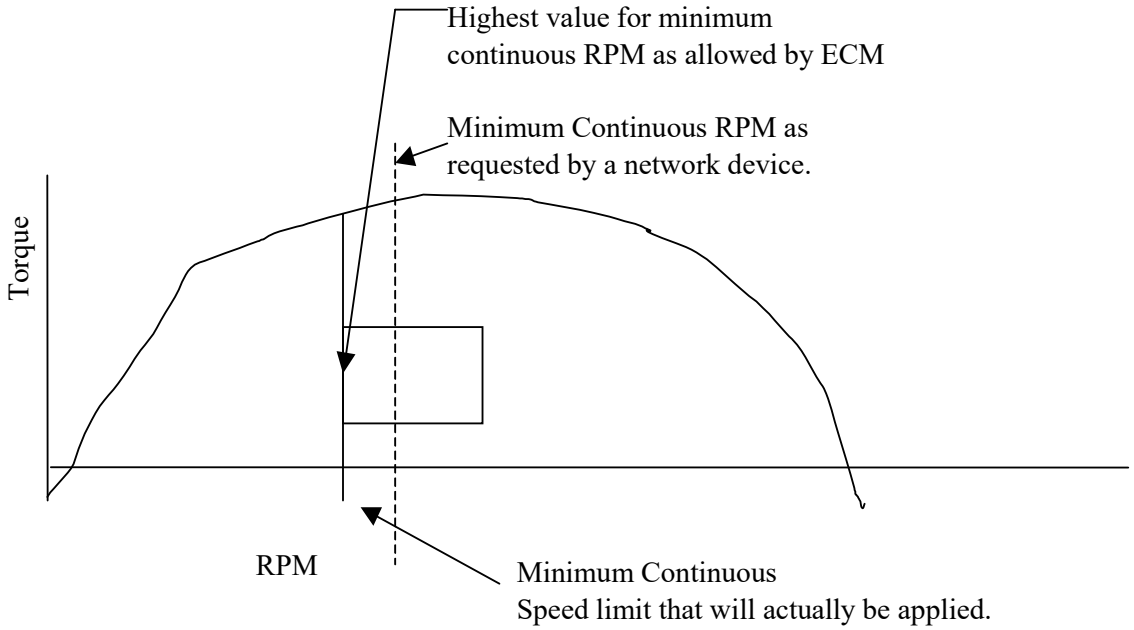


FIGURE PGN52992_B

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Things get a little more complicated when a retarder is included. Fortunately, only the engine compression brake retarder has any real relationship to the engine's torque map. Because other retarders may work against the engine, only the compression brake is generally controlled by the same ECU. For this reason, we must give it more careful attention.

The following figure illustrates one of the problems. Suppose continuous limits have been applied to the engine and retarder as indicated by the rectangular boxes within the torque maps. If the engine is prohibited from allowing torque to decrease below ***x***, how can the retarder be engaged? An engine compression brake retarder needs zero fueling for the engine in order to engage. The simple answer is that if there is a minimum continuous torque limit applied to the engine, the retarder will not be engaged. How does the reverse case behave? If the retarder is of a type other than engine compression brake, it may work against the engine and continuously produce a negative torque. Engine compression brake retarders must not send out a list of acceptable limits that would allow such conundrums. In practical terms, this means that engine compression brake retarders must set their Maximum Continuous Torque limit (think of it as MINIMUM continuous BRAKING torque limit) to zero in order for the retarder to ever be engaged. Similarly, the continuous limits as actually applied to the engine must allow zero torque if the retarder is to be engaged.

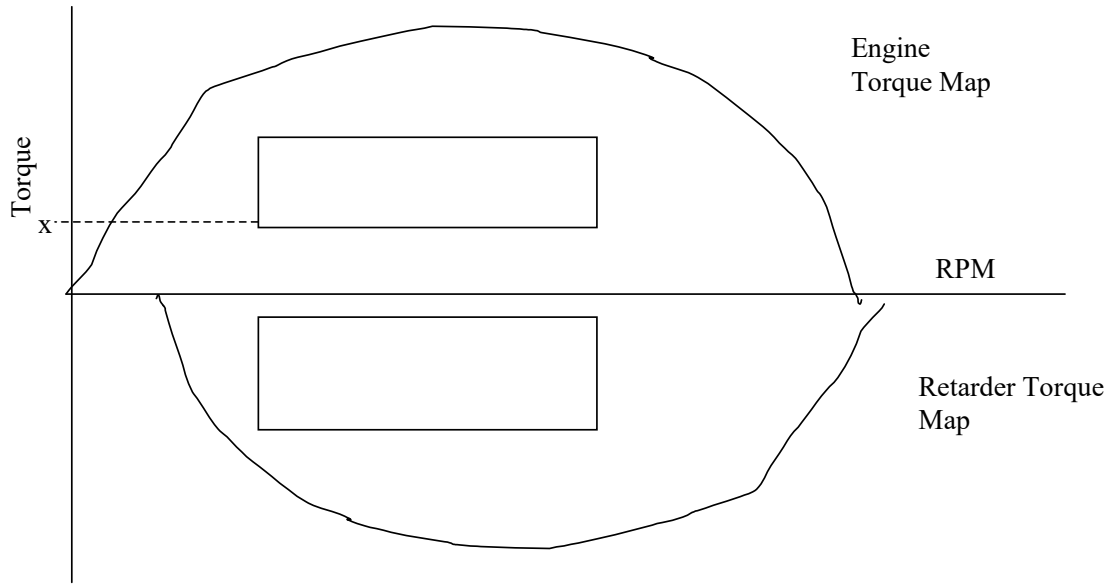


FIGURE PGN52992_C

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PGN 56320 – Anti-Theft Status

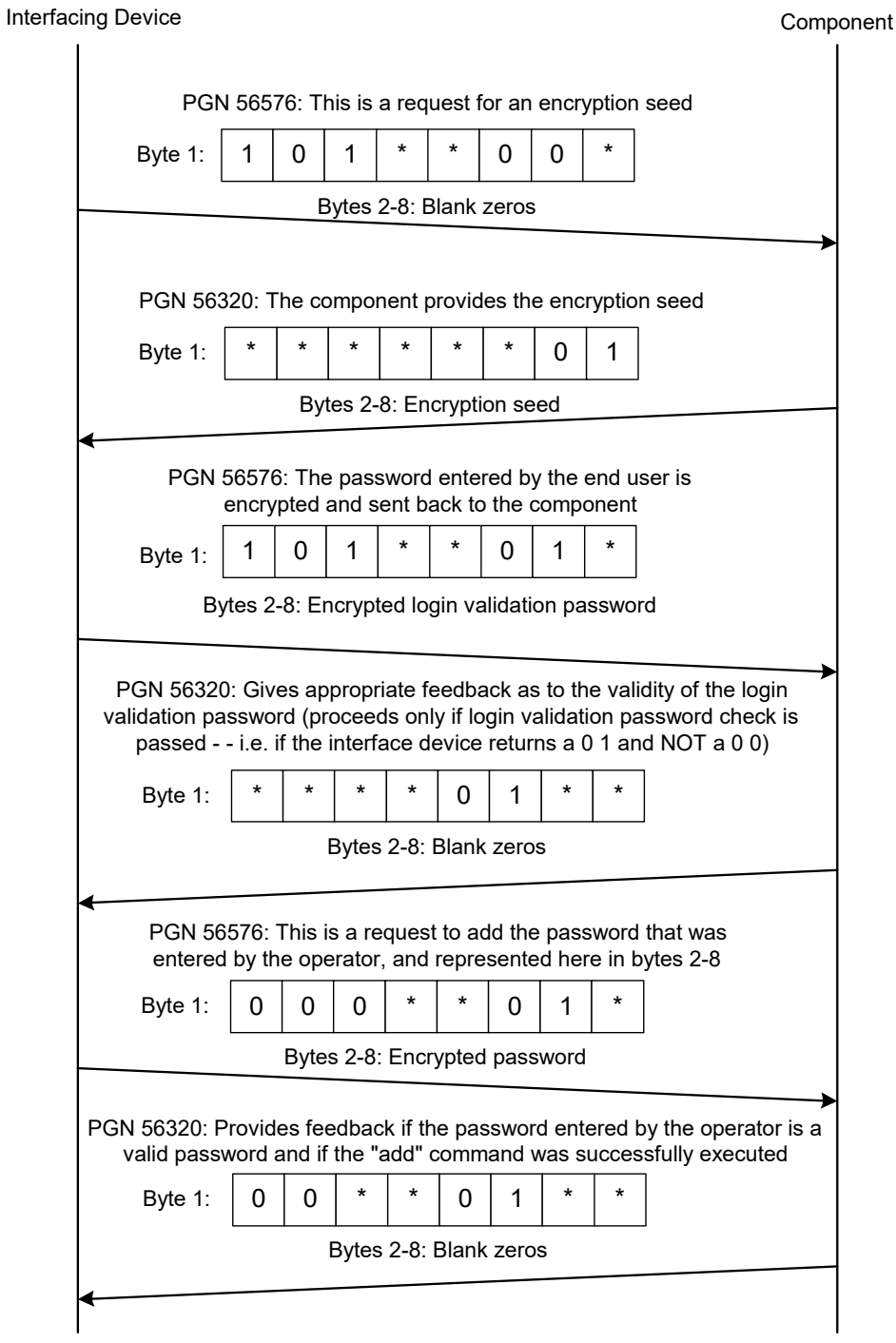


FIGURE PGN56320_A - OPERATOR DESIRES TO ADD A PASSWORD TO THE COMPONENT'S PASSWORD STRUCTURE

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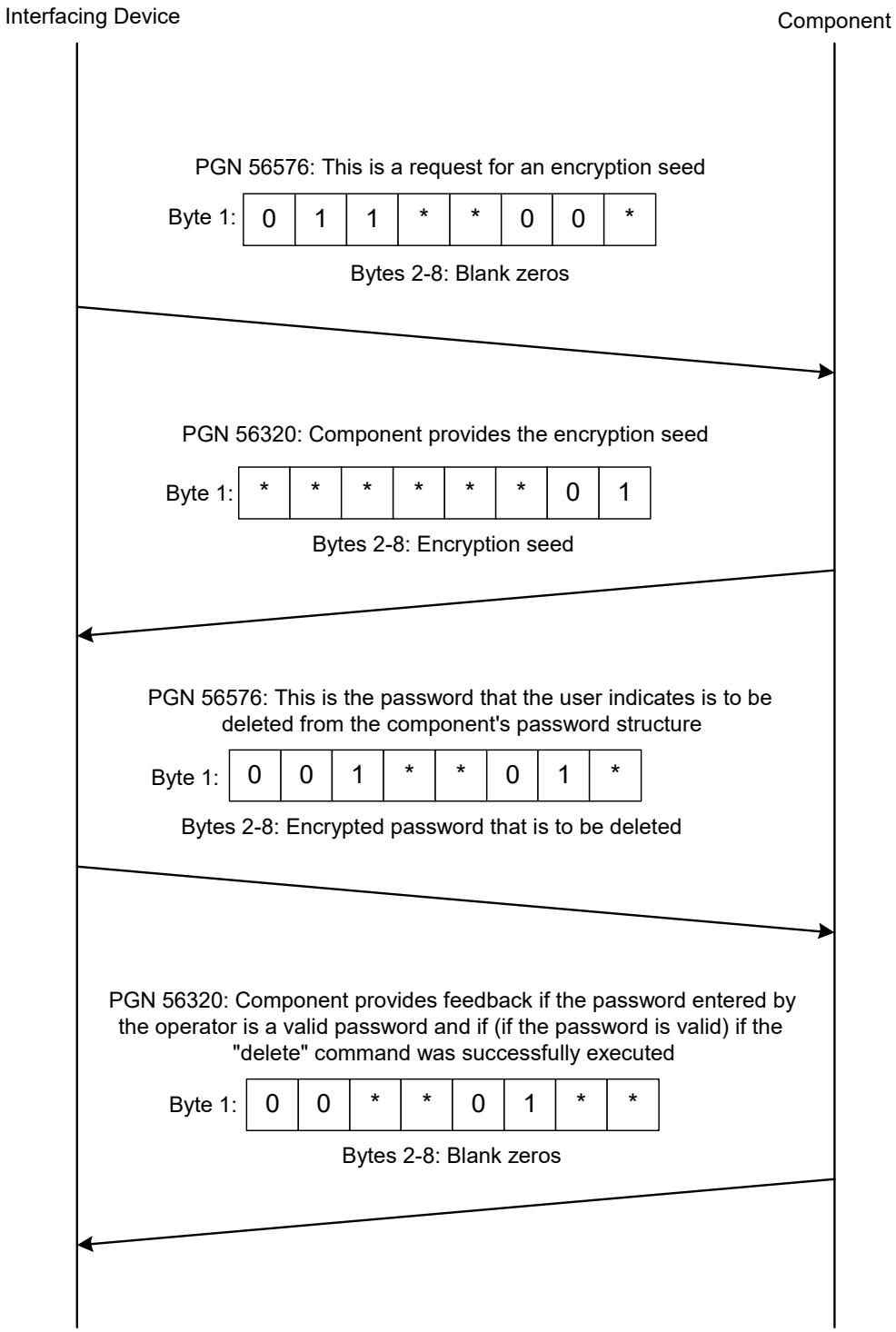


FIGURE PGN56320_B—OPERATOR DESIRES TO DELETE A PASSWORD FROM THE COMPONENT'S PASSWORD STRUCTURE

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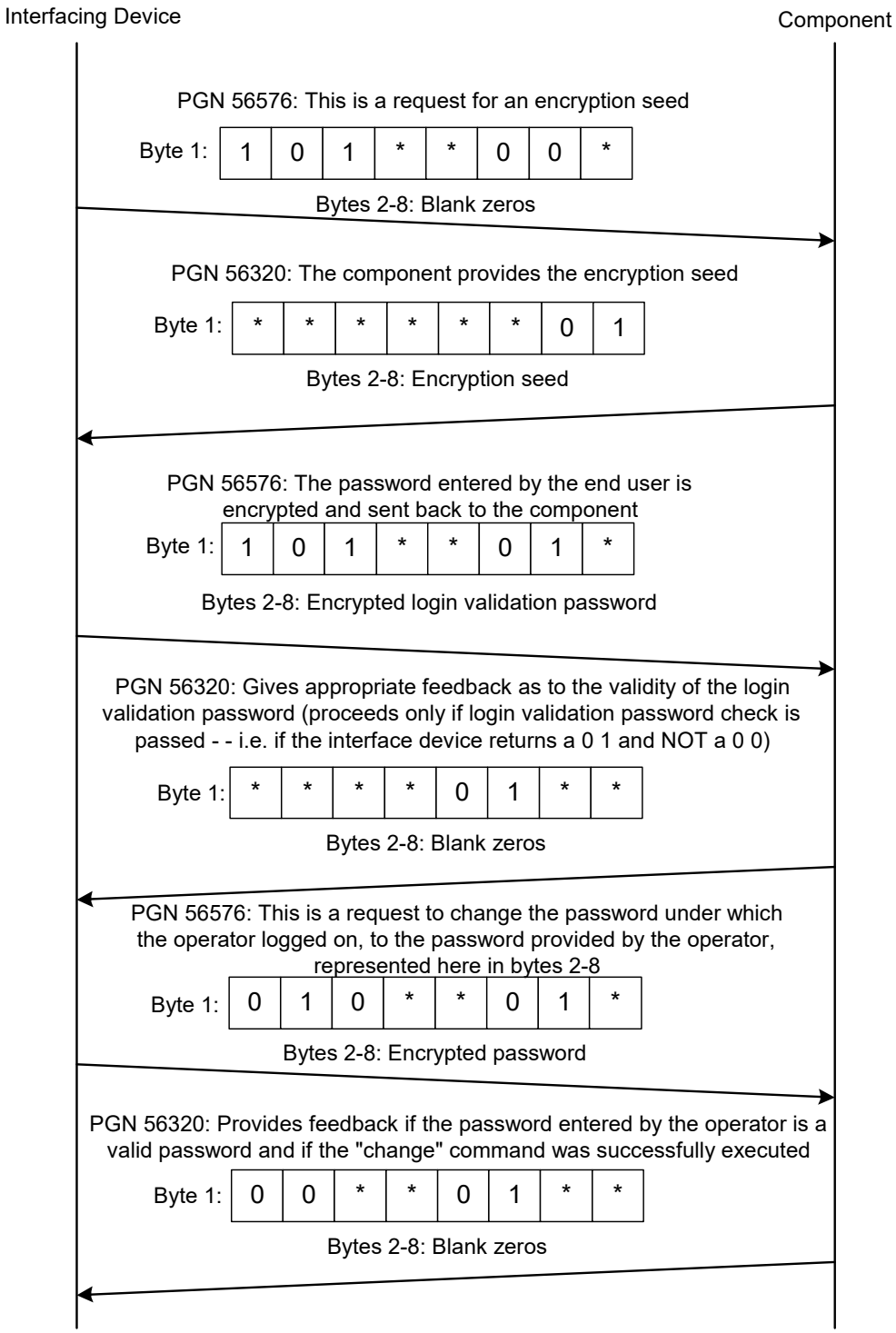


FIGURE PGN56320_C—OPERATOR DESIRES TO CHANGE A PASSWORD WITHIN THE COMPONENT'S PASSWORD STRUCTURE

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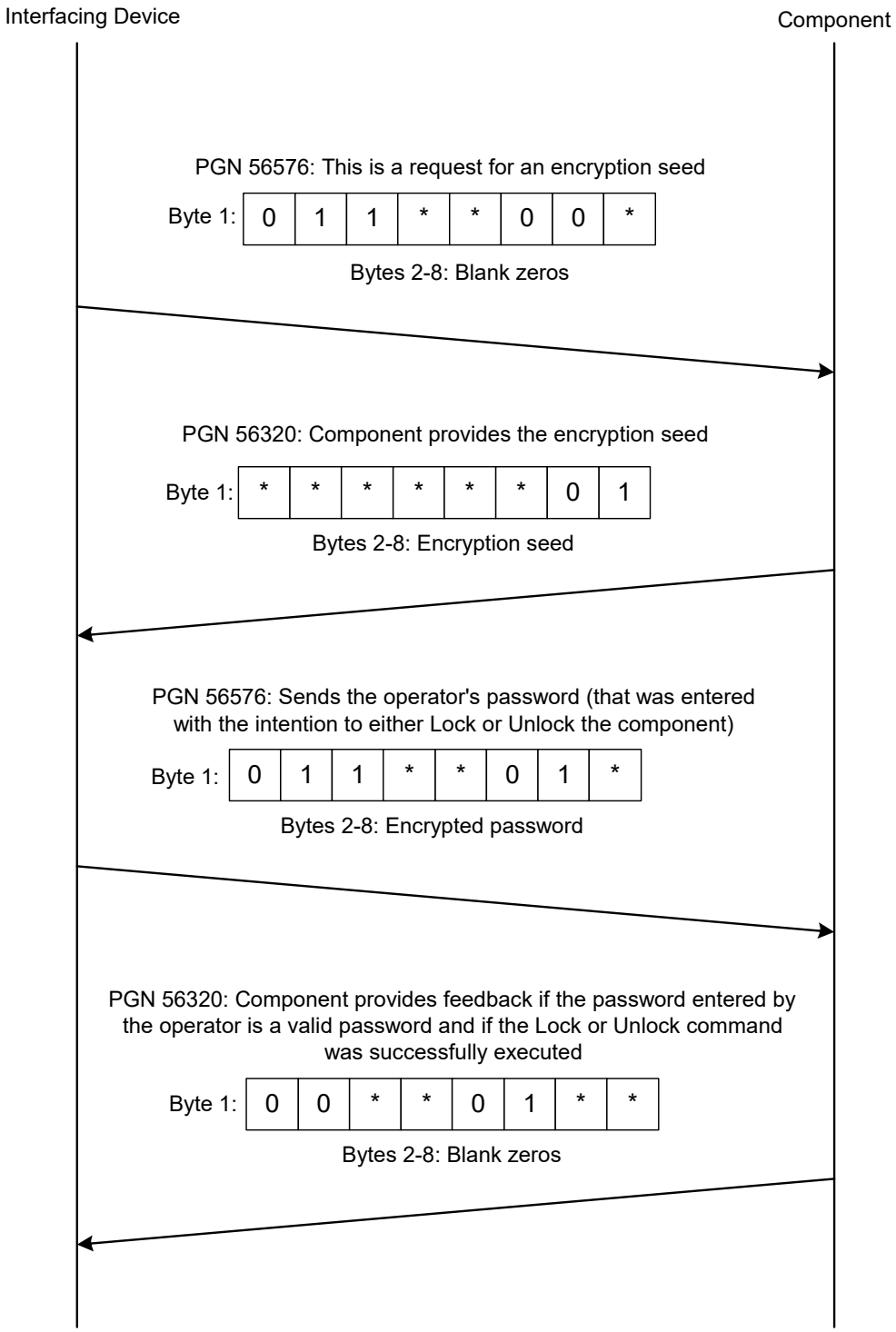


FIGURE PGN56320_D—OPERATOR DESIRES TO LOCK OR UNLOCK THE COMPONENT

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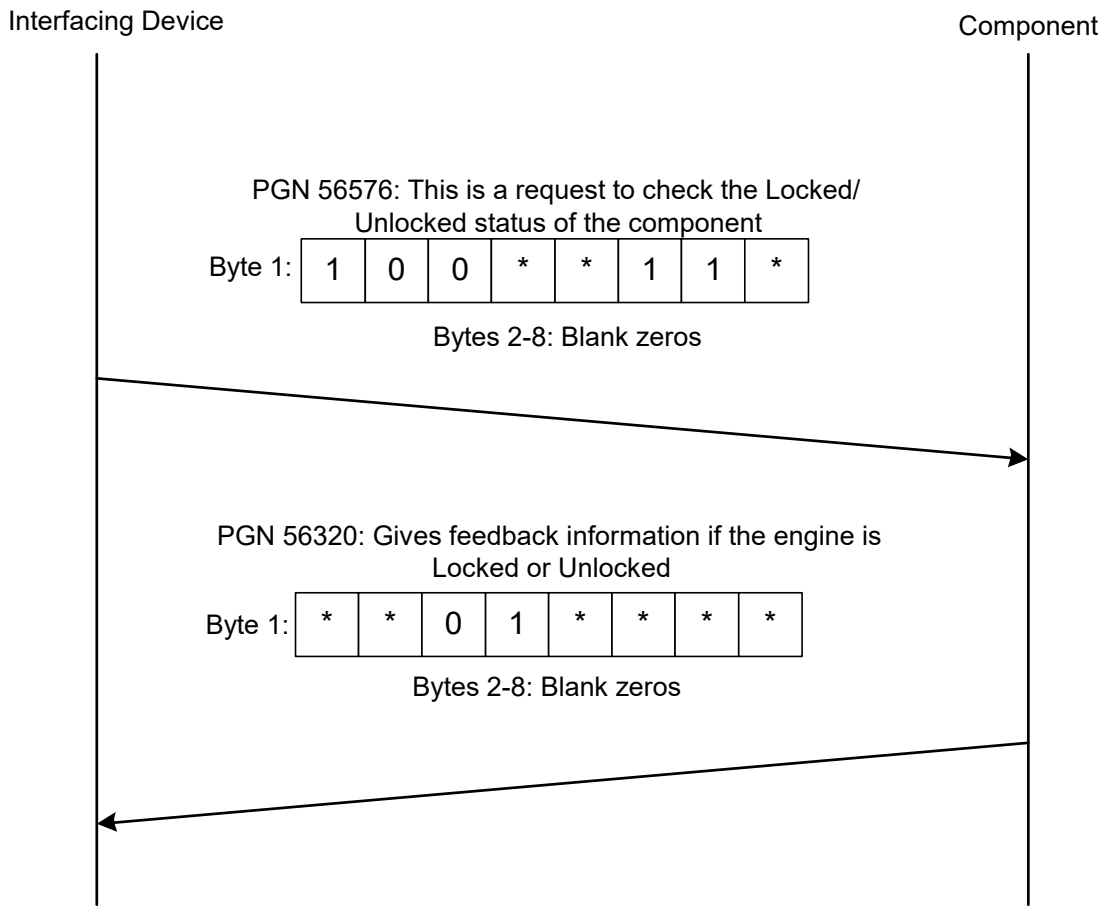


FIGURE PGN56320_E—CHECKING STATUS OF THE COMPONENT

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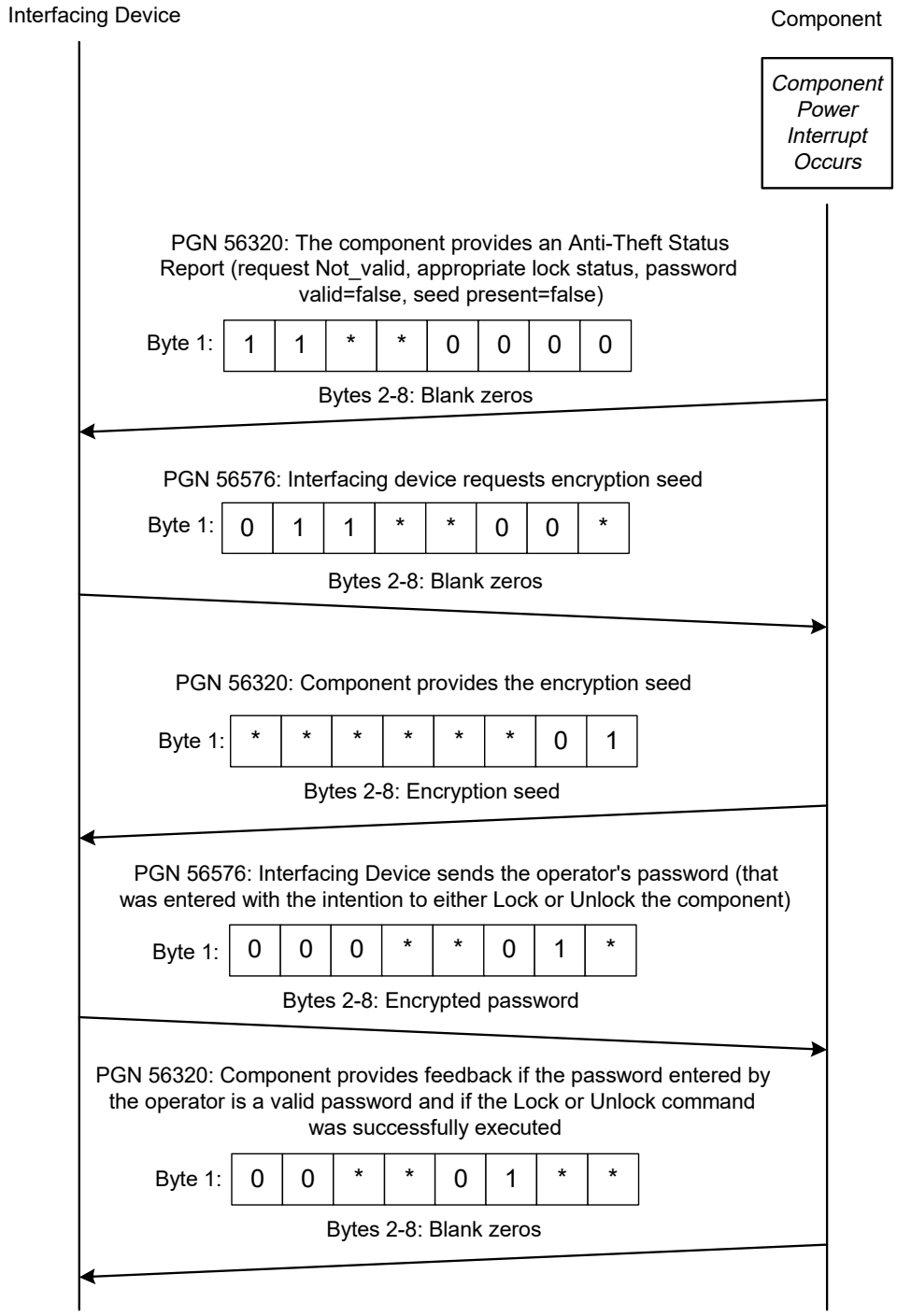


FIGURE PGN56320_F—ABNORMAL COMPONENT POWER INTERRUPTION (INTERFACING DEVICE POWER IS NOT INTERRUPTED)

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PGN 65135 – Adaptive Cruise Control

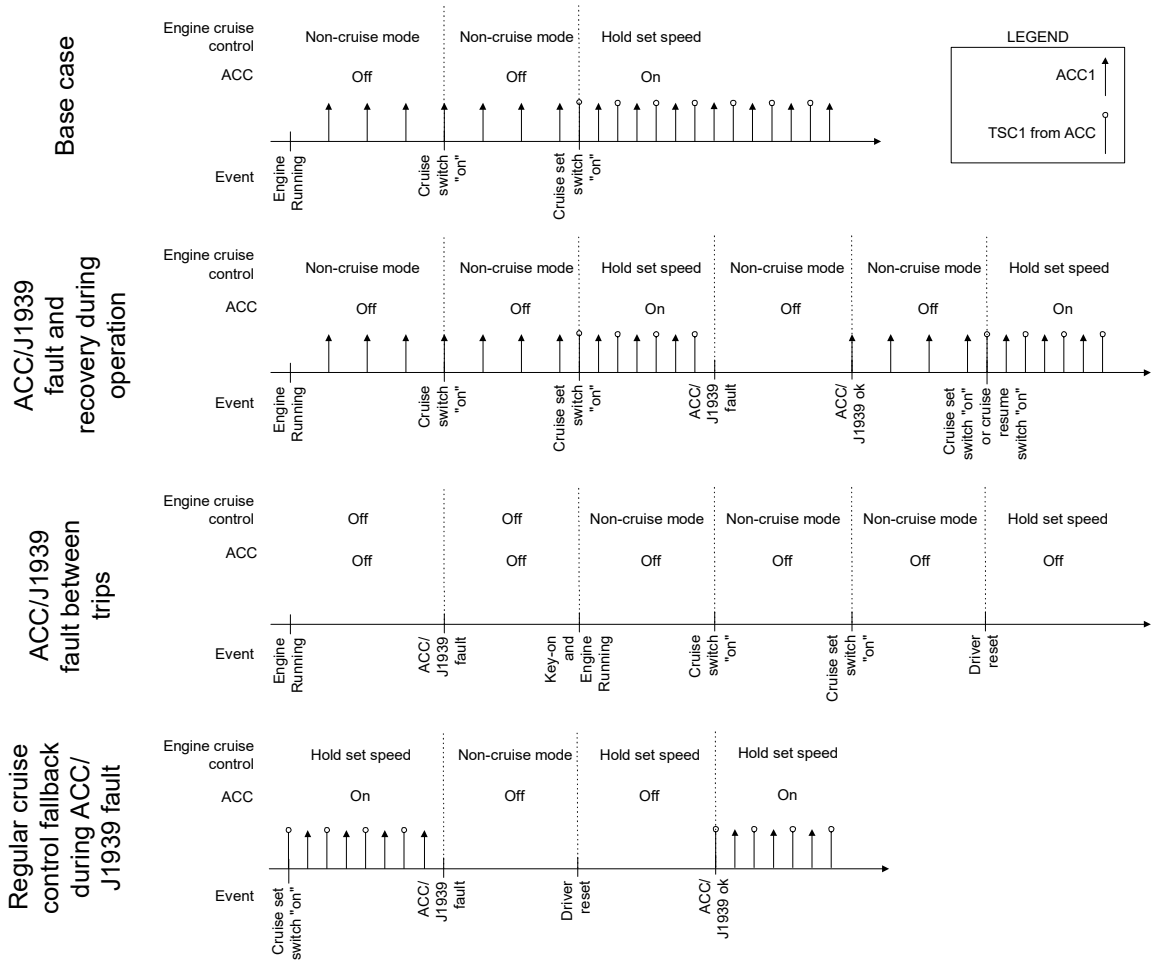


FIGURE PGN65135_A – ADAPTIVE CRUISE CONTROL TIMING DIAGRAM

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PGN 65249 – Retarder Configuration

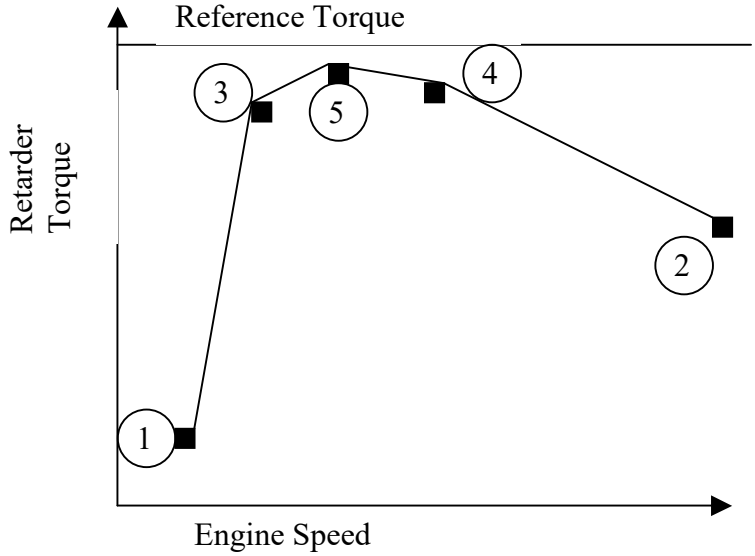


FIGURE PGN65249_A—TYPICAL HYDRAULIC RETARDER TORQUE CURVE

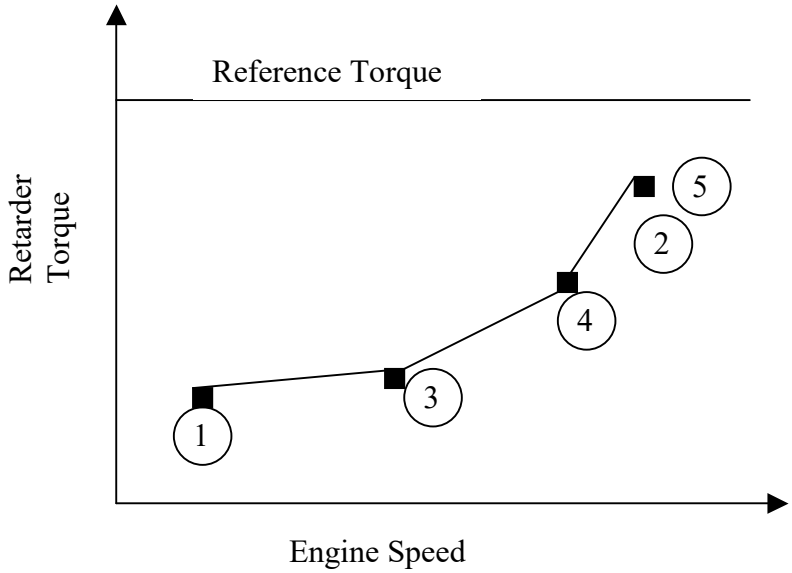


FIGURE PGN65249_B—TYPICAL ENGINE COMPRESSION BRAKE TORQUE CURVE

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PGN 65251 – Engine Configuration

TABLE PGN65251_A—ENGINE CONFIGURATION CHARACTERISTIC MODES

Mode	Torque/Speed Point 2	Governor Gain KP	High Idle Speed
1	Available	Not available	Available
2	Not Available	Available	Available
3	Available	Available	Not available

The following points are shown in Figures PGN65251_A, PGN65251_B, and PGN65251_C.

Point 1 (required):	Torque/speed point at idle
Point 2 (required):	Mode 1 & 3: Torque/speed point at which the high speed governor becomes active Mode 2: Normal torque/speed point
Point 3,4,5 (required):	Torque/speed points between points 1 and 2 to permit linear interpolation over the entire torque range. It is required that one of these points indicate the peak torque point for the current engine torque map.
Point 6 (mode dependent):	Mode 1 & 2: High idle speed (torque = 0) Mode 3: Not available (point is defined by the endspeed governor where torque = 0)
Point 7 (optional):	Maximum momentary engine override speed (torque = 0)
Reference engine torque:	Engine torque in Nm. This parameter is the reference value of 100% for all defined indicated engine torque parameters. It is only defined once and doesn't change if a different engine torque map becomes valid.

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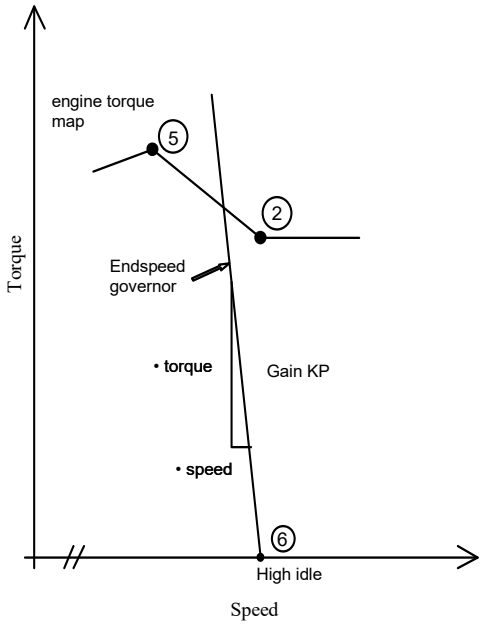


FIGURE PGN65251_A—ENGINE CONFIGURATION MAP-MODE 1

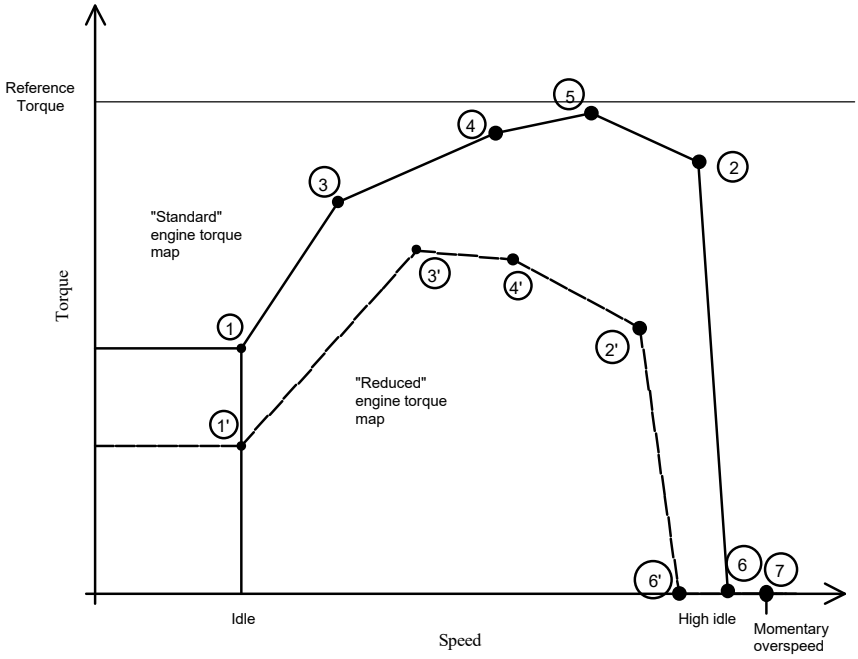


FIGURE PGN65251_B—ENGINE CONFIGURATION MAP-MODE 2

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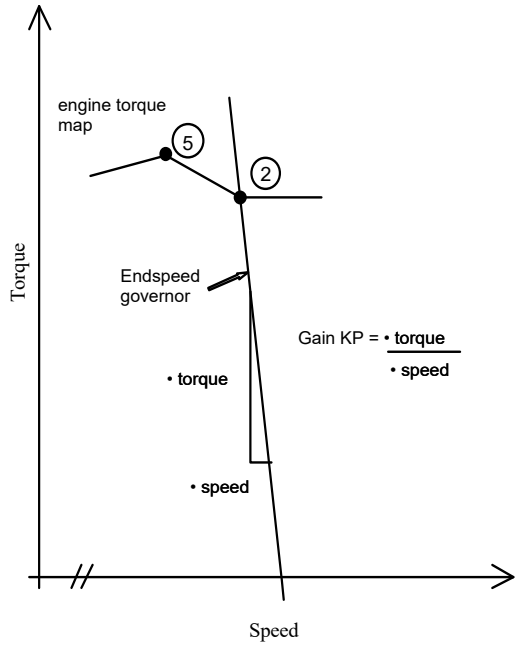


FIGURE PGN65251_C—ENGINE CONFIGURATION MAP-MODE 3