PGN Report (sorted by Number)

National Marine Electronics Association

NMEA 2000 ®

Appendix B.1 -- PGN Table

STANDARD FOR SERIAL-DATA NETWORKING OF MARINE ELECTRONIC DEVICES

Version 1.300
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ISO Acknowledgment

PGN: 059392
hex: E800

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

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

Single Frame: Yes *Priority Default:* 6 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Address *Query Support:* *ACK Rqmnts:*

Original Reference ID # 64

Field #	*Field Name*						
1	**Control Byte**		*Byte Field Size:*	*Bit Field Size:* 8		*Request Parameter*	No
	DD177 ISO 11783 ACK Status			0x00 = Positive Acknowledgment; 0x01 = Negative Acknowledgment; 0x02 = PGN supported but access denied; 0x03 to 0xFF = Reserved			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
2	**Group Function Value**		*Byte Field Size:*	*Bit Field Size:* 8		*Request Parameter*	No
	DD178 Group Function Value			Group Function of PGN being acknowledged. This field identifies for a device the specific group function of a PGN being acknowledged or declined. This field is not used if the PGN being acknowledged or declined is not a group function PGN.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 24		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**PGN of Requested Information**		*Byte Field Size:*	*Bit Field Size:* 24		*Request Parameter*	No
	DD009 PGN			24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

ISO Request

PGN: 059904
hex: EA00

ISO 11783 defines this message to provide a method for requesting the transmission of a PGN from a network device or devices. As defined by ISO, this message has a data length of 3 bytes with no padding added to complete the single frame. The appropriate response to this message is based on the PGN being requested, and whether the receiver supports the requested PGN. See section 3.4.2 of 11783-3 for the rules governing the response to this PGN.

Single Frame: Yes *Priority Default:* 6 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Address *Query Support:* *ACK Rqmnts:* Requested data or 059932 ISO Acknowledge with error code.

Field # *Field Name* Original Reference ID # 65

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

ISO Transport Protocol, Data Transfer

PGN: 060160
hex: EB00

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

Single Frame: Yes *Priority Default:* 6 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Address *Query Support:* *ACK Rqmnts:*

Original Reference ID # 71

Field #	*Field Name*						
1	**Sequence number of multi-packet frame**		*Byte Field Size:*		*Bit Field Size:* 8	*Request Parameter*	No
	DD180 Multi-packet frame counter			Valid range 0x01 to 0xFF			
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1	Used to construct bit fields	
2	**Multi-packet packetized data**		*Byte Field Size:*		*Bit Field Size:* 56	*Request Parameter*	No
	DD181 Multi-packet packetized data			56 bits organized as seven 8-bit bytes, each of the bytes is transmitted in the same order as it would in a standard (i.e., single frame) message. Unused bytes shall be filled with 0xFF.			
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1	Used to construct bit fields	

ISO Transport Protocol, Connection Management - RTS group function

PGN: 060416
hex: EC00

ISO 11783 defines this group function PGN as part of the transport protocol method used for transmitting messages that have 9 or more data bytes. This PGN's role in the transport process is determined by the group function value found in the first data byte of the PGN.

RTS - When the group function is Request To Send (RTS), the PGN is asking a specific node on the network for permission to transmit a larger than 8 byte message to the node. This process is referred to as opening a connection.

CTS - If the group function is Clear To Send (CTS), the PGN is notifying the transmitter of a multipacket message how many packets the node is ready to receive and which packets have been received successfully. This group function is the proper response to an RTS group function to start the transmission of the multipacket data and allows the receiver to control the flow of data throughout the multipacket transmission.

EOM - When the group function is End Of Message (EOM), the PGN is notifying the transmitter of a multipacket message that all packets were received successfully. This group function signals the successful conclusion of a transmission started with the RTS group function thus closing the connection.

ABORT - When the group function is Abort, the PGN is notifying the transmitter or receiver of the multipacket message that the other partner is terminating the connection without completing the transfer of the message. This group function can also be used to refuse the connection when the RTS group function is initially received.

BAM - When the group function is Broadcast Announce Message (BAM), the PGN is notifying all network nodes that a multipacket message is about to be transmitted on the network. Because the BAM group function is broadcast, no further handshake is required before the multipacket message is transmitted.

For a complete description of this PGN's usage and timing requirements see section 3.10 of 11783-3.

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

Field # *Field Name* Original Reference ID # 66

1 **RTS Group Function Code** *Byte Field Size:* *Bit Field Size:* 8 *Request Parameter* No
DD179 Group Function, Connection Management
0x10 = Request to Send;
0x11 = Clear to Send;
0x13 = End of Message;
0x20 = Broadcast Announce Message;
0xFF = Abort;
0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved

DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
This is the RTS message, set = 0x10

2 **Total message size, bytes** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium
Number of route, waypoint, event, mark, etc.

DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
Only values in the range of 9 to 1785 are allowed.

3 **Total number of frames to be transmitted** *Byte Field Size:* *Bit Field Size:* 8 *Request Parameter* No
DD180 Multi-packet frame counter
Valid range 0x01 to 0xFF

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

4 **Reserved Bits** *Byte Field Size:* *Bit Field Size:* resv 8 *Request Parameter* No
DD001 Reserved field
Variable number of reserved bits, all set to logic "1"

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

5 **PGN of multi-packet message** *Byte Field Size:* *Bit Field Size:* 24 *Request Parameter* No
DD009 PGN
24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first

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

Original Reference ID # 67

Field #	Field Name						
1	**CTS Group Function Code**		*Byte Field Size:*	*Bit Field Size:*	8	*Request Parameter*	No
	DD179 Group Function, Connection Management			0x10 = Request to Send; 0x11 = Clear to Send; 0x13 = End of Message; 0x20 = Broadcast Announce Message; 0xFF = Abort; 0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This is the CTS message, set = 0x11						
2	**Number of frames that can be sent**		*Byte Field Size:*	*Bit Field Size:*	8	*Request Parameter*	No
	DD180 Multi-packet frame counter			Valid range 0x01 to 0xFF			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Number of next frame to be transmitted**		*Byte Field Size:*	*Bit Field Size:*	8	*Request Parameter*	No
	DD180 Multi-packet frame counter			Valid range 0x01 to 0xFF			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:*	resv 16	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**PGN of multi-packet message**		*Byte Field Size:*	*Bit Field Size:*	24	*Request Parameter*	No
	DD009 PGN			24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

ISO Transport Protocol, Connection Management - EOM group function

PGN: 060416
hex: EC00

Original Reference ID # 68

Field #	Field Name							
1	**EOM Group Function Code**		*Byte Field Size:*		*Bit Field Size:*	8	*Request Parameter*	No
	DD179 Group Function, Connection Management			0x10 = Request to Send; 0x11 = Clear to Send; 0x13 = End of Message; 0x20 = Broadcast Announce Message; 0xFF = Abort; 0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
	This is the EOM message, set = 0x13							
2	**Total message size, bytes**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD007 Generic numeric ID, medium			Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:*	0 to 65,532	*Resolution:*	1 bit	Unit-less number	
	Only values in the range of 9 to 1785 are allowed.							
3	**Total number of frames received**		*Byte Field Size:*		*Bit Field Size:*	8	*Request Parameter*	No
	DD180 Multi-packet frame counter			Valid range 0x01 to 0xFF				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
4	**Reserved Bits**		*Byte Field Size:*		*Bit Field Size:*	resv 8	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
5	**PGN of multi-packet message**		*Byte Field Size:*		*Bit Field Size:*	24	*Request Parameter*	No
	DD009 PGN			24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	

Field # *Field Name* Original Reference ID # 69

1 **BAM Group Function Code** *Byte Field Size:* *Bit Field Size:* 8 *Request Parameter* No

DD179 Group Function, Connection Management

0x10 = Request to Send;
0x11 = Clear to Send;
0x13 = End of Message;
0x20 = Broadcast Announce Message;
0xFF = Abort;
0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved

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

This is the BAM message, set = 0x20

2 **Total message size, bytes** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD007 Generic numeric ID, medium

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

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

Maximum value = 1785

3 **Total number of frames to be transmitted** *Byte Field Size:* *Bit Field Size:* 8 *Request Parameter* No

DD180 Multi-packet frame counter

Valid range 0x01 to 0xFF

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

4 **Reserved Bits** *Byte Field Size:* *Bit Field Size:* resv 8 *Request Parameter* No

DD001 Reserved field

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

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

5 **PGN of multi-packet message** *Byte Field Size:* *Bit Field Size:* 24 *Request Parameter* No

DD009 PGN

24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first

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

ISO Transport Protocol, Connection Management - Abort group function

PGN: 060416
hex: EC00

Original Reference ID # 70

Field #	Field Name						
1	**Abort Group Function Code**		*Byte Field Size:*	*Bit Field Size:*	8	*Request Parameter*	No
	DD179 Group Function, Connection Management		0x10 = Request to Send; 0x11 = Clear to Send; 0x13 = End of Message; 0x20 = Broadcast Announce Message; 0xFF = Abort; 0x00 to 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = Reserved				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This is the Abort message, set = 0xFF						
2	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:*	resv 32	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**PGN of multi-packet message**		*Byte Field Size:*	*Bit Field Size:*	24	*Request Parameter*	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

ISO Address Claim

PGN: 060928
hex: EE00

This network management message is used to claim network address, reply to devices requesting the claimed address, and to respond with device information (NAME) requested by the ISO Request (PGN 059904) or Complex Request Group Function (PGN 126208). This PGN contains several fields that are requestable, either independently or in any combination. A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing this PGN. If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner: If no requestable fields have been included with the Complex Request, then the response is to return this PGN, just like responding to the ISO Request (PGN 059904) described above. If the Complex Request (PGN 126208) includes one or more requestable fields, then the response shall be filtered by the one or more fields and field values contained within the request. For example, if the Complex Request for this PGN contained a value for field 2, the manufacturers code, then the device would respond with this PGN, if and only if the device's Manufacturer Code matched the value requested. If the device's Manufacturer code did not match the value requested, then the response would depend on whether the request was global or addressed. A global request containing one or more requested field values that do not match requires no response, while an addressed request containing requested field values, in which one or more do not match, requires a response with the Acknowledge Group PGN (126208), containing the appropriate error codes for each of the requested fields, such as "0x3" = Request or command parameter out-of-range;" for the fields that did not match.

Single Frame: Yes *Priority Default:* 6 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Address *Query Support:* Req'd *ACK Rqmnts:* Refer to Section 6.4 of ISO 11783-5

Field #	*Field Name*						Original Reference ID # 63
1	**Unique Number (ISO Identity Number)**		*Byte Field Size:*	*Bit Field Size:* 21	*Request Parameter* No		
	DD173 NMEA 2000 Unique Number		Binary number assigned by manufacturer to ensure that the NAME field for each manufactured device is unique, reference NMEA 2000 Network Management Section 8.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
2	**Manufacturer Code**		*Byte Field Size:*	*Bit Field Size:* 11	*Request Parameter* Yes		
	DD172 NMEA 2000 Manufacturer Code		Assigned by NMEA 2000 Committee				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Device Instance Lower (ISO ECU Instance)**		*Byte Field Size:*	*Bit Field Size:* 3	*Request Parameter* Yes		
	DD201 Generic instance 2 (3-bit)		0x0 to 0x7 = instance 0 to 7				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	The combination of fields 3 & 4 make up the 8 bit NMEA 2000 Instance. Devices 0 - 252						
4	**Device Instance Upper (ISO Function Instance)**		*Byte Field Size:*	*Bit Field Size:* 5	*Request Parameter* Yes		
	DD174 Generic instance (5-bit)		0x00 to 0x1F = Instance 0 to 31;				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Device Function (ISO Function)**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* Yes		
	DD171 NMEA 2000 Function Code		Dependent on NMEA 2000 Device Class DD170, reference NMEA 2000, Table 8-1				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Reserved**		*Byte Field Size:*	*Bit Field Size:* 1	*Request Parameter* No		
	DD175 Dominant Bit		Set = 0				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**Device Class**		*Byte Field Size:*	*Bit Field Size:* 7	*Request Parameter* Yes		
	DD170 NMEA 2000 Device Class		Dependent on Industry Group DD 168, reference NMEA 2000, Table 8-1				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
8	**System Instance (ISO Device Class Instance)**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* Yes		
	DD169 Generic instance (4-bit)		0x0 to 0xF = Instance number 0 to 15;				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

9	**Industry Group**		*Byte Field Size:*	*Bit Field Size:*	3	*Request Parameter*	Yes
	DD168 Industry Group		0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserve for SAE 7 = Reserve for SAE				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
	Marine Industry Group, set = 4						
10	**Reserved (ISO Self Configurable)**		*Byte Field Size:*	*Bit Field Size:*	resv 1	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	

ISO Commanded Address

PGN: 065240
hex: FED8

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

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

Destination: Global *Query Support:* *ACK Rqmnts:* Refer to Section 6.4 of ISO 11783-5

Field # *Field Name* Original Reference ID # 83

1	**Unique Number (ISO Identity Number)**		*Byte Field Size:*	*Bit Field Size:*	21	*Request Parameter*	No	
	DD173 NMEA 2000 Unique Number			Binary number assigned by manufacturer to ensure that the NAME field for each manufactured device is unique, reference NMEA 2000 Network Management Section 8.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
2	**Manufacturer Code**		*Byte Field Size:*	*Bit Field Size:*	11	*Request Parameter*	Yes	
	DD172 NMEA 2000 Manufacturer Code			Assigned by NMEA 2000 Committee				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
3	**Device Instance Lower (ISO ECU Instance)**		*Byte Field Size:*	*Bit Field Size:*	3	*Request Parameter*	No	
	DD201 Generic instance 2 (3-bit)			0x0 to 0x7 = instance 0 to 7				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
4	**Device Instance Upper (ISO Function Instance)**		*Byte Field Size:*	*Bit Field Size:*	5	*Request Parameter*	No	
	DD174 Generic instance (5-bit)			0x00 to 0x1F = Instance 0 to 31;				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
5	**Device Function (ISO Function)**		*Byte Field Size:*	*Bit Field Size:*	8	*Request Parameter*	Yes	
	DD171 NMEA 2000 Function Code			Dependent on NMEA 2000 Device Class DD170, reference NMEA 2000, Table 8-1				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
6	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:*	1	*Request Parameter*	No	
	DD175 Dominant Bit			Set = 0				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
7	**Device Class**		*Byte Field Size:*	*Bit Field Size:*	7	*Request Parameter*	Yes	
	DD170 NMEA 2000 Device Class			Dependent on Industry Group DD 168, reference NMEA 2000, Table 8-1				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
8	**System Instance (ISO Device Class Instance)**		*Byte Field Size:*	*Bit Field Size:*	4	*Request Parameter*	No	
	DD169 Generic instance (4-bit)			0x0 to 0xF = Instance number 0 to 15;				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
9	**Industry Group**		*Byte Field Size:*	*Bit Field Size:*	3	*Request Parameter*	Yes	
	DD168 Industry Group			0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserve for SAE 7 = Reserve for SAE				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	Marine Group, set = 4							
10	**Reserved (ISO Self Configurable)**		*Byte Field Size:*	*Bit Field Size:*	resv 1	*Request Parameter*	No	
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			

11	**New Source Address**		*Byte Field Size:*		*Bit Field Size:* 8	*Request Parameter*	No
	DD176 Network Address			0x00 to 0xFB (0 to 251) = Claimable NMEA 2000 network address space; 0xFC (252) = Reserved; 0xFD (253) = Reserved; 0xFE (254) = Null address; 0xFF (255) = Global address			
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1	Used to construct bit fields	

Only values less than 252 shall be used.

NMEA - Request group function

PGN: 126208
hex: 1ED00

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

Request Group Function (0): This message requests the transmission of a specific set of data in a Parameter Group by setting variable parameters within the Parameter Group specified by the field number. Field number and parameter value may appear in any order in this message. When multiple fields and parameters are specified the request is treated as an "AND" function. This PGN may be used to set the transmission interval and the delay before the first transmission. It is recommended that only a System Tool alters the values of transmission time and that they be maintained after power cycling. All parameter value fields of this request must be padded if necessary to ensure byte boundaries are adhered to.

Command Group Function (1): This Command message is directed to a specific address, the Global Address (255) shall not be used. This command sets the value of one, some or all parameters in a Parameter Group. The number of parameters to set is in field 5, then follows the field number and the new value repeated for each of them. A Parameter Group may contain one group of parameters out of multiple instances where the instance number of the group is given in one field. A command to set any parameter of such a group must contain the field number and value of the group instance number.
Example is setting the name of a Tracked Target in PGN 128520, where the Target ID must be specified with the new Name. The field number and value of the group instance is included in the number of parameters to set (field 5) and is listed together with them. Field number and parameter value may appear in any order in this message, also all parameter value fields will be padded if necessary to ensure byte boundaries are adhered to.

Acknowledge Group Function (2): The Acknowledgement Reply is transmitted in response to a Request or Command Group Function message. In response to the Request Command, the Acknowledge is only required for a request that cannot be complied with. All fields applicable to the requested message are transmitted, fields where the error does not exist are set to 0x0 (No Error/Acknowledge).

Read Fields Group Function (3): This Read Fields Group Function provides a means to read specific fields in a PGN. The receiver of this message is expected to transmit to the sender a Read Fields Reply Group Function.

Read Fields Reply Group Function (4): This Read Fields Reply Group Function is a reply to the Read Fields Group Function.

Write Fields Group Function (5): This Write Fields Group Function provides a means to write specific fields in a PGN. The receiver of this message is expected to transmit to the sender a Write Fields Reply Group Function.

Write Fields Reply Group Function (6): This Write Fields Reply Group Function is a reply to the Write Fields Group Function.

Single Frame: No *Priority Default:* 3 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Address *Query Support:* Opt'l *ACK Rqmnts:* For Requested Group - Requested data as scheduled or AcknowledgeGroup Function with acknowledgement error codes.

For Command Group - 126208 Acknowledge Group Function must be transmitted.

Field #	*Field Name*					Original Reference ID # 1
1	**Complex Request Group Function Code**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No
	DD144 Group Function, Request/Command/Acknowledge		0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields, 4 = Read Fields Reply, 5 = Write Fields, 6 = Write Fields Reply			
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
	This is the Request message, set = 0x00.					
2	**Requested PGN**		*Byte Field Size:*	*Bit Field Size:* 24	*Request Parameter*	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	

3	**Transmission interval**	*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No	
	DD035 Data transmit interval	Time interval between data transmissions Where: 0x0000 0000 = Turn-off transmission, 0xFFFF FFFE = Restore Default Interval, (added NMEA Version 1.201) 0xFFFF FFFF = Do not change interval				
	DF65 Time interval, standard	**uint32**	*Range:* 0 to ~4.295x10E+6 s	*Resolution:* 1x10E-3 s		
	0xFFFF FFFF in this field and 0xFFFF in field 4: Transmit now without changing timing variables.					
4	**Transmission interval offset**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD036 Data transmit offset	Offset in transmit time from time of request command: 0x0 = transmit immediately, 0xFFFF = Do not change offset.				
	DF66 Time interval, .01sec	**uint16**	*Range:* 0 to 655.32s	*Resolution:* 1x10-2sec		
	0xFFFF in this field and 0xFFFF FFFF in field 3: Transmit now without changing timing variables.					
5	**Number of Pairs of Request Parameters to follow**	*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No	
	DD006 Generic counter, short	Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
6	**Field number of first requested parameter**	*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No	
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
7	**Value of first requested parameter**	*Byte Field Size:* ?	*Bit Field Size:*	*Request Parameter*	No	
	DD000 Undefined	Application specific, defined at time of use				
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.	
	Requested parameter size and type is dependent on the PGN and the specific request parameter field.					
8	**Variable Number of fields, Field number 6 repeated**	*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No	
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
9	**Variable Number of fields, Field number 7 repeated**	*Byte Field Size:* ?	*Bit Field Size:*	*Request Parameter*	No	
	DD000 Undefined	Application specific, defined at time of use				
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.	
	Requested parameter size and type is dependent on the PGN and the specific request parameter field.					

Original Reference ID # 2

Field #	Field Name						
1	**Command Group Function Code**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD144 Group Function, Request/Command/Acknowledge		0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields, 4 = Read Fields Reply, 5 = Write Fields, 6 = Write Fields Reply				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
	This is the Command message, set = 0x01.						
2	**Commanded PGN**		Byte Field Size:	Bit Field Size: 24		Request Parameter	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
3	**Priority Setting**		Byte Field Size:	Bit Field Size: 4		Request Parameter	No
	DD182 Priority, Set		0x0 to 0x7 = commanded priority value; 0x8 = do not change priority; 0x9 = return priority to default; 0xA to 0xF = reserved				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
4	**Reserved Bits**		Byte Field Size:	Bit Field Size: resv 4		Request Parameter	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	4 Bits needed to fill out the byte						
5	**Number of Pairs of Commanded Parameters to follow**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
6	**Field number of first commanded parameter**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
7	**Value of first command parameter**		Byte Field Size: ?	Bit Field Size:		Request Parameter	No
	DD000 Undefined		Application specific, defined at time of use				
	DF00 Undefined	**Undefined**	Range: undefined	Resolution: undefined	Application specific, defIned at time of use.		
	Commanded parameter size and type is dependent on the PGN and the specific command parameter field.						
8	**Variable Number of fields, Field number 6 repeated**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
9	**Variable Number of fields, Field number 7 repeated**		Byte Field Size: ?	Bit Field Size:		Request Parameter	No
	DD000 Undefined		Application specific, defined at time of use				
	DF00 Undefined	**Undefined**	Range: undefined	Resolution: undefined	Application specific, defIned at time of use.		
	Commanded parameter size and type is dependent on the PGN and the specific command parameter field.						

Field # *Field Name* Original Reference ID # 3

1	**Acknowledgment Group Function Code**	*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No			
	DD144 Group Function, Request/Command/Acknowledge	0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields, 4 = Read Fields Reply, 5 = Write Fields, 6 = Write Fields Reply					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	This is the Acknowlwdgment message, set = 0x02.						
2	**Requested or Commanded PGN # being acknowledged**	*Byte Field Size:*	*Bit Field Size:* 24	*Request Parameter* No			
	DD009 PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**PGN error code**	*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No			
	DD037 Error codes, Acknowledgement	0x0 = No Error/Acknowledge, 0x1 = PGN not supported, 0x2 = PGN temporarily not available, 0x3 = Access denied, 0x4 = Request is not supported.					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Value 0x4 indicates that "Request is not supported." For this condition field 4 will be 0x4 - "Request Not Supported" and field 5 will be 0xFF indicating no additional "parameter error code" fields following.						
4	**Transmission Interval / Priority error code**	*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No			
	DD139 Error codesTransmit interval acknowledgement	0x0 = No Error/Acknowledge, 0x1 = Transmit Interval /Priority not supported, 0x2 = Transmit interval is less than measurement/calculation interval, 0x3 = Access denied. 0x4 = Request is not supported.					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Number of Requested or Commanded Parameters**	*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No			
	DD006 Generic counter, short	Numeric count, event counter, sequence counter					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	Value 0xFF indicates no fields follow						
6	**First parameter error code**	*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No			
	DD141 Error codesCommand acknowledgement	0x0 = No Error/Acknowledge; 0x1 = Invalid request or command parameter field; 0x2 = Temporarily unable to comply; 0x3 = Request or command parameter out-of-range; 0x4 = Access denied; 0x5 = Request or Command Group Function not supported					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**Variable Number of fields, Field number 6 repeated**	*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No			
	DD141 Error codesCommand acknowledgement	0x0 = No Error/Acknowledge; 0x1 = Invalid request or command parameter field; 0x2 = Temporarily unable to comply; 0x3 = Request or command parameter out-of-range; 0x4 = Access denied; 0x5 = Request or Command Group Function not supported					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

Original Reference ID # 191

Field #	Field Name						
1	**Complex Request Group Function Code**	Byte Field Size: 1	Bit Field Size:	Request Parameter: No			
	DD144 Group Function, Request/Command/Acknowledge	0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields, 4 = Read Fields Reply, 5 = Write Fields, 6 = Write Fields Reply					
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
	This is the Read Fields message, set = 0x03						
2	**PGN Number**	Byte Field Size:	Bit Field Size: 24	Request Parameter: No			
	DD009 PGN	24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first					
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
3	**Manufacturer's Code**	Byte Field Size:	Bit Field Size: 11	Request Parameter: No			
	DD172 NMEA 2000 Manufacturer Code	Assigned by NMEA 2000 Committee					
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
4	**Reserve Bits**	Byte Field Size:	Bit Field Size: resv 2	Request Parameter: No			
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
5	**Industry Group**	Byte Field Size:	Bit Field Size: 3	Request Parameter: No			
	DD168 Industry Group	0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserve for SAE 7 = Reserve for SAE					
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
6	**Unique ID**	Byte Field Size: 1	Bit Field Size:	Request Parameter: No			
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
7	**Number of pairs of Commanded Parameters Fields**	Byte Field Size: 1	Bit Field Size:	Request Parameter: No			
	DD006 Generic counter, short	Numeric count, event counter, sequence counter					
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
8	**Number of pairs of Fields to Read**	Byte Field Size: 1	Bit Field Size:	Request Parameter: No			
	DD006 Generic counter, short	Numeric count, event counter, sequence counter					
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
9	**Field Number of first Commanded Parameter**	Byte Field Size: 1	Bit Field Size:	Request Parameter: No			
	DD005 Generic numeric ID, short	Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		

10	**Value of first Commanded Parameter**		*Byte Field Size:*	?	*Bit Field Size:*		*Request Parameter*	No
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:*	undefined	*Resolution:*	undefined	Application specific, defIned at time of use.	
11	**Variable Number of fields, field 9 repeated**		*Byte Field Size:*	1	*Bit Field Size:*		*Request Parameter*	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:*	0 to 252	*Resolution:*	1 bit	Unit-less number	
12	**Variable Number of Fields, field 10 repeated**		*Byte Field Size:*	?	*Bit Field Size:*		*Request Parameter*	No
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:*	undefined	*Resolution:*	undefined	Application specific, defIned at time of use.	
13	**Field Number of first Field to Read**		*Byte Field Size:*	1	*Bit Field Size:*		*Request Parameter*	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:*	0 to 252	*Resolution:*	1 bit	Unit-less number	
14	**Variable Number of Fields, field 13 repeated**		*Byte Field Size:*	1	*Bit Field Size:*		*Request Parameter*	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:*	0 to 252	*Resolution:*	1 bit	Unit-less number	

NMEA - Read Fields Reply - group function

PGN: 126208
hex: 1ED00

Original Reference ID # 192

Field #	Field Name						
1	**Complex Request Group Function Code**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD144 Group Function, Request/Command/Acknowledge		0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields, 4 = Read Fields Reply, 5 = Write Fields, 6 = Write Fields Reply				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
	This is the Read Fields Reply message, set = 0x04						
2	**PGN Number**		Byte Field Size:	Bit Field Size: 24		Request Parameter	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
3	**Manufacturer's Code**		Byte Field Size:	Bit Field Size: 11		Request Parameter	No
	DD172 NMEA 2000 Manufacturer Code		Assigned by NMEA 2000 Committee				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
4	**Reserve Bits**		Byte Field Size:	Bit Field Size: resv 2		Request Parameter	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
5	**Industry Group**		Byte Field Size:	Bit Field Size: 3		Request Parameter	No
	DD168 Industry Group		0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserve for SAE 7 = Reserve for SAE				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
6	**Unique ID**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
7	**Number of pairs of Commanded Parameters Fields**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
8	**Number of pairs of Fields to Read**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
9	**Field Number of first Commanded Parameter**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		

10	**Value of first Commanded Parameter**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			
11	**Variable Number of fields, field 9 repeated**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
12	**Variable Number of Fields, field 10 repeated**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			
13	**Field Number of first Field to Read**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
14	**Value of first Field to Read**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			
15	**Variable Number of Fields, field 13 repeated**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
16	**Variable Number of Fields, field 14 repeated**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			

Original Reference ID # 193

Field #	Field Name						
1	**Complex Request Group Function Code**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD144 Group Function, Request/Command/Acknowledge		0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields, 4 = Read Fields Reply, 5 = Write Fields, 6 = Write Fields Reply				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
	This is the Write Fields message, set = 0x05						
2	**PGN Number**		Byte Field Size:	Bit Field Size: 24		Request Parameter	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
3	**Manufacturer's Code**		Byte Field Size:	Bit Field Size: 11		Request Parameter	No
	DD172 NMEA 2000 Manufacturer Code		Assigned by NMEA 2000 Committee				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
4	**Reserve Bits**		Byte Field Size:	Bit Field Size: resv 2		Request Parameter	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
5	**Industry Group**		Byte Field Size:	Bit Field Size: 3		Request Parameter	No
	DD168 Industry Group		0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserve for SAE 7 = Reserve for SAE				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
6	**Unique ID**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
7	**Number of pairs of Commanded Parameters Fields**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
8	**Number of pairs of Fields to Written**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
9	**Field Number of first Commanded Parameter**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		

10	**Value of first Commanded Parameter**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			
11	**Variable Number of fields, field 9 repeated**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
12	**Variable Number of Fields, field 10 repeated**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			
13	**Field Number of first Field to be Written**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
14	**Value of first Field to be written**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			
15	**Variable Number of Fields, field 13 repeated**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
16	**Variable Number of Fields, field 14 repeated**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			

NMEA - Write Fields Reply - group function

PGN: 126208
hex: 1ED00

Original Reference ID # 194

Field #	Field Name						
1	**Complex Request Group Function Code**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD144 Group Function, Request/Command/Acknowledge		0 = Request Message, 1 = Command Message, 2 = Acknowledge Message, 3 = Read Fields, 4 = Read Fields Reply, 5 = Write Fields, 6 = Write Fields Reply				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
	This is the Write Fields Reply message, set = 0x06						
2	**PGN Number**		Byte Field Size:	Bit Field Size: 24		Request Parameter	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
3	**Manufacturer's Code**		Byte Field Size:	Bit Field Size: 11		Request Parameter	No
	DD172 NMEA 2000 Manufacturer Code		Assigned by NMEA 2000 Committee				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
4	**Reserve Bits**		Byte Field Size:	Bit Field Size: resv 2		Request Parameter	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
5	**Industry Group**		Byte Field Size:	Bit Field Size: 3		Request Parameter	No
	DD168 Industry Group		0 = Global; 1 = On-Highway; 2 = Agricultural and Forestry; 3 = Construction; 4 = Marine; 5 = Industrial - Process Control - Stationary (Gen-Sets) 6 = Reserve for SAE 7 = Reserve for SAE				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	Field Specified Only for Proprietary PGN Messages, Otherwise skip to next field.						
6	**Unique ID**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
7	**Number of pairs of Commanded Parameters Fields**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
8	**Number of pairs of Fields to Written**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
9	**Field Number of first Commanded Parameter**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		

10	**Value of first Commanded Parameter**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			
11	**Variable Number of fields, field 9 repeated**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
12	**Variable Number of Fields, field 10 repeated**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			
13	**Field Number of first Field to be Written**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
14	**Status of first Field Written**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			
15	**Variable Number of Fields, field 13 repeated**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
16	**Variable Number of Fields, field 14 repeated**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No	
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			

PGN List - Transmit PGN's group function

PGN: 126464
hex: 1EE00

The Transmit / Receive PGN List Group type of function is defined by first field. The message will be a Transmit or Receive PGN List group function. These are defined as follows:

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

Receive PGN List group function: This message contains a list of the Receive PGNs that are supported by a device.

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

This PGN will be requested as needed.

Single Frame:	No	*Priority Default:*	6	*Default Update Rate:*	NA milliseconds	*Frequency:*	NA cycles per second
Destination:	Address	*Query Support:*	Req'd	*ACK Rqmnts:*	Requested data or AcknowledgementGroup Function containing error codes of reasons for non-compliance.		

Field #	*Field Name*						Original Reference ID # 6
1	**Transmitted PGN Group Function Code**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	Yes
	DD145 Group Function, Transmit and Receive PGN List		0 = Transmit PGN List Message, 1 = Receive PGN List Message				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	This is the Transmitted Group List, set = 0x00						
2	**First PGN supported**		*Byte Field Size:*	*Bit Field Size:* 24		*Request Parameter*	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Variable Number of fields, Field number 2 repeated**		*Byte Field Size:*	*Bit Field Size:* 24		*Request Parameter*	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

PGN List - Received PGN's group function

PGN: 126464
hex: 1EE00

Original Reference ID # 7

Field #	Field Name						
1	**Received PGN Group Function Code**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	Yes
	DD145 Group Function, Transmit and Receive PGN List		0 = Transmit PGN List Message, 1 = Receive PGN List Message				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	This is the Receive Group List, set = 0x01						
2	**First PGN supported**		*Byte Field Size:*	*Bit Field Size:* 24		*Request Parameter*	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Variable Number of fields, Field number 2 repeated**		*Byte Field Size:*	*Bit Field Size:* 24		*Request Parameter*	No
	DD009 PGN		24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

System Time

PGN: 126992
hex: 1F010

The purpose of this PGN is twofold:

- To provide a regular transmission of UTC time and date
- To provide synchronism for measurement data

This transmission is required to be output on a regular basis with minimal latency to ensure that the SID (sequence identification number) can be used effectively.

Single Frame:	Yes	Priority Default:	3	Default Update Rate:	1,000 milliseconds	Frequency:	1. cycles per second
Destination:	Global	Query Support:	Opt'l	ACK Rqmnts:			

Original Reference ID # 29

Field #	Field Name						
1	**SID**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number		
2	**Source**		Byte Field Size:	Bit Field Size: 4		Request Parameter	No
	DD066 Time Source		0x0 = GPS, 0x1 =GLONASS, 0x2 = WWV or equivalent Radio Station Time Sync, 0x3 = Local Cesium clock, 0x4 = Local Rubidium clock, 0x5 = Local Crystal clock, 0x6 - 0xE = reserved, 0xF = Null				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
3	**Reserved Bits**		Byte Field Size:	Bit Field Size: resv 4		Request Parameter	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	4 Bits needed to fill out the byte						
4	**Date**		Byte Field Size: 2	Bit Field Size:		Request Parameter	No
	DD039 Generic date		Days since January 1, 1970, Date is relative to UTC Time.				
	DF41 Date, day count	**uint16**	Range: 0 to 65,532 days	Resolution: 1 day	0 = January 1, 1970, max = ~179 years		
5	**Time**		Byte Field Size: 4	Bit Field Size:		Request Parameter	No
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC				
	DF06 Time of day	**uint32**	Range: 0 to 86,401 s	Resolution: 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day		

Product Information

PGN: 126996
hex: 1F014

Provides product information onto the network that could be important for determining quality of data coming from this product. Each field must be provided if the data is typically available from such a product. At minimum the NMEA 2000 Version, NMEA Manufacturer's Product Code, and NMEA 2000 Certification Level must be provided

This PGN will be requested as needed.

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

Destination: Global *Query Support:* Req'd *ACK Rqmnts:*

Field #	*Field Name*					Original Reference ID # 4
1	**NMEA 2000 Database Version**	*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Assigned by the NMEA 2000: Decimal Number of the format AA.BBB where AA is the major release and BBB is a minor release. The decimal point position is assumed. i.e. The first release of this standard is value 1000, which is to be refered to as Version 1.000					
2	**NMEA Manufacturer's Product Code**	*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	Yes
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Assigned by the NMEA 2000: Decimal Number assigned numerically to a manufacturer's product. If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will with the unit's product code. Otherwise if this field is specified only the units with a matching product code will respond with this PGN.					
3	**Manufacturer's Model ID**	*Byte Field Size:* char n	*Bit Field Size:*		*Request Parameter*	No
	DD192 Generic String, ASCII, Fixed length	Length specified by PGN field definition.				
	DF63 String, fixed **char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary		
	This is a n=32 character string, Format defined and documented by manufacturer. The beginning of the field should clearly define Manufacturer's Product.					
4	**Manufacturer's Software Version Code**	*Byte Field Size:* char n	*Bit Field Size:*		*Request Parameter*	No
	DD192 Generic String, ASCII, Fixed length	Length specified by PGN field definition.				
	DF63 String, fixed **char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary		
	This is a n=32 character string, Format defined and documented by manufacturer.					
5	**Manufacturer's Model Version**	*Byte Field Size:* char n	*Bit Field Size:*		*Request Parameter*	No
	DD192 Generic String, ASCII, Fixed length	Length specified by PGN field definition.				
	DF63 String, fixed **char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary		
	This is a n=32 character string, Format defined and documented by manufacturer.					
6	**Manufacturer's Model Serial Code**	*Byte Field Size:* char n	*Bit Field Size:*		*Request Parameter*	No
	DD192 Generic String, ASCII, Fixed length	Length specified by PGN field definition.				
	DF63 String, fixed **char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary		
	This is a n=32 character string, Format defined and documented by manufacturer.					

7	**NMEA 2000 Certification Level**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD226 NMEA 2000 Certification Level		0 = Level A, 1 = Level B				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
8	**Load Equivalency**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD257 Load Equivalency Number		The "Load Equivalency Number" is defined in the NMEA 2000 Standard's Main Document in section 2.4.7 Interface Power. Please consult this for details.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		

Configuration Information

PGN: 126998
hex: 1F016

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

This PGN will be requested as needed.

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

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 5

1 **Installation Description, Field 1** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* No

DD004 Generic name string, short — Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

70 ASCII or 35 Unicode characters maximum

2 **Installation Description, Field 2** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* No

DD004 Generic name string, short — Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

70 ASCII or 35 Unicode characters maximum

3 **Manufacturer Information, Field 3** *Byte Field Size:* 8 or 16 | n *Bit Field Size:* *Request Parameter* No

DD004 Generic name string, short — Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

70 ASCII or 35 Unicode characters maximum

Heading/Track Control

PGN: 127237
hex: 1F105

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

Single Frame: No *Priority Default:* 2 *Default Update Rate:* 250 milliseconds *Frequency:* 4. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 54

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

2 Off-Heading Limit Exceeded *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD002 Generic status pair
MSB/LSB:
00 = [No, Off, Disabled, Reset, "0"],
01 = [Yes, On, Enabled, Set, "1"],
10 = Error,
11= [Unavailable, Unknown]
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Off-Heading Limit field can be generated if the Steering Mode is Heading Control Standalone, Heading Control, or Track Control.

3 Off-Track Limit Exceeded *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD002 Generic status pair
MSB/LSB:
00 = [No, Off, Disabled, Reset, "0"],
01 = [Yes, On, Enabled, Set, "1"],
10 = Error,
11= [Unavailable, Unknown]
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Off-Track Limit field can be generated if the Steering Mode is Track Control.

4 Override *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD163 Autopilot Override
1 = Yes, 0 = No. Yes means a temporary interruption of the selected steering mode. As long as this field is Yes, Steering Mode and Turn Mode shall be ignored by the heading/track controller and its computing parts shall operate as if manual steering was selected.
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

5 Steering Mode *Byte Field Size:* *Bit Field Size:* 3 *Request Parameter* No
DD153 Steering Mode
MSB/LSB:
000 = Main Steering,
001 = Non-Follow-up Device,
010 = Follow-up Device,
011 = Heading Control Standalone,
100 = Heading Control,
101 = Track Control.
Definitions: Main Steering/Outside System – The main steering system is in use.
Non-Follow-up Device – The system provides non-follow-up control. Rudder is moved in the commanded direction but a specific angle is not maintained.
Follow-up – The system provides follow-up control. Rudder is moved to the commanded angle and maintained at that angle.
Heading Control Standalone – The system works as a standalone heading controller.
Heading Control – The system works as a remotely controlled heading controller with the commanded course input from an external device.
Track Control – The system works as a track controller by correcting a commanded course. Corrections are based on additionally received track errors.
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

6	**Turn Mode**		*Byte Field Size:*		*Bit Field Size:*	3	*Request Parameter*	No
	DD152 Turn Method		MSB/LSB: 000 = Rudder Limit controlled, 001 = turn rate controlled, 010 = radius controlled. Definitions: Rudder – An operator set rudder limit determines the maximum turning capability available, in which case the system outputs rudder orders up to and limited by the rudder limit. Turn Rate – An operator set turn rate limit determines the maximum turning capability available, in which case the system controls the rate of turn using whatever value of rudder order is necessary to control the rate. Radius – An operator set turn radius determines the maximum turning capability available which in this case is described as the minimum turn radius, in which case the system controls the rate of turn corresponding to the set turn radius.					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
7	**Heading Reference**		*Byte Field Size:*		*Bit Field Size:*	2	*Request Parameter*	No
	DD117 Direction reference		0 = True, 1 = Magnetic, 2 = Error, 3 = Null					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
8	**Reserved Bits**		*Byte Field Size:*		*Bit Field Size:*	resv 5	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
	5 Bits needed to fill out the byte							
9	**Commanded Rudder Direction**		*Byte Field Size:*		*Bit Field Size:*	3	*Request Parameter*	No
	DD147 Directional Command		MSB/LSB: 000 = No Order, 001 = Move to starboard, 010 = Move to port.					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
10	**Commanded Rudder Angle**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD146 Rudder Angle Signed		Rudder angle where positive values are starboard and negative values are port					
	DF04 Angle, signed	**int16**	*Range:*	+/-Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg	
11	**Heading-To-Steer (Course)**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD113 Course		The horizontal direction in which a vessel is steered or intended to be steered, expressed as angular distance 000 north, clockwise through 359 degrees. Not to be confused with Course-over-ground, Track, or Heading.					
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
12	**Track**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD166 Track		The intended or desired horizontal direction of travel with respect to the earth. The track expressed in degrees of the compass may differ from the course due to allowances made in the course for such factors as sea and weather conditions in order to achieve the desired track. This field represents the course line (leg) between two waypoints. It may be altered dynamically in a track-controlled turn along a pre-planned radius.					
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
13	**Rudder Limit**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD148 Angular Limit							
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	

14 **Off-Heading Limit** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD148 Angular Limit
DF02 Angle **uint16** *Range:* 0 to 2Pi rad *Resolution:* 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad
Off-Heading Limit field can be generated if the Steering Mode is Heading Control Standalone, Heading Control, or Track

15 **Radius of Turn Order** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD149 Distance ordered
A commanded distance like radius order, off-track limit, etc.
DF74 Distance, rough **int16** *Range:* +/-32,764 m *Resolution:* 1 m

16 **Rate of Turn Order** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD150 Rate of Turn
+ = Bow turning to starboard, 1 deg/min = .00029 rad/sec
DF73 Angular rate, signed **int16** *Range:* +/-1.0 rad/s *Resolution:* 1/32 x 10E-3 rad/s Resolution 0.1 deg/min

17 **Off-Track Limit** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD149 Distance ordered
A commanded distance like radius order, off-track limit, etc.
DF74 Distance, rough **int16** *Range:* +/-32,764 m *Resolution:* 1 m
Off-Track field can be generated if the Steering Mode is Track Control.

18 **Vessel Heading** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD167 Heading
The horizontal direction in which a ship actually points or heads at any instant, expressed in angular units from a reference direction, usually from 000 at the reference direction clockwise through 359 degrees.
DF02 Angle **uint16** *Range:* 0 to 2Pi rad *Resolution:* 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad

Rudder

PGN: 127245
hex: 1F10D

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

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 100 milliseconds *Frequency:* 10. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 53

1 **Rudder Instance** *Byte Field Size:* *Bit Field Size:* 8 *Request Parameter* Yes
DD128 Generic instance

For Engines:
0 = Instance 0; 0 = Single Engine or Dual Engine Port
1 = Instance 1; 1 = Dual Engine StarBoard
(for Multiple Engines, Instances will start
thru from Bow, Port (0) to Stern, Starboard (n))

n = Instance n, where n < 253
253 = Reserve
254 = Error;
255 = Not available

DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Rudder Instances. (This PGN will be transmitted for each instance.)

2 **Direction Order** *Byte Field Size:* *Bit Field Size:* 3 *Request Parameter* No
DD147 Directional Command

MSB/LSB:
000 = No Order,
001 = Move to starboard,
010 = Move to port.

DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Value should be "Not Available" when Angle Order is provided.

3 **Reserved Bits** *Byte Field Size:* *Bit Field Size:* resv 5 *Request Parameter* No
DD001 Reserved field

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

DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
5 Bits needed to fill out the byte

4 **Angle Order** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD146 Rudder Angle Signed

Rudder angle where positive values are starboard and negative values are port

DF04 Angle, signed **int16** *Range:* +/-Pi rad *Resolution:* 1x10E-4 rad Resolution ~0.0057deg
Value should be "Not Available" when Direction Order is provided.

5 **Position** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD146 Rudder Angle Signed

Rudder angle where positive values are starboard and negative values are port

DF04 Angle, signed **int16** *Range:* +/-Pi rad *Resolution:* 1x10E-4 rad Resolution ~0.0057deg

6 **Reserved Bits** *Byte Field Size:* *Bit Field Size:* resv 16 *Request Parameter* No
DD001 Reserved field

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

DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Needed to fill the CAN frame.

Vessel Heading

PGN: 127250
hex: 1F112

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

To obtain Magnetic Heading from the Heading Sensor Reading: Add Deviation to Heading Sensor Reading.

To obtain True Heading: Add Variation to Magnetic Heading.

The Heading Sensor Reading may or may not be corrected for Deviation and the Deviation field set to 'DataNotAvailable'. (A fluxgate compass may be compensated for Deviation without being able to produce the Deviation corresponding to every Heading)

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

Variation provided in this PGN is the one currently in use by this device. If this device is also a source of variation, it should also tranmit Magnetic Variation PGN 127258.

A steering compass must send rapidly, a second backup compass may send at a slower rate, a Variation only source may send this at a slow rate.

A deviation table may be programmed into the compass using the Complex Command Group function message and sending Heading Sensor Reading and Deviation for each entry of the table.

Single Frame:	Yes	*Priority Default:*	2	*Default Update Rate:*	100 milliseconds	*Frequency:*	10. cycles per second
Destination:	Global	*Query Support:*	Opt'l	*ACK Rqmnts:*			

Original Reference ID # 56

Field #	*Field Name*						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No	
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Heading Sensor Reading**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD118 Heading Sensor Reading		Primary output of heading as indicated by the heading sensor.				
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad		
3	**Deviation**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD151 Magnetic Heading Correction		Positive values are Easterly and negative values are Westerly.				
	DF04 Angle, signed	**int16**	*Range:* +/-Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg		
4	**Variation**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD151 Magnetic Heading Correction		Positive values are Easterly and negative values are Westerly.				
	DF04 Angle, signed	**int16**	*Range:* +/-Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg		
5	**Heading Sensor Reference**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter*	No	
	DD117 Direction reference		0 = True, 1 = Magnetic, 2 = Error, 3 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 6	*Request Parameter*	No	
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Needed to fill the CAN frame.						

Rate of Turn

PGN: 127251
hex: 1F113

Rate of Turn is the rate of change of the Heading.

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

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 100 milliseconds *Frequency:* 10. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 90

Field #	*Field Name*							
1	**Sequence ID**		*Byte Field Size:* 1	*Bit Field Size:*			*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
2	**Rate of Turn**		*Byte Field Size:* 4	*Bit Field Size:*			*Request Parameter*	No
	DD224 Rate of Turn		+ = Bow turning to starboard, 1 deg/min = .00029 rad/sec					
	DF85 Angular rate, signed - Pre	**int32**	*Range:* +/-67.0 rad/s (approx. 230703 deg/min	*Resolution:* 1/32 x 10E-6 rad/s				
3	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 24			*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			

Attitude

PGN: 127257
hex: 1F119

This PGN provides a single transmission that describes the position of a vessel relative to both horizontal and vertical planes. This would typically be used for vessel stabilization, vessel control and onboard platform stabilization.

Products that directly interface to pitch, roll and yaw transducers would transmit this PGN

Single Frame: Yes *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 35

Field #	Field Name						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Yaw**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD063 Yaw		Oscillation of ship about it's vertical axis. Bow moving to starboard is positive.				
	DF04 Angle, signed	**int16**	*Range:* +/-Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg		
3	**Pitch**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD062 Pitch		Oscillation of ship about it's latitudinal axis. Bow moving up is positive.				
	DF04 Angle, signed	**int16**	*Range:* +/-Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg		
4	**Roll**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD061 Roll		Oscillation of ship about it's longitudinal axis. Roll to the starboard is positive.				
	DF04 Angle, signed	**int16**	*Range:* +/-Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg		
	Roll to starboard is positive +/- 180 degrees						
5	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 8		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Needed to fill the CAN frame.						

Magnetic Variation

PGN: 127258
hex: 1F11A

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

Single Frame: Yes *Priority Default:* 7 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 92

Field #	*Field Name*						
1	**Sequence ID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Variation Source**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD232 Variation Source		0x00 = Manual Entry, "Variation has been entered via key entry" 0x01 = Automatic - Chart, "Variation is derived from cartograhy present in system" 0x02 = Automatic Table, "Variation has been computed from tabular based system" 0x03 = Automatic Calculation, "Variation has been derived via calculation" 0x04 = WMM 2000, "Variation is calc via World Magnetic Model for 2000" 0x05 = WMM 2005, "Variation is calc via World Magnetic Model for 2005" 0x06 = WMM 2010, "Variation is calc via World Magnetic Model for 2010" 0x07 = WMM 2015, "Variation is calc via World Magnetic Model for 2015" 0x08 = WMM 2020, "Variation is calc via World Magnetic Model for 2020" 0x09 = Reserve, thru 0x0E = Reserve, 0x0F = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 4		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Age of Service (Date)**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD039 Generic date		Days since January 1, 1970, Date is relative to UTC Time.				
	DF41 Date, day count	**uint16**	*Range:* 0 to 65,532 days	*Resolution:* 1 day	0 = January 1, 1970, max = ~179 years		
5	**Variation**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD151 Magnetic Heading Correction		Positive values are Easterly and negative values are Westerly.				
	DF04 Angle, signed	**int16**	*Range:* +/-Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg		

Engine Parameters, Rapid Update

PGN: 127488
hex: 1F200

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

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 100 milliseconds *Frequency:* 10. cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 88

Field #	Field Name						
1	**Engine Instance**		*Byte Field Size:*		*Bit Field Size:* 8		*Request Parameter* Yes
	DD128 Generic instance			For Engines: 0 = Instance 0; 0 = Single Engine or Dual Engine Port 1 = Instance 1; 1 = Dual Engine StarBoard thru (for Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n)) n = Instance n, where n < 253 253 = Reserve 254 = Error; 255 = Not available		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Engine Instances. (This PGN will be transmitted for each instance.)						
2	**Engine Speed**		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DD129 Rate of rotation						
	DF72 Rotational rate, unsigned	**uint16**	*Range:* 0-16,383 RPM	*Resolution:* 1/4 RPM			
3	**Engine Boost Pressure**		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DD049 Generic Pressure						
	DF47 Pressure, medium	**uint16**	*Range:* 0 to 6,553,200 Pa	*Resolution:* 1x10E+2 Pa			
4	**Engine tilt/trim**		*Byte Field Size:* 1		*Bit Field Size:*		*Request Parameter* No
	DD138 Generic percent of range						
	DF30 Percent, Relative measure	**int8**	*Range:* +/- 124%	*Resolution:* 1%			
	Range 0 - 100%, where 0% =Full Down (trim) and 100% = Full Up (tilt) Positions						
5	**Reserved Bits**		*Byte Field Size:*		*Bit Field Size:* resv 16		*Request Parameter* No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Needed to fill the CAN frame.						

Engine Parameters, Dynamic

PGN: 127489
hex: 1F201

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

Single Frame: No | *Priority Default:* 2 | *Default Update Rate:* 500 milliseconds | *Frequency:* 2. cycles per second
Destination: Global | *Query Support:* Opt'l | *ACK Rqmnts:*

Original Reference ID # 47

Field #	Field Name						
1	**Engine instance** **DD128** Generic instance		*Byte Field Size:*		*Bit Field Size:* 8		*Request Parameter* Yes
				For Engines: 0 = Instance 0; 0 = Single Engine or Dual Engine Port 1 = Instance 1; 1 = Dual Engine StarBoard (for Multiple Engines, Instances will start thru from Bow, Port (0) to Stern, Starboard (n)) n = Instance n, where n < 253 253 = Reserve 254 = Error; 255 = Not available		
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1		Used to construct bit fields
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Engine Instances. (This PGN will be transmitted for each instance.)						
2	**Engine oil pressure** **DD049** Generic Pressure		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DF47 Pressure, medium	**uint16**	*Range:* 0 to 6,553,200 Pa		*Resolution:* 1x10E+2 Pa		
3	**Engine oil temp.** **DD130** Temperature, high		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DF38 Temperature, high	**uint16**	*Range:* 0 to 6,553.2 deg K		*Resolution:* 1x10E-1 deg K		
4	**Engine temp.** **DD043** Generic Temperature		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K		*Resolution:* 1x10E-2 deg K		
5	**Alternator potential** **DD136** Voltage, DC		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DF42 Voltage, high	**int16**	*Range:* +/- 327.64 V		*Resolution:* 1x10E-2 V		
6	**Fuel rate** **DD131** Flow rate, low		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DF18 Flow rate, low	**int16**	*Range:* +/-3.2764 cu-m/hr		*Resolution:* 1x10E-4 cu-m/hr		
7	**Total engine hours** **DD132** Run time, Engine		*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter* No
	DF67 Time interval, large	**uint32**	*Range:* 0 to ~4.295x10E+9 s		*Resolution:* 1 sec		
8	**Engine coolant pressure** **DD049** Generic Pressure		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DF47 Pressure, medium	**uint16**	*Range:* 0 to 6,553,200 Pa		*Resolution:* 1x10E+2 Pa		
9	**Fuel Pressure** **DD225** Generic Pressure High		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DF29 Pressure	**uint16**	*Range:* 0 to 65,532,000 Pa		*Resolution:* 1x10E+3 Pa		

10 **Not Available** *Byte Field Size:* *Bit Field Size:* resv 8 *Request Parameter* No

DD001 Reserved field — Variable number of reserved bits, all set to logic "1"

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

Previously asssigned Eng tilt/trim, moved to PGN127488 field 4 for faster update rate. This value to be always set to +127 (Not Available) until future reuse.

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11 **Engine Discrete Status 1** *Byte Field Size:* *Bit Field Size:* 16 *Request Parameter* No

DD206 Engine Discrete Warning Status

xxxx xxxx xxxx xxx1 = Check Engine,
xxxx xxxx xxxx xx1x = Over Temperature,
xxxx xxxx xxxx x1xx = Low Oil Pressure,
xxxx xxxx xxxx 1xxx = Low Oil Level,
xxxx xxxx xxx1 xxxx = Low Fuel Pressure,
xxxx xxxx xx1x xxxx = Low System Voltage,
xxxx xxxx x1xx xxxx = Low Coolant Level,
xxxx xxxx 1xxx xxxx = Water Flow,
xxxx xxx1 xxxx xxxx = Water in Fuel,
xxxx xx1x xxxx xxxx = Charge Indicator,
xxxx x1xx xxxx xxxx = Preheat Indicator,
xxxx 1xxx xxxx xxxx = High Boost Pressure,
xxx1 xxxx xxxx xxxx = Rev Limit Exceeded,
xx1x xxxx xxxx xxxx = EGR System,
x1xx xxxx xxxx xxxx = Throttle Position Sensor,
1xxx xxxx xxxx xxxx = Engine Emergency Stop Mode
where x = don't care

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

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12 **Engine Discrete Status 2** *Byte Field Size:* *Bit Field Size:* 16 *Request Parameter* No

DD223 Engine Discrete Warning Status

xxxx xxxx xxxx xxx1 = Warning Level 1,
xxxx xxxx xxxx xx1x = Warning Level 2,
xxxx xxxx xxxx x1xx = Power Reduction,
xxxx xxxx xxxx 1xxx = Maintenance Needed,
xxxx xxxx xxx1 xxxx = Engine Comm Error,
xxxx xxxx xx1x xxxx = Sub or Secondary Throttle,
xxxx xxxx x1xx xxxx = Neutral Start Protect,
xxxx xxxx 1xxx xxxx = Engine Shutting Down,
xxxx xxx1 xxxx xxxx = reserved,
xxxx xx1x xxxx xxxx = reserved,
xxxx x1xx xxxx xxxx = reserved,
xxxx 1xxx xxxx xxxx = reserved,
xxx1 xxxx xxxx xxxx = reserved,
xx1x xxxx xxxx xxxx = reserved,
x1xx xxxx xxxx xxxx = reserved,
1xxx xxxx xxxx xxxx = reserved,
where x = don't care

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

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13 **Percent Engine Load** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No

DD138 Generic percent of range

DF30 Percent, Relative measure **int8** *Range:* +/- 124% *Resolution:* 1%

Range 0 - 124%

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14 **Percent Engine Torque** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No

DD138 Generic percent of range

DF30 Percent, Relative measure **int8** *Range:* +/- 124% *Resolution:* 1%

Range 0 - 124%

Transmission Parameters, Dynamic

PGN: 127493
hex: 1F205

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

Single Frame: Yes | *Priority Default:* 2 | *Default Update Rate:* 100 milliseconds | *Frequency:* 10. cycles per second
Destination: Global | *Query Support:* Opt'l | *ACK Rqmnts:*

Original Reference ID # 43

Field #	Field Name						
1	**Transmission instance** **DD128** Generic instance		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* Yes		For Engines: 0 = Instance 0; 0 = Single Engine or Dual Engine Port 1 = Instance 1; 1 = Dual Engine StarBoard (for Multiple Engines, Instances will start thru from Bow, Port (0) to Stern, Starboard (n)) n = Instance n, where n < 253 253 = Reserve 254 = Error; 255 = Not available
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Transmission Instances. (This PGN will be transmitted for each instance.)						
2	**Transmission Gear** **DD222** Transmission Gear		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		0 = Forward. 1 = Neutral, 2 = Reverse, 3 = [Unavailable, Unknown]
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Reserved Bits** **DD001** Reserved field		*Byte Field Size:*	*Bit Field Size:* resv 6	*Request Parameter* No		Variable number of reserved bits, all set to logic "1"
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	6 Bits needed to fill out the byte.						
4	**Transmission oil pressure** **DD049** Generic Pressure		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DF47 Pressure, medium	**uint16**	*Range:* 0 to 6,553,200 Pa	*Resolution:* 1x10E+2 Pa			
5	**Transmission oil temperature** **DD130** Temperature, high		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DF38 Temperature, high	**uint16**	*Range:* 0 to 6,553.2 deg K	*Resolution:* 1x10E-1 deg K			
6	**Transmission Discrete Status** **DD221** Transmission Discrete Warning Status		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		xxxx xxx1 = Check Tranmission, xxxx xx1x = Over Temperature, xxxx x1xx = Low Oil Pressure, xxxx 1xxx = Low Oil Level, xxx1 xxxx = Sail Drive, xx1x xxxx = reserved, x1xx xxxx = reserved, 1xxx xxxx = reserved, where x = don't care
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**Reserved Bits** **DD001** Reserved field		*Byte Field Size:*	*Bit Field Size:* resv 8	*Request Parameter* No		Variable number of reserved bits, all set to logic "1"
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Needed to fill the CAN frame.						

Trip Parameters, Vessel

PGN: 127496
hex: 1F208

Trip parameters relative to Vessel

Single Frame: No *Priority Default:* 5 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second
Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 95

Field #	Field Name						
1	**Time to Empty** **DD134** Run time, Trip		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DF65 Time interval, standard	**uint32**	*Range:* 0 to ~4.295x10E+6 s	*Resolution:* 1x10E-3 s			
2	**Distance to Empty** **DD199** Distance, Unsigned		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DF09 Distance	**uint32**	*Range:* 0 to ~4.295x10E+7 m	*Resolution:* 1x10E-2 m			
3	**Estimated Fuel Remaining** **DD135** Volume		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DF44 Volume	**uint16**	*Range:* 0 to 65.532 cu m	*Resolution:* 1x10E-3 cu m			
4	**Trip Run Time** **DD134** Run time, Trip		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DF65 Time interval, standard	**uint32**	*Range:* 0 to ~4.295x10E+6 s	*Resolution:* 1x10E-3 s			

Trip Parameters, Engine

PGN: 127497
hex: 1F209

Engine related trip information.

This PGN will be requested as needed.

Single Frame:	No	Priority Default:	5	Default Update Rate:	1,000 milliseconds	Frequency:	1. cycles per second
Destination:	Global	Query Support:	Opt'l	ACK Rqmnts:			

Original Reference ID # 48

Field #	Field Name		Byte Field Size:	Bit Field Size:	Request Parameter	Range:	Resolution:	
1	**Engine instance** **DD128** Generic instance			8	Yes	For Engines: 0 = Single Engine or Dual Engine Port 1 = Dual Engine StarBoard (for Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n)) 0 = Instance 0; 1 = Instance 1; thru n = Instance n, where n < 253 253 = Reserve 254 = Error; 255 = Not available		
	DF52 Bit field	**bit(n)**				Variable	1	Used to construct bit fields
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Engine Instances. (This PGN will be transmitted for each instance.)							
2	**Trip fuel used** **DD135** Volume		2		No			
	DF44 Volume	**uint16**				0 to 65.532 cu m	1x10E-3 cu m	
3	**Fuel Rate, Average** **DD131** Flow rate, low		2		No			
	DF18 Flow rate, low	**int16**				+/-3.2764 cu-m/hr	1x10E-4 cu-m/hr	
4	**Fuel Rate, Economy** **DD131** Flow rate, low		2		No			
	DF18 Flow rate, low	**int16**				+/-3.2764 cu-m/hr	1x10E-4 cu-m/hr	
5	**Instantaneous Fuel Economy** **DD131** Flow rate, low		2		No			
	DF18 Flow rate, low	**int16**				+/-3.2764 cu-m/hr	1x10E-4 cu-m/hr	

Engine Parameters, Static

PGN: 127498
hex: 1F20A

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

This PGN will be requested as needed.

Single Frame: No *Priority Default:* 5 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 49

Field #	*Field Name*						
1	**Engine instance**		*Byte Field Size:*		*Bit Field Size:* 8	*Request Parameter*	Yes
	DD128 Generic instance			For Engines: 0 = Single Engine or Dual Engine Port 1 = Dual Engine StarBoard (for Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n)) n = Instance n, where n < 253 253 = Reserve 254 = Error; 255 = Not available		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Engine Instances. (This PGN will be transmitted for each instance.)						
2	**Rated engine speed**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD129 Rate of rotation						
	DF72 Rotational rate, unsigned	**uint16**	*Range:* 0-16,383 RPM	*Resolution:* 1/4 RPM			
3	**VIN**		*Byte Field Size:* 8 or 16 n		*Bit Field Size:*	*Request Parameter*	No
	DD004 Generic name string, short			Name of place, route, waypoint, destination, vessel, vehicle, etc.			
	DF50 String, variable, short	**ch8or16(n)**	*Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:* 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.		
	200 characters maximum						

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

Binary Switch Bank Status

PGN: 127501
hex: 1F20D

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

Single Frame: Yes *Priority Default:* 3 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 44

Field #	Field Name						
1	**Indicator Bank instance**			*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	Yes
	DD005	Generic numeric ID, short		Number of route, waypoint, event, mark, etc.			
	DF53	Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Indicator Bank Instances. (This PGN will be transmitted for each instance.)						
2	**Indic. 1**			*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
3	**Indic. 2**			*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
4	**Indic. 3**			*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
5	**Indic. 4**			*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
6	**Indic. 5**			*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
7	**Indic. 6**			*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	

8	**Indic. 7**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
9	**Indic. 8**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
10	**Indic. 9**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
11	**Indic. 10**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
12	**Indic. 11**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
13	**Indic. 12**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
14	**Indic. 13**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
15	**Indic. 14**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002	Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]			
	DF52	Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	

16	**Indic. 15**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
17	**Indic. 16**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
18	**Indic. 17**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
19	**Indic. 18**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
20	**Indic. 19**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
21	**Indic. 20**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
22	**Indic. 21**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
23	**Indic. 22**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

24	**Indic. 23**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
25	**Indic. 24**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
26	**Indic. 25**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
27	**Indic. 26**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
28	**Indic. 27**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
29	**Indic. 28**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

Switch Bank Control

PGN: 127502
hex: 1F20E

Universal commands to multiple banks of two-state devices.

Single Frame: Yes *Priority Default:* 3 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 45

1 **Switch bank instance** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* Yes
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Switch Bank Instances. (This PGN will be transmitted for each instance.)

2 **Switch 1** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD003 Generic command pair — 00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

3 **Switch 2** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD003 Generic command pair — 00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

4 **Switch 3** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD003 Generic command pair — 00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

5 **Switch 4** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD003 Generic command pair — 00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

6 **Switch 5** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD003 Generic command pair — 00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

7 **Switch 6** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD003 Generic command pair — 00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

8 **Switch 7** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD003 Generic command pair — 00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

9	**Switch 8**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
10	**Switch 9**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
11	**Switch 10**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
12	**Switch 11**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
13	**Switch 12**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
14	**Switch 13**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
15	**Switch 14**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
16	**Switch 15**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
17	**Switch 16**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

18	**Switch 17**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
19	**Switch 18**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
20	**Switch 19**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
21	**Switch 20**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
22	**Switch 21**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
23	**Switch 22**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
24	**Switch 23**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
25	**Switch 24**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
26	**Switch 25**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

27	**Switch 26**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
28	**Switch 27**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
29	**Switch 28**		*Byte Field Size:*	*Bit Field Size:*	2	*Request Parameter*	No
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	

AC Input Status

PGN: 127503
hex: 1F20F

Any device with an AC Input may transmit this message. Fields 3 through 12 may repeat as indicated by the Number of Lines.

If requested via the ISO Request, a separate message will be returned for each AC Instance connected to the device.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,500 milliseconds *Frequency:* .7 cycles per second

Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 128

Field #	Field Name						
1	**AC Instance**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	Yes
	DD005 Generic numeric ID, short			Number of route, waypoint, event, mark, etc.			
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	The subsequent parameters pertain to this AC source.						
2	**Number of Lines**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD006 Generic counter, short			Numeric count, event counter, sequence counter			
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	This is the number of lines (tuples) being reported.						
3	**Line**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD270 AC Line		0x00 = Line 1, 0x01 = Line 2, 0x02 = Line 3 0x03 = Reserved				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This is the physical connector that is supplying power. In the case of split phase there are two lines.						
4	**Acceptability**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD259 AC Acceptability		0x00 = Bad Level, 0x01 = Bad Frequency, 0x02 = Being Qualified, 0x03 = Good				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Reserve Bits**		*Byte Field Size:*	*Bit Field Size:* resv 4		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Voltage**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD260 Voltage, AC RMS						
	DF96 Voltage, high, unsigned	**uint16**	*Range:* +/- 655.32 V	*Resolution:* 1x10E-2 V			
7	**Current**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD269 Current, Electric, Unsigned						
	DF95 Current, electric, high	**uint16**	*Range:* 0 - 6553.2 A	*Resolution:* 1x10E-1 A			
8	**Frequency**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD267 Frequency						
	DF22 Frequency, low	**uint16**	*Range:* 0 to 655.32 Hz	*Resolution:* 1x10E-2 Hz			
9	**Breaker Size**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD269 Current, Electric, Unsigned						
	DF95 Current, electric, high	**uint16**	*Range:* 0 - 6553.2 A	*Resolution:* 1x10E-1 A			
10	**Real Power**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD261 Power (watts)						
	DF94 Power	**uint32**	*Range:* 0 - 4,294,967,292 W	*Resolution:* 1 W			
11	**Reactive Power**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD262 Volt Amps Reactive Power (VAR)						
	DF92 Power - VAR	**uint32**	*Range:* 0 - 4,294,967,292 VAR	*Resolution:* 1 VAR			

12	**Power Factor**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No
	DD271 Power Factor		Cosine of the angle between the AC voltage and current			
	DF97 Power Factor	**int8**	*Range:* +/- 1.00	*Resolution:* 0.01		

AC Output Status

PGN: 127504
hex: 1F210

Any device with an AC Output may tranmit this message. Fileds 3 though 12 may repeat as indicated by the Number of Lines.

If requested via the ISO Request, a separate message will be returned for each AC Instance connected to the device.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,500 milliseconds *Frequency:* .7 cycles per second

Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 129

Field #	*Field Name*						
1	**AC Instance**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	Yes
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	The subsequent parameters pertain to this AC source.						
2	**Number of lines**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	This is the number of lines (tuples) being reported.						
3	**Line**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD270 AC Line		0x00 = Line 1, 0x01 = Line 2, 0x02 = Line 3 0x03 = Reserved				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This is the physical connector that is supplying power. In the case of split phase there are two lines.						
4	**Waveform**		*Byte Field Size:*	*Bit Field Size:* 3		*Request Parameter*	No
	DD273 Waveform		0x00 = Sine Wave 0x01 = Modified Sine Wave 0x02 = Reserved thru 0x05 = Reserved 0x06 = Error 0x07 = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Reserve Bits**		*Byte Field Size:*	*Bit Field Size:* resv 3		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Voltage**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD260 Voltage, AC RMS						
	DF96 Voltage, high, unsigned	**uint16**	*Range:* +/- 655.32 V	*Resolution:* 1x10E-2 V			
7	**Current**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD269 Current, Electric, Unsigned						
	DF95 Current, electric, high	**uint16**	*Range:* 0 - 6553.2 A	*Resolution:* 1x10E-1 A			
8	**Frequency**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD267 Frequency						
	DF22 Frequency, low	**uint16**	*Range:* 0 to 655.32 Hz	*Resolution:* 1x10E-2 Hz			
9	**Breaker Size**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD269 Current, Electric, Unsigned						
	DF95 Current, electric, high	**uint16**	*Range:* 0 - 6553.2 A	*Resolution:* 1x10E-1 A			
10	**Real Power**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD261 Power (watts)						
	DF94 Power	**uint32**	*Range:* 0 - 4,294,967,292 W	*Resolution:* 1 W			

11	**Reactive Power**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD262 Volt Amps Reactive Power (VAR)						
	DF92 Power - VAR	**uint32**	*Range:* 0 - 4,294,967,292 VAR	*Resolution:* 1 VAR			
12	**Power Factor**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD271 Power Factor		Cosine of the angle between the AC voltage and current				
	DF97 Power Factor	**int8**	*Range:* +/- 1.00	*Resolution:* 0.01			

Fluid Level

PGN: 127505
hex: 1F211

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

Single Frame: Yes *Priority Default:* 6 *Default Update Rate:* 2,500 milliseconds *Frequency:* .4 cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 51

Field #	Field Name						
1	**Fluid Instance** **DD169** Generic instance (4-bit)		*Byte Field Size:*	*Bit Field Size:* 4 0x0 to 0xF = Instance number 0 to 15;		*Request Parameter*	Yes
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Fluid Instances. (This PGN will be transmitted for each instance.)						
2	**Fluid Type** **DD208** Type of Fluid		*Byte Field Size:*	*Bit Field Size:* 4 0x00 = Fuel, 0x01 = Fresh Water, 0x02 = Waste Water, 0x03 = Live Well, 0x04 = Oil, 0x05 = Black Water (Sewage) 0x06 = Reserved, thru 0x0D = Reserved, 0x0E = Error, 0x0F = Data not available		*Request Parameter*	No
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Fluid Level** **DD215** Generic Percent of Range, Medium		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DF84 Percent, Relative Measur	**int16**	*Range:* -131.072% to 131.056%	*Resolution:* .004%			
	Range 0 - 100%, where 0% =Empty and 100% = Full						
4	**Tank Capacity** **DD227** Volume		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DF86 Volume. Large	**uint32**	*Range:* 0 to~4.296x10E+5 cu m	*Resolution:* 1x10E-4 cu m			
5	**Reserved Bits** **DD001** Reserved field		*Byte Field Size:*	*Bit Field Size:* resv 8 Variable number of reserved bits, all set to logic "1"		*Request Parameter*	No
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Needed to fill the CAN frame.						

DC Detailed Status

PGN: 127506
hex: 1F212

Provides parameteric data for a specific battery, indicated by the battery instance field. Used primarily by display or instrumentation devices, but may also be useed by battery management controls.

This PGN is an extension, via the SID, to the DC Status PGN.

Note: While less than 8 bytes… we are anticipating that this message is expected to grow.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,500 milliseconds *Frequency:* .7 cycles per second

Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 130

Field #	Field Name						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**DC Instance**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* Yes		
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	The subsequent parameters pertain to this DC source. Note: This maps to the Battery Instance field.						
3	**DC Type**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD288 DC Type		0x00 = Battery, 0x01 = Alternator, 0x02 = Convertor, 0x03 = Solar Cell, 0x04 = Wind Generator, 0x05 = Reserved, thru 0xFD = Reserved 0xFE = Error 0xFF = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**State of Charge**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD263 Generic Absolute Percentage 0-252%						
	DF93 Percent, Absolute	**uint8**	*Range:* 0 - 252%	*Resolution:* 1			
	% of total charge remaining						
5	**State of Health**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD263 Generic Absolute Percentage 0-252%						
	DF93 Percent, Absolute	**uint8**	*Range:* 0 - 252%	*Resolution:* 1			
	% of total life remaining						
6	**Time Remaining**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD268 Time						
	DF98 Time interval, medium, u	**uint16**	*Range:* 0 - 65,532 minutes	*Resolution:* 1 minute			
	Time remaing at current rate of discharge						
7	**Ripple Voltage**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD287 AC Ripple						
	DF102 AC Vrms	**uint16**	*Range:* 0 - 65.532	*Resolution:* 1000 mv			

Charger Status

PGN: 127507
hex: 1F213

Any device capable of charging a battery may transmit this message.

If requested via the ISO Request, a separate message will be returned for each Battery Instance connected to the device.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,500 milliseconds *Frequency:* .7 cycles per second

Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 131

Field #	*Field Name*						
1	**Charger Instance**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* Yes		
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Battery Instance**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* Yes		
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	The subsequent parameters pertain to this DC source.						
3	**Operating State**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD264 Charger Operating State		0x00 = Not Charging, 0x01 = Bulk, 0x02 = Absorption, 0x03 = Overcharge, 0x04 = Equalize, 0x05 = Float, 0x06 = No Float 0x07 = Constant VI, 0x08 = Disabled, 0x09 = Fault, thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Charge Mode**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD265 Charger Mode		0x00 = Standalone, 0x01 = Primary, 0x02 = Secondary, 0x03 = Echo 0x04 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Charger Enable/Disable**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Equalization Pending**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

7	**Reserved**		*Byte Field Size:*		*Bit Field Size:* resv 4	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
8	**Equalization Time Remaining**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD268 Time						
	DF98 Time interval, medium, u	**uint16**	*Range:* 0 - 65,532 minutes	*Resolution:* 1 minute			

Battery Status

PGN: 127508
hex: 1F214

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

Single Frame: Yes *Priority Default:* 6 *Default Update Rate:* 1,500 milliseconds *Frequency:* .7 cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 50

1 **Battery Instance** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* Yes
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will be with all defined Battery Instances. (This PGN will be transmitted for each instance.)

2 **Battery Voltage** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD136 Voltage, DC
DF42 Voltage, high **int16** *Range:* +/- 327.64 V *Resolution:* 1x10E-2 V

3 **Battery Current** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD140 Current, Electric — + = current consumed, - = current supplied
DF07 Current, electric, high **int16** *Range:* +/- 3,276.4 A *Resolution:* 1x10E-1 A

4 **Battery Case Temperature** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD043 Generic Temperature
DF39 Temperature, low **uint16** *Range:* 0 to 655.32 deg K *Resolution:* 1x10E-2 deg K

5 **SID** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No
DD056 Sequence ID — An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number

Inverter Status

PGN: 127509
hex: 1F215

Any device capable of inverting a DC source to an SC output may transmit this message.

If requested via the ISO Request, a separate message will be returned for each AC Instance connected to the device.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,500 milliseconds *Frequency:* .7 cycles per second

Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Field #	*Field Name*							Original Reference ID # 132
1	**Inverter Instance**		*Byte Field Size:* 1	*Bit Field Size:*			*Request Parameter*	Yes
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
2	**AC Instance**		*Byte Field Size:* 1	*Bit Field Size:*			*Request Parameter*	Yes
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
	The subsequent parameters pertain to this AC source.							
3	**DC Instance**		*Byte Field Size:* 1	*Bit Field Size:*			*Request Parameter*	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
	The subsequent parameters pertain to this DC source. Note: This maps to the Battery Instance field.							
4	**Operating State**		*Byte Field Size:*	*Bit Field Size:* 4			*Request Parameter*	No
	DD266 Invertor Operating State		0x00 = Invert, 0x01 = AC Passthru, 0x02 = Load Sense, 0x03 = Fault, 0x04 = Disabled 0x05 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
5	**Inverter Enable/Disable**		*Byte Field Size:*	*Bit Field Size:* 2			*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
6	**Reserved**		*Byte Field Size:*	*Bit Field Size:* resv 2			*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			

Charger Configuration Status

PGN: 127510
hex: 1F216

Any device capable of charging a battery may transmit this message.

If requested via the ISO Request, a separate message will be returned for each Battery Instance connected to the device.

The Complex Request/Command/Acknowledgement group function message can be used to set the following parameters.

Note: While less than 8 bytes… we are anticipating that this message is expected to grow.

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

Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 135

1 **Charger Instance** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* Yes

DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.

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

2 **Battery Instance** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* Yes

DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.

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

The subsequent parameters pertain to this DC source.

3 **Charger Enable/Disable** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No

DD003 Generic command pair

00 = [Turn Off, Disable, Reset, Make "0"],
01 = [Turn On, Enable, Set, Make "1"],
02 = Reserved,
03 = No action

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

4 **Reserved Bits** *Byte Field Size:* *Bit Field Size:* resv 6 *Request Parameter* No

DD001 Reserved field — Variable number of reserved bits, all set to logic "1"

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

5 **Charge Current Limit** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No

DD263 Generic Absolute Percentage 0-252%

DF93 Percent, Absolute **uint8** *Range:* 0 - 252% *Resolution:* 1

Limits charger output current to a percentage (0-100%) of the designed maximum.

6 **Charging Algorithm** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No

DD272 Charging Algorithm

0x00 = Trickle
0x01 = CVCC (Constant Voltage Constant Current)
0x02 = 2 Stage (No float)
0x03 = 3 Stage
0x04 = Reserved
thru
0x0D = Reserved
0x0E = Error
0x0F = Data Not Available

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

7 **Charger Mode** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No

DD265 Charger Mode

0x00 = Standalone,
0x01 = Primary,
0x02 = Secondary,
0x03 = Echo
0x04 = Reserved
thru
0x0D = Reserved
0x0E = Error
0x0F = Data Not Available

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

Default is standalone. For installations where two or more chargers are charging the same battery bank, one charger is the primary and the others are secondary. Some chargers include a second, lower power echo charger for maintaining a second battery bank (e.g., start battery).

8 **Estimated Battery Temp - When No Sensor Present** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No

DD274 Batt Temp - No Sensor

0x00 = Cold
0x01 = Warm
0x02 = Hot
0x03 = Reserved
thru
0x0D = Reserved
0x0E = Error
0x0F = Data Not Available

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

If there is no battery temperature sensor or it is defective then the charger will use this field to determine the battery temperature.

9 **Equalize One Time Enable/Disable** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No

DD003 Generic command pair

00 = [Turn Off, Disable, Reset, Make "0"],
01 = [Turn On, Enable, Set, Make "1"],
02 = Reserved,
03 = No action

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

Equalizing over charges the battery in an attempt to bring the battery's cells up to the same level of charge.

10 **Over Charge Enable/Disable** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No

DD003 Generic command pair

00 = [Turn Off, Disable, Reset, Make "0"],
01 = [Turn On, Enable, Set, Make "1"],
02 = Reserved,
03 = No action

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

For chargers that support regular over charging, this field enables the feature.

11 **Equailize Time** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD268 Time

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

Inverter Configuration Status

PGN: 127511
hex: 1F217

Any device capable of inverting DC to AC may transmit this message.

If requested via the ISO Request, a separate message will be returned for each AC Instance connected to the device.

The Complex Request/Command/Acknowledgement group function message can be used to set the following parameters.

Note: While less than 8 bytes… we are anticipating that this message is expected to grow.

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

Original Reference ID # 136

Field #	*Field Name*						
1	**Inverter Instance**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* Yes		
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**AC Instance**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* Yes		
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	The subsequent parameters pertain to this AC source.						
3	**DC Instance**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
	The subsequent parameters pertain to this DC source. Note: This maps to the Battery Instance field.						
4	**Inverter Enable/Disable**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Inverter Mode**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD275 Inverter Mode		0x00 = Standalone 0x01 = Series Master 0x02 = Series Slave 0x03 = Parallel Master 0x04 = Parallel Slave 0x05 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Load Sense Enable/Disable**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD003 Generic command pair		00 = [Turn Off, Disable, Reset, Make "0"], 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved, 03 = No action				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**Load Sense Power Threshold**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD276 Power, medium (watts)						
	DF28 Power	**uint16**	*Range:* 0 to 65,532 W	*Resolution:* 1 W			
	When load sensing is enabled and the inverter is in the standby state, a load requiring at least this amount of power must be applied to enter the inverting state.						

8 **Load Sense Interval** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD036 Data transmit offset

Offset in transmit time from time of request command: 0x0 = transmit immediately, 0xFFFF = Do not change offset.

DF66 Time interval, .01sec **uint16** *Range:* 0 to 655.32s *Resolution:* 1x10-2sec

When load sensing is enabled and the inverter is in the standby state, the inverter will periodically check for a load on this interval.

AGS Configuration Status

PGN: 127512
hex: 1F218

Automatic Generator Starter

Any device that is capable of starting/stopping a generator may transmit this message.

The Complex Request/Command/Acknowledgement group function message can be used to set the following parameters.

Note: While less than 8 bytes… we are anticipating that this message is expected to grow.

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

Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 137

Field #	*Field Name*						
1	**AGS Instance**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* Yes		
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Generator Instance**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* Yes		
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
3	**AGS Mode**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD277 AGS Mode		0x00 = Off 0x01 = On 0x02 = Automatic 0x03 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

Battery Configuration Status

PGN: 127513
hex: 1F219

Any device connected to a battery may transmit this message.

If requested via the ISO Request, a separate message will be returned for each Battery Instance connected to the device.

The Complex Request/Command/Acknowledgement group function message can be used to set the following parameters.

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

Field # *Field Name* Original Reference ID # 138

1 **Battery Instance** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* Yes
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
The subsequent parameters pertain to this DC source.

2 **Battery Type** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No
DD282 Battery Type
0x00 = Flooded
0x01 = GEL
0x02 = AGM
0x03 = Reserved
thru
0x0D = Reserved
0x0E = Error
0x0F = Data Not Available
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

3 **Supports Equalization** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD002 Generic status pair
MSB/LSB:
00 = [No, Off, Disabled, Reset, "0"],
01 = [Yes, On, Enabled, Set, "1"],
10 = Error,
11= [Unavailable, Unknown]
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Indicates if the battery supports equalization.

4 **Reserved Bits** *Byte Field Size:* *Bit Field Size:* resv 2 *Request Parameter* No
DD001 Reserved field — Variable number of reserved bits, all set to logic "1"
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

5 **Nominal Voltage** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No
DD284 Nominal Voltage
0x00 = 6 Volts
0x01 = 12 Volts
0x02 = 24 Volts
0x03 = 32 Volts
0x04 = 36 Volts
0x05 = 42 Volts
0x06 = 48 Volts
0x07 = Reserved
thru
0x0D = Reserved
0x0E = Error
0x0F = Data Not Available
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

6	**Battery Chemistry**		*Byte Field Size:*		*Bit Field Size:* 4	*Request Parameter*	No
	DD285 Battery Chemistry		0x00 = Lead Acid 0x01 = LiIon 0x02 = NiCad 0x03 = ZnO 0x04 = NiMH 0x05 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:* 1	Used to construct bit fields	
7	**Battery Capacity**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD283 Battery Capacity (Coulombs)						
	DF100 Battery Capacity	**uint16**	*Range:*	0 - 235,915,200 Coulombs	*Resolution:* 3600 C	This maps directly into Ampere Hours (AH) where 3600C = 1AH.	
8	**Battery Temperature Coefficient**		*Byte Field Size:* 1		*Bit Field Size:*	*Request Parameter*	No
	DD138 Generic percent of range						
	DF30 Percent, Relative measure	**int8**	*Range:*	+/- 124%	*Resolution:* 1%		
9	**Peukert Exponent**		*Byte Field Size:* 1		*Bit Field Size:*	*Request Parameter*	No
	DD286 Peukert Exponent						
	DF101 Peukert Exponent	**uint8**	*Range:*	1 - 1.5	*Resolution:* 0.002		
10	**Charge Efficiency Factor**		*Byte Field Size:* 1		*Bit Field Size:*	*Request Parameter*	No
	DD138 Generic percent of range						
	DF30 Percent, Relative measure	**int8**	*Range:*	+/- 124%	*Resolution:* 1%		

AGS Status

PGN: 127514
hex: 1F21A

Automatic Generator Starter

Any device capable of starting/stopping a generator may transmit this message.

Note: While less than 8 bytes… we are anticipating that this message is expected to grow.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,500 milliseconds *Frequency:* .7 cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 133

Field #	Field Name						
1	**AGS Instance**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	Yes
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Generator Instance**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	Yes
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
3	**AGS Operating State**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD278 AGS Operating State		0x00 = Quiet Time 0x01 = Auto On 0x02 = Auto Off 0x03 = Manual On 0x04 = Manual Off 0x05 = Generator Shutdown 0x06 = External Shutdown 0x07 = Fault 0x08 = Suspend 0x09 = Not Operating 0x0A = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Generator State**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD279 Generator State		0x00 = Preheating 0x01 = Start Delay 0x02 = Cranking 0x03 = Starter Cooling 0x04 = Warming Up 0x05 = Cooling Down 0x06 = Spinning Down 0x07 = Shutdown Bypass 0x08 = Stopping 0x09 = Running 0x0A = Stopped 0x0B = Crank Delay 0x0C = Reserved 0x0D = Reserved 0x0E = Error 0x0F = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

5	**Generator On Reason**		*Byte Field Size:*	*Bit Field Size:*	8	*Request Parameter*	No
	DD280 Generator On Reason		0x00 = Not On 0x01 = DC Voltage Low 0x02 = Battery State Of Charge Low 0x03 = AC Current High 0x04 = Contact Closed 0x05 = Manual On 0x06 = Exercise 0x07 = Non Quiet Time 0x08 = External On Via AGS 0x09 = External On Via Generator 0x0A = Unable to Stop 0x0B = Reserved thru 0xFD = Reserved 0xFE = Error 0xFF = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
6	**Generator Off Reason**		*Byte Field Size:*	*Bit Field Size:*	8	*Request Parameter*	No
	DD281 Generator Off Reason		0x00 = Not Off 0x01 = DC Voltage High 0x02 = Battery State Of Charge High 0x03 = AC Current Low 0x04 = Contact Opened 0x05 = Reached Absorption 0x06 = Reached Float 0x07 = Manual Off 0x08 = Max Run Time 0x09 = Max Auto Cycle 0x0A = Exercise Done 0x0B = Quiet Time 0x0C = External Off Via AGS 0x0D = Safe Mode 0x0E = External Off Via Generator 0x0F = External Shutdown 0x10 = Auto Off 0x11 = Fault 0x12 = Unable to Start 0x13 = Reserved thru 0xFD = Reserved 0xFE = Error 0xFF = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields

Speed, Water referenced

PGN: 128259
hex: 1F503

The purpose of this PGN is to provide a single transmission that describes the motion of a vessel over water. As of version 1.210 of this standard the name of this PGN was changed from "Speed", field 4 "Speed Water Reference Type" was added, and field 3 "Speed Ground Referenced" was noted not for new designs.

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 32

Field #	*Field Name*					
1	**Sequence ID**	*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD056 Sequence ID	An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
2	**Speed Water Referenced**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD044 Generic Speed					
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s	*Resolution:* 1x10E-2 m/s	1 Knot = 0.5144 m/s	
3	**Speed Ground Referenced**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD044 Generic Speed					
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s	*Resolution:* 1x10E-2 m/s	1 Knot = 0.5144 m/s	
	Not for new designs value to be obtained from PGN129026. Value to be set to Not Available.					
4	**Speed Water Referenced Type**	*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD293 Speed Water Reference Type	00 = Paddle Wheel 01 = Pitot Tube 02 = Doppler Log 03 = Correlation Log (Ultra-Sound) 04 = EM Log (Electro - Magnetic) 05 through 128 Reserved 129 through 252 Generic Speed Sources other than those defined 253 = Not Supported 254 = Error 255 = Do Not Change/Not Available					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
	Added as of version 1.210. Previously was reserved					
5	**Reserved Bits**	*Byte Field Size:*	*Bit Field Size:* resv 16	*Request Parameter* No		
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
	Needed to fill the CAN frame.					

Water Depth

PGN: 128267
hex: 1F50B

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

Single Frame: Yes *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 60

1 **SID** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No

DD056 Sequence ID

An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.

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

2 **Water Depth, Transducer** *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No

DD162 Water Depth At Transducer

Depth relative to the transducer location. Range of value specified in "Maximum Range" field.

DF09 Distance **uint32** *Range:* 0 to ~4.295x10E+7 m *Resolution:* 1x10E-2 m

3 **Offset** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD161 Transducer Offset

Positive values represent distance from transducer to water line and negative values represent distance from the transducer to the keel.

DF46 Distance, signed, medium **int16** *Range:* +/- 32.764 m *Resolution:* 1x10E-3 m

4 **Reserved Bits** *Byte Field Size:* *Bit Field Size:* resv 8 *Request Parameter* No

DD001 Reserved field

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

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

Needed to fill the CAN frame.

Distance Log

PGN: 128275
hex: 1F513

This PGN provides two distance values recorded from one log which measures speed through water. The UTC time of the last distance increment is captured as Measurement Date & Time (which will be near current time). The distance values are stored during power down and resume counting after power up.

- Total Cumulative Distance is normally set to zero when the log is installed and never reset after that.

- Distance Since Last Reset may manually be set to zero at any suitable time.

The "Distance Since Last Reset" is reset by setting its value to 0 with the "Command Group Function" PGN 126208.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 39

Field #	*Field Name*							
1	**Measurement Date**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No	
	DD039 Generic date		Days since January 1, 1970, Date is relative to UTC Time.					
	DF41 Date, day count	**uint16**	*Range:* 0 to 65,532 days	*Resolution:* 1 day	0 = January 1, 1970, max = ~179 years			
2	**Measurement Time**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No	
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC					
	DF06 Time of day	**uint32**	*Range:* 0 to 86,401 s	*Resolution:* 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day			
3	**Total Cumulative Distance**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No	
	DD120 Distance, voyage							
	DF11 Distance, long	**uint32**	*Range:* 0 to ~4.295x10E+9 m	*Resolution:* 1 m				
4	**Distance Since Last Reset**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No	
	DD120 Distance, voyage							
	DF11 Distance, long	**uint32**	*Range:* 0 to ~4.295x10E+9 m	*Resolution:* 1 m				

Tracked Target Data

PGN: 128520
hex: 1F608

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

Single Frame: No | Priority Default: 2 | Default Update Rate: 1,000 milliseconds | Frequency: 1. cycles per second
Destination: Global | Query Support: Yes | ACK Rqmnts:

Original Reference ID # 87

Field #	Field Name		Byte Field Size	Bit Field Size	Request Parameter	Description	Range	Resolution	
1	**Sequence ID**		1		No				
	DD056 Sequence ID					An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.			
	DF53 Integer, 8 bit unsigned	**uint8**					0 to 252	1 bit	Unit-less number
2	**Target ID #**		2		Yes				
	DD007 Generic numeric ID, medium					Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned	**uint16**					0 to 65,532	1 bit	Unit-less number
3	**Track Status**			4	Yes				
	DD216 Track Status					xx00 = Cancelled or Not Available, xx01 = Initial Acquisition Target, xx10 = Tracking Target, xx11 = Lost Target, x0xx = Reported Target No, x1xx = Reported Target Yes, 0xxx = Acquision Manual, 1xxx = Acquision Auto, where x = don't care			
	DF52 Bit field	**bit(n)**					Variable	1	Used to construct bit fields
4	**Bearing Reference**			2	No				
	DD218 Direction reference for target					0 = True, 1 = Magnetic, 2 = Error, 3 = Releative			
	DF52 Bit field	**bit(n)**					Variable	1	Used to construct bit fields
5	**Reserved Bits**			resv 2	No				
	DD001 Reserved field					Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**					Variable	1	Used to construct bit fields
	2 Bits needed to fill out the byte								
6	**Bearing**		2		No				
	DD127 Generic Direction -True					Degrees clockwise relative to True North.			
	DF02 Angle	**uint16**					0 to 2Pi rad	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
7	**Distance**		4		No				
	DD115 Distance								
	DF15 Distance, signed	**int32**					+/-~2.147x10E+7 m	1x10E-2 m	
8	**Course**		2		No				
	DD127 Generic Direction -True					Degrees clockwise relative to True North.			
	DF02 Angle	**uint16**					0 to 2Pi rad	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
9	**Speed**		2		No				
	DD044 Generic Speed								
	DF35 Speed	**uint16**					0 to 655.32 m/s	1x10E-2 m/s	1 Knot = 0.5144 m/s

10	**CPA**		*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter*	No
	DD115 Distance							
	DF15 Distance, signed	**int32**	*Range:*	+/-~2.147x10E+7 m	*Resolution:*	1x10E-2 m		
11	**TCPA**		*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter*	No
	DD034 Time-elapsed/Time-to-go		Time interval in milli-sec. "-" = time elapsed since event, "+" = time to go before event.					
	DF40 Time interval, signed, sta	**int32**	*Range:*	+/- ~2.148x10E+6 s	*Resolution:*	1x10E-3 s		
12	**UTC of Fix**		*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter*	No
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC					
	DF06 Time of day	**uint32**	*Range:*	0 to 86,401 s	*Resolution:*	1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day	
13	**Name**		*Byte Field Size:* 8 or 16 n		*Bit Field Size:*		*Request Parameter*	No
	DD004 Generic name string, short		Name of place, route, waypoint, destination, vessel, vehicle, etc.					
	DF50 String, variable, short	**ch8or16(n)**	*Range:*	0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:*	1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
14	**Reference Target**		*Byte Field Size:*		*Bit Field Size:* 2		*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	

Position, Rapid Update

PGN: 129025
hex: 1F801

This PGN provides latitude and longitude referenced to WGS84. Being defined as single frame message, as opposed to other PGNs that include latitude and longitude and are defined as fast or multi-packet, this PGN lends itself to being transmitted more frequently without using up excessive bandwidth on the bus for the benefit of receiving equipment that may require rapid position updates.

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 100 milliseconds *Frequency:* 10. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 18

Field #	*Field Name*						
1	**Latitude**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84				
	DF23 Latitude	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm		
2	**Longitude**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm		

COG & SOG, Rapid Update

PGN: 129026
hex: 1F802

This PGN is a single frame PGN that provides Course Over Ground (COG) and Speed Over Ground (SOG).

Being a single frame message, as opposed to other PGNs that include COG and SOG and are defined as multi-packet, this PGN lends itself to being transmitted more frequently, without using up excessive bandwidth on the bus. This may be of benefit to receiving equipment requiring rapid COG and SOG updates.

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 250 milliseconds *Frequency:* 4. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 31

Field #	*Field Name*						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**COG Reference**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD117 Direction reference		0 = True, 1 = Magnetic, 2 = Error, 3 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 6		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	6 Bits needed to fill out the byte						
4	**Course Over Ground**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD165 Course-Over-Ground (COG)		The direction of the path over ground actually followed by a vessel.				
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad		
5	**Speed Over Ground**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD044 Generic Speed						
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s	*Resolution:* 1x10E-2 m/s	1 Knot = 0.5144 m/s		
6	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 16		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Needed to fill the CAN frame.						

Position Delta, High Precision Rapid Update

PGN: 129027
hex: 1F803

The "Position Delta, High Precision Rapid Update" Parameter Group is intended for applications where very high precision and very fast update rates are needed for position data. This PG can provide delta position changes down to 1 millimeter with a delta time period accurate to 5 milliseconds. One example application for this PG is high precision positioning and guidance of automated machinery such as tractor implements utilized in the agriculture industry. Similar high precision positioning needs in the marine industry may be satisfied with this parameter Group. This PG only has meaning when it is associated (via the Sequence ID field) with another PG such as the GNSS Position Data Parameter Group. Association with the "Altitude Delta, High Precision Rapid Update" PG is needed for a complete 3D position update.

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 100 milliseconds *Frequency:* 10. cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 93

Field #	*Field Name*					
1	**Sequence ID**	*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD056 Sequence ID	An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
2	**Time Delta**	*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD233 Time Value (Short resolution 5 msec)					
	DF88 Time Interval, short	**uint8**	*Range:* 0 to 1.26 sec	*Resolution:* 5x10E-3 sec		
3	**Latitude Delta**	*Byte Field Size:* 3	*Bit Field Size:*	*Request Parameter* No		
	DD234 Latitude					
	DF89 Latitude, 24 bit	**int24**	*Range:* +/-83 sec (")	*Resolution:* 1x10E-5 sec(")		
4	**Longitude Delta**	*Byte Field Size:* 3	*Bit Field Size:*	*Request Parameter* No		
	DD235 Longitude					
	DF90 Longitude, 24 bit	**int24**	*Range:* +/-83 sec (")	*Resolution:* 1x10E-5 sec(")		

Altitude Delta, High Precision Rapid Update

PGN: 129028
hex: 1F804

The "Altitude Delta, High Precision Rapid Update" Parameter Group is intended for applications where very high precision and very fast update rates are needed for altitude and course over ground data. This PG can provide delta altitude changes down to 1 millimeter, a change in direction as small as 0.0057 degrees, and with a delta time period accurate to 5 milliseconds. One example application for this PG is high precision positioning and guidance of automated machinery such as tractor implements utilized in the agriculture industry. Similar high precision positioning needs in the marine industry may be satisfied with this parameter Group. This PG only has meaning when it is associated (via the Sequence ID field) with another PG such as the GNSS Position Data Parameter Group. Association with the "Position Delta, High Precision Rapid Update" PG is needed for a complete 3D position update.

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 100 milliseconds *Frequency:* 10. cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 94

Field #	Field Name						
1	**Sequence ID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Time Delta**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD233 Time Value (Short resolution 5 msec)						
	DF88 Time Interval, short	**uint8**	*Range:* 0 to 1.26 sec	*Resolution:* 5x10E-3 sec			
3	**GNSS Quality**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD067 Quality, GNSS		0 = no GPS, 1 = GNSS fix, 2 = DGNSS fix, 3 = Precise GNSS*, 4 = RTK Fixed Integer, 5 = RTK Float, 6 = Estimated (DR) mode, 7 = Manual Input, 8 = Simulate mode, 9-13 = Reserved, 14 = Error, 15 = Null. *Precise GNSS means no deliberate degradation (such as SA) and higher resolution code (P-code), and 2 frequencies are used to correct atmospheric delays.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Direction**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD117 Direction reference		0 = True, 1 = Magnetic, 2 = Error, 3 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 2		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Course Over Ground**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD165 Course-Over-Ground (COG)		The direction of the path over ground actually followed by a vessel.				
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad		
7	**Altitude Delta**		*Byte Field Size:* 3	*Bit Field Size:*		*Request Parameter*	No
	DD236 Altitude						
	DF91 Altitude, 24 bit	**int24**	*Range:* +/-8,388m	*Resolution:* 1x10E-3m			

GNSS Position Data

PGN: 129029
hex: 1F805

This PGN conveys a comprehensive set of Global Navigation Satellite System (GNSS) parameters, including position information. Equipment transmitting this PGN would typically also transmit PGN 129025 (Position – Rapid Update).

The Sequence ID may be used to synchronize the data with data from other PGNs originating from the same source. For example, a GPS chart plotter with an integrated depth finder might output both PGN 128009 and PGN 129545 (water depth) for each position

Single Frame: No *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 19

Field #	Field Name							
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No			
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
2	**Position date**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No			
	DD039 Generic date		Days since January 1, 1970, Date is relative to UTC Time.					
	DF41 Date, day count	**uint16**	*Range:* 0 to 65,532 days	*Resolution:* 1 day	0 = January 1, 1970, max = ~179 years			
3	**Position time**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No			
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC					
	DF06 Time of day	**uint32**	*Range:* 0 to 86,401 s	*Resolution:* 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day			
4	**Latitude**		*Byte Field Size:* 8	*Bit Field Size:*	*Request Parameter* No			
	DD202 Latitude (Extended Resolution)		Latitude referenced to WGS-84					
	DF76 Latitude (Extended)	**int64**	*Range:* +/- 90 deg	*Resolution:* 1x10E-16 deg	"-" = South, resolution ~.01 nanometer			
5	**Longitude**		*Byte Field Size:* 8	*Bit Field Size:*	*Request Parameter* No			
	DD203 Longitude (Extended Resolution)		Longitude referenced to WGS-84					
	DF77 Longitude (Extended)	**int64**	*Range:* +/- 180 deg	*Resolution:* 1x10E-16 deg	"-" = West, resolution ~.01 nanometer			
6	**Altitude**		*Byte Field Size:* 8	*Bit Field Size:*	*Request Parameter* No			
	DD204 Altitude (Extended Resolution)		Altitude referenced to WGS-84					
	DF78 Distance (Extended)	**int64**	*Range:* +/-~9.223x10E+12 m	*Resolution:* 1x10E-6 m				
7	**Type of System**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No			
	DD207 Type of System		0x0 = GPS 0x1 = GLONASS 0x2 = GPS+GLONASS 0x3 = GPS+SBAS(WAAS) 0x4 = GPS+SBAS+GLONASS 0x5 - 0xF = Reserved for future combinations					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			

8	**Method, GNSS**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD067 Quality, GNSS		0 = no GPS, 1 = GNSS fix, 2 = DGNSS fix, 3 = Precise GNSS*, 4 = RTK Fixed Integer, 5 = RTK Float, 6 = Estimated (DR) mode, 7 = Manual Input, 8 = Simulate mode, 9-13 = Reserved, 14 = Error, 15 = Null. *Precise GNSS means no deliberate degradation (such as SA) and higher resolution code (P-code), and 2 frequencies are used to correct atmospheric delays.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Position Fixed Method						
9	**Integrity**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD209 GNSS Integrity		0 = No Integrity checking,* 1 = Safe, 2 = Caution, 3 = Unsafe * means the receiver does not have this capability				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
10	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 6		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	6 Bits needed to fill out the byte						
11	**Number of SVs**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
12	**HDOP**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD055 DOP		Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).				
	DF69 Ratio, Relative measure,	**int16**	*Range:* +/-327.64	*Resolution:* 1x10E-2	Unit-less number		
13	**PDOP**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD055 DOP		Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).				
	DF69 Ratio, Relative measure,	**int16**	*Range:* +/-327.64	*Resolution:* 1x10E-2	Unit-less number		
14	**Geoidal Separation**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD069 Geoidal Separation		The difference between the earth ellipsoid and mean-sea-level (geoid) defined by the reference datum used in the position solution, "-" = mean-sea-level below ellipsoid. Reference datum is defined in this packet.				
	DF15 Distance, signed	**int32**	*Range:* +/-~2.147x10E+7 m	*Resolution:* 1x10E-2 m			
15	**Number of Reference Stations**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD006 Generic counter, short		Numeric count, event counter, sequence counter				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		

16 **Reference Station Type"1"** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No
DD070 Ref Station Type
Reference Station Type.
0x0=GPS;
0x1=GLONASS;
0x2 to 0xD=Reserved;
0XE=Error;
0XF=Null
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

17 **Reference Station ID"1"** *Byte Field Size:* *Bit Field Size:* 12 *Request Parameter* No
DD071 Ref Station
Reference Station ID. Reference Station number as provided by the Service Provider.[Reference document required]
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

18 **Age of DGNSS Corrections "1"** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD060 Differential Age
Age of Differential corrections
DF66 Time interval, .01sec **uint16** *Range:* 0 to 655.32s *Resolution:* 1x10-2sec

19 **Reference Station Type "n"** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No
DD070 Ref Station Type
Reference Station Type.
0x0=GPS;
0x1=GLONASS;
0x2 to 0xD=Reserved;
0XE=Error;
0XF=Null
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Variable Number of fields, Field number 18 repeated

20 **Reference Station ID "n"** *Byte Field Size:* *Bit Field Size:* 12 *Request Parameter* No
DD071 Ref Station
Reference Station ID. Reference Station number as provided by the Service Provider.[Reference document required]
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Variable Number of fields, Field number 19 repeated

21 **Age of DGNSS Reference Station "n"** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD060 Differential Age
Age of Differential corrections
DF66 Time interval, .01sec **uint16** *Range:* 0 to 655.32s *Resolution:* 1x10-2sec
Variable Number of fields, Field number 20 repeated

Time & Date

PGN: 129033
hex: 1F809

This PGN has a single transmission that provides:

- UTC Time
- UTC Date
- Local offset

Products that can maintain or have a method of calculating or manually providing local offset should transmit this PGN.
This PGN is not required to output at high update rates as PGN 126992 will also exist.

Single Frame: Yes *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 40

Field #	*Field Name*						
1	**Date**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD039 Generic date		Days since January 1, 1970, Date is relative to UTC Time.				
	DF41 Date, day count	**uint16**	*Range:* 0 to 65,532 days	*Resolution:* 1 day	0 = January 1, 1970, max = ~179 years		
2	**Time**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC				
	DF06 Time of day	**uint32**	*Range:* 0 to 86,401 s	*Resolution:* 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day		
3	**Local Offset, Minutes**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD121 Time, Local Offset		Local offset from UTC to obtain Local Time. This value includes Time Zone, daylight Savings Time, etc.				
	DF71 Time interval, medium	**int16**	*Range:* +/-32,764 minutes	*Resolution:* 1.0 minute			

AIS Class A Position Report

PGN: 129038
hex: 1F80E

This parameter group provides data associated with the ITU-R M.1371 Messages 1, 2, and 3 Position Reports, autonomous, assigned, and response to interrogation, respectively. An AIS device may generate this parameter group either upon receiving a VHF data link message 1,2 or 3, or upon receipt of an ISO or NMEA request PGN (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 4 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 109

Field #	*Field Name*						
1	**Message ID**		*Byte Field Size:*		*Bit Field Size:* 6	*Request Parameter*	No
	DD188 AIS Message Identifier			Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	1 = Autonomously Scheduled Position Report Message, 2 = Assigned Scheduled Position Report Message, 3 = Special (response to interrogation) Position Report Message.						
2	**Repeat Indicator**		*Byte Field Size:*		*Bit Field Size:* 2	*Request Parameter*	No
	DD185 AIS Repeater Indicator			Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**User ID**		*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of mobile station reporting its position.						
4	**Longitude**		*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD023 Longitude, WGS-84			Longitude referenced to WGS-84			
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm		
	Longitude of mobile station reporting its position.						
5	**Latitude**		*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD022 Latitude, WGS-84			Latitude referenced to WGS-84			
	DF23 Latitude	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm		
	Latitude of mobile station reporting its position.						
6	**Position Accuracy**		*Byte Field Size:*		*Bit Field Size:* 1	*Request Parameter*	No
	DD184 AIS Position Accuracy			0=low accuracy>10m such as nondifferential GNSS (default), 1=high accuracy <10m such as DGNSS See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**RAIM-flag**		*Byte Field Size:*		*Bit Field Size:* 1	*Request Parameter*	No
	DD189 AIS RAIM-flag			0 = RAIM not in use (default), 1 = RAIM in use See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

8	**Time Stamp**		*Byte Field Size:*		*Bit Field Size:*	6	*Request Parameter*	No
	DD186 AIS Time Stamp		0-59=UTC second when the report was generated, 60=time stamp not available (default), 61=positioning system is in manual input mode, 62=Electronic position fixing system operates in estimated (dead reckoning) mode, 63=positioning system is inoperative See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
9	**COG**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD165 Course-Over-Ground (COG)		The direction of the path over ground actually followed by a vessel.					
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
	COG of mobile station reporting its position.							
10	**SOG**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD044 Generic Speed							
	DF35 Speed	**uint16**	*Range:*	0 to 655.32 m/s	*Resolution:*	1x10E-2 m/s	1 Knot = 0.5144 m/s	
	SOG of mobile station reporting its position.							
11	**Communication State**		*Byte Field Size:*		*Bit Field Size:*	19	*Request Parameter*	No
	DD187 AIS Communication State		The Communication State contains information used by the various TDMA slot allocation algorithms and synchronization information See the latest version of ITU-R M.1371 for more information.					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
12	**AIS Transceiver Information**		*Byte Field Size:*		*Bit Field Size:*	5	*Request Parameter*	No
	DD246 AIS Transceiver Information		0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
13	**True Heading**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD127 Generic Direction -True		Degrees clockwise relative to True North.					
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
	True Heading of mobile station reporting its position.							
14	**Rate of Turn**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD150 Rate of Turn		+ = Bow turning to starboard, 1 deg/min = .00029 rad/sec					
	DF73 Angular rate, signed	**int16**	*Range:*	+/-1.0 rad/s	*Resolution:*	1/32 x 10E-3 rad/s	Resolution 0.1 deg/min	
	Rate of turn of mobile station reporting its position.							

15 **Navigational Status** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No

DD183 AIS Navigational Status

0 = under way using engine,
1 = at anchor,
2 = not under command,
3 = restricted manoeuvrability,
4 = constrained by her draught,
5 = moored,
6 = aground,
7 = engaged in fishing,
8 = under way sailing,
9 = reserved for future amendment of navigational status for ships carrying DG, HS, or MP, or IMO hazard or pollutant category C (HSC),
10 = reserved for future amendment of navigational status for ships carrying DG, HS or MP, or IMO hazard or pollutant category A (WIG),
11-14 = reserved for future use,
15 = not defined (default)

See the latest version of ITU-R M.1371 for more information.

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

16 **Reserved for Regional Applications** *Byte Field Size:* *Bit Field Size:* resv 4 *Request Parameter* No

DD001 Reserved field

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

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

This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

17 **Spare** *Byte Field Size:* *Bit Field Size:* resv 1 *Request Parameter* No

DD001 Reserved field

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

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

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

AIS Class B Position Report

PGN: 129039
hex: 1F80F

This parameter group provides data associated with the ITU-R M.1371 Message 18 Standard Class B Equipment Position Report. An AIS device may generate this parameter group either upon receiving a VHF data link message 18, or upon receipt of an ISO or NMEA request PGN (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 4 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 122

Field #	Field Name						
1	**Message ID**		*Byte Field Size:*	*Bit Field Size:* 6	*Request Parameter* No		
	DD188 AIS Message Identifier		Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	18 = Standard Class B Equipment Position Report Message						
2	**Repeat Indicator**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD185 AIS Repeater Indicator		Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**User ID**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.				
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of mobile station reporting position.						
4	**Longitude**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm		
	Longitude of mobile station reporting position.						
5	**Latitude**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84				
	DF23 Latitude	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm		
	Latitude of mobile station reporting position.						
6	**Position Accuracy**		*Byte Field Size:*	*Bit Field Size:* 1	*Request Parameter* No		
	DD184 AIS Position Accuracy		0=low accuracy>10m such as nondifferential GNSS (default), 1=high accuracy <10m such as DGNSS See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**RAIM-flag**		*Byte Field Size:*	*Bit Field Size:* 1	*Request Parameter* No		
	DD189 AIS RAIM-flag		0 = RAIM not in use (default), 1 = RAIM in use See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

8	**Time Stamp**		*Byte Field Size:*		*Bit Field Size:*	6	*Request Parameter*	No
	DD186 AIS Time Stamp			0-59=UTC second when the report was generated, 60=time stamp not available (default), 61=positioning system is in manual input mode, 62=Electronic position fixing system operates in estimated (dead reckoning) mode, 63=positioning system is inoperative See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
9	**COG**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD165 Course-Over-Ground (COG)			The direction of the path over ground actually followed by a vessel.				
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
	COG of mobile station reporting position.							
10	**SOG**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD044 Generic Speed							
	DF35 Speed	**uint16**	*Range:*	0 to 655.32 m/s	*Resolution:*	1x10E-2 m/s	1 Knot = 0.5144 m/s	
	SOG of mobile station reporting position.							
11	**Communication State**		*Byte Field Size:*		*Bit Field Size:*	19	*Request Parameter*	No
	DD187 AIS Communication State			The Communication State contains information used by the various TDMA slot allocation algorithms and synchronization information See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
12	**AIS Transceiver Information**		*Byte Field Size:*		*Bit Field Size:*	5	*Request Parameter*	No
	DD246 AIS Transceiver Information			0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
13	**True Heading**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD167 Heading			The horizontal direction in which a ship actually points or heads at any instant, expressed in angular units from a reference direction, usually from 000 at the reference direction clockwise through 359 degrees.				
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
	True heading of mobile station reporting position. A value of 65535 indicates that data is not available.							
14	**Reserved for Regional Applications**		*Byte Field Size:*		*Bit Field Size:*	resv 8	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
	This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							
15	**Reserved for Regional Applications**		*Byte Field Size:*		*Bit Field Size:*	resv 2	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
	This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							

16	**Class B unit flag**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD294 AIS ClassB Unit Flag		0 = Class B SOTDMA unit 1 = Class B "CS" unit See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
17	**Class B Display Flag**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD295 AIS Class B Display Flag		0 = No display available; not capable of displaying ITU-R M.1371 Messages12 and 14 1 = Equipped with integrated display displaying ITU-R M.1371 Messages 12 and 14 See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
18	**Class B DSC Flag**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD296 AIS Class B DSC Flag		0 = Not equipped with DSC function 1 = Equipped with DSC function (dedicated or time-shared) See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
19	**Class B Band Flag**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD297 AIS Class B Band Flag		0 = Capable of operating over the upper 525 kHz band of the marine band 1 = Capable of operating over the whole marine band (irrelevant if "Class B Message 22 flag" is 0) See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
20	**Class B Msg 22 Flag**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD298 AIS Class B Msg 22 Flag		0 = No frequency management via Message 22 , operating on AIS1 and AIS2 only 1 = Frequency management via Message 22 See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
21	**Mode Flag**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD299 AIS Mode Flag		0 = Station operating in autonomous mode = default 1 = Station operating in assigned mode See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
22	**Communication State Selector Flag**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD245 AIS Communication State Selctor Flag		0=SOTDMA communication state, 1=ITDMA communication state follows. See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

AIS Class B Extended Position Report

PGN: 129040
hex: 1F810

This parameter group provides data associated with the ITU-R M.1371 Message 19 Extended Class B Equipment Position Report containing position and static information. An AIS device may generate this parameter group either upon receiving a VHF data link message 19, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure static parameters such as ship dimensions, antenna location, and type of electronic position fixing device (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

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

Original Reference ID # 123

Field #	Field Name						
1	**Message ID**		*Byte Field Size:*	*Bit Field Size:* 6		*Request Parameter*	No
	DD188 AIS Message Identifier			Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	19 = Extended Class B Equipment Position Report						
2	**Repeat Indicator**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD185 AIS Repeater Indicator			Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**User ID**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of mobile station reporting position.						
4	**Longitude**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD023 Longitude, WGS-84			Longitude referenced to WGS-84			
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm		
	Longitude of mobile station reporting position.						
5	**Latitude**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD022 Latitude, WGS-84			Latitude referenced to WGS-84			
	DF23 Latitude	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm		
	Latitude of mobile station reporting position.						
6	**Position Accuracy**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD184 AIS Position Accuracy			0=low accuracy>10m such as nondifferential GNSS (default), 1=high accuracy <10m such as DGNSS See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**RAIM-flag**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD189 AIS RAIM-flag			0 = RAIM not in use (default), 1 = RAIM in use See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

8	**Time Stamp**		*Byte Field Size:*		*Bit Field Size:*	6	*Request Parameter*	No
	DD186 AIS Time Stamp			0-59=UTC second when the report was generated, 60=time stamp not available (default), 61=positioning system is in manual input mode, 62=Electronic position fixing system operates in estimated (dead reckoning) mode, 63=positioning system is inoperative See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
9	**COG**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD165 Course-Over-Ground (COG)			The direction of the path over ground actually followed by a vessel.				
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
	COG of mobile station reporting position.							
10	**SOG**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD044 Generic Speed							
	DF35 Speed	**uint16**	*Range:*	0 to 655.32 m/s	*Resolution:*	1x10E-2 m/s	1 Knot = 0.5144 m/s	
	SOG of mobile station reporting position.							
11	**Reserved for Regional Applications**		*Byte Field Size:*		*Bit Field Size:*	resv 8	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
	This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							
12	**Reserved for Regional Applications**		*Byte Field Size:*		*Bit Field Size:*	resv 4	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
	This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							
13	**NMEA 2000 Reserved**		*Byte Field Size:*		*Bit Field Size:*	resv 4	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
	Used to align subsequent data on byte boundary.							
14	**Ship/Cargo Type**		*Byte Field Size:*		*Bit Field Size:*	8	*Request Parameter*	No
	DD193 Ship/Cargo Type			0=Not Available or no ship (default), 1-99= (See the latest version of ITU-R M.1371 Section 3.3.8.2.3.2 Table 18), 100-199=Reserved for Regional (See the latest version of ITU-R M.1371), 200-255=Reserved for future (See the latest version of ITU-R M.1371).				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
15	**True Heading**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD165 Course-Over-Ground (COG)			The direction of the path over ground actually followed by a vessel.				
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
	True Heading of mobile station reporting its position.							
16	**NMEA 2000 Reserved**		*Byte Field Size:*		*Bit Field Size:*	resv 4	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
	Used to align subsequent data on byte boundary.							

17 **Type of Electronic Positioning Device** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No

DD191 AIS Electronic Positioning Device Type

0 =Undefined (default),
1 = GPS,
2 = GLONASS,
3 = Combined GPS/GLONASS,
4 = Loran-C,
5 = Chayka,
6 = Integrated Navigation System,
7 = Surveyed (Base Station),
8 = Galilieo
9-15 = Reserved for future use.

See the latest version of ITU-R M.1371 for more information.

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

18 **Ship Length** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD194 Distance, medium

Dependent upon PG Field definition.

DF75 Distance, Medium **uint16** *Range:* 0 to 6553.2 m *Resolution:* 1x10E-1 m

Length of mobile station reporting its position. A value of 65535 indicates that data is not available.

19 **Ship Beam** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD194 Distance, medium

Dependent upon PG Field definition.

DF75 Distance, Medium **uint16** *Range:* 0 to 6553.2 m *Resolution:* 1x10E-1 m

Beam of mobile station reporting its position. A value of 65535 indicates that data is not available.

20 **Position Reference Point from Starboard** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD194 Distance, medium

Dependent upon PG Field definition.

DF75 Distance, Medium **uint16** *Range:* 0 to 6553.2 m *Resolution:* 1x10E-1 m

Position reference point from starboard side of mobile station reporting its position. A value of 65535 indicates that data is not available.

21 **Position Reference Point aft of Ship's Bow** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD194 Distance, medium

Dependent upon PG Field definition.

DF75 Distance, Medium **uint16** *Range:* 0 to 6553.2 m *Resolution:* 1x10E-1 m

Position reference point from aft of ship's bow of mobile station reporting its position. A value of 65535 indicates that data is not available.

22 **Name** *Byte Field Size:* char n *Bit Field Size:* *Request Parameter* No

DD192 Generic String, ASCII, Fixed length

Length specified by PGN field definition.

DF63 String, fixed **char8(n)** *Range:* 0 to 1,785 characters *Resolution:* 1 char 0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary

This is a 20 character string, see ITU-R M.1371-1 for more information.

23 **Data Terminal Equipment (DTE)** *Byte Field Size:* *Bit Field Size:* 1 *Request Parameter* No

DD242 Data Terminal Equipment (DTE)

0=Available,
1=not available.

See the latest version of ITU-R M.1371 for more information.

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

24 **Mode Flag** *Byte Field Size:* *Bit Field Size:* 1 *Request Parameter* No

DD299 AIS Mode Flag

0 = Station operating in autonomous mode = default
1 = Station operating in assigned mode

See the latest version of ITU-R M.1371 for more information.

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

25	**Spare**		*Byte Field Size:*	*Bit Field Size:*	resv 4	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
26	**AIS Transceiver Information**		*Byte Field Size:*	*Bit Field Size:*	5	*Request Parameter*	No
	DD246 AIS Transceiver Information		0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	

Datum

PGN: 129044
hex: 1F814

Local geodetic datum and datum offsets from a reference datum. This PGN is used to define the datum to which a position location output by the same device in other PGNs is referenced.

This PGN will normally be requested as needed.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 10,000 milliseconds *Frequency:* .1 cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 20

Field #	*Field Name*						
1	**Local Datum**		*Byte Field Size:* char 4	*Bit Field Size:*	*Request Parameter* No		
	DD068 Datum		4-character code for the datum currently being output for the position solution. The datum's are defined in the IHO Publication S-60, Appendices B and C. The first three chars are the datum ID as per the IHO tables. The fourth char is the local datum subdivision code. A null char indicates the datum or subdivision code is unknown or not used.				
	DF63 String, fixed	**char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary		
2	**Delta Latitude**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD106 Latitude, Offset		Offsets change with position; position in the local datum is offset from the position in the reference datum in the directions indicated: Plocal datum = Pref datum + offset.				
	DF23 Latitude '+' is North	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm		
3	**Delta Longitude**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD107 Longitude, Offset		Offsets change with position; position in the local datum is offset from the position in the reference datum in the directions indicated: Plocal datum = Pref datum + offset.				
	DF25 Longitude '+' is East	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm		
4	**Delta Altitude**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD115 Distance						
	DF15 Distance, signed '+' is Up	**int32**	*Range:* +/-~2.147x10E+7 m	*Resolution:* 1x10E-2 m			
5	**Reference Datum**		*Byte Field Size:* char 4	*Bit Field Size:*	*Request Parameter* No		
	DD068 Datum		4-character code for the datum currently being output for the position solution. The datum's are defined in the IHO Publication S-60, Appendices B and C. The first three chars are the datum ID as per the IHO tables. The fourth char is the local datum subdivision code. A null char indicates the datum or subdivision code is unknown or not used.				
	DF63 String, fixed	**char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary		

User Datum Settings

PGN: 129045
hex: 1F815

Transformation parameters for converting from WGS-84 to other Datums.
This PGN will normally be requested as needed.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 21

Field #	Field Name							
1	**Delta X**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD108 Axis Delta shift			Delta Shift in X, Y, or Z axis from WGS 84.				
	DF15 Distance, signed	**int32**	*Range:* +/-~2.147x10E+7 m	*Resolution:* 1x10E-2 m				
2	**Delta Y**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD108 Axis Delta shift			Delta Shift in X, Y, or Z axis from WGS 84.				
	DF15 Distance, signed	**int32**	*Range:* +/-~2.147x10E+7 m	*Resolution:* 1x10E-2 m				
3	**Delta Z**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD108 Axis Delta shift			Delta Shift in X, Y, or Z axis from WGS 84.				
	DF15 Distance, signed	**int32**	*Range:* +/-~2.147x10E+7 m	*Resolution:* 1x10E-2 m				
4	**Rotation in X**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD109 Axis Rotational shift			Rotational shift in X, Y, or Z axis from WGS 84. Rotations presented use the geodetic sign convention. When looking along the positive axis towards the origin, counter-clockwise rotations are positive.				
	DF70 Angle, tiny	**float32**	*Range:* Variable radians	*Resolution:* Floats, radian				
5	**Rotation in Y**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD109 Axis Rotational shift			Rotational shift in X, Y, or Z axis from WGS 84. Rotations presented use the geodetic sign convention. When looking along the positive axis towards the origin, counter-clockwise rotations are positive.				
	DF70 Angle, tiny	**float32**	*Range:* Variable radians	*Resolution:* Floats, radian				
6	**Rotation in Z**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD109 Axis Rotational shift			Rotational shift in X, Y, or Z axis from WGS 84. Rotations presented use the geodetic sign convention. When looking along the positive axis towards the origin, counter-clockwise rotations are positive.				
	DF70 Angle, tiny	**float32**	*Range:* Variable radians	*Resolution:* Floats, radian				
7	**Scale**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD110 Scale			Scale factor expressed in parts-per-million				
	DF49 Ratio, Relative measure	**float32**	*Range:* Variable	*Resolution:* Floats	Unit-less number			
8	**Ellipsoid Semi-major Axis**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD111 Ellipsoid Semi-major Axis			Semi-major axis (a) of the User Datum ellipsoid.				
	DF15 Distance, signed	**int32**	*Range:* +/-~2.147x10E+7 m	*Resolution:* 1x10E-2 m				
9	**Ellipsoid Flattening Inverse**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD112 Ellipsoid Flattening Inverse			Flattening (1/f) of the user Datum ellipsoid.				
	DF49 Ratio, Relative measure	**float32**	*Range:* Variable	*Resolution:* Floats	Unit-less number			
10	**Datum Name**			*Byte Field Size:* char 4	*Bit Field Size:*	*Request Parameter* No		
	DD068 Datum			4-character code for the datum currently being output for the position solution. The datum's are defined in the IHO Publication S-60, Appendices B and C. The first three chars are the datum ID as per the IHO tables. The fourth char is the local datum subdivision code. A null char indicates the datum or subdivision code is unknown or not used.				
	DF63 String, fixed	**char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary			

Cross Track Error

PGN: 129283
hex: 1F903

This PGN provides the magnitude of position error perpendicular to the desired course.

Single Frame: Yes *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 34

Field #	*Field Name*						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**XTE Mode**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD025 Mode, Data		0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Reserve**		*Byte Field Size:*	*Bit Field Size:* resv 2		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	2 Bits needed to fill out the byte						
4	**Navigation Terminated**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Flag should be set as follows: NO - when Navigation is running normally, YES - In the last PGN when Navigation was Terminated (manually or automatically), ERROR - in case of a navigation error, UNAVAIL - if flag is not supported.						
5	**XTE**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD114 XTE		Cross-track-error of a route. "-" = Left of track, need to steer right				
	DF15 Distance, signed	**int32**	*Range:* +/-~2.147x10E+7 m	*Resolution:* 1x10E-2 m			
6	**Reserve**		*Byte Field Size:*	*Bit Field Size:* resv 16		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Needed to fill the CAN frame.						

Navigation Data

PGN: 129284
hex: 1F904

This PGN provides essential navigation data for following a route.

Transmissions will originate from products that can create and manage routes using waypoints. This information is intended for navigational repeaters.

Transmission intervals should be aligned to latitude and longitude update rates

Single Frame: No *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 37

Field #	*Field Name*						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Distance to Destination Waypoint**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD199 Distance, Unsigned						
	DF09 Distance	**uint32**	*Range:* 0 to ~4.295x10E+7 m	*Resolution:* 1x10E-2 m			
3	**Course/Bearing Ref.**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD117 Direction reference		0 = True, 1 = Magnetic, 2 = Error, 3 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Perpendicular Crossed**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Arrival Circle Entered**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Calculation Type**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD119 Calculation Type		0 = Great Circle calculations, 1 = Rhumb Line calculations, 2 = Error, 3 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**ETA Time**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC				
	DF06 Time of day	**uint32**	*Range:* 0 to 86,401 s	*Resolution:* 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day		
8	**ETA Date**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD039 Generic date		Days since January 1, 1970, Date is relative to UTC Time.				
	DF41 Date, day count	**uint16**	*Range:* 0 to 65,532 days	*Resolution:* 1 day	0 = January 1, 1970, max = ~179 years		

9 **Bearing, Origin To Destination Waypoint** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD164 Bearing — The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction, measured from 000 at the reference direction clockwise through 359 degrees.

DF02 Angle **uint16** *Range:* 0 to 2Pi rad *Resolution:* 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad

10 **Bearing, Position To Destination Waypoint** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD164 Bearing — The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction, measured from 000 at the reference direction clockwise through 359 degrees.

DF02 Angle **uint16** *Range:* 0 to 2Pi rad *Resolution:* 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad

11 **Origin Waypoint Number** *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No

DD010 Generic numeric ID, large — Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned **uint32** *Range:* 0 to 4,294,967,292 *Resolution:* 1 bit Unit-less number

Applies to current route and at this time is limited to 16 bits

12 **Destination Waypoint Number** *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No

DD010 Generic numeric ID, large — Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned **uint32** *Range:* 0 to 4,294,967,292 *Resolution:* 1 bit Unit-less number

Applies to current route and at this time is limited to 16 bits

13 **Destination Wpt Latitude** *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No

DD022 Latitude, WGS-84 — Latitude referenced to WGS-84

DF23 Latitude **int32** *Range:* +/- 90 deg *Resolution:* 1x10E-7 deg "-" = South, resolution ~1.1 cm

14 **Destination Wpt Longitude** *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No

DD023 Longitude, WGS-84 — Longitude referenced to WGS-84

DF25 Longitude **int32** *Range:* +/- 180 deg *Resolution:* 1x10E-7 deg "-" = West, resolution ~1.1 cm

15 **Waypoint Closing Velocity** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD228 Generic speed, signed - large — Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.

DF87 Speed, signed - large **int16** *Range:* +/- 327.66 m/s (+/- 636 knots) *Resolution:* 1x10E-2 m/s

Positive value indicates approaching Wpt, negative indicates moving away from Wpt

Navigation - Route/WP information

PGN: 129285
hex: 1F905

This PGN shall return Route and WP data ahead in the Active Route.
It can be requested or may be transmitted without a request, typically at each Waypoint advance.

When navigating the Route in Forward direction, the Waypoints shall be included in the order of increasing RPS#s. When navigating in Reverse direction the order shall be decreasing RPS#s.

The first Waypoint shall be the origin WP. When navigating towards a single WP or when the first WP of the Route is not yet passed, the origin RPS# shall be 65535 (NA). The WP Name and Position may optionally be filled with the name and position where the navigation started, or it shall be set to NA.

ISO request for this PGN shall return origin and destination WP, next WP may be added - but it is not required.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

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

Field # *Field Name* Original Reference ID # 105

1 **Start RPS#** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
Route Point Sequence Number (RPS#) of the Origin Waypoint. Set to 65535 (NA) if the origin WP is not defined.

2 **nItems** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
n RPS#'s requested/sent.
If not specified in the request, the default is n = 2.

3 **Database ID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number

4 **Route ID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number

5 **Navigation direction in route** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No
DD241 Navigation Direction
0=Forward,
1=Reverse,
2-5 Reserved,
6= Error,
7=Null (info not available)
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Forward=increasing Route Point Sequence Number (RPS#)

6 **Supplementary Route/WP data available** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD002 Generic status pair
MSB/LSB:
00 = [No, Off, Disabled, Reset, "0"],
01 = [Yes, On, Enabled, Set, "1"],
10 = Error,
11= [Unavailable, Unknown]
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
YES=there are supplementary data available
The Database ID, Route ID, WPID/RPS# may be used to request other "Route and WP Service" PGNs with supplementary data.

7 **Reserved bits** *Byte Field Size:* *Bit Field Size:* resv 3 *Request Parameter* No
DD001 Reserved field — Variable number of reserved bits, all set to logic "1"
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields

8 **Route Name** — Byte Field Size: 8 or 16 n — Bit Field Size: — Request Parameter: No

DD004 Generic name string, short — Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short — **ch8or16(n)** — Range: 0 to 250 ASCII or 0 to 125 Unicode Characters — Resolution: 1 ASCII or 1 Unicode Character — 2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16).
Control byte = 0 => Unicode characters
Control byte = 1 => ASCII characters
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

Max 30 ASCII or Unicode Characters

9 **Reserved** — Byte Field Size: — Bit Field Size: resv 8 — Request Parameter: No

DD001 Reserved field — Variable number of reserved bits, all set to logic "1"

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

10 **WPID** — Byte Field Size: 2 — Bit Field Size: — Request Parameter: No

DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.

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

Shall have valid data if the Waypoint exists in the WP-List.

The waypoints shall be included in the order of appearance in the Navigation Direction.

11 **WP Name** — Byte Field Size: 8 or 16 n — Bit Field Size: — Request Parameter: No

DD004 Generic name string, short — Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short — **ch8or16(n)** — Range: 0 to 250 ASCII or 0 to 125 Unicode Characters — Resolution: 1 ASCII or 1 Unicode Character — 2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16).
Control byte = 0 => Unicode characters
Control byte = 1 => ASCII characters
A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

Max. 30 ASCII or Unicode Characters

12 **WP Latitude** — Byte Field Size: 4 — Bit Field Size: — Request Parameter: No

DD022 Latitude, WGS-84 — Latitude referenced to WGS-84

DF23 Latitude — **int32** — Range: +/- 90 deg — Resolution: 1x10E-7 deg — "-" = South, resolution ~1.1 cm

13	**WP Longitude**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm		
14	**Fields 10 thru 13 repeat as needed**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No
	DD000 Undefined		Application specific, defined at time of use				
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.		

Set & Drift, Rapid Update

PGN: 129291
hex: 1F90B

The Set and Drift effect on the Vessel is the direction and the speed of a current. The Course & Speed (through water) vector added to the Set & Drift vector is the COG & SOG vector. The bearings may be True or Magnetic referenced.
When Set & Drift is calculated from data from a GPS, a compass and a speed log, the Set & Drift estimate will be influenced by current, weather and anything that sets the ship off from the intended Course.
The Sequence ID may be used to tie the data to time, position, sample number.

Single Frame: Yes *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 33

Field #	Field Name							
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
2	**Set Reference**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No	
	DD117 Direction reference		0 = True, 1 = Magnetic, 2 = Error, 3 = Null					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
3	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 6		*Request Parameter*	No	
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	6 Bits needed to fill out the byte							
4	**Set**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No	
	DD048 Current flow direction		Direction towards which current flows. Degrees relative to True North.					
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad			
5	**Drift**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No	
	DD044 Generic Speed							
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s	*Resolution:* 1x10E-2 m/s	1 Knot = 0.5144 m/s			
6	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 16		*Request Parameter*	No	
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	Needed to fill the CAN frame.							

Time to/from Mark

PGN: 129301
hex: 1F915

Time to go to or elapsed from a generic mark, that may be non-fixed. The mark is not generally a specific geographic point but may vary continuously and is most often determined by calculation (the recommended turning or tacking point for sailing vessels, the wheel-over point for vessels making turns, a predicted collision point, etc.)

Single Frame: No *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 41

Field #	Field Name						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Time elapsed (from) or to-go to mark**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD034 Time-elapsed/Time-to-go		Time interval in milli-sec. "-" = time elapsed since event, "+" = time to go before event.				
	DF40 Time interval, signed, sta	**int32**	*Range:* +/- ~2.148x10E+6 s	*Resolution:* 1x10E-3 s			
3	**Mark Type**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD122 Mark Type		0 = Collision, 1 = Turning Point, 2 = Reference (general), 3 = Wheelover, 4 = Waypoint, 5-13 = Reserved, 14 = Error, 15 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 4	*Request Parameter* No		
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	4 Bits needed to fill out the byte						
5	**Mark ID**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.				
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		

Bearing and Distance between two Marks

PGN: 129302
hex: 1F916

Bearing and distance from the origin mark to the destination mark, calculated at the origin mark, for any two arbitrary generic marks. The calculation type (Rhumb Line, Great Circle) is specified, as well as the bearing reference (Mag, True).

This PGN will normally be requested as needed.

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

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 38

Field #	Field Name						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Bearing Ref.**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD117 Direction reference		0 = True, 1 = Magnetic, 2 = Error, 3 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Calculation Type**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD119 Calculation Type		0 = Great Circle calculations, 1 = Rhumb Line calculations, 2 = Error, 3 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 4		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	4 Bits needed to fill out the byte						
5	**Bearing, Origin To Destination**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD164 Bearing		The horizontal direction of one terrestrial point from another, expressed as the angular distance from a reference direction, measured from 000 at the reference direction clockwise through 359 degrees.				
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad		
6	**Distance**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD199 Distance, Unsigned						
	DF09 Distance	**uint32**	*Range:* 0 to ~4.295x10E+7 m	*Resolution:* 1x10E-2 m			
7	**Origin Mark Type**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD122 Mark Type		0 = Collision, 1 = Turning Point, 2 = Reference (general), 3 = Wheelover, 4 = Waypoint, 5-13 = Reserved, 14 = Error, 15 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

8	**Destination Mark Type**		*Byte Field Size:*		*Bit Field Size:* 4	*Request Parameter*	No
	DD122 Mark Type		0 = Collision, 1 = Turning Point, 2 = Reference (general), 3 = Wheelover, 4 = Waypoint, 5-13 = Reserved, 14 = Error, 15 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
9	**Origin Mark Id**		*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.				
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
10	**Destination Mark ID**		*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.				
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		

GNSS Control Status

PGN: 129538
hex: 1FA02

GNSS common satellite receiver parameter status

This PGN will be requested as needed.

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

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 17

1 **SV Elevation Mask** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD054 Elevation — Angle above or below the horizon. -90° to +90°; negative below the horizon

DF04 Angle, signed **int16** *Range:* +/-Pi rad *Resolution:* 1x10E-4 rad Resolution ~0.0057deg

Do not use satellites below this value.

2 **PDOP Mask** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD055 DOP — Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).

DF69 Ratio, Relative measure, **int16** *Range:* +/-327.64 *Resolution:* 1x10E-2 Unit-less number

When exceeded, GNSS Receiver shall indicate No GNSS fix or DR Mode in PGN 129029

3 **PDOP Switch** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD055 DOP — Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).

DF69 Ratio, Relative measure, **int16** *Range:* +/-327.64 *Resolution:* 1x10E-2 Unit-less number

When exceeded GNSS Receiver shall switch from 3D to 2D mode

4 **SNR Mask** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD057 SNR Value — SNR expressed in C/No

DF31 dB, relative measure **int16** *Range:* +/- 327.64 dB *Resolution:* 1x10E-2 dB

Do not use satellites below this value.

5 **GNSS Mode** *Byte Field Size:* *Bit Field Size:* 3 *Request Parameter* No

DD058 Mode, GNSS

0 = 1D,
1 = 2D,
2 = 3D,
3 = Auto,
4-5 = Reserved,
6 = Error,
7 = Null

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

6 **DGNSS Mode** *Byte Field Size:* *Bit Field Size:* 3 *Request Parameter* No

DD059 Mode, DGNSS

0 = Off,
1 = Auto,
2 = RTCM SC104 Pseudorange Corrections,
3 = RTCA SC159 Network Corrections,
4 = RTK Differential Corrections,
5 = Reserved,
6 = Error;
7 = Null

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

7 **Position / Velocity Filter** *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No

DD002 Generic status pair

MSB/LSB:
00 = [No, Off, Disabled, Reset, "0"],
01 = [Yes, On, Enabled, Set, "1"],
10 = Error,
11= [Unavailable, Unknown]

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

8	**Max Correction Age**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD060 Differential Age		Age of Differential corrections				
	DF66 Time interval, .01sec	**uint16**	*Range:* 0 to 655.32s	*Resolution:* 1x10-2sec			
9	**Antenna Altitude for 2D Mode**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD024 Altitude, WGS-84		Altitude referenced to WGS-84				
	DF15 Distance, signed	**int32**	*Range:* +/-~2.147x10E+7 m	*Resolution:* 1x10E-2 m			
10	**Use Antenna Altitude for 2D Mode**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	00 = Use last good calculated Altitude for 2D mode.						

GNSS DOPs

PGN: 129539
hex: 1FA03

This PGN provides a single transmission containing GNSS status and dilution of precision components (DOP) that indicate the contribution of satellite geometry to the overall positioning error. There are three DOP parameters reported, horizontal (HDOP), Vertical (VDOP) and time (TDOP).

Single Frame: Yes *Priority Default:* 6 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 22

Field #	Field Name						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No	
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Set Mode**		*Byte Field Size:*	*Bit Field Size:* 3	*Request Parameter*	No	
	DD058 Mode, GNSS		0 = 1D, 1 = 2D, 2 = 3D, 3 = Auto, 4-5 = Reserved, 6 = Error, 7 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Op Mode**		*Byte Field Size:*	*Bit Field Size:* 3	*Request Parameter*	No	
	DD058 Mode, GNSS		0 = 1D, 1 = 2D, 2 = 3D, 3 = Auto, 4-5 = Reserved, 6 = Error, 7 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Reserve**		*Byte Field Size:*	*Bit Field Size:* resv 2	*Request Parameter*	No	
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	2 Bits needed to fill out the byte						
5	**HDOP**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD055 DOP		Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).				
	DF69 Ratio, Relative measure,	**int16**	*Range:* +/-327.64	*Resolution:* 1x10E-2	Unit-less number		
6	**VDOP**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD055 DOP		Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).				
	DF69 Ratio, Relative measure,	**int16**	*Range:* +/-327.64	*Resolution:* 1x10E-2	Unit-less number		
7	**TDOP**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD055 DOP		Dilution of Precision (DOP) indicates the contribution of satellite configuration geometry to positioning error. A lower DOP value is preferred because less error is being introduced. Reported as components: HDOP (Horizontal), VDOP (Vertical), TDOP (Time). Minimum DOP value is 1.0 (no error introduced).				
	DF69 Ratio, Relative measure,	**int16**	*Range:* +/-327.64	*Resolution:* 1x10E-2	Unit-less number		

GNSS Sats in View

PGN: 129540
hex: 1FA04

GNSS information on current satellites in view tagged by sequence ID. Information includes PRN, elevation, azimuth, and SNR. Field 4 defines the number of satellites. Fields 5 thru 11 define the satellite number and the information. These fields sequentially repeated for each satellite to be transmitted as indicated by "n" in fields 12 thru 18.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 23

Field #	*Field Name*							
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No			
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
2	**Mode**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No			
	DD072 Range Residual Mode		Range Residual used in position calculation or range residuals were calculated after the position. 0=range residuals were used to calculate data; 1=range residuals were calculated after the position., 2=Error, 3=Null					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
3	**Reserve Bits**		*Byte Field Size:*	*Bit Field Size:* resv 6	*Request Parameter* No			
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	6 Bits needed to fill out the byte							
4	**Number of SVs**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No			
	DD006 Generic counter, short		Numeric count, event counter, sequence counter					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
5	**PRN "1"**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No			
	DD074 Satellite ID Number		0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
6	**Elevation "1"**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No			
	DD054 Elevation		Angle above or below the horizon. -90° to +90°; negative below the horizon					
	DF04 Angle, signed	**int16**	*Range:* +/-Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg			
7	**Azimuth "1"**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No			
	DD127 Generic Direction -True		Degrees clockwise relative to True North.					
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad			
8	**SNR "1"**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No			
	DD057 SNR Value		SNR expressed in C/No					
	DF31 dB, relative measure	**int16**	*Range:* +/- 327.64 dB	*Resolution:* 1x10E-2 dB				
9	**Range Residuals 1**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No			
	DD073 Range Residuals		Range Residual value in meters					
	DF79 Distance signed fine	**int32**	*Range:* +/-~2.147x10E+4 m	*Resolution:* 1x10E-5 m				

10	**PRN Status "1"**	*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter*	No	
	DD124 PRN Usage Status	0 = Not Tracked, 1 = Tracked but not used in solution, 2 = Used in solution without Differential corrections, 3 = Differential Corrections available, 4 = Tracked with Differential Corrections, 5 = used with Differential Corrections, 6-13 =Reserved, 14 = Error, 15 = No Selection				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
11	**Reserved Bits**	*Byte Field Size:*	*Bit Field Size:* resv 4	*Request Parameter*	No	
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
	4 Bits needed to fill out the byte					
12	**PRN "n"**	*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No	
	DD074 Satellite ID Number	0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
	Variable Number of fields, Field number 5 repeated					
13	**Elevation "n"**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD054 Elevation	Angle above or below the horizon. -90° to +90°; negative below the horizon				
	DF04 Angle, signed	**int16**	*Range:* +/-Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg	
	Variable Number of fields, Field number 6 repeated					
14	**Azimuth "n"**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD127 Generic Direction -True	Degrees clockwise relative to True North.				
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
	Variable Number of fields, Field number 7 repeated					
15	**SNR "n"**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No	
	DD057 SNR Value	SNR expressed in C/No				
	DF31 dB, relative measure	**int16**	*Range:* +/- 327.64 dB	*Resolution:* 1x10E-2 dB		
	Variable Number of fields, Field number 8 repeated					
16	**Range Residuals "n"**	*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No	
	DD073 Range Residuals	Range Residual value in meters				
	DF79 Distance signed fine	**int32**	*Range:* +/-~2.147x10E+4 m	*Resolution:* 1x10E-5 m		
	Variable number of fields, Filed Number 9 repeated					
17	**PRN Status "n"**	*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter*	No	
	DD124 PRN Usage Status	0 = Not Tracked, 1 = Tracked but not used in solution, 2 = Used in solution without Differential corrections, 3 = Differential Corrections available, 4 = Tracked with Differential Corrections, 5 = used with Differential Corrections, 6-13 =Reserved, 14 = Error, 15 = No Selection				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
	Variable Number of fields, Field number 10 repeated					

18	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:*	resv 4	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Variable Number of fields, Field number 11 repeated						

GPS Almanac Data

PGN: 129541
hex: 1FA05

This PGN provides a single transmission that contains relevant almanac data for GPS products. The almanac contains satellite vehicle course orbital parameters. This information is not considered precise and is only valid for several months at a time. GPS products receive almanac data directly from the satellites.

This information would either be transmitted to and from GPS products for update, or system interrogation.
This information would generally be transmitted upon request, during calibration or installation, but not at regular intervals.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Field #	*Field Name*						Original Reference ID # 24
1	**PRN**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD074 Satellite ID Number		0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**GPS Week number**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD082 GPS Week Number		GPS week number. Starting on 6 Jan., 1980. The GPS week number roll over will not affect this value, i.e., it will continue to count up 1022, 1023, 1024, 1025.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
3	**SV Health Bits**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD083 SV Health Bits		SV health, bits 17-24 of each almanac page. Reference ICD-GPS-200 paragraph 20.3.3.5.1.3, Table 20-VII and Table 20-VIII				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Eccentricity**		*Byte Field Size:*	*Bit Field Size:* 16	*Request Parameter* No		
	DD084 Eccentricity, e		Eccentricity, e. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Almanac Reference Time**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD085 Almanac Reference Time, toa		Almanac reference time. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Inclination Angle**		*Byte Field Size:*	*Bit Field Size:* 16	*Request Parameter* No		
	DD086 Almanac parameter, (sigma)I		Inclination angle. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**Rate of Right Ascension**		*Byte Field Size:*	*Bit Field Size:* 16	*Request Parameter* No		
	DD087 Almanac parameter, OMEGADOT		Rate of right ascension, OMEGADOT. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
8	**Root of Semi-major Axis**		*Byte Field Size:*	*Bit Field Size:* 24	*Request Parameter* No		
	DD088 Almanac parameter, (A)1/2		Root of semi-major axis. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
9	**Argument of Perigee**		*Byte Field Size:*	*Bit Field Size:* 24	*Request Parameter* No		
	DD089 Almanac parameter, (omega)		Argument of Perigee. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

10	**Longitude of Ascension Node**		*Byte Field Size:*		*Bit Field Size:*	24	*Request Parameter* No
	DD090 Almanac parameter, (omega)0			Longitude of ascension node. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
11	**Mean Anomaly**		*Byte Field Size:*		*Bit Field Size:*	24	*Request Parameter* No
	DD091 Almanac parameter, M0			Mean anomaly. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
12	**Clock Parameter 1**		*Byte Field Size:*		*Bit Field Size:*	11	*Request Parameter* No
	DD092 Almanac parameter, af0			Clock Parameter 1. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
13	**Clock Parameter 2**		*Byte Field Size:*		*Bit Field Size:*	11	*Request Parameter* No
	DD093 Almanac parameter, af1			Clock Parameter 2. Reference ICD-GPS-200 Table 20-VI for scaling factors and units.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
14	**Reserved Bits**		*Byte Field Size:*		*Bit Field Size:*	resv 2	*Request Parameter* No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
	2 Bits needed to fill out the byte						

GNSS Pseudorange Noise Statistics

PGN: 129542
hex: 1FA06

GNSS pseudorange measurement noise statistics can be translated in the position domain in order to give statistical measures of the quality of the position solution. Intended for use with a Receiver Autonomous Integrity Monitoring (RAIM) application.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 26

Field #	Field Name						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**RMS of Position Uncertainty**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD075 Error Distances		Error distances expressed in meters.				
	DF13 Distance, short	**uint16**	*Range:* 0 to 655.32 m	*Resolution:* 1x10E-2 m			
3	**STD of Major axis**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD075 Error Distances		Error distances expressed in meters.				
	DF13 Distance, short	**uint16**	*Range:* 0 to 655.32 m	*Resolution:* 1x10E-2 m			
4	**STD of Minor axis**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD075 Error Distances		Error distances expressed in meters.				
	DF13 Distance, short	**uint16**	*Range:* 0 to 655.32 m	*Resolution:* 1x10E-2 m			
5	**Orientation of Major axis**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD127 Generic Direction -True		Degrees clockwise relative to True North.				
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad		
6	**STD of Lat Error**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD075 Error Distances		Error distances expressed in meters.				
	DF13 Distance, short	**uint16**	*Range:* 0 to 655.32 m	*Resolution:* 1x10E-2 m			
7	**STD of Lon Error**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD075 Error Distances		Error distances expressed in meters.				
	DF13 Distance, short	**uint16**	*Range:* 0 to 655.32 m	*Resolution:* 1x10E-2 m			
8	**STD of Alt Error**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD075 Error Distances		Error distances expressed in meters.				
	DF13 Distance, short	**uint16**	*Range:* 0 to 655.32 m	*Resolution:* 1x10E-2 m			

GNSS RAIM Output

PGN: 129545
hex: 1FA09

This PGN is used to provide the output from a GNSS Receiver's Receiver Autonomous Integrity Monitoring (RAIM) process. The Integrity field value is based upon the parameters set in PGN 130059 GNS RAIM Settings.

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

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 84

Field #	Field Name		Byte Field Size	Bit Field Size	Request Parameter	Range	Resolution	
1	**Sequence ID** **DD056** Sequence ID An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.		1		No			
	DF53 Integer, 8 bit unsigned	**uint8**				0 to 252	1 bit	Unit-less number
2	**Integrity Flag** **DD209** GNSS Integrity 0 = No Integrity checking,* 1 = Safe, 2 = Caution, 3 = Unsafe * means the receiver does not have this capability			2	No			
	DF52 Bit field	**bit(n)**				Variable	1	Used to construct bit fields
3	**Reserve Bits** **DD001** Reserved field Variable number of reserved bits, all set to logic "1"			resv 6	No			
	DF52 Bit field	**bit(n)**				Variable	1	Used to construct bit fields
4	**Latitude expected error** **DD220** Measure		2		No			
	DF14 Distance, short, signed	**int16**				+/-327.64 m	1x10E-2 m	
5	**Longitude expected error** **DD220** Measure		2		No			
	DF14 Distance, short, signed	**int16**				+/-327.64 m	1x10E-2 m	
6	**Altitude expected error** **DD220** Measure		2		No			
	DF14 Distance, short, signed	**int16**				+/-327.64 m	1x10E-2 m	
7	**SV ID of most likely failed sat** **DD074** Satellite ID Number 0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.		1		No			
	DF53 Integer, 8 bit unsigned	**uint8**				0 to 252	1 bit	Unit-less number
8	**Probability of missed detection** **DD220** Measure		2		No			
	DF14 Distance, short, signed	**int16**				+/-327.64 m	1x10E-2 m	
9	**Estimate of pseudorange bias** **DD220** Measure		2		No			
	DF14 Distance, short, signed	**int16**				+/-327.64 m	1x10E-2 m	
10	**Std Deviation of bias** **DD220** Measure		2		No			
	DF14 Distance, short, signed	**int16**				+/-327.64 m	1x10E-2 m	

GNSS RAIM Settings

PGN: 129546
hex: 1FA0A

This PGN is used to report the control parameters for a GNSS Receiver Autonomous Integrity Monitoring (RAIM) process. The Command Group Function PGN 126208 provides the means to set these values over the network.

Single Frame: Yes *Priority Default:* 6 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 85

Field #	Field Name					
1	**Radial Position Error Maximum threshold**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No
	DD075 Error Distances		Error distances expressed in meters.			
	DF13 Distance, short	**uint16**	*Range:* 0 to 655.32 m	*Resolution:* 1x10E-2 m		
2	**Probability of False Alarm**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No
	DD138 Generic percent of range					
	DF30 Percent, Relative measure	**int8**	*Range:* +/- 124%	*Resolution:* 1%		
3	**Probability of Missed Detection**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No
	DD138 Generic percent of range					
	DF30 Percent, Relative measure	**int8**	*Range:* +/- 124%	*Resolution:* 1%		
4	**Pseudorange Residual Filtering Time Constant**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No
	DD210 Time Value, resolution 1 sec		Time in seconds			
	DF80 Time, 1sec	**uint16**	*Range:* 0 to 65532 seconds	*Resolution:* 1 second		
5	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 16	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
	Needed to fill the CAN frame.					

GNSS Pseudorange Error Statistics

PGN: 129547
hex: 1FA0B

This parameter group is used to support Receiver Autononmous Integrity Monitoring (RAIM). Pseudorange measurement error statistics can be translated in the position domain in order to give statistical measures of the quality of the position solution.

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

Original Reference ID # 89

Field #	Field Name						
1	**Sequence ID** **DD056** Sequence ID		Byte Field Size: 1	Bit Field Size:	Request Parameter: No		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit		Unit-less number	
2	**RMS Std Dev of Range Inputs** **DD219** Standard Deviation		Byte Field Size: 2	Bit Field Size:	Request Parameter: No		
	DF13 Distance, short	**uint16**	Range: 0 to 655.32 m	Resolution: 1x10E-2 m			RMS value of the standard deviation of the range inputs to the navigation process. Range inputs include pseudoranges & DGNSS corrections.
3	**Std Dev major error ellipse** **DD219** Standard Deviation		Byte Field Size: 2	Bit Field Size:	Request Parameter: No		
	DF13 Distance, short	**uint16**	Range: 0 to 655.32 m	Resolution: 1x10E-2 m			Standard deviation of the semi-major axis of error ellipse (meters)
4	**Std Dev minor error ellipse** **DD219** Standard Deviation		Byte Field Size: 2	Bit Field Size:	Request Parameter: No		
	DF13 Distance, short	**uint16**	Range: 0 to 655.32 m	Resolution: 1x10E-2 m			Standard deviation of the semi-minor axis of error ellipse (meters).
5	**Orientation of error ellipse** **DD127** Generic Direction -True		Byte Field Size: 2	Bit Field Size:	Request Parameter: No		Degrees clockwise relative to True North.
	DF02 Angle	**uint16**	Range: 0 to 2Pi rad	Resolution: 1x10E-4 rad			Resolution ~0.0057deg, 1 deg = .01745 rad Orientation of semi-major axis of error ellipse (from true north)
6	**Std Dev Latitude error** **DD219** Standard Deviation		Byte Field Size: 2	Bit Field Size:	Request Parameter: No		
	DF13 Distance, short	**uint16**	Range: 0 to 655.32 m	Resolution: 1x10E-2 m			Standard deviation of Latitude error (meters)
7	**Std Dev Longitude error** **DD219** Standard Deviation		Byte Field Size: 2	Bit Field Size:	Request Parameter: No		
	DF13 Distance, short	**uint16**	Range: 0 to 655.32 m	Resolution: 1x10E-2 m			Standard deviation of Longitude error (meters)
8	**Std Dev Altitude error** **DD219** Standard Deviation		Byte Field Size: 2	Bit Field Size:	Request Parameter: No		
	DF13 Distance, short	**uint16**	Range: 0 to 655.32 m	Resolution: 1x10E-2 m			Standard deviation of altitude error (meters)

DGNSS Corrections

PGN: 129549
hex: 1FA0D

This PGN provides a means to pass differential GNSS corrections between NMEA 2000 devices. Passing DGNSS data this way allows for more flexibility than traditional methods. One differential correction receiver could supply multiple GNSS receivers. Multiple differential correction receivers or data streams could be connected to a GNSS receiver allowing for network DGNSS approaches. This PGN can accommodate DGPS and DGLONASS corrections. Future systems can be indicated by allocation of the reserved states in field 3. These corrections can be related to the position solution and to time through proper application of the sequence ID field.

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

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 86

Field #	Field Name						
1	**Sequence ID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Reference Station ID**		*Byte Field Size:*	*Bit Field Size:* 12		*Request Parameter*	No
	DD071 Ref Station		Reference Station ID. Reference Station number as provided by the Service Provider.[Reference document required]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Reference Station Type**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD070 Ref Station Type		Reference Station Type. 0x0=GPS; 0x1=GLONASS; 0x2 to 0xD=Reserved; 0XE=Error; 0XF=Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Time of corrections**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD211 Time Value, resolution 0.1 sec		Time in seconds				
	DF81 Time, 0.1sec	**uint16**	*Range:* 0 to 6553.2 seconds	*Resolution:* 1 x 10E-1 sec			
5	**Station Health**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD212 Station Heath		0x00 = Not Working, 0x01 = Unmonitored, 0x02 = Healthy & Operational, 0x03 = Healthy & in Test Mode, 0x04 = In Test Mode - DO NOT USE, 0x05 - 0x15 = Reserved				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 4		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	4 Bits needed to fill out the byte						
7	**Satellite ID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD074 Satellite ID Number		0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		

8	**PRC**			*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD213 Distance, int 32 4dp							
	DF83 Distance, signed 4dp	**int32**	*Range:* +/-~2.147x10E+5 m	*Resolution:* 1x10E-4 m				
9	**RRC**			*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD214 Generic Speed							
	DF82 Speed, signed 4dpt	**int16**	*Range:* +/-3.2764 m/s	*Resolution:* 1x10E-4 m/s				
10	**UDRE**			*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD195 Distance, short		Dependent upon PG Field definition.					
	DF13 Distance, short	**uint16**	*Range:* 0 to 655.32 m	*Resolution:* 1x10E-2 m				
	value 655.32 (all 1's) indicates satellite invalid do not use or stop using immediately.							
11	**IOD**			*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD005 Generic numeric ID, short		Number of route, waypoint, event, mark, etc.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			

GNSS Differential Correction Receiver Interface

PGN: 129550
hex: 1FA0E

GNSS common differential correction receiver parameter status.

Single Frame: Yes *Priority Default:* 6 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 27

Field #	Field Name						
1	**Channel**			*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No
	DD076 Receiver channel number			The channel number of the correction receiver. If the receiver only has one beacon input channel, this value shall be 1; 0 is undefined.			
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Frequency**			*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No
	DD077 Differential Correction Receiver frequency			This is the input frequency of the correction receiver.			
	DF21 Frequency	**uint32**	*Range:* 0 to ~4.295x10E+10 Hz	*Resolution:* 10 Hz			
3	**Serial Interface Bit Rate**			*Byte Field Size:*	*Bit Field Size:* 5	*Request Parameter*	No
	DD078 Differential Correction Broadcast Bit Rate			This is the bit rate of the correction receiver. 0 = 25bps, 1 = 50bps, 2 = 100bps, 3 = 200bps, 4 = 300bps, 5 = 500bps, 6 = 1200bps, 7 = 2400bps, 8 = 4800bps, 9 = 9600bps 10 = 19200bps, 11 = 38400bps, 12 = 57600bps, 13-29 = Reserved, 30 = Error, 31 = Null		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Serial Interface Detection Mode**			*Byte Field Size:*	*Bit Field Size:* 3	*Request Parameter*	No
	DD079 Mode, Bit Rate			This is the mode of operation for the correction receiver. 0 = Auto bit rate set, 1 = Manual bit rate set, 2-5 = Reserved 6 = Error, 7 = Null.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
5	**Differential Source**			*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter*	No
	DD125 Differential Source			0 = Auto Select, 1 = Loran Communications 2 = MSK Beacon, 3 = FM Subcarrier, 4 = AIS (Automatic Identification System), 5 = Other Ground-based Radio, 6 = SBAS (Satellite Based Augmentation System, 7 = Other Satellite, 8-13 = Reserved, 14 = Error, 15 = No Selection		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

7	**Differential Operation Mode**		*Byte Field Size:*		*Bit Field Size:* 4		*Request Parameter* No
	DD126 Differential Operating Mode		0 = Manual, 1 = Auto Power, 2 = Auto Range, 3-13 = Reserved, 14 = Error, 15 = No Selection				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
8	**Reserved Bits**		*Byte Field Size:*		*Bit Field Size:* resv 8		*Request Parameter* No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
	Needed to fill the CAN frame.						

GNSS Differential Correction Receiver Signal

PGN: 129551
hex: 1FA0F

GNSS differential correction receiver status tagged by sequence ID. Status information includes frequency, SNR, and use as a correction source.

Single Frame:	No	Priority Default:	6	Default Update Rate:	NA milliseconds	Frequency:	NA cycles per second
Destination:	Global	Query Support:	Opt'l	ACK Rqmnts:			

Original Reference ID # 28

Field #	Field Name							
1	**SID**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No	
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.					
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number			
2	**Channel**		Byte Field Size: 1	Bit Field Size:		Request Parameter	No	
	DD076 Receiver channel number		The channel number of the correction receiver. If the receiver only has one beacon input channel, this value shall be 1; 0 is undefined.					
	DF53 Integer, 8 bit unsigned	**uint8**	Range: 0 to 252	Resolution: 1 bit	Unit-less number			
3	**Signal Strength**		Byte Field Size: 4	Bit Field Size:		Request Parameter	No	
	DD080 Correction Receiver Signal Strength		This is the signal strength expressed in dB with respect to 1uV/m.					
	DF16 Electric field	**int32**	Range: +/-327.64 dB re: uV/m	Resolution: 1x10E-2 dB re: uV/m				
4	**Signal SNR**		Byte Field Size: 2	Bit Field Size:		Request Parameter	No	
	DD081 SNR Value		SNR expressed in dB.					
	DF31 dB, relative measure	**int16**	Range: +/- 327.64 dB	Resolution: 1x10E-2 dB				
5	**Frequency**		Byte Field Size: 4	Bit Field Size:		Request Parameter	No	
	DD077 Differential Correction Receiver frequency		This is the input frequency of the correction receiver.					
	DF21 Frequency	**uint32**	Range: 0 to ~4.295x10E+10 Hz	Resolution: 10 Hz				
6	**Station Type**		Byte Field Size:	Bit Field Size: 4		Request Parameter	No	
	DD070 Ref Station Type		Reference Station Type. 0x0=GPS; 0x1=GLONASS; 0x2 to 0xD=Reserved; 0XE=Error; 0XF=Null					
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields			
7	**Station ID**		Byte Field Size:	Bit Field Size: 12		Request Parameter	No	
	DD071 Ref Station		Reference Station ID. Reference Station number as provided by the Service Provider.[Reference document required]					
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields			

8	**Differential Signal Bit Rate**		*Byte Field Size:*		*Bit Field Size:* 5		*Request Parameter* No
	DD078 Differential Correction Broadcast Bit Rate		This is the bit rate of the correction receiver. 0 = 25bps, 1 = 50bps, 2 = 100bps, 3 = 200bps, 4 = 300bps, 5 = 500bps, 6 = 1200bps, 7 = 2400bps, 8 = 4800bps, 9 = 9600bps 10 = 19200bps, 11 = 38400bps, 12 = 57600bps, 13-29 = Reserved, 30 = Error, 31 = Null			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
9	**Differential Signal Detection Mode**		*Byte Field Size:*		*Bit Field Size:* 3 3		*Request Parameter* No
	DD079 Mode, Bit Rate		This is the mode of operation for the correction receiver. 0 = Auto bit rate set, 1 = Manual bit rate set, 2-5 = Reserved 6 = Error, 7 = Null.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
10	**Used as Correction Source**		*Byte Field Size:*		*Bit Field Size:* 2		*Request Parameter* No
	DD002 Generic status pair		MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11= [Unavailable, Unknown]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
11	**Reserved Bits**		*Byte Field Size:*		*Bit Field Size:* resv 2		*Request Parameter* No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
	2 Bits needed to fill out the byte						
12	**Differential Source**		*Byte Field Size:*		*Bit Field Size:* 4		*Request Parameter* No
	DD125 Differential Source		0 = Auto Select, 1 = Loran Communications 2 = MSK Beacon, 3 = FM Subcarrier, 4 = AIS (Automatic Identification System), 5 = Other Ground-based Radio, 6 = SBAS (Satellite Based Augmentation System, 7 = Other Satellite, 8-13 = Reserved, 14 = Error, 15 = No Selection				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
13	**Time Since Last Sat Differential Sync**		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DD060 Differential Age		Age of Differential corrections				
	DF66 Time interval, .01sec	**uint16**	*Range:* 0 to 655.32s	*Resolution:* 1x10-2sec			
14	**Satellite Service ID No.**		*Byte Field Size:*		*Bit Field Size:* 16		*Request Parameter* No
	DD143 Satellite Service ID		Satellite Service ID number as provided by the Service Provider.[Reference document required]				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields

GLONASS Almanac Data

PGN: 129556
hex: 1FA14

This PGN provides a single transmission that contains relevant almanac data for Glonass products. The almanac contains satellite vehicle course orbital parameters. This information is not considered precise and is only valid for several months at a time. Glonass products receive almanac data directly from the satellites.

This information would either be transmitted to and from Glonass products for update, or system interrogation.
This information would generally be transmitted upon request, during calibration or installation, but not at regular intervals.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Field #	*Field Name*					Original Reference ID # 30
1	**PRN**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No
	DD074 Satellite ID Number		0 = value not used, 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS. For GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares.			
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
2	**NA**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No
	DD094 Almanac parameter, NA		Calendar day count within the four year period beginning with the previous leap year			
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number	
3	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 2	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
	2 Bits needed to fill out the byte					
4	**CnA**		*Byte Field Size:*	*Bit Field Size:* 1	*Request Parameter*	No
	DD095 Almanac parameter, CnA		Generalized health of the Satellite, reference GLONASS ICD.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
5	**HnA**		*Byte Field Size:*	*Bit Field Size:* 5	*Request Parameter*	No
	DD096 Almanac parameter, HnA		Carrier frequency number respectively, reference GLONASS ICD.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
6	**(epsilon)nA**		*Byte Field Size:*	*Bit Field Size:* 16	*Request Parameter*	No
	DD097 Almanac parameter, (epsilon)nA		Eccentricity, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
7	**(deltaTnA)DOT**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter*	No
	DD098 Almanac parameter, (deltaTnA)DOT		Rate of change of the draconitic circling time, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
8	**(omega)nA**		*Byte Field Size:*	*Bit Field Size:* 16	*Request Parameter*	No
	DD099 Almanac parameter, (omega)nA		Argument of Perigee, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
9	**(delta)TnA**		*Byte Field Size:*	*Bit Field Size:* 24	*Request Parameter*	No
	DD100 Almanac parameter, (delta)TnA		Correction to the average value of the draconitic circling time, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	

10	**tnA**			*Byte Field Size:*	*Bit Field Size:* 24	*Request Parameter*	No
	DD101 Almanac parameter, tnA			Time of the ascension node, almanac reference time, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
11	**(lambda)nA**			*Byte Field Size:*	*Bit Field Size:* 24	*Request Parameter*	No
	DD102 Almanac parameter, (lambda)nA			Greenwich longitude of the ascension node, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
12	**(delta)inA**			*Byte Field Size:*	*Bit Field Size:* 24	*Request Parameter*	No
	DD103 Almanac parameter, (delta)inA			Correction to the average value of the inclination angle, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
13	**tcA**			*Byte Field Size:*	*Bit Field Size:* 28	*Request Parameter*	No
	DD104 Almanac parameter, (tau)cA			System time scale correction, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
14	**tnA**			*Byte Field Size:*	*Bit Field Size:* 12	*Request Parameter*	No
	DD105 Almanac parameter, (tau)nA			Course value of the time scale shift, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros).			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

AIS DGNSS Broadcast Binary Message

PGN: 129792
hex: 1FB00

This parameter group provides data associated with the ITU-R M.1371 Message 17 GNSS Broadcast Binary Message containing DGNSS corrections from a base station. An AIS device may generate this parameter group either upon receiving a VHF data link message 17, or upon receipt of an ISO or NMEA request PGN (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

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

Original Reference ID # 121

Field #	Field Name						
1	**Message ID**		*Byte Field Size:*	*Bit Field Size:* 6		*Request Parameter*	No
	DD188 AIS Message Identifier			Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	17 = GNSS Broadcast Binary Message						
2	**Repeat Indicator**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD185 AIS Repeater Indicator			Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Source ID**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of base station reporting DGNSS information.						
4	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:* resv 1		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
5	**AIS Transceiver Information**		*Byte Field Size:*	*Bit Field Size:* 5		*Request Parameter*	No
	DD246 AIS Transceiver Information			0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Spare**		*Byte Field Size:*	*Bit Field Size:* resv 2		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
7	**Longitude**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD023 Longitude, WGS-84			Longitude referenced to WGS-84			
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm		
	Longitude of base station reporting DGNSS information.						

8	**Latitude**		*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter*	No
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84					
	DF23 Latitude	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm			
	Latitude of base station reporting DGNSS information.							
9	**NMEA 2000 Reserved**		*Byte Field Size:*		*Bit Field Size:* resv 3		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	Used to align subsequent data on byte boundary.							
10	**Spare**		*Byte Field Size:*		*Bit Field Size:* resv 5		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							
11	**Number of Bits in Binary Data Field**		*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	Indicates the number of binary data bits that are contained within the Binary Data field.							
12	**Binary Data**		*Byte Field Size:*		*Bit Field Size:* n		*Request Parameter*	No
	DD142 Binary Bit Field		Binary data bit field.					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	Differential correction data. See ITU-R M.1371-1. The size of this field is provided in field 10, Number of Bits in Binary Data Field.							

AIS UTC and Date Report

PGN: 129793
hex: 1FB01

This parameter group provides data from ITU-R M.1371 message 4 Base Station Report providing position, time, date, and current slot number of a base station, and 11 UTC and date response message providing current UTC and date if available. An AIS device may generate this parameter group either upon receiving a VHF data link message 4 or 11, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure base station parameters (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 110

Field #	Field Name						
1	**Message ID**		Byte Field Size:	Bit Field Size: 6	Request Parameter: No		
	DD188 AIS Message Identifier		Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
	4 = Base Station Report 11 = UTC and Date Response						
2	**Repeat Indicator**		Byte Field Size:	Bit Field Size: 2	Request Parameter: No		
	DD185 AIS Repeater Indicator		Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
3	**User ID**		Byte Field Size: 4	Bit Field Size:	Request Parameter: No		
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.				
	DF55 Integer, 32 bit unsigned	**uint32**	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number		
	MMSI number of station reporting its UTC and date.						
4	**Longitude**		Byte Field Size: 4	Bit Field Size:	Request Parameter: No		
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm		
	Longitude of station reporting its UTC and date.						
5	**Latitude**		Byte Field Size: 4	Bit Field Size:	Request Parameter: No		
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84				
	DF23 Latitude	**int32**	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm		
	Latitude of station reporting its UTC and date.						
6	**Position accuracy**		Byte Field Size:	Bit Field Size: 1	Request Parameter: No		
	DD184 AIS Position Accuracy		0=low accuracy>10m such as nondifferential GNSS (default), 1=high accuracy <10m such as DGNSS See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
7	**RAIM-flag**		Byte Field Size:	Bit Field Size: 1	Request Parameter: No		
	DD189 AIS RAIM-flag		0 = RAIM not in use (default), 1 = RAIM in use See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		

8	**NMEA 2000 Reserved**	*Byte Field Size:*	*Bit Field Size:* resv 6	*Request Parameter* No		
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.					
9	**Position time**	*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC			
	DF06 Time of day **uint32**	*Range:* 0 to 86,401 s	*Resolution:* 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day		
	Time of position of station reporting its UTC and date.					
10	**Communication State**	*Byte Field Size:*	*Bit Field Size:* 19	*Request Parameter* No		
	DD187 AIS Communication State		The Communication State contains information used by the various TDMA slot allocation algorithms and synchronization information See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
11	**AIS Transceiver Information**	*Byte Field Size:*	*Bit Field Size:* 5	*Request Parameter* No		
	DD246 AIS Transceiver Information		0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
12	**Position Date**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD039 Generic date		Days since January 1, 1970, Date is relative to UTC Time.			
	DF41 Date, day count **uint16**	*Range:* 0 to 65,532 days	*Resolution:* 1 day	0 = January 1, 1970, max = ~179 years		
13	**NMEA 2000 Reserved**	*Byte Field Size:*	*Bit Field Size:* resv 4	*Request Parameter* No		
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.					
14	**Type of Electronic Positioning Device**	*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD191 AIS Electronic Positioning Device Type		0 =Undefined (default), 1 = GPS, 2 = GLONASS, 3 = Combined GPS/GLONASS, 4 = Loran-C, 5 = Chayka, 6 = Integrated Navigation System, 7 = Surveyed (Base Station), 8 = Galilieo 9-15 = Reserved for future use. See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
15	**Spare**	*Byte Field Size:*	*Bit Field Size:* resv 10	*Request Parameter* No		
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.					

AIS Class A Static and Voyage Related Data

PGN: 129794
hex: 1FB02

This parameter group provides data associated with the ITU-R M.1371 Message 5 Ship Static and Voyage Related Data Message. An AIS device may generate this parameter group either upon receiving a VHF data link message 5, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure static and voyage related parameters (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

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

Field # *Field Name* Original Reference ID # 111

1 Message ID *Byte Field Size:* *Bit Field Size:* 6 *Request Parameter* No
DD188 AIS Message Identifier
Message Identifier (range of 0 to 63).

See the latest version of ITU-R M.1371 for more information.

DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
5 = Ship Static and Voyage Related Data Message.

2 Repeat Indicator *Byte Field Size:* *Bit Field Size:* 2 *Request Parameter* No
DD185 AIS Repeater Indicator
Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3).

0 = Default
1 = First retransmission
2 = Second retransmission
3 = Final retransmission

See the latest version of ITU-R M.1371 for more information.

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

3 User ID *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No
DD010 Generic numeric ID, large
Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned **uint32** *Range:* 0 to 4,294,967,292 *Resolution:* 1 bit Unit-less number
MMSI number of mobile station reporting its static and voyage related data.

4 IMO *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No
DD010 Generic numeric ID, large
Number of route, waypoint, event, mark, etc.

DF55 Integer, 32 bit unsigned **uint32** *Range:* 0 to 4,294,967,292 *Resolution:* 1 bit Unit-less number
IMO number of mobile station reporting its static and voyage related data.

5 Call Sign *Byte Field Size:* char n *Bit Field Size:* *Request Parameter* No
DD192 Generic String, ASCII, Fixed length
Length specified by PGN field definition.

DF63 String, fixed **char8(n)** *Range:* 0 to 1,785 characters *Resolution:* 1 char 0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
This is a 7 character string, see ITU-R M.1371-1 for more information.

6 Name *Byte Field Size:* char n *Bit Field Size:* *Request Parameter* No
DD192 Generic String, ASCII, Fixed length
Length specified by PGN field definition.

DF63 String, fixed **char8(n)** *Range:* 0 to 1,785 characters *Resolution:* 1 char 0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
This is a 20 character string, see ITU-R M.1371-1 for more information.

7 Ship/Cargo Type *Byte Field Size:* *Bit Field Size:* 8 *Request Parameter* No
DD193 Ship/Cargo Type
0=Not Available or no ship (default),
1-99= (See the latest version of ITU-R M.1371 Section 3.3.8.2.3.2 Table 18),
100-199=Reserved for Regional (See the latest version of ITU-R M.1371),
200-255=Reserved for future (See the latest version of ITU-R M.1371).

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

8 **Ship Length** — Byte Field Size: 2 — Bit Field Size: — Request Parameter: No

DD194 Distance, medium — Dependent upon PG Field definition.

DF75 Distance, Medium **uint16** Range: 0 to 6553.2 m Resolution: 1x10E-1 m

Length of mobile station reporting its static and voyage related data. A value of 65535 indicates that data is not available.

9 **Ship Beam** — Byte Field Size: 2 — Bit Field Size: — Request Parameter: No

DD194 Distance, medium — Dependent upon PG Field definition.

DF75 Distance, Medium **uint16** Range: 0 to 6553.2 m Resolution: 1x10E-1 m

Beam of mobile station reporting its static and voyage related data. A value of 65535 indicates that data is not available.

10 **Position Reference Point from Starboard** — Byte Field Size: 2 — Bit Field Size: — Request Parameter: No

DD194 Distance, medium — Dependent upon PG Field definition.

DF75 Distance, Medium **uint16** Range: 0 to 6553.2 m Resolution: 1x10E-1 m

Position reference point from starboard side of mobile station reporting its static and voyage related data. A value of 65535 indicates that data is not available.

11 **Position Reference Point aft of Ship's Bow** — Byte Field Size: 2 — Bit Field Size: — Request Parameter: No

DD194 Distance, medium — Dependent upon PG Field definition.

DF75 Distance, Medium **uint16** Range: 0 to 6553.2 m Resolution: 1x10E-1 m

Position reference point from aft of ship's bow of mobile station reporting its static and voyage related data. A value of 65535 indicates that data is not available.

12 **Estimated Date of Arrival** — Byte Field Size: 2 — Bit Field Size: — Request Parameter: No

DD039 Generic date — Days since January 1, 1970, Date is relative to UTC Time.

DF41 Date, day count **uint16** Range: 0 to 65,532 days Resolution: 1 day — 0 = January 1, 1970, max = ~179 years

EDA of mobile station reporting its static and voyage related data.

13 **Estimated Time of Arrival** — Byte Field Size: 4 — Bit Field Size: — Request Parameter: No

DD158 Generic time of day — 24 hour clock, 0 = midnight, time is in UTC

DF06 Time of day **uint32** Range: 0 to 86,401 s Resolution: 1x10E-4 s — ~24 hours, 0 = midnight, range allows for up to two leap seconds per day

ETA of mobile station reporting its static and voyage related data.

14 **Draft** — Byte Field Size: 2 — Bit Field Size: — Request Parameter: No

DD196 Draft — The depth of a ship in the water. The vertical distance between the waterline and the keel.

DF13 Distance, short **uint16** Range: 0 to 655.32 m Resolution: 1x10E-2 m

15 **Destination** — Byte Field Size: char n — Bit Field Size: — Request Parameter: No

DD192 Generic String, ASCII, Fixed length — Length specified by PGN field definition.

DF63 String, fixed **char8(n)** Range: 0 to 1,785 characters Resolution: 1 char — 0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary

This is a 20 character string, see ITU-R M.1371-1 for more information.

16 **AIS Version** — Byte Field Size: — Bit Field Size: 2 — Request Parameter: No

DD304 AIS Version Indicator — 0 = Station compliant with AIS edition 0
1-3 = Station compliant with AIS editions 1, 2, and 3

See the latest version of ITU-R M.1371 for more information.

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

17 **Type of Electronic Positioning Device** *Byte Field Size:* *Bit Field Size:* 4 *Request Parameter* No

DD191 AIS Electronic Positioning Device Type

0 =Undefined (default),
1 = GPS,
2 = GLONASS,
3 = Combined GPS/GLONASS,
4 = Loran-C,
5 = Chayka,
6 = Integrated Navigation System,
7 = Surveyed (Base Station),
8 = Galilieo
9-15 = Reserved for future use.

See the latest version of ITU-R M.1371 for more information.

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

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18 **Data Terminal Equipment (DTE)** *Byte Field Size:* *Bit Field Size:* 1 *Request Parameter* No

DD242 Data Terminal Equipment (DTE)

0=Available,
1=not available.

See the latest version of ITU-R M.1371 for more information.

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

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19 **Spare** *Byte Field Size:* *Bit Field Size:* resv 1 *Request Parameter* No

DD001 Reserved field

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

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

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

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20 **AIS Transceiver Information** *Byte Field Size:* *Bit Field Size:* 5 *Request Parameter* No

DD246 AIS Transceiver Information

0 = Channel A VDL reception,
1 = Channel B VDL reception,
2 = Channel A VDL transmission,
3 = Channel B VDL transmission,
4 = Own information not broadcast,
5-31 = Reserved.

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

AIS Addressed Binary Message

PGN: 129795
hex: 1FB03

This parameter group provides data associated with the ITU-R M.1371 Message 6 Addressed Binary Message supporting address communication of binary data. An AIS device may generate this parameter group either upon receiving a VHF data link message 6, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure parameters such as the Destination ID and Binary Data (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 5 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 112

Field #	Field Name						
1	**Message ID** **DD188** AIS Message Identifier		*Byte Field Size:*	*Bit Field Size:* 6	*Request Parameter* No	Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	6 = Addressed Binary Message.	
2	**Repeat Indicator** **DD185** AIS Repeater Indicator		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Source ID** **DD010** Generic numeric ID, large		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No	Number of route, waypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number	MMSI number of source station.	
4	**NMEA 2000 Reserved** **DD001** Reserved field		*Byte Field Size:*	*Bit Field Size:* resv 1	*Request Parameter* No	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	Used to align subsequent data on byte boundary.	
5	**AIS Transceiver Information** **DD246** AIS Transceiver Information		*Byte Field Size:*	*Bit Field Size:* 5	*Request Parameter* No	0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.	
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Sequence Number** **DD243** AIS Sequence Number		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No	Range 0-3 See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**Destination ID** **DD010** Generic numeric ID, large		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No	Number of route, waypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number	MMSI Number of destination station.	

8	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:*	resv 6	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
9	**Retransmit Flag**		*Byte Field Size:*	*Bit Field Size:*	1	*Request Parameter*	No
	DD244 AIS Retransmit Flag			0=No retransmission, 1=retransmitted. See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
10	**Spare**		*Byte Field Size:*	*Bit Field Size:*	resv 1	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
11	**Number of Bits in Binary Data Field**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD007 Generic numeric ID, medium			Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Indicates the number of binary data bits that are contained within the Binary Data field.						
12	**Binary Data**		*Byte Field Size:*	*Bit Field Size:*	n	*Request Parameter*	No
	DD142 Binary Bit Field			Binary data bit field.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Application specific data.						

AIS Acknowledge

PGN: 129796
hex: 1FB04

This parameter group provides data associated with the ITU-R M.1371 Messages 7 Binary Acknowledge Message and 13 Safety Related Acknowledge Message. Message 7 acknowledges receipt of message 6 while message 13 acknowledges receipt of message 14. An AIS device may generate this parameter group either upon receiving a VHF data link message 7 or 13, or upon receipt of an ISO or NMEA request PGN (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 113

Field #	*Field Name*						
1	**Message ID**		*Byte Field Size:*	*Bit Field Size:* 6		*Request Parameter*	No
	DD188 AIS Message Identifier			Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	7 = Binary Acknowledge Message, 13 = Safety Related Acknowledge Message.						
2	**Repeat Indicator**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD185 AIS Repeater Indicator			Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Source ID**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of source station for this acknowledge.						
4	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:* resv 1		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
5	**AIS Transceiver Information**		*Byte Field Size:*	*Bit Field Size:* 5		*Request Parameter*	No
	DD246 AIS Transceiver Information			0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Spare**		*Byte Field Size:*	*Bit Field Size:* resv 2		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
7	**Destination ID"1"**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of first destination for this acknowledge.						

8	**NMEA 2000 Reserved**		*Byte Field Size:*		*Bit Field Size:*	resv 6	*Request Parameter* No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
	Used to align subsequent data on byte boundary.						
9	**Sequence Number for ID"1"**		*Byte Field Size:*		*Bit Field Size:*	2	*Request Parameter* No
	DD243 AIS Sequence Number			Range 0-3 See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
	Sequence number of message to be acknowledged, range 0-3.						
10	**Destination ID"n"**		*Byte Field Size:*	4	*Bit Field Size:*		*Request Parameter* No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:*	0 to 4,294,967,292	*Resolution:*	1 bit	Unit-less number
	Variable Number of fields, Field number 7 repeated.						
11	**NMEA 2000 Reserved**		*Byte Field Size:*		*Bit Field Size:*	resv 6	*Request Parameter* No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
	Variable Number of fields, Field number 8 repeated.						
12	**Sequence Number for ID"n"**		*Byte Field Size:*		*Bit Field Size:*	2	*Request Parameter* No
	DD243 AIS Sequence Number			Range 0-3 See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
	Variable Number of fields, Field number 9 repeated.						

AIS Binary Broadcast Message

PGN: 129797
hex: 1FB05

This parameter group provides data associated with the ITU-R M.1371 Message 8 Binary Broadcast Message supporting broadcast communication of binary data. An AIS device may generate this parameter group either upon receiving a VHF data link message 8, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure parameters such as the Binary Data (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 5 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 114

Field #	Field Name						
1	**Message ID**		*Byte Field Size:*	*Bit Field Size:* 6	*Request Parameter* No		
	DD188 AIS Message Identifier		Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	8 = Binary Broadcast Message.						
2	**Repeat Indicator**		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD185 AIS Repeater Indicator		Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Source ID**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.				
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of source station.						
4	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:* resv 1	*Request Parameter* No		
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
5	**AIS Transceiver Information**		*Byte Field Size:*	*Bit Field Size:* 5	*Request Parameter* No		
	DD246 AIS Transceiver Information		0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Spare**		*Byte Field Size:*	*Bit Field Size:* resv 2	*Request Parameter* No		
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
7	**Number of Bits in Binary Data Field**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Indicates the number of binary data bits that are contained within the Binary Data field.						

8	**Binary Data**		*Byte Field Size:*		*Bit Field Size:*	n	*Request Parameter* No
	DD142 Binary Bit Field			Binary data bit field.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
	Application specific data.						

AIS SAR Aircraft Position Report

PGN: 129798
hex: 1FB06

This parameter group provides data associated with the ITU-R M.1371 Message 9 SAR Aircraft Position Report Message for Airborne AIS units conducting Search and Rescue operations. An AIS device may generate this parameter group either upon receiving a VHF data link message 9, or upon receipt of an ISO or NMEA request PGN (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 4 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 115

Field #	Field Name							
1	**Message ID**		*Byte Field Size:*		*Bit Field Size:* 6		*Request Parameter*	No
	DD188 AIS Message Identifier		Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	9 = SAR Aircraft Position Report Message							
2	**Repeat Indicator**		*Byte Field Size:*		*Bit Field Size:* 2		*Request Parameter*	No
	DD185 AIS Repeater Indicator		Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
3	**User ID**		*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.					
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number			
	MMSI number of SAR aircraft reporting position.							
4	**Longitude**		*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter*	No
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84					
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm			
	Longitude of SAR aircraft reporting position.							
5	**Latitude**		*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter*	No
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84					
	DF23 Latitude	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm			
	Latitude of SAR aircraft reporting position.							
6	**Position Accuracy**		*Byte Field Size:*		*Bit Field Size:* 1		*Request Parameter*	No
	DD184 AIS Position Accuracy		0=low accuracy>10m such as nondifferential GNSS (default), 1=high accuracy <10m such as DGNSS See the latest version of ITU-R M.1371 for more information.					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
7	**RAIM-Flag**		*Byte Field Size:*		*Bit Field Size:* 1		*Request Parameter*	No
	DD189 AIS RAIM-flag		0 = RAIM not in use (default), 1 = RAIM in use See the latest version of ITU-R M.1371 for more information.					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			

8	**Time Stamp**		*Byte Field Size:*		*Bit Field Size:*	6	*Request Parameter*	No
	DD186 AIS Time Stamp			0-59=UTC second when the report was generated, 60=time stamp not available (default), 61=positioning system is in manual input mode, 62=Electronic position fixing system operates in estimated (dead reckoning) mode, 63=positioning system is inoperative See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
9	**COG**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD165 Course-Over-Ground (COG)			The direction of the path over ground actually followed by a vessel.				
	DF02 Angle	**uint16**	*Range:*	0 to 2Pi rad	*Resolution:*	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
	COG of SAR aircraft reporting position.							
10	**SOG**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD044 Generic Speed							
	DF35 Speed	**uint16**	*Range:*	0 to 655.32 m/s	*Resolution:*	1x10E-2 m/s	1 Knot = 0.5144 m/s	
	SOG of SAR aircraft reporting position.							
11	**Communication State**		*Byte Field Size:*		*Bit Field Size:*	19	*Request Parameter*	No
	DD187 AIS Communication State			The Communication State contains information used by the various TDMA slot allocation algorithms and synchronization information See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
12	**AIS Transceiver Information**		*Byte Field Size:*		*Bit Field Size:*	5	*Request Parameter*	No
	DD246 AIS Transceiver Information			0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
13	**Altitude**		*Byte Field Size:*	4	*Bit Field Size:*		*Request Parameter*	No
	DD115 Distance							
	DF15 Distance, signed	**int32**	*Range:*	+/-~2.147x10E+7 m	*Resolution:*	1x10E-2 m		
	Altitude of SAR aircraft reporting position.							
14	**Reserved for Regional Applications**		*Byte Field Size:*		*Bit Field Size:*	resv 8	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
	This field mirrors the "Reserved for Regional Applications" bit field found within the corresponding AIS such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							
15	**Data Terminal Equipment (DTE)**		*Byte Field Size:*		*Bit Field Size:*	1	*Request Parameter*	No
	DD242 Data Terminal Equipment (DTE)			0=Available, 1=not available. See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	

16	**Spare**		*Byte Field Size:*	*Bit Field Size:*	resv 5	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

Radio Frequency/Mode/Power

PGN: 129799
hex: 1FB07

This PGN provides status and control for a Radiotelephone, connected to a NMEA 2000 network.

The Radiotelephone will transmit and receive status along with remote control and repeater products.
This information will either need to be transmitted on change, by request or on a low duty cycle.

Single Frame: No *Priority Default:* 3 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 62

Field #	Field Name						
1	**Rx Frequency**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD016 Radio Tx or Rx Frequency						
	DF21 Frequency	**uint32**	*Range:* 0 to ~4.295x10E+10 Hz	*Resolution:* 10 Hz			
2	**Tx Frequency**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD016 Radio Tx or Rx Frequency						
	DF21 Frequency	**uint32**	*Range:* 0 to ~4.295x10E+10 Hz	*Resolution:* 10 Hz			
3	**Radio Channel**		*Byte Field Size:* char 6	*Bit Field Size:*		*Request Parameter*	No
	DD017 Radio Tx or Rx Channel		MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have he first digit 9 followed by zero. The next number is "1" indicating the ship station's transmit frequency is being used as a simplex channel frequency, or "2" indicating the coast station's transmit frequency is being used as a simplex channel frequency, "0" otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.				
	DF63 String, fixed	**char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary		
	It is not necessary to supply both RX/TX frequency and channel but if both are present, frequency takes priority in case of mismatch.						
4	**Tx Power**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD018 Radio Tx Power						
	DF28 Power	**uint16**	*Range:* 0 to 65,532 W	*Resolution:* 1 W			
	If equipment has insufficient resolution to apply a commanded power, the next lower available power setting should be used.						
5	**Mode**		*Byte Field Size:*	*Bit Field Size:* 8		*Request Parameter*	No
	DD019 Mode, Radiotelephone		Radiotelephone mode settings: 0 = F3E/G3E simplex, telephone; 1 = F3E/G3E duplex, telephone; 2 = J3E, telephone; 3 = H3E, telephone; 4 = F1B/J2B FEC NBDP, telex/teleprinter; 5 = F1B/J2B ARQ NBDP, telex/teleprinter; 6 = F1B/J2B receive only, teleprinter/DSC; 7 = F1B/J2B, teleprinter/DSC; 8 = A1A Morse, tape recorder; 9 = A1A Morse, Morse key/head set; 10 =F1C/F2C/F3C, FAX-machine; 11-253 = reserved; 254 = error; 255 = unavailable/do not change				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Channel Bandwidth**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD020 Radio Channel Bandwidth						
	DF26 Frequency, mid	**uint16**	*Range:* 0 to 65,532 Hz	*Resolution:* 1 Hz			
	If equipment has insufficient resolution to apply a commanded bandwidth, the closest available setting should be used.						

AIS UTC/Date Inquiry

PGN: 129800
hex: 1FB08

This parameter group provides data associated with the ITU-R M.1371 Message 10 UTC and Date Inquiry Message used to request current UTC and date. An AIS device may generate this parameter group either upon receiving a VHF data link message 10, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure parameters such as the Destination ID (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 116

Field #	Field Name						
1	**Message ID**		*Byte Field Size:*	*Bit Field Size:* 6		*Request Parameter*	No
	DD188 AIS Message Identifier			Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	10 = AIS UTC and Date Inquiry Message						
2	**Repeat Indicator**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD185 AIS Repeater Indicator			Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Source ID**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of station which inquires UTC.						
4	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:* resv 1		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
5	**AIS Transceiver Information**		*Byte Field Size:*	*Bit Field Size:* 5		*Request Parameter*	No
	DD246 AIS Transceiver Information			0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Spare**		*Byte Field Size:*	*Bit Field Size:* resv 2		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
7	**Destination ID**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of station which is inquired.						

8	**Spare**		*Byte Field Size:*	*Bit Field Size:*	resv 2	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

AIS Addressed Safety Related Message

PGN: 129801
hex: 1FB09

This parameter group provides data associated with the ITU-R M.1371 Message 12 Addressed Safety Related Message supporting addressed communication of safety related data. An AIS device may generate this parameter group either upon receiving a VHF data link message 12, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure safety related message parameters (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 5 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 117

Field #	*Field Name*						
1	**Message ID**		*Byte Field Size:*	*Bit Field Size:* 6		*Request Parameter*	No
	DD188 AIS Message Identifier			Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	12 = Addressed Safety Related Message						
2	**Repeat Indicator**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD185 AIS Repeater Indicator			Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Source ID**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of station which is the source of the message.						
4	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:* resv 1		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
5	**AIS Transceiver Information**		*Byte Field Size:*	*Bit Field Size:* 5		*Request Parameter*	No
	DD246 AIS Transceiver Information			0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Sequence Number**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD243 AIS Sequence Number			Range 0-3 See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
7	**Destination ID**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of station which is the destination of this message.						

8	**NMEA 2000 Reserved**			*Byte Field Size:*		*Bit Field Size:*	resv 6	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.								
9	**Retransmit Flag**			*Byte Field Size:*		*Bit Field Size:*	1	*Request Parameter*	No
	DD244 AIS Retransmit Flag			0=No retransmission, 1=retransmitted. See the latest version of ITU-R M.1371 for more information.					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields		
10	**Spare**			*Byte Field Size:*		*Bit Field Size:*	resv 1	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.								
11	**Safety Related Text**			*Byte Field Size:*	8 or 16 n	*Bit Field Size:*		*Request Parameter*	No
	DD004 Generic name string, short			Name of place, route, waypoint, destination, vessel, vehicle, etc.					
	DF50 String, variable, short	**ch8or16(n)**	*Range:*	0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:*	1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.		
	Maximum size is 156 8-bit ASCII characters.								

AIS Safety Related Broadcast Message

PGN: 129802
hex: 1FB0A

This parameter group provides data associated with the ITU-R M.1371 Message 14 Safety Related Broadcast Message supporting broadcast communication of safety related data. An AIS device may generate this parameter group either upon receiving a VHF data link message 14, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure parameters such as the Safety Related Text (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 5 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 118

Field #	Field Name						
1	**Message ID** **DD188** AIS Message Identifier		Byte Field Size:	Bit Field Size: 6	Request Parameter: No	Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields	14 = Safety Related Broadcast Message.	
2	**Repeat Indicator** **DD185** AIS Repeater Indicator		Byte Field Size:	Bit Field Size: 2	Request Parameter: No	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
3	**Source ID** **DD010** Generic numeric ID, large		Byte Field Size: 4	Bit Field Size:	Request Parameter: No	Number of route, waypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsigned	**uint32**	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number	MMSI number of station which is the source of the message.	
4	**NMEA 2000 Reserved** **DD001** Reserved field		Byte Field Size:	Bit Field Size: resv 1	Request Parameter: No	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields	Used to align subsequent data on byte boundary.	
5	**AIS Transceiver Information** **DD246** AIS Transceiver Information		Byte Field Size:	Bit Field Size: 5	Request Parameter: No	0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.	
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields		
6	**Spare** **DD001** Reserved field		Byte Field Size:	Bit Field Size: resv 2	Request Parameter: No	Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.	

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

Maximum size is 163 8-bit ASCII characters.

AIS Interrogation

PGN: 129803
hex: 1FB0B

This parameter group provides data associated with the ITU-R M.1371 Message 15 Interrogation Message used to request a specific ITU-R M.1371 message resulting in responses from one or more AIS mobile units. An AIS device may generate this parameter group either upon receiving a VHF data link message 15, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure base station interrogation parameters (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 119

Field #	*Field Name*						
1	**Message ID**		*Byte Field Size:*	*Bit Field Size:* 6		*Request Parameter*	No
	DD188 AIS Message Identifier			Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	15 = Interrogation Message						
2	**Repeat Indicator**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD185 AIS Repeater Indicator			Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Source ID**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of interrogating station.						
4	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:* resv 1		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
5	**AIS Transceiver Information**		*Byte Field Size:*	*Bit Field Size:* 5		*Request Parameter*	No
	DD246 AIS Transceiver Information			0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Spare**		*Byte Field Size:*	*Bit Field Size:* resv 2		*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
7	**Destination ID 1**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of first interrogated station.						

8	**NMEA 2000 Reserved**	*Byte Field Size:*	*Bit Field Size:*	resv 2	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.					
9	**Message ID 1.1**	*Byte Field Size:*	*Bit Field Size:*	6	*Request Parameter*	No
	DD188 AIS Message Identifier		Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	First Requested message type from first interrogated station.					
10	**Slot Offset 1.1**	*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Response Slot offset for first requested message from first interrogated station.					
11	**Spare**	*Byte Field Size:*	*Bit Field Size:*	resv 2	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.					
12	**Message ID 1.2**	*Byte Field Size:*	*Bit Field Size:*	6	*Request Parameter*	No
	DD188 AIS Message Identifier		Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Second requested message type from first interrogated station.					
13	**Slot Offset 1.2**	*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Response Slot offset for second requested message from second interrogated station.					
14	**NMEA 2000 Reserved**	*Byte Field Size:*	*Bit Field Size:*	resv 6	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.					
15	**Spare**	*Byte Field Size:*	*Bit Field Size:*	resv 2	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.					
16	**Destination ID 2**	*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.			
	DF55 Integer, 32 bit unsigned **uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of second interrogated station.					
17	**NMEA 2000 Reserved**	*Byte Field Size:*	*Bit Field Size:*	resv 2	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.					

18	**Message ID 2.1**		*Byte Field Size:*		*Bit Field Size:*	6	*Request Parameter* No
	DD188 AIS Message Identifier			Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
	Requested message type from second interrogated station.						
19	**Slot Offset 2.1**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter* No
	DD007 Generic numeric ID, medium			Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:*	0 to 65,532	*Resolution:*	1 bit	Unit-less number
	Response slot offset for requested message from second interrogated station.						
20	**Spare**		*Byte Field Size:*		*Bit Field Size:*	resv 2	*Request Parameter* No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"			
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						

AIS Assignment Mode Command

PGN: 129804
hex: 1FB0C

This parameter group provides data associated with the ITU-R M.1371 Message 16 Assigned Mode Command Message for assigning specific behavior by a competent authority. An AIS device may generate this parameter group either upon receiving a VHF data link message 16, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure base station assigned mode parameters (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 120

Field #	Field Name						
1	**Message ID** **DD188** AIS Message Identifier Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.		*Byte Field Size:*	*Bit Field Size:* 6	*Request Parameter* No		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	16 = Assigned Mode Command Message						
2	**Repeat Indicator** **DD185** AIS Repeater Indicator Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.		*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Source ID** **DD010** Generic numeric ID, large Number of route, waypoint, event, mark, etc.		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of assigning station.						
4	**NMEA 2000 Reserved** **DD001** Reserved field Variable number of reserved bits, all set to logic "1"		*Byte Field Size:*	*Bit Field Size:* resv 1	*Request Parameter* No		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
5	**AIS Transceiver Information** **DD246** AIS Transceiver Information 0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.		*Byte Field Size:*	*Bit Field Size:* 5	*Request Parameter* No		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Spare** **DD001** Reserved field Variable number of reserved bits, all set to logic "1"		*Byte Field Size:*	*Bit Field Size:* resv 2	*Request Parameter* No		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
7	**Destination ID A** **DD010** Generic numeric ID, large Number of route, waypoint, event, mark, etc.		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of destination station A.						

8	**Offset A**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No	
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	Offset from Current slot to first assigned slot.							
9	**Increment A**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No	
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	Increment to next assigned slot.							
10	**Destination ID B**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No	
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.					
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number			
	MMSI number of destination station B.							
11	**Offset B**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No	
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	Offset from Current slot to first assigned slot.							
12	**Increment B**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No	
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	Increment to next assigned slot.							
13	**Spare**		*Byte Field Size:*	*Bit Field Size:*	resv 4	*Request Parameter*	No	
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.							

AIS Data Link Management Message

PGN: 129805
hex: 1FB0D

This parameter group provides data associated with the ITU-R M.1371 Message 20 Data Link Management Message for reserving slots for base stations. An AIS device may generate this parameter group either upon receiving a VHF data link message 20, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure base station data link management parameters (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 124

#	Field Name	Byte Field Size	Bit Field Size	Request Parameter
1	**Message ID**		6	No
	DD188 AIS Message Identifier		Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field **bit(n)**		*Range:* Variable *Resolution:* 1	Used to construct bit fields
	20 = Data Link Management Message			
2	**Repeat Indicator**		2	No
	DD185 AIS Repeater Indicator		Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.	
	DF52 Bit field **bit(n)**		*Range:* Variable *Resolution:* 1	Used to construct bit fields
3	**Source Station ID**	4		No
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsigned **uint32**		*Range:* 0 to 4,294,967,292 *Resolution:* 1 bit	Unit-less number
	MMSI number of base station transmitting management message.			
4	**NMEA 2000 Reserved**		resv 1	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field **bit(n)**		*Range:* Variable *Resolution:* 1	Used to construct bit fields
	Used to align subsequent data on byte boundary.			
5	**AIS Transceiver Information**		5	No
	DD246 AIS Transceiver Information		0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.	
	DF52 Bit field **bit(n)**		*Range:* Variable *Resolution:* 1	Used to construct bit fields
6	**Spare**		resv 2	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"	
	DF52 Bit field **bit(n)**		*Range:* Variable *Resolution:* 1	Used to construct bit fields
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.			

7 **Offset Number 1** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
0=Not available,
1-4095=respective reserved offset number.

See ITU-R M.1371-1 for more information.

8 **Number of Slots 1** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
0=Not available,
1-15=respective number of reserved consecutive slots.

See ITU-R M.1371-1 for more information.

9 **Time Out 1** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
0=Not available,
1-7=respective time-out value in minutes.

See ITU-R M.1371-1 for more information.

10 **Increment 1** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
0=Not available,
1-2047=respective increment to repeat reservation block.

See ITU-R M.1371-1 for more information.

11 **Offset Number 2** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
0=Not available,
1-4095=respective reserved offset number.

See ITU-R M.1371-1 for more information.

12 **Number of Slots 2** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
0=Not available,
1-15=respective number of reserved consecutive slots.

See ITU-R M.1371-1 for more information.

13 **Time Out 2** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
0=Not available,
1-7=respective time-out value in minutes.

See ITU-R M.1371-1 for more information.

14 **Increment 2** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
0=Not available,
1-2047=respective increment to repeat reservation block.

See ITU-R M.1371-1 for more information.

15 **Offset Number 3** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
0=Not available,
1-4095=respective reserved offset number.

See ITU-R M.1371-1 for more information.

16 **Number of Slots 3** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
0=Not available,
1-15=respective number of reserved consecutive slots.

See ITU-R M.1371-1 for more information.

17 **Time Out 3** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
0=Not available,
1-7=respective time-out value in minutes.

See ITU-R M.1371-1 for more information.

18 **Increment 3** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
0=Not available,
1-2047=respective increment to repeat reservation block.

See ITU-R M.1371-1 for more information.

19 **Offset Number 4** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
0=Not available,
1-4095=respective reserved offset number.

See ITU-R M.1371-1 for more information.

20 **Number of Slots 4** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No
DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.
DF53 Integer, 8 bit unsigned **uint8** *Range:* 0 to 252 *Resolution:* 1 bit Unit-less number
0=Not available,
1-15=respective number of reserved consecutive slots.

See ITU-R M.1371-1 for more information.

21 **Time Out 4** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No

DD005 Generic numeric ID, short — Number of route, waypoint, event, mark, etc.

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

0=Not available,
1-7=respective time-out value in minutes.

See ITU-R M.1371-1 for more information.

22 **Increment 4** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.

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

0=Not available,
1-2047=respective increment to repeat reservation block.

See ITU-R M.1371-1 for more information.

23 **Spare** *Byte Field Size:* *Bit Field Size:* resv 6 *Request Parameter* No

DD001 Reserved field — Variable number of reserved bits, all set to logic "1"

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

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.

AIS Channel Management

PGN: 129806
hex: 1FB0E

This parameter group provides data associated with the ITU-R M.1371 Message 22 Channel Management Message supporting management of transceiver modes and channels by a base station. An AIS device may generate this parameter group either upon receiving a VHF data link message 5, or upon receipt of an ISO or NMEA request PGN. The Command Group Function PGN 126208 may be used with this PGN to configure static and voyage related parameters (see ITU-R M.1371-1 for additional information). Note that future revisions to the ITU-R M.1371 VHF Data Link Messages may result in their spare or reserved bits being defined with a specific meaning, requiring the spare or reserved parameter in this parameter group to have the corresponding new meaning in future revisions of this standard.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* No *ACK Rqmnts:*

Original Reference ID # 202

Field #	*Field Name*						
1	**Message ID**		*Byte Field Size:*		*Bit Field Size:* 6	*Request Parameter*	No
	DD188 AIS Message Identifier		Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	22 = Channel Management Message.						
2	**Repeat Indicator**		*Byte Field Size:*		*Bit Field Size:* 2	*Request Parameter*	No
	DD185 AIS Repeater Indicator		Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Station ID**		*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.				
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number		
	MMSI number of base station.						
4	**NMEA 2000 Reserved**		*Byte Field Size:*		*Bit Field Size:* resv 1	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
5	**AIS Transceiver Information**		*Byte Field Size:*		*Bit Field Size:* 5	*Request Parameter*	No
	DD246 AIS Transceiver Information		0 = Channel A VDL reception, 1 = Channel B VDL reception, 2 = Channel A VDL transmission, 3 = Channel B VDL transmission, 4 = Own information not broadcast, 5-31 = Reserved.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
6	**Spare**		*Byte Field Size:*		*Bit Field Size:* resv 2	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
7	**Channel A**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Channel number according to recommendation ITU-R M.1084, Annex 4.						

8	**Channel B**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Channel number according to recommendation ITU-R M.1084, Annex 4.						
9	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:* resv 3		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
10	**Power**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD252 AIS Power		0=High (default), 1=low. See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
11	**Tx/Rx Mode**		*Byte Field Size:*	*Bit Field Size:* 4		*Request Parameter*	No
	DD253 AIS Tx/Rx Mode		0=Tx A/Tx B, Rx A/Rx B (default), 1=Tx A, Rx A/Rx B, 2=Tx B, Rx A/Rx B, 3-15=not used. See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
12	**North East Longitude Corner 1**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm		
	North East longitude corner of geographic area designated in this message.						
13	**North East Latitude Corner 1**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84				
	DF23 Latitude	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm		
	North East latitude corner of geographic area designated in this message.						
14	**South West Longitude Corner 2**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm		
	South West longitude corner of geographic area designated in this message.						
15	**South West Latitude Corner 2**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84				
	DF23 Latitude	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm		
	South West latitude cornerof geographic area designated in this message.						
16	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:* resv 1		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
17	**Addressed or Broadcast Message Indicator**		*Byte Field Size:*	*Bit Field Size:* 1		*Request Parameter*	No
	DD254 AIS Addressed or Broadcast Message Indicator		0=Broadcast geographical area message (default), 1=addressed message (to individual station(s)). See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

18	**Channel A Bandwidth**		*Byte Field Size:*	*Bit Field Size:*	1	*Request Parameter*	No
	DD255 AIS Channel Bandwidth		0=default (as specified by channel number), 1=12.5 kHz bandwidth. See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
19	**Channel B Bandwidth**		*Byte Field Size:*	*Bit Field Size:*	1	*Request Parameter*	No
	DD255 AIS Channel Bandwidth		0=default (as specified by channel number), 1=12.5 kHz bandwidth. See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
20	**NMEA 2000 Reserved**		*Byte Field Size:*	*Bit Field Size:*	resv 1	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to align subsequent data on byte boundary.						
21	**Transitional Zone Size**		*Byte Field Size:*	*Bit Field Size:*	3	*Request Parameter*	No
	DD256 AIS Transitional Zone Size		See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
22	**Spare**		*Byte Field Size:*	*Bit Field Size:*	resv 23	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						

AIS Class B Group Assignment

PGN: 129807
hex: 1FB0F

The Group Assignment Command is transmitted by a base station when operating as a controlling entity for AIS Stations. ITU-R M.1371 Message 23 contains three criteria (position, ship and cargo type, and station type) that areused by each station that receives the message to determine if the message content applies to that station.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 201

Field #	Field Name			Byte Field Size	Bit Field Size	Request Parameter	
1	**Message ID** **DD188** AIS Message Identifier				6 6	No	Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
	23 = Group Assignment Command for AIS						
2	**Repeat Indicator** **DD185** AIS Repeater Indicator				2 2	No	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
3	**Source ID** **DD010** Generic numeric ID, large			4		No	Number of route, waypoint, event, mark, etc.
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit			Unit-less number
	MMSI number of base station						
4	**Spare** **DD001** Reserved field				resv 2	No	Variable number of reserved bits, all set to logic "1"
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within theAIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encodedwith logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's.						
5	**Tx/Rx Mode** **DD253** AIS Tx/Rx Mode				4 4	No	0=Tx A/Tx B, Rx A/Rx B (default), 1=Tx A, Rx A/Rx B, 2=Tx B, Rx A/Rx B, 3-15=not used. See the latest version of ITU-R M.1371 for more information.
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
6	**NMEA 2000 Reserved** **DD001** Reserved field				resv 2	No	Variable number of reserved bits, all set to logic "1"
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1			Used to construct bit fields
	Used to align subsequent data on byte boundary						
7	**North East Longitude Corner 1** **DD023** Longitude, WGS-84			4		No	Longitude referenced to WGS-84
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg			"-" = West, resolution ~1.1 cm
	North East Longitude corner of geographic area designated in this message						

8 **North East Latitude Corner 1** *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No
DD022 Latitude, WGS-84 Latitude referenced to WGS-84
DF23 Latitude **int32** *Range:* +/- 90 deg *Resolution:* 1x10E-7 deg "-" = South, resolution ~1.1 cm
North East Latitude corner of geographic area designated in this message.

9 **South West Longitude Corner 2** *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No
DD023 Longitude, WGS-84 Longitude referenced to WGS-84
DF25 Longitude **int32** *Range:* +/- 180 deg *Resolution:* 1x10E-7 deg "-" = West, resolution ~1.1 cm
South West Longitude corner of geographic area designated in this message.

10 **South West Latitude Corner 2** *Byte Field Size:* 4 *Bit Field Size:* *Request Parameter* No
DD022 Latitude, WGS-84 Latitude referenced to WGS-84
DF23 Latitude **int32** *Range:* +/- 90 deg *Resolution:* 1x10E-7 deg "-" = South, resolution ~1.1 cm
South West Latitude corner of geographic area designated in this message.

11 **Station Type** *Byte Field Size:* *Bit Field Size:* 4 4 *Request Parameter* No
DD301 AIS Station Type
0 = All types of mobiles (default)
1 = Reserved for future use
2 = All types of Class B mobile stations
3 = SAR airborne mobile station
4 = AtoN station
5 = Class B "CS" shipborne mobile station only
6 = Inland waterways
7 to 9 = Reserved for regional use
10 to 15 = Reserved for future use

See the latest version of ITU-R M.1371 for more information.

DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Specifies type of AIS Station this is intended for.

12 **NMEA 2000 Reserved** *Byte Field Size:* *Bit Field Size:* resv 4 *Request Parameter* No
DD001 Reserved field Variable number of reserved bits, all set to logic "1"
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Used to align subsequent data on byte boundary

13 **Ship and Cargo Filter** *Byte Field Size:* *Bit Field Size:* 8 *Request Parameter* No
DD300 Ship/Cargo Filter
0 = all types (default)
1 - 99 - See ITU-R M.1371Table 50
100 - 199 = Reserved for regional use
200 - 255 = Reserved for future use

See the latest version of ITU-R M.1371 for more information.

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

14 **Spare** *Byte Field Size:* *Bit Field Size:* resv 22 *Request Parameter* No
DD001 Reserved field Variable number of reserved bits, all set to logic "1"
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within theAIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encodedwith logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's

15 **NMEA 2000 Reserved** *Byte Field Size:* *Bit Field Size:* resv 2 *Request Parameter* No
DD001 Reserved field Variable number of reserved bits, all set to logic "1"
DF52 Bit field **bit(n)** *Range:* Variable *Resolution:* 1 Used to construct bit fields
Used to align subsequent data on byte boundary

16 **Reporting Interval** *Byte Field Size:* *Bit Field Size:* 4 | 4 *Request Parameter* No

DD302 AIS Reporting Interval for Class B

0 = As given by the autonomous mode
1 = 10 min
2 = 6 min
3 = 3 min
4 = 1 min
5 = 30 sec
6 = 15 sec
7 = 10 sec
8 = 5 sec
9 = 2 sec (not applicable to the Class B “CS”)
10 = Next shorter reporting interval
11 = Next longer reporting interval
12-15 = Reserved for future use

See the latest version of ITU-R M.1371 for more information.

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

Specifies how often the position report is transmitted. When in dual channel mode (see field 5) the transmission rate is maintained by alternating transmissions between channels, each channel transmitting half the required reports. When in single channel mode the single selected channel transmits all the required reports.

17 **Quiet Time** *Byte Field Size:* *Bit Field Size:* 4 | 4 *Request Parameter* No

DD303 AIS Quiet Time

0 = No quiet time commanded
1-15 = Quiet time of 1 to 15 min

See the latest version of ITU-R M.1371 for more information.

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

18 **Spare** *Byte Field Size:* *Bit Field Size:* resv | 6 *Request Parameter* No

DD001 Reserved field

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

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

This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within theAIS message can also be accomodated within this field. Normally, spare or reserved bits in NMEA 2000 are encodedwith logic 1's, however for AIS PGNs the unused or reserved bits are to be encoded as logic 0's

DSC Call Information

PGN: 129808
hex: 1FB10

This PGN provides Digital Selective Calling (DSC) data according to ITU M.493-9 with optional expansion according to ITU M.821-1. DSC is a paging system that is used to automate distress alerts sent over terrestrial communication systems such as VHF, MF and HF marine radio systems. DSC provides a mechanism to report significantly more information regarding a distress call rather than just the distress itself.
Products equipped with DSC will transmit and receive this information.

This PGN will be transmitted as and when required.

Calls to be transmitted should generally use the command Group Function Message (PGN 126208) in conjunction with this parameter group to ensure that the correct transmitter is selected.

This PGN will be transmitted as and when required.

Single Frame: No *Priority Default:* 4 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 61

Field #	*Field Name*						
1	**DSC Format Symbol**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD011 DSC Symbol Definitions		Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**DSC Category Symbol**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD011 DSC Symbol Definitions		Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
3	**DSC Message Address**		*Byte Field Size:* char 5	*Bit Field Size:*	*Request Parameter* No		
	DD012 DSC Address or Geographic Area		Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code the address or geographic area as defined in ITU-R M.493-9 Section 5. This may represent an individual MMSI, a group MMSI, or a geographic area.				
	DF63 String, fixed	**char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary		
4	**Nature Of Distress or 1st Telecommand**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD011 DSC Symbol Definitions		Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
5	**Subsequent Communication Mode or 2nd Telecommand**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD011 DSC Symbol Definitions		Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		

6	**Proposed Rx Frequency/Channel**		*Byte Field Size:*	char 6	*Bit Field Size:*		*Request Parameter*	No
	DD017 Radio Tx or Rx Channel					MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have he first digit 9 followed by zero. The next number is "1" indicating the ship station's transmit frequency is being used as a simplex channel frequency, or "2" indicating the coast station's transmit frequency is being used as a simplex channel frequency, "0" otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.		
	DF63 String, fixed	**char8(n)**	*Range:*	0 to 1,785 characters	*Resolution:*	1 char		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
7	**Proposed Tx Frequency/Channel**		*Byte Field Size:*	char 6	*Bit Field Size:*		*Request Parameter*	No
	DD017 Radio Tx or Rx Channel					MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have he first digit 9 followed by zero. The next number is "1" indicating the ship station's transmit frequency is being used as a simplex channel frequency, or "2" indicating the coast station's transmit frequency is being used as a simplex channel frequency, "0" otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.		
	DF63 String, fixed	**char8(n)**	*Range:*	0 to 1,785 characters	*Resolution:*	1 char		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
8	**Telephone Number**		*Byte Field Size:*	8 or 16 n	*Bit Field Size:*		*Request Parameter*	Yes
	DD015 DSC Symbol String					Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code: Telephone number as defined by ITU-R M.493 Section 8.2.3; DSC Expansion Data as defined by ITU-R M.821 Section 2.		
	DF50 String, variable, short	**ch8or16(n)**	*Range:*	0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:*	1 ASCII or 1 Unicode Character		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	16 ASCII characters maximum, no Unicode							
9	**Latitude of Vessel Reported**		*Byte Field Size:*	4	*Bit Field Size:*		*Request Parameter*	No
	DD022 Latitude, WGS-84					Latitude referenced to WGS-84		
	DF23 Latitude	**int32**	*Range:*	+/- 90 deg	*Resolution:*	1x10E-7 deg		"-" = South, resolution ~1.1 cm

10 **Longitude of Vessel Reported** — Byte Field Size: 4 — Bit Field Size: — Request Parameter: No

DD023 Longitude, WGS-84 — Longitude referenced to WGS-84

DF25	Longitude	**int32**	Range:	+/- 180 deg	Resolution:	1x10E-7 deg	"-" = West, resolution ~1.1 cm

11 **Time of Position** — Byte Field Size: 4 — Bit Field Size: — Request Parameter: No

DD158 Generic time of day — 24 hour clock, 0 = midnight, time is in UTC

DF06	Time of day	**uint32**	Range:	0 to 86,401 s	Resolution:	1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day

12 **MMSI Of Ship In Distress** — Byte Field Size: char 5 — Bit Field Size: — Request Parameter: No

DD012 DSC Address or Geographic Area — Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code the address or geographic area as defined in ITU-R M.493-9 Section 5. This may represent an individual MMSI, a group MMSI, or a geographic area.

DF63	String, fixed	**char8(n)**	Range:	0 to 1,785 characters	Resolution:	1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary

13 **DSC EOS Symbol** — Byte Field Size: 1 — Bit Field Size: — Request Parameter: No

DD011 DSC Symbol Definitions — Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand

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

14 **Expansion Enabled** — Byte Field Size: — Bit Field Size: 2 — Request Parameter: No

DD002 Generic status pair — MSB/LSB:
00 = [No, Off, Disabled, Reset, "0"],
01 = [Yes, On, Enabled, Set, "1"],
10 = Error,
11= [Unavailable, Unknown]

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

15 **Reserved Bits** — Byte Field Size: — Bit Field Size: resv 6 — Request Parameter: No

DD001 Reserved field — Variable number of reserved bits, all set to logic "1"

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

6 Bits needed to fill out the byte

16 **Calling Rx Frequency/Channel** — Byte Field Size: char 6 — Bit Field Size: — Request Parameter: No

DD017 Radio Tx or Rx Channel — MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have he first digit 9 followed by zero. The next number is “1” indicating the ship station’s transmit frequency is being used as a simplex channel frequency, or “2” indicating the coast station’s transmit frequency is being used as a simplex channel frequency, “0” otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.

DF63	String, fixed	**char8(n)**	Range:	0 to 1,785 characters	Resolution:	1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary

17	**Calling Tx Frequency/Channel**		*Byte Field Size:*	char 6	*Bit Field Size:*		*Request Parameter*	No
	DD017 Radio Tx or Rx Channel					MF/HF telephone channels to have first digit 3 followed by ITU channel numbers with leading zeros as required. MF/HF teletype channels to have first digit 4; the second and third digit give the frequency bands; and the fourth to sixth digits ITU channel numbers; each with leading zeros as required. VHF channels to have he first digit 9 followed by zero. The next number is "1" indicating the ship station's transmit frequency is being used as a simplex channel frequency, or "2" indicating the coast station's transmit frequency is being used as a simplex channel frequency, "0" otherwise. The remaining three numbers are the VHF channel numbers with leading zeros as required.		
	DF63 String, fixed	**char8(n)**	*Range:*	0 to 1,785 characters	*Resolution:*	1 char		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
18	**Time of Receipt/Transmission**		*Byte Field Size:*	4	*Bit Field Size:*		*Request Parameter*	No
	DD158 Generic time of day					24 hour clock, 0 = midnight, time is in UTC		
	DF06 Time of day	**uint32**	*Range:*	0 to 86,401 s	*Resolution:*	1x10E-4 s		~24 hours, 0 = midnight, range allows for up to two leap seconds per day
19	**Date of Receipt/Transmission**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD039 Generic date					Days since January 1, 1970, Date is relative to UTC Time.		
	DF41 Date, day count	**uint16**	*Range:*	0 to 65,532 days	*Resolution:*	1 day		0 = January 1, 1970, max = ~179 years
20	**DSC Equipment Assigned Message ID**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	Yes
	DD007 Generic numeric ID, medium					Number of route, waypoint, event, mark, etc.		
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:*	0 to 65,532	*Resolution:*	1 bit		Unit-less number
	If this field is not specified in the "Command Request" or an ISO Request is made of this PGN, the response will with the current ID. Otherwise if this field is specified only the units with a matching ID will respond with this PGN.							
21	**DSC Expansion Field Symbol**		*Byte Field Size:*	1	*Bit Field Size:*		*Request Parameter*	No
	DD014 DSC Expansion Symbol Definitions					Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.821 Table 1.		
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:*	0 to 252	*Resolution:*	1 bit		Unit-less number

22 **DSC Expansion Field Data** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* No

DD015 DSC Symbol String

Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code: Telephone number as defined by ITU-R M.493 Section 8.2.3; DSC Expansion Data as defined by ITU-R M.821 Section 2.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

The meaning and size of this field is determined by the DSC Expansion symbol in field 21.
String length 38 ASCII characters maximum, no Unicode.

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23 **Variable Number Of Fields, Field 21 Repeated, Expansion Field Type** *Byte Field Size:* 1 *Bit Field Size:* *Request Parameter* No

DD014 DSC Expansion Symbol Definitions

Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.821 Table 1.

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

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24 **Variable Number Of Fields, Field 22 Repeated, Expansion Field Data** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* No

DD015 DSC Symbol String

Individual characters having only decimal values in the range 0 to 127 for the DSC symbols defined by ITU-R M.493 are used to code: Telephone number as defined by ITU-R M.493 Section 8.2.3; DSC Expansion Data as defined by ITU-R M.821 Section 2.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

The meaning and size of this field is determined by the DSC Expansion symbol in field 23.
String length 38 ASCII characters maximum, no Unicode.

AIS Class B "CS" Static Data Report, Part A

PGN: 129809
hex: 1FB11

This parameter group is used by Class B "CS" shipborne mobile equipment each time Part A of ITU-R M.1372 Message 24 is received. The parameter group is the first of two parts, the second being transmitted in PGN 129810. This is Part A of ITU-R M.1372 Message 24. Message 24 part B is normally transmitted within 1 minute following Message 24 part A, and these parameter groups follow accordingly with PGN 129810 following 1 minute after PGN129809.
Reception of Part A followed immediately by Part B will occur in response to an AIS interrogation for Message 24. In that case the parameter groups will follow accordingly with PGN 129809 followed immediately by PGN 129810.

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

Original Reference ID # 199

Field #	Field Name							
1	**Message ID**		Byte Field Size:		Bit Field Size: 6	6	Request Parameter	No
	DD188 AIS Message Identifier			Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields			
	24 = AIS Class B Static Data Part A							
2	**Repeat Indicator**		Byte Field Size:		Bit Field Size: 2	2	Request Parameter	No
	DD185 AIS Repeater Indicator			Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.				
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1	Used to construct bit fields			
3	**User ID**		Byte Field Size: 4		Bit Field Size:		Request Parameter	No
	DD010 Generic numeric ID, large			Number of route, waypoint, event, mark, etc.				
	DF55 Integer, 32 bit unsigned	**uint32**	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number			
	MMSI number of mobile station reporting its static information							
4	**Name**		Byte Field Size: char	n	Bit Field Size:		Request Parameter	No
	DD192 Generic String, ASCII, Fixed length			Length specified by PGN field definition.				
	DF63 String, fixed	**char8(n)**	Range: 0 to 1,785 characters	Resolution: 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary			
	20 character string, default value is "@@@@@@@@@@@@@@@@@@@@" = not available							

AIS Class B "CS" Static Data Report, Part B

PGN: 129810
hex: 1FB12

This parameter group is used by Class B “CS” shipborne mobile equipment each time Part B of ITU-R M.1372 Message 24 is received. The parameter group is the second of two parts, the first part being transmitted in PGN 129809. This is Part B of ITU-R M.1372 Message 24. Message 24 part B is normally transmitted within 1 minute following Message 24 part A, and these parameter groups follow accordingly with PGN 129810 following 1 minute after PGN129809.
Reception of Part A followed immediately by Part B will occur in response to an AIS interrogation for Message 24. In that case the parameter groups will follow accordingly with PGN 129809 followed immediately by PGN 129810.

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

Original Reference ID # 200

Field #	Field Name		Byte Field Size	Bit Field Size	Request Parameter	
1	**Message ID** **DD188** AIS Message Identifier			6 (6)	No	Message Identifier (range of 0 to 63). See the latest version of ITU-R M.1371 for more information.
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1		Used to construct bit fields
	24 = AIS Class B static data Part B					
2	**Repeat Indicator** **DD185** AIS Repeater Indicator			2 (2)	No	Used by the repeater to indicate how many times a message has been repeated (range of 0 to 3). 0 = Default 1 = First retransmission 2 = Second retransmission 3 = Final retransmission See the latest version of ITU-R M.1371 for more information.
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1		Used to construct bit fields
3	**User ID** **DD010** Generic numeric ID, large		4		No	Number of route, waypoint, event, mark, etc.
	DF55 Integer, 32 bit unsigned	**uint32**	Range: 0 to 4,294,967,292	Resolution: 1 bit		Unit-less number
	MMSI number of mobile station reporting its static information					
4	**Type of Ship and Cargo** **DD193** Ship/Cargo Type			8 (8)	No	0=Not Available or no ship (default), 1-99= (See the latest version of ITU-R M.1371 Section 3.3.8.2.3.2 Table 18), 100-199=Reserved for Regional (See the latest version of ITU-R M.1371), 200-255=Reserved for future (See the latest version of ITU-R M.1371).
	DF52 Bit field	**bit(n)**	Range: Variable	Resolution: 1		Used to construct bit fields
5	**Vendor ID** **DD192** Generic String, ASCII, Fixed length		char (n)		No	Length specified by PGN field definition.
	DF63 String, fixed	**char8(n)**	Range: 0 to 1,785 characters	Resolution: 1 char		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
	7 character string - Unique identification of the unit by a number as defined by the manufacturer; ("@@@@@@@" = not available = default)					
6	**Call Sign** **DD192** Generic String, ASCII, Fixed length		char (n)		No	Length specified by PGN field definition.
	DF63 String, fixed	**char8(n)**	Range: 0 to 1,785 characters	Resolution: 1 char		0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
	7 character string - See the latest version of ITU-R M.1371 for more information; ("@@@@@@@" = not available = default)					

7	**Ship Length**	*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD194 Distance, medium	Dependent upon PG Field definition.				
	DF75 Distance, Medium	**uint16**	*Range:* 0 to 6553.2 m	*Resolution:* 1x10E-1 m		
	Length of mobile station reporting its static data; Valid range = 0-1022, and must be greater than or equal to field 10 "Reference Point Position Aft of Bow", a value of 65535 indicates that data is not available. For more information, see IMO Circular 227 Section 5.3 Ships Dimensions or NMEA 0400 Section 19.3.2 Vessel Reference Point (This field is valid only if field 3 "User ID" contains a value <= 999999999)					
8	**Ship Beam**	*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD194 Distance, medium	Dependent upon PG Field definition.				
	DF75 Distance, Medium	**uint16**	*Range:* 0 to 6553.2 m	*Resolution:* 1x10E-1 m		
	Beam of mobile station reporting its statis data; A value of 65535 indicates that data is not available (This field is valid only if field 3 "User ID" contains a value <= 999999999)					
9	**Reference Point Position from Starboard**	*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD194 Distance, medium	Dependent upon PG Field definition.				
	DF75 Distance, Medium	**uint16**	*Range:* 0 to 6553.2 m	*Resolution:* 1x10E-1 m		
	Distance to reference point measured from the starboard side of mobile station reporting its static data; Valid range = 0-63, a value of 65535 indicates that data is not available. For more information, see IMO Circular 227 Section 5.3 Ships Dimensions or NMEA 0400 Section 19.3.2 Vessel Reference Point (This field is valid only if field 3 "User ID" contains a value <= 999999999)					
10	**Reference Point Position Aft of Bow**	*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD194 Distance, medium	Dependent upon PG Field definition.				
	DF75 Distance, Medium	**uint16**	*Range:* 0 to 6553.2 m	*Resolution:* 1x10E-1 m		
	Distance to reference point measured aft from the bow of mobile station reporting its static position; Valid range = 0-511, a value of 65535 indicates that data is not available. For more information, see IMO Circular 227 Section 5.3 Ships Dimensions or NMEA 0400 Section 19.3.2 Vessel Reference Point (This field is valid only if field 3 "User ID" contains a value <= 999999999)					
11	**Mother Ship MMSI**	*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter*	No
	DD010 Generic numeric ID, large	Number of route, waypoint, event, mark, etc.				
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number	
	For unregistered daughter vessels, this is the MMSI assigned to the mother ship; (This field is valid only if field 3 "User ID" contains a value > 999999999)					
12	**NMEA 2000 Reserved**	*Byte Field Size:*	*Bit Field Size:* resv 2		*Request Parameter*	No
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
	Used to aligh subsequent fields on a byte boundary.					
13	**Spare**	*Byte Field Size:*	*Bit Field Size:* resv 6		*Request Parameter*	No
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
	This field mirrors the "Spare" bit field found within the corresponding AIS message such that future definition within the AIS message can also be accomodated within this parameter group while maintaining field order; Normally, spare or reserved bits in NMEA 2000 are encoded with logic 1's, however for AIS parameter groups the spare or reserved bits are encoded as logic 0's.					

Loran-C TD Data

PGN: 130052
hex: 1FC04

This provides Time Difference (TD) lines of position of Loran-C signals relative to a single Group Repetition Interval.

Field #1, Group Repetition Interval (GRI), is identified as a request parameter for this Parameter Group. All providers of this PGN shall accept and process requests based upon the requested value of Field #1. A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for every GRI that has associated data fields. If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner: If no requested fields have been included with the Complex Request, than the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904) described above. If the Complex Request (PGN 126208) includes the GRI field, then the response shall be filtered by the field (Field #1) and field value (GRI #) contained within the request.

For example, if the Complex Request for this PGN contained a value of 9960 for field 1, the Group Repetition Interval (GRI), and this was a GRI that the device was operating with or had information about, than the device would respond by providing a single PGN with Time Difference measurement data associated with the 9960 GRI value requested.

If the GRI requested is considered valid by the device, but the device was not operating on that GRI, or had no data associated with the GRI requested, there are two possible responses:
1 - The device responds with the PGN containing the GRI requested and all other fields set to the value indicating "Data not available".
2 - The device responds with the Acknowledge Group PGN (126208) containing the error state of "0x2 = Temporarily unable to comply".

If the request was global no response would be required. If the request was addressed to the device, than either response 1 or 2 would apply.

If the GRI requested is not considered a valid GRI by the receiving device, then the appropriate response would be the Acknowledge Group PGN (126208), containing the error state for the requested GRI field of "0x3 = Request or command parameter out-of-range;".

Single Frame: No *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:* None

Field # *Field Name* — Original Reference ID # 9

#	Field Name						
1	**Group Repetition Interval (GRI)**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* Yes		
	DD027 Loran-C GRI		Group Repetition Interval (GRI) in nano-sec. Often cited in units of 10 micro-sec. (i.e., 9960 = 99,600,000 ns)				
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s			
2	**Master Range**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD029 Loran - Range (Time)		The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.				
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s			
3	**V Secondary TD**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD028 Loran-C TD		Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.				
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s			
4	**W Secondary TD**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD028 Loran-C TD		Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.				
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s			
5	**X Secondary TD**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD028 Loran-C TD		Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.				
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s			
6	**Y Secondary TD**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD028 Loran-C TD		Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.				
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s			

7	**Z Secondary TD**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD028 Loran-C TD		Loran-C Time difference (TD) in nano-sec. The arrival time of a Loran-C secondary station signal minus the arrival time of the master station signal.				
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s			
8	**Station status: Master**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
9	**Station status: V**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
10	**Station status: W**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
11	**Station status: X**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
12	**Station status: Y**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
13	**Station status: Z**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

14	**Mode**		*Byte Field Size:*	*Bit Field Size:*	4	*Request Parameter*	No
	DD025 Mode, Data		0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
15	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:*	resv 4	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
	Needed to fill the CAN frame.						

Loran-C Range Data

PGN: 130053
hex: 1FC05

This provides Propagation times (Ranges) of Loran-C signals relative to a single Group Repetition Interval.

Field #1, Group Repetition Interval (GRI), is identified as a request parameter for this Parameter Group. All providers of this PGN shall accept and process requests based upon the requested value of Field #1. A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for every GRI that has associated data fields. If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner: If no requested fields have been included with the Complex Request, than the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904) described above. If the Complex Request (PGN 126208) includes the GRI field, then the response shall be filtered by the field (Field #1) and field value (GRI #) contained within the request.

For example, if the Complex Request for this PGN contained a value of 9960 for field 1, the Group Repetition Interval (GRI), and this was a GRI that the device was operating with or had information about, than the device would respond by providing a single PGN with Range measurement data associated with the 9960 GRI value requested.

If the GRI requested is considered valid by the device, but the device was not operating on that GRI, or had no data associated with the GRI requested, there are two possible responses:
1 - The device responds with the PGN containing the GRI requested and all other fields set to the value indicating "Data not available".
2 - The device responds with the Acknowledge Group PGN (126208) containing the error state of "0x2 = Temporarily unable to comply".

If the request was global no response would be required. If the request was addressed to the device, than either response 1 or 2 would apply.

If the GRI requested is not considered a valid GRI by the receiving device, then the appropriate response would be the Acknowledge Group PGN (126208), containing the error state for the requested GRI field of "0x3 = Request or command parameter out-of-range;".

Single Frame: No *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:* None

Field # *Field Name* Original Reference ID # 10

1	**Group Repetition Interval (GRI)**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	Yes
	DD027 Loran-C GRI		Group Repetition Interval (GRI) in nano-sec. Often cited in units of 10 micro-sec. (i.e., 9960 = 99,600,000 ns)			
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s		
2	**Master Range**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No
	DD029 Loran - Range (Time)		The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.			
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s		
3	**V Secondary Range**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No
	DD029 Loran - Range (Time)		The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.			
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s		
4	**W Secondary Range**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No
	DD029 Loran - Range (Time)		The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.			
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s		
5	**X Secondary Range**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No
	DD029 Loran - Range (Time)		The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.			
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s		
6	**Y Secondary Range**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No
	DD029 Loran - Range (Time)		The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.			
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s		

7	**Z Secondary Range**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD029 Loran - Range (Time)		The actual propagation time of a Loran-C signal from the station to a receiver in nano-sec.				
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s			
8	**Station status: Master**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
9	**Station status: V**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
10	**Station status: W**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
11	**Station status: X**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
12	**Station status: Y**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
13	**Station status: Z**		*Byte Field Size:*	*Bit Field Size:* 4	*Request Parameter* No		
	DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in use, xx1x = Low SNR, x1xx = Cycle error, 1xxx = Blink where x = don't care				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

14	**Mode**		*Byte Field Size:*	*Bit Field Size:*	4	*Request Parameter*	No
	DD025 Mode, Data		0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
15	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:*	resv 4	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1		Used to construct bit fields	
	Needed to fill the CAN frame.						

Loran-C Signal Data

PGN: 130054
hex: 1FC06

SNR, ECD, and ASF values of Loran-C signals

Field #1, Group Repetition Interval (GRI), is identified as a request parameter for this Parameter Group. All providers of this PGN shall accept and process requests based upon the requested value of Field #1. A device receiving an ISO Request (PGN 059904) for this PGN, shall respond by providing as many of these PGNs as necessary for every GRI that has associated data fields. If a Complex Request Group Function (PGN 126208) requesting this PGN is received, the receiving device shall respond in the following manner: If no requested fields have been included with the Complex Request, than the response is to return one or more PGNs, just like responding to the ISO Request (PGN 059904) described above. If the Complex Request (PGN 126208) includes the GRI field, then the response shall be filtered by the field (Field #1) and field value (GRI #) contained within the request.

For example, if the Complex Request for this PGN contained a value of 9960 for field 1, the Group Repetition Interval (GRI), and this was a GRI that the device was operating with or had information about, than the device would respond by providing a single PGN with Range measurement data associated with the 9960 GRI value requested.

If the GRI requested is considered valid by the device, but the device was not operating on that GRI, or had no data associated with the GRI requested, there are two possible responses:
1 - The device responds with the PGN containing the GRI requested and all other fields set to the value indicating "Data not available".
2 - The device responds with the Acknowledge Group PGN (126208) containing the error state of "0x2 = Temporarily unable to comply".

If the request was global no response would be required. If the request was addressed to the device, than either response 1 or 2 would apply.

Single Frame: No *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:* None

Original Reference ID # 11

Field #	Field Name					
1	**Group Repetition Interval (GRI)**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	Yes
	DD027 Loran-C GRI		Group Repetition Interval (GRI) in nano-sec. Often cited in units of 10 micro-sec. (i.e., 9960 = 99,600,000 ns)			
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s		
2	**Station identifier**		*Byte Field Size:* char 1	*Bit Field Size:*	*Request Parameter*	Yes
	DD031 Loran-C Station ID		1-character code for the Loran-C station: M = master, V, W, X, Y, Z			
	DF63 String, fixed	**char8(n)**	*Range:* 0 to 1,785 characters	*Resolution:* 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary	
3	**Station SNR**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No
	DD026 Loran-C SNR		Signal at standard sampling point / RMS noise in 3kHz BW at 100KHz			
	DF31 dB, relative measure	**int16**	*Range:* +/- 327.64 dB	*Resolution:* 1x10E-2 dB		
4	**Station ECD**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No
	DD032 Loran-C ECD		Envelope-to-Cycle Discrepancy (ECD) of the Loran-C pulse			
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s		
5	**Station ASF**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter*	No
	DD033 Loran-C ASF		Additional Secondary Factor (ASF) associated with the propagation of the signal from a Loran-C station			
	DF45 Time interval, precise	**int32**	*Range:* +/- 2.14 s	*Resolution:* 1x10E-9 s		

Route and WP Service - Database List

PGN: 130064
hex: 1FC10

Complex request for this PGN should return a list of Databases in which a navigation Device organizes its Routes and WPs.

A Database may contain one WP-List and multiple Routes.

A device need not support the concept of multiple Databases. The support of this PGN is then optional and the default Database ID = 0 shall be used in other "Route and Waypoint Service" PGNs. If supporting this PGN the Number of Databases defaults to 1.

The reply should use the same transfer protocol as the request.
ISO request shall, if this PGN is supported, return the 3 first fields with respectively: NA, 0 and the Number of Databases Available.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 96

Field #	*Field Name*							
1	**Start Database ID**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes				
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.						
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	1st Database ID requested/sent. If not specified in the request, the reply shall default to the lowest available Database ID. If the requested Database does not exist, the default response is the next highest Database ID.							
2	**nItems**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes				
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.						
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	n Databases requested/sent. If not specified in the request, the reply shall include all Databases available (or as many as the transport protocol space permits).							
3	**Number of Databases available**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No				
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.						
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
4	**Database ID**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No				
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.						
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	Databases shall be included in this PGN in the order of increasing ID.							
5	**Database Name**	*Byte Field Size:* 8 or 16 n	*Bit Field Size:*	*Request Parameter* No				
	DD004 Generic name string, short	Name of place, route, waypoint, destination, vessel, vehicle, etc.						
	DF50 String, variable, short	**ch8or16(n)**	*Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:* 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.			

6	**Database Timestamp**		*Byte Field Size:* 4	*Bit Field Size:*			*Request Parameter*	No
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC					
	DF06 Time of day	**uint32**	*Range:* 0 to 86,401 s	*Resolution:* 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day			
7	**Database Datestamp**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	No
	DD039 Generic date		Days since January 1, 1970, Date is relative to UTC Time.					
	DF41 Date, day count	**uint16**	*Range:* 0 to 65,532 days	*Resolution:* 1 day	0 = January 1, 1970, max = ~179 years			
8	**WP Position Resolution**		*Byte Field Size:*	*Bit Field Size:* 4			*Request Parameter*	No
	DD238 WP Position Resolution		0= [>0.1min.], 1= [<=0.1& >0.01min.], 2= [<=0.01 & >0.001] 3= [<=0.001 & >0.0001] 4= [<=0.000 1 & >=0.000 001min.] 5-6 =reserved, 7= Not available (not known) (1min. = 0.01667deg.)					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
9	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 4			*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
10	**Number of Routes in Database**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
11	**Number of WPs in Database**		*Byte Field Size:* 4	*Bit Field Size:*			*Request Parameter*	No
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.					
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number			
	Includes WPs from the WP-List and all other WPs embedded in Routes							
12	**Number of Bytes in Database**		*Byte Field Size:* 4	*Bit Field Size:*			*Request Parameter*	No
	DD010 Generic numeric ID, large		Number of route, waypoint, event, mark, etc.					
	DF55 Integer, 32 bit unsigned	**uint32**	*Range:* 0 to 4,294,967,292	*Resolution:* 1 bit	Unit-less number			
13	**Fields 4 thru 12 repeat as needed**		*Byte Field Size:* ?	*Bit Field Size:*			*Request Parameter*	No
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			

Route and WP Service - Route List

PGN: 130065
hex: 1FC11

Complex request for this PGN should return a list of Routes in a Database.

A Database may contain Routes identified with Route ID in the range 0-65532. There may be empty gaps (the Route ID does not represent a valid/existent Route) anywhere in this range. This PGN shall include valid Routes only.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 97

1 **Start Route ID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
1st Route ID requested/sent.
If not specified in the request, the reply shall default to the lowest available Route ID.
If the requested Route is not available, the default response is the next highest Route ID.

2 **nItems** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
n Routes requested/sent.
If not specified in the request, the reply shall include all Routes available in the Database (or as many of them as the transport protocol space permits).

3 **Number of Routes available in Database** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number

4 **Database ID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
Should be specified in the request. Is typically gathered from a prior "Database List PGN".
If not specified in the request, the reply may use a default Database.

5 **Route ID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
Routes shall be included in this PGN in the order of increasing ID, skipping non-valid Routes.

6	**Route Name**		*Byte Field Size:* 8 or 16 n		*Bit Field Size:*		*Request Parameter*	No
	DD004 Generic name string, short		Name of place, route, waypoint, destination, vessel, vehicle, etc.					
	DF50 String, variable, short	**ch8or16(n)**	*Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:* 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.		
7	**reserved**		*Byte Field Size:*		*Bit Field Size:* resv 2		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
8	**WP Identification Method**		*Byte Field Size:*		*Bit Field Size:* 2		*Request Parameter*	No
	DD240 WP Identification Method		0=WP's in WP-List, 1=WP embedded in Rute, 2=Reserved 3=Null (info not available)					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
9	**Route Status**		*Byte Field Size:*		*Bit Field Size:* 4		*Request Parameter*	No
	DD239 Route Status		0=Active, 1=Inactive, 2=Deleted, 3-13= Reserved, 14=Error, 15= Null					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
10	**Fields 5 thru 9 repeat as needed**		*Byte Field Size:* ?		*Bit Field Size:*		*Request Parameter*	No
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			

Route and WP Service - Route/WP-List Attributes

PGN: 130066
hex: 1FC12

Complex request for this PGN should return the attributes of a Route or the WP-List.

WARNING: The Route Track may not be defined by the Waypoint positions only: The Navigation Method (GC/RL) and Radius of Turn at each Waypoint are optional additional parameters defining the Track.
PGN 130066 field #8 "Critical supplementary parameters" shall be used to determine if there are additional parameters to the Waypoint positions.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

A Database may contain one WP-List and multiple Routes. The Database ID and the Route ID shall be specified in the request/reply. Route ID = 65535 (NA) indicates that the request/reply is addressing the WP-List.

This PGN contains parameters common for the Route or WP-List. The individual Waypoints with positions and other associated parameters must be requested/transferred in other “Route and WP Service” PGNs, such as PGN 130067 “Route - WP Name & Position”.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Field #	*Field Name*						Original Reference ID # 98
1	**Database ID**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter* Yes	
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
2	**Route ID**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter* Yes	
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Set to 65535 (NA) to access the WP-List in the Database.						
3	**Route/WP-List Name**		*Byte Field Size:* 8 or 16 n	*Bit Field Size:*		*Request Parameter* No	
	DD004 Generic name string, short		Name of place, route, waypoint, destination, vessel, vehicle, etc.				
	DF50 String, variable, short	**ch8or16(n)**	*Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:* 1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.		
4	**Route/WP-List Timestamp**		*Byte Field Size:* 4	*Bit Field Size:*		*Request Parameter* No	
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC				
	DF06 Time of day	**uint32**	*Range:* 0 to 86,401 s	*Resolution:* 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day		

5 **Route/WP-List Datestamp** — Byte Field Size: 2 — Bit Field Size: — Request Parameter: No

DD039 Generic date — Days since January 1, 1970, Date is relative to UTC Time.

DF41 Date, day count — **uint16** — Range: 0 to 65,532 days — Resolution: 1 day — 0 = January 1, 1970, max = ~179 years

---

6 **Change at Last Timestamp** — Byte Field Size: — Bit Field Size: 8 — Request Parameter: No

DD237 Changed at timestamp flag

0000 0000 = No change in data.
0xxx xxx1 = WP: Change in main data (Position, Name)
0xxx xx1x = WP: Change in supplementary parameters (or new added)
0xxx x1xx = Changed no. of WP's in Route/WP-List, and/or name changed/added
0xxx 1xxx = Route: Change supplementary parameters (or new added)
0xx1 xxxx = Reserved
0x1x xxxx = Reserved
01xx xxxx = Other not specifyed change
1111 1111 = This flag is not supported
x = don't care

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

---

7 **Number of WPs in the Route/WP-List** — Byte Field Size: 2 — Bit Field Size: — Request Parameter: No

DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.

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

---

8 **Critical supplementary parameters** — Byte Field Size: — Bit Field Size: 8 — Request Parameter: No

DD258 Critical supplementary Route parameters

0000 0000 = There are no parameters additional to the Waypoint Positions
xxxx xxx1 = Navigation Method (GC/RL), PGN 130069
xxxx xx1x = XTE Limit, PGN 130069
xxxx x1xx = Spare
xxxx 1xxx = Spare
xxx1 xxxx = Spare
xx1x xxxx = Spare
x1xx xxxx = Spare
1xxx xxxx = Spare

Each of these bitflags represents a parameter. If a flag is '1', the parameter must be downloaded and appended to the Route information. Ignoring any of these parameters will not be safe.

The spare flags shall be transmitted as '0's.

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

---

9 **Navigation Method** — Byte Field Size: — Bit Field Size: 2 — Request Parameter: No

DD119 Calculation Type

0 = Great Circle calculations,
1 = Rhumb Line calculations,
2 = Error,
3 = Null

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

Not applicable to the WP-List
NOTE: This is the default Navigation Method for the Route. It may be altered for specific legs. Ref. field 8, Critical supplementary parameters.

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10 **WP Identification Method** — Byte Field Size: — Bit Field Size: 2 — Request Parameter: No

DD240 WP Identification Method

0=WP's in WP-List,
1=WP embedded in Rute,
2=Reserved
3=Null (info not available)

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

Not applicable to the WP-List

---

11 **Route Status** — *Byte Field Size:* — *Bit Field Size:* 4 — *Request Parameter* No

DD239 Route Status

0=Active,
1=Inactive,
2=Deleted,
3-13= Reserved,
14=Error,
15= Null

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

Not applicable to the WP-List

12 **XTE Limit for the Route** — *Byte Field Size:* 2 — *Bit Field Size:* — *Request Parameter* No

DD149 Distance ordered

A commanded distance like radius order, off-track limit, etc.

DF74 Distance, rough **int16** *Range:* +/-32,764 m *Resolution:* 1 m

No negative values. The limit applies to both sides of the track.
Not applicable to the WP-List.
NOTE: This is the default XTE-Limit for the Route. It may be altered for specific legs. Ref. field 8, Critical supplementary parameters.

13 **Reserved** — *Byte Field Size:* — *Bit Field Size:* resv 0 — *Request Parameter* No

DD001 Reserved field

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

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

Additional future Route parameters (eg. Radius of Turn, etc). Fields are normally not reserved at the end of a PGN because it is a general rule that new parameters may be appended to an existing (non-single frame) PGN. This is a reminder.

Route and WP Service - Route - WP Name & Position

PGN: 130067
hex: 1FC13

Complex request of this PGN should return the Waypoints belonging to a Route.

WARNING: The Route Track may not be defined by the Waypoint positions only: The Navigation Method (GC/RL) and Radius of Turn at each Waypoint are optional additional parameters defining the Track.
PGN 130066 field #8 "Critical supplementary parameters" shall be used to determine if there are additional parameters to the Waypoint positions.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

The Waypoints of a Route are numbered with RPS# continuously from 0 and up in the Forward Direction. RPS# is the sequence number of the Waypoint in the Route. (Route Point Sequence #).

A Database may contain one WP-List and multiple Routes. The WP-List holds Waypoints identified by WPID in the range 0-65532. Each of these may be single or belong to one or multiple Routes in the Database. A Waypoint may be private to a particular Route and not exist in the WP List, its WPID shall then be 65535(NA).

The Database ID and Route ID shall be specified in the request/reply. These will typically be selected from the information received in other ""Route and WP Service"" PGNs previously requested from the same Device.

The Waypoint Name (if available) and Position shall be filled with valid data, even if the Waypoints are from the WP-List which the receiver may already have downloaded.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 99

1 **Start RPS#** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
RPS# of the 1st requested/sent Waypoint.
If not specified in the request, the default is the first RPS# (=0) of the Route.

2 **nItems** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
n Waypoints requested/sent.
If not specified in the request, the reply shall include all WPs of the Route (or as many thereof as the transport protocol space permits).

3 **Number of WPs in the Route** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
The receiver will use this parameter to determine if it has received all WPs of the complete route.

4 **Database ID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number

5 **Route ID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number

6 **WPID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
Shall have valid data if the Waypoint exists in the WP List.

The Waypoints shall be included in the order of increasing RPS# (The order of appearance in the Forward Direction of the Route).

7	**WP Name**		*Byte Field Size:*	8 or 16 n	*Bit Field Size:*		*Request Parameter*	No
	DD004 Generic name string, short			Name of place, route, waypoint, destination, vessel, vehicle, etc.				
	DF50 String, variable, short	**ch8or16(n)**	*Range:*	0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:*	1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
	Max. 30 ASCII or Unicode Characters							
8	**WP Latitude**		*Byte Field Size:*	4	*Bit Field Size:*		*Request Parameter*	No
	DD022 Latitude, WGS-84			Latitude referenced to WGS-84				
	DF23 Latitude	**int32**	*Range:*	+/- 90 deg	*Resolution:*	1x10E-7 deg	"-" = South, resolution ~1.1 cm	
9	**WP Longitude**		*Byte Field Size:*	4	*Bit Field Size:*		*Request Parameter*	No
	DD023 Longitude, WGS-84			Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	*Range:*	+/- 180 deg	*Resolution:*	1x10E-7 deg	"-" = West, resolution ~1.1 cm	
10	**Fields 6 thru 9 repeat as needed**		*Byte Field Size:*	?	*Bit Field Size:*		*Request Parameter*	No
	DD000 Undefined			Application specific, defined at time of use				
	DF00 Undefined	**Undefined**	*Range:*	undefined	*Resolution:*	undefined	Application specific, defIned at time of use.	

Route and WP Service - Route - WP Name

PGN: 130068
hex: 1FC14

Complex request of this PGN should return the Waypoints belonging to a Route.

WARNING: The Route Track may not be defined by the Waypoint positions only: The Navigation Method (GC/RL) and Radius of Turn at each Waypoint are optional additional parameters defining the Track.
PGN 130066 field #8 "Critical supplementary parameters" shall be used to determine if there are additional parameters to the Waypoint positions.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

The Waypoints of a Route are numbered with RPS# continuously from 0 and up in the Forward Direction. RPS# is the sequence number of the Waypoint in the Route. (Route Point Sequence #).

A Database may contain one WP-List and multiple Routes. The WP-List holds Waypoints identified by WPID in the range 0-65532. Each of these may be single or belong to one or multiple Routes in the Database. A Waypoint may be private to a particular Route and not exist in the WP List, its WPID shall then be 65535(NA).

The Database ID and Route ID shall be specified in the request/reply. These will typically be selected from the information received in other ""Route and WP Service"" PGNs previously requested from the same Device.

The Waypoint Name (if available) and Position shall be filled with valid data, even if the Waypoints are from the WP-List which the receiver may already have downloaded.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Field #	*Field Name*							Original Reference ID # 100
1	**Start RPS#**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	Yes
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	1st RPS# requested/sent							
2	**nItems**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	Yes
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	n RPS# requested/sent							
3	**Number of WPs in the Route**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
4	**Database ID**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	Yes
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
5	**Route ID**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	Yes
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
6	**WPID**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			

7	**WP Name**		*Byte Field Size:*	8 or 16 n	*Bit Field Size:*	*Request Parameter*	No
	DD004 Generic name string, short			Name of place, route, waypoint, destination, vessel, vehicle, etc.			
	DF50 String, variable, short	**ch8or16(n)**	*Range:*	0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:*	1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
	Max. 30 ASCII or Unicode Characters						
8	**field 6 thru 7 repeat as needed**		*Byte Field Size:*	?	*Bit Field Size:*	*Request Parameter*	No
	DD000 Undefined			Application specific, defined at time of use			
	DF00 Undefined	**Undefined**	*Range:*	undefined	*Resolution:*	undefined	Application specific, defIned at time of use.

Route and WP Service - XTE Limit & Navigation Method

PGN: 130069
hex: 1FC15

Complex request of this PGN will return XTE Limit and/or Navigation Method specific to individual legs of a Route.

The Database ID and Route ID shall be specified in the request/reply.

The parameters apply to the one leg after the Waypoint identified with RPS# in the Forward Direction of the Route and overrides any Route default XTE Limit and Navigation Method.

Waypoints where none of these parameters has valid data shall not be included in this PGN.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 101

Field #	*Field Name*					
1	**Start RPS#**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes		
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number	
	1st RPS# requested/sent If not specified in the request, the default is the lowest RPS# with valid data. If the requested RPS# has no valid data, the default response is the next highest RPS#.					
2	**nItems**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes		
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number	
	n RPS# requested/sent. If not specified in the request, the reply shall include all RPS# with valid data (or as many the transfer protocol space permits).					
3	**Number of Waypoints with a specific XTE Limit or Nav. Method**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number	
	Note: This may be less than Number of Waypoints in the Route.					
4	**Database ID**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes		
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number	
5	**Route ID**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes		
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number	
6	**RPS#**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.			
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number	
	Waypoints without individually specific XTE Limit or Navigation Method shall not be included.					
7	**XTE limit in the leg after WP**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD149 Distance ordered		A commanded distance like radius order, off-track limit, etc.			
	DF74 Distance, rough	**int16**	*Range:* +/-32,764 m	*Resolution:* 1 m		
	No negative values. The limit applies to both sides of the track.					
8	**Nav. Method in the leg after WP**	*Byte Field Size:*	*Bit Field Size:* 2	*Request Parameter* No		
	DD119 Calculation Type		0 = Great Circle calculations, 1 = Rhumb Line calculations, 2 = Error, 3 = Null			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	

9	**Reserved Bits**		*Byte Field Size:*		*Bit Field Size:*	resv 6	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	
10	**Fields 6 thru 9 repeat as needed**		*Byte Field Size:*	?	*Bit Field Size:*		*Request Parameter*	No
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:*	undefined	*Resolution:*	undefined	Application specific, defIned at time of use.	

Route and WP Service - WP Comment

PGN: 130070
hex: 1FC16

Complex request of this PGN should return supplementary Comments attached to Waypoints in a Route or a WP-List.

Waypoints without a Commment shall not be included in this PGN.

If the Route ID is set to 65535 (NA), the Comments will be for the Waypoints in the WP-List.
The Database ID shall be specified in the request/reply.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 102

Field #	*Field Name*					
1	**Start ID**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes		
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	1st requested/sent WPID in a WP-List or RPS# in a Route. If not specified in the request, the default is the lowest WPID/RPS# with a Comment. If the requested WPID/RPS# does not have a Comment, the default response is the next highest WPID/RPS#.					
2	**nItems**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes		
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	n Waypoints requested/sent. If not specified in the request, the default is the all the Waypoints with a Comment (or as many the transfer protocol permits).					
3	**Number of WPs with Comments**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
4	**Database ID**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes		
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
5	**Route ID**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes		
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Set to 65535 (NA) to access the WP-List in the Database.					
6	**WPID / RPS#**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned **uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	WPID shall be used when addressing a WP-List. RPS# shall be used when addressing a Route.					

7	**Comment**		*Byte Field Size:* 8 or 16	*Bit Field Size:*		*Request Parameter*	No
	DD198 Generic name string, Medium		Medium size text strings.				
	DF51 String, variable, medium	**ch8or16(n)**	*Range:* 0 to 1,782 ASCII or 0 to 891 Unicode Characters	*Resolution:* 1 ASCII or 1 Unicode Character	3 to 1,785 bytes. First and Second bytes in string (unit16) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Third byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 3 bytes, i.e. Count = 3) is a null string.		
	Max 1782 ASCII or 891 Unicode characters						
8	**Fields 6 thru 7 repeat as needed**		*Byte Field Size:* ?	*Bit Field Size:*		*Request Parameter*	No
	DD000 Undefined		Application specific, defined at time of use				
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.		

Route and WP Service - Route Comment

PGN: 130071
hex: 1FC17

Complex request of this PGN should return supplementary Comments attached to Routes.

The Database ID shall be specified in the request/reply.
Routes without a comment shall not be included in this PGN.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 103

Field #	Field Name						
1	**Start Route ID**	Byte Field Size: 2	Bit Field Size:	Request Parameter: Yes			
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned **uint16**	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number			
	1st Route ID requested/sent. If not specified in the request, the reply shall default to the lowest Route ID with a Comment. If the requested Route has no Comment, the default response is the next highest Route ID.						
2	**nItems**	Byte Field Size: 2	Bit Field Size:	Request Parameter: Yes			
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned **uint16**	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number			
	n Routes requested/sent. If not specified in the request, the reply shall include all Routes with a Comment in the Database (or as many of them as the transport protocol space permits).						
3	**Number of Routes with Comments**	Byte Field Size: 2	Bit Field Size:	Request Parameter: No			
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned **uint16**	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number			
4	**Database ID**	Byte Field Size: 2	Bit Field Size:	Request Parameter: Yes			
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned **uint16**	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number			
5	**Route ID**	Byte Field Size: 2	Bit Field Size:	Request Parameter: No			
	DD007 Generic numeric ID, medium	Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned **uint16**	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number			
6	**Comment**	Byte Field Size: 8 or 16	Bit Field Size:	Request Parameter: No			
	DD198 Generic name string, Medium	Medium size text strings.					
	DF51 String, variable, medium **ch8or16(n)**	Range: 0 to 1,782 ASCII or 0 to 891 Unicode Characters	Resolution: 1 ASCII or 1 Unicode Character	3 to 1,785 bytes. First and Second bytes in string (unit16) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Third byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 3 bytes, i.e. Count = 3) is a null string.		

7	Fields 5 thru 6 repeat as needed	*Byte Field Size:* ?	*Bit Field Size:*	*Request Parameter* No			
	DD000 Undefined	Application specific, defined at time of use					
	DF00 Undefined	**Undefined** *Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			

Route and WP Service - Database Comment

PGN: 130072
hex: 1FC18

Complex request of this PGN should return supplementary Comments attached to Databases in the navigation Device.

Databases without a Comment shall not be included in this PGN.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if PGN is supported.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 104

Field #	Field Name							
1	**Start Database ID**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	Yes
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	1st Database ID requested/sent. If not specified in the request, the reply shall default to the lowest Database ID with a Comment. If the requested Database has no Comment, the default response is the next highest Database ID.							
2	**nItems**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	Yes
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
	n Databases requested/sent. If not specified in the request, the reply shall include all Databases with a Comment (or as many of them as the transport protocol space permits).							
3	**Number of Databases with comments**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
4	**Database ID**		*Byte Field Size:* 2	*Bit Field Size:*			*Request Parameter*	No
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.					
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number			
5	**Comment text**		*Byte Field Size:* 8 or 16	*Bit Field Size:*			*Request Parameter*	No
	DD198 Generic name string, Medium		Medium size text strings.					
	DF51 String, variable, medium	**ch8or16(n)**	*Range:* 0 to 1,782 ASCII or 0 to 891 Unicode Characters	*Resolution:* 1 ASCII or 1 Unicode Character	3 to 1,785 bytes. First and Second bytes in string (unit16) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Third byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 3 bytes, i.e. Count = 3) is a null string.			
	Max. 1782 ASCII or 891 Unicode characters							
6	**Fields 4 thru 5 repeat as needed**		*Byte Field Size:* ?	*Bit Field Size:*			*Request Parameter*	No
	DD000 Undefined		Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.			

Route and WP Service - Radius of Turn

PGN: 130073
hex: 1FC19

Complex request of this PGN should return the Radius of Turn at specific Waypoints of a Route.

For a complete description of the Route and WP PGNs, see the application note in Appendix D. The Radius of Turn is described in Appendix D.5.15.6.

The Database ID and Route ID shall be specified in the request/reply.

The Radius overrides any Route default Radius of Turn.
Only those Waypoints with an individually specified Radius of Turn shall be included in this PGN. The Waypoints are identified with RPS#.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Original Reference ID # 108

Field #	*Field Name*						
1	**Start RPS#**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes			
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	1st RPS# requested/sent If not specified in the request, the default is the first RPS# with valid data. If the requested RPS# has no valid data, the default response is the next highest RPS#.						
2	**nItems**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes			
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	n RPS# requested/sent If not specified in the request, the reply shall include all RPS# with valid data (or as many the transfer protocol space permits).						
3	**Number of Waypoints with a specific Radius of Turn**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No			
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Note: This may be less than the number of Waypoints in the Route						
4	**Database ID**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes			
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
5	**Route ID**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* Yes			
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
6	**RPS#**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No			
	DD007 Generic numeric ID, medium		Number of route, waypoint, event, mark, etc.				
	DF54 Integer, 16 bit unsigned	**uint16**	*Range:* 0 to 65,532	*Resolution:* 1 bit	Unit-less number		
	Waypoints using the Route-default Radius or no Radius shall not be included.						
7	**Radius of Turn**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No			
	DD149 Distance ordered		A commanded distance like radius order, off-track limit, etc.				
	DF74 Distance, rough	**int16**	*Range:* +/-32,764 m	*Resolution:* 1 m			
	No negative values.						
8	**Fields 6 and 7 repeated as needed**	*Byte Field Size:* ?	*Bit Field Size:*	*Request Parameter* No			
	DD000 Undefined		Application specific, defined at time of use				
	DF00 Undefined	**Undefined**	*Range:* undefined	*Resolution:* undefined	Application specific, defIned at time of use.		

Route and WP Service - WP List - WP Name & Position

PGN: 130074
hex: 1FC1A

Complex request of this PGN should return the Waypoints of a WP-List.

WARNING: The Route Track may not be defined by the Waypoint positions only: The Navigation Method (GC/RL) and Radius of Turn at each Waypoint are optional additional parameters defining the Track.
PGN 130066 field #8 "Critical supplementary parameters" shall be used to determine if there are additional parameters to the Waypoint positions.
For a complete description of the Route and WP PGNs, see the application note in Appendix D.

The WP-List has Waypoints identified by WPID in the range 0-65532. Each of these may be single or belong to one or multiple Routes in the Database. There may be empty gaps anywhere in the range of WPIDs. These (non-valid WPs) shall not be included in this PGN. A Waypoint is valid when its Position is valid.

A Database may contain one WP-List and multiple Routes. The Database ID shall be specified in the request/reply. The Database ID will typically be selected from the information received in the ""Route and WP Service - Database List"" PGN previously requested from the same Device.

The reply should use the same transfer protocol as the request.
ISO request for this PGN shall return 059392 with a positive ACK if the PGN is supported.

Single Frame: No *Priority Default:* 7 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second
Destination: Global *Query Support:* Yes *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 107

1 **Start WPID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
1st requested/sent WPID.
If not specified in the request, the default is the lowest WPID with a valid Waypoint.
If the requested Waypoint is not valid, the default response is the next highest WPID.

2 **nItems** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
n Waypoints requested/sent.
Non-valid Waypoints shall be skipped and is not included in this count.
If not specified in the request, the reply shall include all valid WPs of the WP-List (or as many thereof as the transport protocol space permits).

3 **Number of valid WPs in the WP-List** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number

4 **Database ID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* Yes
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number

5 **reserved** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number

6 **WPID** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No
DD007 Generic numeric ID, medium — Number of route, waypoint, event, mark, etc.
DF54 Integer, 16 bit unsigned **uint16** *Range:* 0 to 65,532 *Resolution:* 1 bit Unit-less number
The Waypoints shall be included in the order of increasing WPIDs.
Non-valid WPs shall not be included.

7	**WP Name**			*Byte Field Size:*	8 or 16 n	*Bit Field Size:*		*Request Parameter*	No
	DD004 Generic name string, short			Name of place, route, waypoint, destination, vessel, vehicle, etc.					
	DF50 String, variable, short	**ch8or16(n)**	*Range:*	0 to 250 ASCII or 0 to 125 Unicode Characters	*Resolution:*	1 ASCII or 1 Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.		
	Max. 30 ASCII or Unicode Characters								
8	**WP Latitude**			*Byte Field Size:*	4	*Bit Field Size:*		*Request Parameter*	No
	DD022 Latitude, WGS-84			Latitude referenced to WGS-84					
	DF23 Latitude	**int32**	*Range:*	+/- 90 deg	*Resolution:*	1x10E-7 deg	"-" = South, resolution ~1.1 cm		
9	**WP Longitude**			*Byte Field Size:*	4	*Bit Field Size:*		*Request Parameter*	No
	DD023 Longitude, WGS-84			Longitude referenced to WGS-84					
	DF25 Longitude	**int32**	*Range:*	+/- 180 deg	*Resolution:*	1x10E-7 deg	"-" = West, resolution ~1.1 cm		
10	**Fields 6 thru 9 repeat as needed**			*Byte Field Size:*	?	*Bit Field Size:*		*Request Parameter*	No
	DD000 Undefined			Application specific, defined at time of use					
	DF00 Undefined	**Undefined**	*Range:*	undefined	*Resolution:*	undefined	Application specific, defIned at time of use.		

Wind Data

PGN: 130306
hex: 1FD02

Direction and speed of Wind. True wind can be referenced to the vessel or to the ground. The Apparent Wind is what is felt standing on the (moving) ship, I.e., the wind measured by the typical mast head instruments.
The boat referenced true wind is given by the vector sum of Apparent wind and vessel's heading and speed though the water. The ground referenced true wind is given by the vector sum of Apparent wind and vessel's heading and speed over ground.

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 100 milliseconds *Frequency:* 10. cycles per second
Destination: Global *Query Support:* *ACK Rqmnts:*

Field # *Field Name* Original Reference ID # 81

1	**Sequence ID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No	
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.					
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number			
2	**Wind Speed**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No	
	DD044 Generic Speed							
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s	*Resolution:* 1x10E-2 m/s	1 Knot = 0.5144 m/s			
3	**Wind Direction**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No	
	DD045 Wind Direction							
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad			
4	**Wind Reference**		*Byte Field Size:*	*Bit Field Size:* 3		*Request Parameter*	No	
	DD205 Wind Reference		0x00 = Theoretical Wind (ground referenced, referenced to True North; calculated using COG/SOG) 0x01 = Theoretical Wind (ground referenced, referenced to Magnetic North; calculated using COG/SOG) 0x02 = Apparent Wind (relative to the vessel centerline) 0x03 = Theoretical (Calculated to Centerline of the vessel, refernced to ground; calculated using COG/SOG) 0x04 = Theoretical (Calculated to Centerline of the vessel, refernced to water; calculated using Heading/Speed through Water) 0x05 = Reserved 0x06 = Error 0x07 = Null					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
5	**Reserve**		*Byte Field Size:*	*Bit Field Size:* resv 21		*Request Parameter*	No	
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	Needed to fill the CAN frame.							

Environmental Parameters

PGN: 130310
hex: 1FD06

Local atmospheric environmental conditions

Single Frame: Yes *Priority Default:* 5 *Default Update Rate:* 500 milliseconds *Frequency:* 2. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 46

Field #	*Field Name*						
1	**Sequence ID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Water Temp**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD043 Generic Temperature						
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K	*Resolution:* 1x10E-2 deg K			
3	**Outside Ambient Air Temp.**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD043 Generic Temperature						
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K	*Resolution:* 1x10E-2 deg K			
4	**Atmospheric Pressure**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD049 Generic Pressure						
	DF47 Pressure, medium	**uint16**	*Range:* 0 to 6,553,200 Pa	*Resolution:* 1x10E+2 Pa			
5	**Reserved Bits**		*Byte Field Size:*	*Bit Field Size:* resv 8		*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Needed to fill the CAN frame.						

Environmental Parameters

PGN: 130311
hex: 1FD07

Environmental Conditions contains Temperature, Humidity, and Atmospheric Pressure. This PGN was introduced as a rework of PGN 130310, however as of version 1.210 of this standard, this PGN is not to be used for new designs. Specific PGNs 130312 Temperature, 130313 Relative Humidity, 130314 Actual Pressure, 130315 Set Pressure shall be used.

Single Frame: Yes *Priority Default:* 5 *Default Update Rate:* 500 milliseconds *Frequency:* 2. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 91

Field #	*Field Name*						
1	**Sequence ID**		*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Temperature Instance**		*Byte Field Size:*	*Bit Field Size:* 6		*Request Parameter*	No
	DD229 Temperature Instance		0x00 = Sea Temperature, 0x01 = Outside Temperature, 0x02 = Inside Temperature, 0x03 = Engine Room Temperature, 0x04 = Main Cabin Temperature, 0x05 = Reserve, thru 0x3E = Reserve, 0x3F = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to qualify contents of field 4						
3	**Humidity Instance**		*Byte Field Size:*	*Bit Field Size:* 2		*Request Parameter*	No
	DD230 Humidity Instance		0x00 = Inside Humidity, 0x01 = Outside Humidity, 0x02 = reserved, 0x03 = Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Used to qualify contents of field 5						
4	**Temperature**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD043 Generic Temperature						
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K	*Resolution:* 1x10E-2 deg K			
5	**Humidity**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD231 Humidity		Relative Humidity				
	DF84 Percent, Relative Measur	**int16**	*Range:* -131.072% to 131.056%	*Resolution:* .004%			
6	**Atmospheric Pressure**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD049 Generic Pressure						
	DF47 Pressure, medium	**uint16**	*Range:* 0 to 6,553,200 Pa	*Resolution:* 1x10E+2 Pa			

Temperature

PGN: 130312
hex: 1FD08

This PGN contains the Sequence ID, a Temperature Instance, Temperature Source, Temperature Value, and Set Temperature. For example the Temperature might be the temperature of sea water or live well as defined by the Temperature Source (field 3), with a Temperature Instance (field 2) of 1. Using Set Temperature (field 5) this PGN can also be used to control temperature or to report a targeted temperature. This PGN is a rework of PGN 130311and was introduced in version 1.210 of this standard, it is to used for new designs.

Single Frame: Yes *Priority Default:* 5 *Default Update Rate:* 2,000 milliseconds *Frequency:* .5 cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 196

Field #	Field Name					
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.			
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number	
2	**Temperature Instance**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter*	No
	DD128 Generic instance		0 = Instance 0; 1 = Instance 1; thru n = Instance n, where n < 253 253 = Reserved 254 = Error; 255 = Not available	For Engines: 0 = Single Engine or Dual Engine Port 1 = Dual Engine StarBoard (for Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n))		
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
3	**Temperature Source**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter*	No
	DD291 Temperature Source		00 = Sea Temperature 01 = Outside Temperature 02 = Inside Temperature 03 = Engine Room Temperature 04 = Main Cabin Temperature 05 = Live Well Temperature 06 = Bait Well Temperature 07 = Refrigeration Temperature 08 = Heating System Temperature 09 = Dew Point Temperature 10 = Wind Chill Temperature, Apparent 11 = Wind Chill Temperature, Theoretical 12 = Heat Index Temperature 13 = Freezer Temperature 14 through 128 Reserved 129 through 252 Generic Temperature Sources other than those defined 253 = Not Supported 254 = Error 255 = No Change / Data Not Available			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields	
4	**Actual Temperature**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No
	DD043 Generic Temperature					
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K	*Resolution:* 1x10E-2 deg K		
5	**Set Temperature**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter*	No
	DD043 Generic Temperature					
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K	*Resolution:* 1x10E-2 deg K		

6	**Reserve Bits**		*Byte Field Size:*		*Bit Field Size:*	resv 8	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:*	Variable	*Resolution:*	1	Used to construct bit fields	

Humidity

PGN: 130313
hex: 1FD09

This PGN contains the Sequence ID, a Humidity Instance, Humidity Source, the Actual Humidity, and the Set Humidity Value. For example the Humidity might be Inside as define by the Humdity Source (field 3) with a Humidity Instance (field 2) of 2. Using Set Humidity (field 5) this PGN can also be used to control humidity or to report a targeted humidity. This PGN is a rework of PGN 130311and was introduced in version 1.210 of this standard, it is to used for new designs.

Single Frame: Yes *Priority Default:* 5 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 198

Field #	*Field Name*						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Humidity Instance**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD128 Generic instance		0 = Instance 0; 1 = Instance 1; thru n = Instance n, where n < 253 253 = Reserve 254 = Error; 255 = Not available	For Engines: 0 = Single Engine or Dual Engine Port 1 = Dual Engine StarBoard (for Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n))			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Humidity Source**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD292 Humidity Source		00 = Inside Humidity 01 = Outside Humidity 02 through 128 Reserved 129 through 252 Generic Humidity Sources other than those defined 253 = Not Supported 254 = Error 255 = No Change / Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Actual Humidity**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD231 Humidity		Relative Humidity				
	DF84 Percent, Relative Measur	**int16**	*Range:* -131.072% to 131.056%	*Resolution:* .004%			
5	**Set Humidity**		*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD231 Humidity		Relative Humidity				
	DF84 Percent, Relative Measur	**int16**	*Range:* -131.072% to 131.056%	*Resolution:* .004%			
6	**Reserve Bits**		*Byte Field Size:*	*Bit Field Size:* resv 8	*Request Parameter* No		
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

Actual Pressure

PGN: 130314
hex: 1FD0A

This PGN contains the Sequence ID, a Pressure Instance, Pressure Source, and the Pressure Value. For example Pressure might be Atmospheric Pressure as defined by the Pressure Source (Field 3) with a Pressure Instance (field 2) of 1. This PGN is a rework of PGN 130311and was introduced in version 1.210 of this standard, it is to used for new designs.

Single Frame: Yes *Priority Default:* 5 *Default Update Rate:* 2,000 milliseconds *Frequency:* .5 cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 195

Field #	*Field Name*						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Pressure Instance**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD128 Generic instance		0 = Instance 0; 1 = Instance 1; thru n = Instance n, where n < 253 253 = Reserve 254 = Error; 255 = Not available	For Engines: 0 = Single Engine or Dual Engine Port 1 = Dual Engine StarBoard (for Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n))			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Pressure Source**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD289 Pressure Source		00 = Atmospheric Pressure 01 = Water Pressure 02 = Steam Pressure 03 = Compressed Air Pressure 04 = Hydraulic Pressure 05 through 128 Reserved 129 through 252 Generic Pressure Sources other than those defined 253 = Reserved 254 = Error 255 = No Change / Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Pressure**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD290 Pressure						
	DF103 Pressure	**int32**	*Range:* +/- 2.1E8	*Resolution:* 1E-1 Pa			
5	**Reserve Bits**		*Byte Field Size:*	*Bit Field Size:* resv 8	*Request Parameter* No		
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

Set Pressure

PGN: 130315
hex: 1FD0B

This PGN contains the Sequence ID, a Pressure Instance, Pressure Source, and the Set Pressure Value. This PGN can be sent to a device that controls pressure to change its targeted pressure, or it can be sent out by the control device to indicate its current targeted pressure. This PGN is a rework of PGN 130311and was introduced in version 1.210 of this standard, it is to used for new designs.

Single Frame: Yes *Priority Default:* 5 *Default Update Rate:* NA milliseconds *Frequency:* NA cycles per second

Destination: *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 197

Field #	Field Name						
1	**SID**		*Byte Field Size:* 1	*Bit Field Size:*	*Request Parameter* No		
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
2	**Pressue Instance**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD128 Generic instance		0 = Instance 0; 1 = Instance 1; thru n = Instance n, where n < 253 253 = Reserve 254 = Error; 255 = Not available	For Engines: 0 = Single Engine or Dual Engine Port 1 = Dual Engine StarBoard (for Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n))			
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Pressure Source**		*Byte Field Size:*	*Bit Field Size:* 8	*Request Parameter* No		
	DD289 Pressure Source		00 = Atmospheric Pressure 01 = Water Pressure 02 = Steam Pressure 03 = Compressed Air Pressure 04 = Hydraulic Pressure 05 through 128 Reserved 129 through 252 Generic Pressure Sources other than those defined 253 = Reserved 254 = Error 255 = No Change / Data Not Available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
4	**Pressure**		*Byte Field Size:* 4	*Bit Field Size:*	*Request Parameter* No		
	DD290 Pressure						
	DF103 Pressure	**int32**	*Range:* +/- 2.1E8	*Resolution:* 1E-1 Pa			
5	**Reserve Bits**		*Byte Field Size:*	*Bit Field Size:* resv 8	*Request Parameter* No		
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		

Tide Station Data

PGN: 130320
hex: 1FD10

Tide station measurement data including station location, numeric identifier, and name.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 12

Field #	Field Name							
1	**Mode**			*Byte Field Size:*		*Bit Field Size:* 4	*Request Parameter*	No
	DD025 Mode, Data			0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
2	**Tide Tendency**			*Byte Field Size:*		*Bit Field Size:* 2	*Request Parameter*	No
	DD038 Tide direction			msb/lsb: 00 = Falling, 01 = Rising, 10 = Error, 11 = Unavailable, Unknown				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
3	**Reserved Bits**			*Byte Field Size:*		*Bit Field Size:* resv 2	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields			
	2 Bits needed to fill out the byte							
4	**Measurement date**			*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD039 Generic date			Days since January 1, 1970, Date is relative to UTC Time.				
	DF41 Date, day count	**uint16**	*Range:* 0 to 65,532 days	*Resolution:* 1 day	0 = January 1, 1970, max = ~179 years			
5	**Measurement time**			*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD158 Generic time of day			24 hour clock, 0 = midnight, time is in UTC				
	DF06 Time of day	**uint32**	*Range:* 0 to 86,401 s	*Resolution:* 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day			
6	**Station location, latitude**			*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD022 Latitude, WGS-84			Latitude referenced to WGS-84				
	DF23 Latitude	**int32**	*Range:* +/- 90 deg	*Resolution:* 1x10E-7 deg	"-" = South, resolution ~1.1 cm			
7	**Station location, longitude**			*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD023 Longitude, WGS-84			Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	*Range:* +/- 180 deg	*Resolution:* 1x10E-7 deg	"-" = West, resolution ~1.1 cm			
8	**Tide level**			*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD041 Tide Level			This value is relative to mean lower low water (MLLW).				
	DF46 Distance, signed, medium	**int16**	*Range:* +/- 32.764 m	*Resolution:* 1x10E-3 m				

9 **Tide level standard deviation** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD040 Standard Deviation for tide level data

The following text is from NOAA and is placed here to convey an understanding of the expected magnitude of the values. "The tide gage processes 181 water level samples, 1 second apart, centered on the 6 minute mark. It then computes the standard deviation of the Samples. Samples more than 3 sigma's away from the average are called "outliers". The "outliers" are removed from the samples and the standard deviation is recomputed. The number of outliers indicates how many samples were discarded. The standard deviation is a measure of noise in the water level environment. In a sheltered location, the typical standard deviation can be as low as 0.001 to 0.010 meters. More open locations could be higher, such as 0.150 meters. Every location is different.

DF13 Distance, short **uint16** *Range:* 0 to 655.32 m *Resolution:* 1x10E-2 m

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10 **Station ID String** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* Yes

DD004 Generic name string, short

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

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

15 characters maximum.

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

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11 **Station Name String** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* No

DD004 Generic name string, short

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

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

50 characters maximum.

Salinity Station Data

PGN: 130321
hex: 1FD11

Salinity station measurement data including station location, numeric identifier, and name.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 13

Field #	Field Name							
1	**Mode**			*Byte Field Size:*		*Bit Field Size:* 4	*Request Parameter*	No
	DD025 Mode, Data			0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available				
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1		Used to construct bit fields	
2	**Reserved Bits**			*Byte Field Size:*		*Bit Field Size:* resv 4	*Request Parameter*	No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1		Used to construct bit fields	
	4 Bits needed to fill out the byte							
3	**Measurement Date**			*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD039 Generic date			Days since January 1, 1970, Date is relative to UTC Time.				
	DF41 Date, day count	**uint16**	*Range:* 0 to 65,532 days		*Resolution:* 1 day		0 = January 1, 1970, max = ~179 years	
4	**Measurement time**			*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD158 Generic time of day			24 hour clock, 0 = midnight, time is in UTC				
	DF06 Time of day	**uint32**	*Range:* 0 to 86,401 s		*Resolution:* 1x10E-4 s		~24 hours, 0 = midnight, range allows for up to two leap seconds per day	
5	**Station location, latitude**			*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD022 Latitude, WGS-84			Latitude referenced to WGS-84				
	DF23 Latitude	**int32**	*Range:* +/- 90 deg		*Resolution:* 1x10E-7 deg		"-" = South, resolution ~1.1 cm	
6	**Station location, longitude**			*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD023 Longitude, WGS-84			Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	*Range:* +/- 180 deg		*Resolution:* 1x10E-7 deg		"-" = West, resolution ~1.1 cm	
7	**Salinity**			*Byte Field Size:* 4		*Bit Field Size:*	*Request Parameter*	No
	DD042 Salinity measure			The average Salinity of ocean water is about 35 grams of salts per kilogram of sea water (g/kg), usually written as 35 ppt which is read as 35 parts per thousand.				
	DF49 Ratio, Relative measure	**float32**	*Range:* Variable		*Resolution:* Floats		Unit-less number	
8	**Water Temperature**			*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD043 Generic Temperature							
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K		*Resolution:* 1x10E-2 deg K			

9 **Station ID String** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* Yes

DD004 Generic name string, short — Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

15 characters maximum.

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

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10 **Station Name String** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* No

DD004 Generic name string, short — Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

50 characters maximum.

Current Station Data

PGN: 130322
hex: 1FD12

Current station measurement data including station location, numeric identifier, and name.

Single Frame: No *Priority Default:* 6 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 14

Field #	Field Name							
1	**Mode**			*Byte Field Size:*		*Bit Field Size:* 4		*Request Parameter* No
	DD025 Mode, Data			0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available				
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1		Used to construct bit fields	
2	**State**			*Byte Field Size:*		*Bit Field Size:* 3		*Request Parameter* No
	DD046 Water Current State			000 = Flood, 001 = Slack, 010 = Ebb, 011 = Reserved, 100 = Reserved, 101 = Reserved, 110 = Error, 111 = Unavailable, Unknown				
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1		Used to construct bit fields	
3	**Reserved Bits**			*Byte Field Size:*		*Bit Field Size:* resv 1		*Request Parameter* No
	DD001 Reserved field			Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1		Used to construct bit fields	
	1 Bits needed to fill out the byte							
4	**Measurement date**			*Byte Field Size:* 2		*Bit Field Size:*		*Request Parameter* No
	DD039 Generic date			Days since January 1, 1970, Date is relative to UTC Time.				
	DF41 Date, day count	**uint16**	*Range:* 0 to 65,532 days		*Resolution:* 1 day		0 = January 1, 1970, max = ~179 years	
5	**Measurement time**			*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter* No
	DD158 Generic time of day			24 hour clock, 0 = midnight, time is in UTC				
	DF06 Time of day	**uint32**	*Range:* 0 to 86,401 s		*Resolution:* 1x10E-4 s		~24 hours, 0 = midnight, range allows for up to two leap seconds per day	
6	**Station location, latitude**			*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter* No
	DD022 Latitude, WGS-84			Latitude referenced to WGS-84				
	DF23 Latitude	**int32**	*Range:* +/- 90 deg		*Resolution:* 1x10E-7 deg		"-" = South, resolution ~1.1 cm	
7	**Station location, longitude**			*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter* No
	DD023 Longitude, WGS-84			Longitude referenced to WGS-84				
	DF25 Longitude	**int32**	*Range:* +/- 180 deg		*Resolution:* 1x10E-7 deg		"-" = West, resolution ~1.1 cm	
8	**Measurement depth**			*Byte Field Size:* 4		*Bit Field Size:*		*Request Parameter* No
	DD047 Water Depth			Water depth measured from the water surface				
	DF09 Distance	**uint32**	*Range:* 0 to ~4.295x10E+7 m		*Resolution:* 1x10E-2 m			

9 **Current speed** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD044 Generic Speed

DF35 Speed **uint16** *Range:* 0 to 655.32 m/s *Resolution:* 1x10E-2 m/s 1 Knot = 0.5144 m/s

10 **Current flow direction** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD048 Current flow direction Direction towards which current flows. Degrees relative to True North.

DF02 Angle **uint16** *Range:* 0 to 2Pi rad *Resolution:* 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad

11 **Water Temperature** *Byte Field Size:* 2 *Bit Field Size:* *Request Parameter* No

DD043 Generic Temperature

DF39 Temperature, low **uint16** *Range:* 0 to 655.32 deg K *Resolution:* 1x10E-2 deg K

12 **Station ID String** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* Yes

DD004 Generic name string, short Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character 2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

15 characters maximum.

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

13 **Station Name String** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* No

DD004 Generic name string, short Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character 2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

50 characters maximum

Meteorological Station Data

PGN: 130323
hex: 1FD13

Meteorological station measurement data including station location, numeric identifier, and name.

Single Frame: No | Priority Default: 6 | Default Update Rate: 1,000 milliseconds | Frequency: 1. cycles per second
Destination: Global | Query Support: Opt'l | ACK Rqmnts:

Original Reference ID # 15

Field #	Field Name		Byte Field Size	Bit Field Size	Request Parameter	Range	Resolution	
1	**Mode**			4	No			
	DD025 Mode, Data					0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available		
	DF52 Bit field	**bit(n)**				Variable	1	Used to construct bit fields
2	**Reserved Bits**			resv 4	No			
	DD001 Reserved field					Variable number of reserved bits, all set to logic "1"		
	DF52 Bit field	**bit(n)**				Variable	1	Used to construct bit fields
	4 Bits needed to fill out the byte							
3	**Measurement date**		2		No			
	DD039 Generic date					Days since January 1, 1970, Date is relative to UTC Time.		
	DF41 Date, day count	**uint16**				0 to 65,532 days	1 day	0 = January 1, 1970, max = ~179 years
4	**Measurement time**		4		No			
	DD158 Generic time of day					24 hour clock, 0 = midnight, time is in UTC		
	DF06 Time of day	**uint32**				0 to 86,401 s	1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
5	**Station location, latitude**		4		No			
	DD022 Latitude, WGS-84					Latitude referenced to WGS-84		
	DF23 Latitude	**int32**				+/- 90 deg	1x10E-7 deg	"-" = South, resolution ~1.1 cm
6	**Station location, longitude**		4		No			
	DD023 Longitude, WGS-84					Longitude referenced to WGS-84		
	DF25 Longitude	**int32**				+/- 180 deg	1x10E-7 deg	"-" = West, resolution ~1.1 cm
7	**Wind Speed**		2		No			
	DD044 Generic Speed							
	DF35 Speed	**uint16**				0 to 655.32 m/s	1x10E-2 m/s	1 Knot = 0.5144 m/s
8	**Wind Direction**		2		No			
	DD045 Wind Direction							
	DF02 Angle	**uint16**				0 to 2Pi rad	1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad

9	**Wind Reference**		*Byte Field Size:*		*Bit Field Size:*	3	*Request Parameter*	No
	DD205 Wind Reference		0x00 = Theoretical Wind (ground referenced, referenced to True North; calculated using COG/SOG) 0x01 = Theoretical Wind (ground referenced, referenced to Magnetic North; calculated using COG/SOG) 0x02 = Apparent Wind (relative to the vessel centerline) 0x03 = Theoretical (Calculated to Centerline of the vessel, refernced to ground; calculated using COG/SOG) 0x04 = Theoretical (Calculated to Centerline of the vessel, refernced to water; calculated using Heading/Speed through Water) 0x05 = Reserved 0x06 = Error 0x07 = Null					
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1		Used to construct bit fields	
10	**Reserve Bits**		*Byte Field Size:*		*Bit Field Size:*	resv 5	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	*Range:* Variable		*Resolution:* 1		Used to construct bit fields	
11	**Wind Gusts**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD053 Wind gusts		Peak wind gust speed. Sustained wind over an interval of 5 seconds.					
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s		*Resolution:* 1x10E-2 m/s		1 Knot = 0.5144 m/s	
12	**Atmospheric Pressure**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD049 Generic Pressure							
	DF47 Pressure, medium	**uint16**	*Range:* 0 to 6,553,200 Pa		*Resolution:* 1x10E+2 Pa			
13	**Air Temperature**		*Byte Field Size:*	2	*Bit Field Size:*		*Request Parameter*	No
	DD043 Generic Temperature							
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K		*Resolution:* 1x10E-2 deg K			
14	**Station ID String**		*Byte Field Size:*	8 or 16 n	*Bit Field Size:*		*Request Parameter*	No
	DD004 Generic name string, short		Name of place, route, waypoint, destination, vessel, vehicle, etc.					
	DF50 String, variable, short	**ch8or16(n)**	*Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters		*Resolution:* 1 ASCII or 1 Unicode Character		2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	
	15 characters maximum.							

15 **Station Name String** *Byte Field Size:* 8 or 16 n *Bit Field Size:* *Request Parameter* Yes

DD004 Generic name string, short — Name of place, route, waypoint, destination, vessel, vehicle, etc.

DF50 String, variable, short **ch8or16(n)** *Range:* 0 to 250 ASCII or 0 to 125 Unicode Characters *Resolution:* 1 ASCII or 1 Unicode Character

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

50 characters maximum.

Moored Buoy Station Data

PGN: 130324
hex: 1FD14

Moored buoy measurement data including station location and numeric identifier.

Single Frame: No | Priority Default: 6 | Default Update Rate: 1,000 milliseconds | Frequency: 1. cycles per second
Destination: Global | Query Support: Opt'l | ACK Rqmnts:

Original Reference ID # 16

Field #	Field Name							
1	**Mode**		Byte Field Size:		Bit Field Size: 4		Request Parameter	No
	DD025 Mode, Data		0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available					
	DF52 Bit field	**bit(n)**	Range: Variable		Resolution: 1		Used to construct bit fields	
2	**Reserved Bits**		Byte Field Size:		Bit Field Size: resv 4		Request Parameter	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"					
	DF52 Bit field	**bit(n)**	Range: Variable		Resolution: 1		Used to construct bit fields	
	4 Bits needed to fill out the byte							
3	**Measurement date**		Byte Field Size: 2		Bit Field Size:		Request Parameter	No
	DD039 Generic date		Days since January 1, 1970, Date is relative to UTC Time.					
	DF41 Date, day count	**uint16**	Range: 0 to 65,532 days		Resolution: 1 day		0 = January 1, 1970, max = ~179 years	
4	**Measurement time**		Byte Field Size: 4		Bit Field Size:		Request Parameter	No
	DD158 Generic time of day		24 hour clock, 0 = midnight, time is in UTC					
	DF06 Time of day	**uint32**	Range: 0 to 86,401 s		Resolution: 1x10E-4 s		~24 hours, 0 = midnight, range allows for up to two leap seconds per day	
5	**Station location, latitude**		Byte Field Size: 4		Bit Field Size:		Request Parameter	No
	DD022 Latitude, WGS-84		Latitude referenced to WGS-84					
	DF23 Latitude	**int32**	Range: +/- 90 deg		Resolution: 1x10E-7 deg		"-" = South, resolution ~1.1 cm	
6	**Station location, longitude**		Byte Field Size: 4		Bit Field Size:		Request Parameter	No
	DD023 Longitude, WGS-84		Longitude referenced to WGS-84					
	DF25 Longitude	**int32**	Range: +/- 180 deg		Resolution: 1x10E-7 deg		"-" = West, resolution ~1.1 cm	
7	**Wind Speed**		Byte Field Size: 2		Bit Field Size:		Request Parameter	No
	DD044 Generic Speed							
	DF35 Speed	**uint16**	Range: 0 to 655.32 m/s		Resolution: 1x10E-2 m/s		1 Knot = 0.5144 m/s	
8	**Wind Direction**		Byte Field Size: 2		Bit Field Size:		Request Parameter	No
	DD045 Wind Direction							
	DF02 Angle	**uint16**	Range: 0 to 2Pi rad		Resolution: 1x10E-4 rad		Resolution ~0.0057deg, 1 deg = .01745 rad	

9	**Wind Reference**		*Byte Field Size:*		*Bit Field Size:* 3	*Request Parameter*	No
	DD205 Wind Reference		0x00 = Theoretical Wind (ground referenced, referenced to True North; calculated using COG/SOG) 0x01 = Theoretical Wind (ground referenced, referenced to Magnetic North; calculated using COG/SOG) 0x02 = Apparent Wind (relative to the vessel centerline) 0x03 = Theoretical (Calculated to Centerline of the vessel, refernced to ground; calculated using COG/SOG) 0x04 = Theoretical (Calculated to Centerline of the vessel, refernced to water; calculated using Heading/Speed through Water) 0x05 = Reserved 0x06 = Error 0x07 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
10	**Reserved Bits**		*Byte Field Size:*		*Bit Field Size:* resv 5	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	5 Bits needed to fill out the byte						
11	**Wind Gusts**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD053 Wind gusts		Peak wind gust speed. Sustained wind over an interval of 5 seconds.				
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s	*Resolution:* 1x10E-2 m/s	1 Knot = 0.5144 m/s		
12	**Wave Height**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD050 Wave Height		Wave height is calculated as the highest one-third of all of the wave heights during a 20-minute sampling period. Note: Accelerometers or inclinometers on board the buoys measure the heave acceleration or the vertical displacement of the buoy hull during the wave acquisition time. A Fast Fourier Transform (FFT) is applied to the data by the processor on board the buoy to transform the data from the temporal domain into the frequency domain. Note that the raw acceleration or displacement measurements are not transmitted shore-side. Response amplitude operator (RAO) processing is then performed on the transformed data to account for both hull and electronic noise. It is from this transformation that non-directional spectral wave measurements (i.e., wave energies with their associated frequencies) are derived. Along with the spectral energies, measurements such as significant wave height (WVHGT), average wave period (AVGPD), and dominant period (DOMPD) are also derived from the transformation.				
	DF13 Distance, short	**uint16**	*Range:* 0 to 655.32 m	*Resolution:* 1x10E-2 m			
13	**Dominate Wave Period**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD051 Wave Period in seconds		Average wave period of all waves during a 20-minute period. Dominant wave period is the period with the maximum wave energy. Note: See DD50 note.				
	DF66 Time interval, .01sec	**uint16**	*Range:* 0 to 655.32s	*Resolution:* 1x10-2sec			
14	**Atmospheric Pressure**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD049 Generic Pressure						
	DF47 Pressure, medium	**uint16**	*Range:* 0 to 6,553,200 Pa	*Resolution:* 1x10E+2 Pa			
15	**Pressure Tendency Rate**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD052 Pressure Rate		Positive value indicates Rising, Negative value indicates Falling.				
	DF48 Pressure rate	**int16**	*Range:* +/- 327,640 Pa/hr	*Resolution:* 1x10E+1 Pa/hr	+ = increasing rate		
16	**Air temperature**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD043 Generic Temperature						
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K	*Resolution:* 1x10E-2 deg K			
17	**Water temperature**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD043 Generic Temperature						
	DF39 Temperature, low	**uint16**	*Range:* 0 to 655.32 deg K	*Resolution:* 1x10E-2 deg K			

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

15 characters maximum.

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

Small Craft Status

PGN: 130576
hex: 1FE10

Provides data on various small craft control surfaces and speed through the water. Used primarily by display or instrumentation devices.

Single Frame: Yes *Priority Default:* 2 *Default Update Rate:* 200 milliseconds *Frequency:* 5. cycles per second
Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 42

Field #	*Field Name*					
1	**Port trim tab**	*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD138 Generic percent of range					
	DF30 Percent, Relative measure **int8**	*Range:* +/- 124%	*Resolution:* 1%			
	Range 0 - 100%, where 0% =Full Up and 100% = Full Down Positions					
2	**Starboard trim tab**	*Byte Field Size:* 1	*Bit Field Size:*		*Request Parameter*	No
	DD138 Generic percent of range					
	DF30 Percent, Relative measure **int8**	*Range:* +/- 124%	*Resolution:* 1%			
	Range 0 - 100%, where 0% =Full Up and 100% = Full Down Positions					
3	**Reserved Bits**	*Byte Field Size:*	*Bit Field Size:*	resv 48	*Request Parameter*	No
	DD001 Reserved field	Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field **bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	Needed to fill the CAN frame.					

Direction Data

PGN: 130577
hex: 1FE11

The purpose of this PGN is to group three fundamental vectors related to vessel motion,

- Speed and heading referenced to the water
- Speed and course referenced to ground
- Current speed and flow direction

Products that are the primary form of navigation would be appropriate for construction and transmission of this sentence, either by combining PGN's 128259, 129026 or through direct measurement.

The SID (Sequence Identification Number) should only be used to synchronize data when PGN 126992 (Time Stamp) is available, otherwise it should be set to unavailable.

This PGN should only be used when all three elements are available and by a primary navigation product.

Single Frame: No *Priority Default:* 3 *Default Update Rate:* 1,000 milliseconds *Frequency:* 1. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 36

Field #	*Field Name*						
1	**Data Mode**		*Byte Field Size:*		*Bit Field Size:* 4	*Request Parameter*	No
	DD025 Mode, Data		0x0 = Autonomous mode, 0x1 = Differential, enhanced mode, 0x2 = Estimated mode, 0x3 = Simulator mode, 0x4 = Manual mode, 0x5 to 0xD = Reserved 0xE = Error, 0xF = Data not available				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
2	**Set/COG/Heading Ref.**		*Byte Field Size:*		*Bit Field Size:* 2	*Request Parameter*	No
	DD117 Direction reference		0 = True, 1 = Magnetic, 2 = Error, 3 = Null				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
3	**Reserved Bits**		*Byte Field Size:*		*Bit Field Size:* resv 2	*Request Parameter*	No
	DD001 Reserved field		Variable number of reserved bits, all set to logic "1"				
	DF52 Bit field	**bit(n)**	*Range:* Variable	*Resolution:* 1	Used to construct bit fields		
	2 Bits needed to fill out the byte						
4	**SID**		*Byte Field Size:* 1		*Bit Field Size:*	*Request Parameter*	No
	DD056 Sequence ID		An upward counting number used to tie related information together between different PGNs . For example, the SID would be used to tie together the COG, SOG and RAIM values to a given position. 255=no valid position fix to tie it to. Range 0 to 250 for valid position fixes.				
	DF53 Integer, 8 bit unsigned	**uint8**	*Range:* 0 to 252	*Resolution:* 1 bit	Unit-less number		
5	**Course Over Ground**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD165 Course-Over-Ground (COG)		The direction of the path over ground actually followed by a vessel.				
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad		
6	**Speed Over Ground**		*Byte Field Size:* 2		*Bit Field Size:*	*Request Parameter*	No
	DD044 Generic Speed						
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s	*Resolution:* 1x10E-2 m/s	1 Knot = 0.5144 m/s		

7	**Heading**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD167 Heading		The horizontal direction in which a ship actually points or heads at any instant, expressed in angular units from a reference direction, usually from 000 at the reference direction clockwise through 359 degrees.				
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad		
8	**Speed through Water**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD044 Generic Speed						
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s	*Resolution:* 1x10E-2 m/s	1 Knot = 0.5144 m/s		
9	**Set**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD048 Current flow direction		Direction towards which current flows. Degrees relative to True North.				
	DF02 Angle	**uint16**	*Range:* 0 to 2Pi rad	*Resolution:* 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad		
10	**Drift**		*Byte Field Size:* 2	*Bit Field Size:*		*Request Parameter*	No
	DD044 Generic Speed						
	DF35 Speed	**uint16**	*Range:* 0 to 655.32 m/s	*Resolution:* 1x10E-2 m/s	1 Knot = 0.5144 m/s		

Vessel Speed Components

PGN: 130578
hex: 1FE12

This PGN provides a single transmission that accurately describes the speed of a vessel by component vectors.

This information is relevant for large vessels and would typically be provided by a product that interfaces to sensors such as dual axis logs. Products that can only measure speed in one direction should not use this PGN.

input to such products that require tracking of vessels using these vector components.

Single Frame: No *Priority Default:* 2 *Default Update Rate:* 250 milliseconds *Frequency:* 4. cycles per second

Destination: Global *Query Support:* Opt'l *ACK Rqmnts:*

Original Reference ID # 58

Field #	*Field Name*					
1	**Longitudinal Speed, Water-referenced**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD160 Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.				
	DF36 Speed, signed	**int16**	*Range:* +/-32.764 m/s	*Resolution:* 1x10E-3 m/s		
2	**Transverse Speed, Water-referenced**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD160 Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.				
	DF36 Speed, signed	**int16**	*Range:* +/-32.764 m/s	*Resolution:* 1x10E-3 m/s		
3	**Longitudinal Speed, Ground-referenced**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD160 Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.				
	DF36 Speed, signed	**int16**	*Range:* +/-32.764 m/s	*Resolution:* 1x10E-3 m/s		
4	**Transverse Speed, Ground-referenced**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD160 Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.				
	DF36 Speed, signed	**int16**	*Range:* +/-32.764 m/s	*Resolution:* 1x10E-3 m/s		
5	**Stern Speed, Water-referenced**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD160 Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.				
	DF36 Speed, signed	**int16**	*Range:* +/-32.764 m/s	*Resolution:* 1x10E-3 m/s		
6	**Stern Speed, Ground-referenced**	*Byte Field Size:* 2	*Bit Field Size:*	*Request Parameter* No		
	DD160 Generic speed, signed	Positive values represent ahead or starboard transverse speed and negative values represent astern or port transverse speed.				
	DF36 Speed, signed	**int16**	*Range:* +/-32.764 m/s	*Resolution:* 1x10E-3 m/s		

NMEA 2000 Appendix B - Revision History

Rev ID	Date Version	Description
1	Sep 2001 1.000	Initial Release
2	Oct 2001 1.001	This Revision History Log Added
3	Oct 2001 1.001	DF09 Range Correction from 10E+5 to 10E+7
4	Oct 2001 1.001	DF21 Range Correction from 10E+10 to 10E+8
5	Dec 2001 1.001	DD176 Network Addresses updated the allocations. Corrections made to agree with specifications
6	Jan 2002 1.001	PGN 127489 - added a second Discrete Status Field 12
7	Jan 2002 1.001	DD223 Dictionary item added for 127489
8	Jan 2002 1.001	PGN 129545 inserted field 3 (Reserve of 6bits) for alignment and corrected Latitude expected error's Data Dictionary reference from DD001 to DD220
9	Sep 2002 1.002	PGNs 060160 & 060416 (Transport Protocol) chgd from priority 7 to 6 as defined by ISO
10	Sep 2002 1.002	PGN 060416 correct "ABORT" description labeling
11	Nov 2002 1.002	PGN 126996 corrected Single Frame "Yes" to "No", field 2 corrected grammer from "manufactures" to "manufacturer's"
12	Nov 2002 1.002	PGN 130321 Field 6 DD022 corrected to DD023
13	Nov 2002 1.002	PGN 129540 Added field 3 Reserve to pad previous field 2 - Mode to Byte, this new field insertion shifted all fields above 2 up 1
14	Nov 2002 1.002	PGN 129033 In description corrected incorrect pgn reference of 128012 to 126992
15	Nov 2002 1.002	PGN 126998 changed note field from 50 char to 70 ASCII or 35 Unicode
16	Nov 2002 1.002	PGN 130577 in description corrected pgn reference from 128006 & 128007 to 128259 & 129026. Also removed no longer appropriate reference to 128008.
17	Nov 2002 1.002	PGN 130577 in description corrected pgn reference from 128012 to 126992
18	May 2003 1.003	Changed Ack Rqmnts Field in PGNs 059904, 060416, 060928, 065240,126208

Rev ID	Date Version	Description
19	May 2003 1.003	PGN 128520 - removed field 15 Reserve Bits is not needed at end.
20	May 2003 1.003	PGN 128520 - changed fields14 & 13 fromDD007 to DD050 var length short ASCII
21	May 2003 1.003	DD045 - Removed description with reference to ground, mag or true
22	May 2003 1.003	PGN 059392 - added clarification to description that message will always be sent with a destination address of 255. (Per agreement with SAE/ISO)
23	May 2003 1.003	PGN 127488 in description corrected pgn reference from 127509 to 127489
24	May 2003 1.003	PGN 129033 in description corrected pgn reference from 128012 to 126992
25	May 2003 1.003	PGN 129029 in description corrected pgn reference from 128005 to 129025
26	Jul 2003 1.004	PGN 126996 field 1 clarified version to "NMEA 2000 Database Version"
27	Jul 2003 1.004	PGN 127251 Rate of turn added along with DD125, DF85
28	Jul 2003 1.004	PGN 128520 fields 13 & 14 changed to ASCII String Fields
29	Jul 2003 1.004	DD217 correct upper 2 bit field definitions
30	Jul 2003 1.004	PGN 129540 GNSS Sats in View. Corrected field references, added missing filed 16 Range Residuals "n", Clarified Description.
31	Sep 2003 1.004	Moved Eng Trim from PGN 127489 to PGN 127488
32	Oct 2003 1.005	PGN 127251 Rate of Turn, deleted Vessel Heading
33	Nov 2003 1.005	Moved "The message will always be sent with a destination address of 255" from ISO Request (pgn 059904) to ISO Acknowledge (pgn 059392)
34	Nov 2003 1.005	Time & Date PGN 129033 corrected old PGN reference 128012 to 126992
35	Feb 2004 1.100	PGN 127489 changed Fuel Pressure Range (field 9); required adding DD225 with DF29 range
36	Feb 2004 1.100	PGN 126208 Command Group, Description clarification made
37	Feb 2004 1.100	PGN 129283 Cross Track Error, removed field 3, increase Reserve field size to adjust
38	Feb 2004 1.100	PGN 129550 chgs fields 3&4 & PGN 129551 chgs fields 8,9

Rev ID	Date Version	Description
39	Mar 2004 1.100	PGN 127505 Fluid Level, added field 4 - Tank Capacity
40	Mar 2004 1.100	PGN 129284 Navigation Data - updated Description
41	Mar 2004 1.100	PGN 129291 Set & Drift, Rapid Update - updated Description
42	Mar 2004 1.100	PGN 130577 Direction Data - field 8 added "through water" to Speed name
43	Apr 2004 1.101	PGN 127505 Fluid Level, revised field 4 size and resolution added DF86 & DD227 to support the change
44	Apr 2004 1.101	PGN 129283 Cross Track Error, added field 4 "Navigation Terminated" to previously "reserve" field
45	Apr 2004 1.101	PGN 129808 DSC Call Info, fields 8, 22, 24 use DD015, no other reference - DD015 was changed from DF63 to DF50. Notes added to each field defining maximum size
46	Apr 2004 1.101	PGN 126208 Command Group, Ack group 2 field 3 PGN error code state 0x4 added , 0xF removed
47	Apr 2004 1.101	PGN 127489 Eng Parms, Dynamic - add % Torque and % Load
48	Apr 2004 1.101	PGN 127489 Eng Parms, Status 2 - added Maintenance Required and Comm error Alarms
49	Apr 2004 1.101	PGN 130311 Environmental Parameters added to be used insterad of PGN 130310 in new designs. Allows for instance of temp and humidity. More flexible. DD129, DD130, and DD131added to support this.
50	May 2004 1.111	PGN 129027 Position Delta & PGN 129028 Altitude Delta addded
51	May 2004 1.111	DD233 thru DD235 & DF88 thru DF90 added to support PGN129027&129028
52	May 2004 1.111	PGN 127496 Trip Parameters, Vessel
53	May 2004 1.111	PGN 127497 Trip Parameters, Engine - revised per discussions last meeting
54	May 2004 1.111	Nav & WP PGN's 129285, 130064 thru 130072 added
55	May 2004 1.111 +	PGN 127258 new PGN Name chgd from Headding variation to Magnetic Variation
56	Sep 2004 1.111 B	Engine Parms Dynamic, added to Field 12, Engine discrete Status 2, the following status bits: Sub or Secondary Throttle, Neutral Start Protect, and Engine Shutting Down.
57	Sep 2004 1.111 B	Added description to Titles on first cover page on all reports

Rev ID	Date Version	Description
58	Sep 2004 1.111 B	PGN 126996 Product Information - added field 8 - Load Equivalency Number, DD242 added in support of this, other text clarifications
59	Oct 2004 1.111 B	Way Point and Route PGNs and supporting items updated.
60	Oct 2004 1.111 B	AIS PGNss and supporting items added and/or updated
61	Nov 2004 1.111 B	PGN 127508 - Field 5 SID added, replaced spare
62	Nov 2004 1.200	DD237 - bit field typo corrections
63	Nov 2004 1.200	PGN 130065 fields 7,8,9 realignment
64	Nov 2004 1.200	PGN 130066 fields 9,1,11 realignment
65	Nov 2004 1.200	WP & Route PGNs 130066, 130067, 130068, 130073, 130074 Descriptions updated
66	May 2009 1.200 A	Fluid Level Corrected DF84 range and resolution (used in PGN 127505)
67	May 2009 1.200 A	Added to PGN Reports the display of the PGN number in hexidecimal format. Located below original Decimal PGN #
68	May 2009 1.200 A	PGN 060928 ISO Address Claim - field 11 note field changed from "Only values less than 254 shall be used" to "Only values less than 252 shall be used"
69	Jul 2005 1.200 A	Added extensions to Command Group PGN 126208
70	Aug 2005 1.200 A	Added Proposed Power PGNs (PGN #s not yet assigned)
71	Aug 2005 1.200 A	PGN 126208 Request group Function, field 3 Transmission Interval added state 0xFFFF FFFE Restore default Time Interval
72	Aug 2005 1.200 A	PGN 059392 ISO Ack remove last line of description "This message will always be sent with a destination address of 255"
73	Sep 2005 1.200 B	PGN 059392 ISO Ack add last line of description "The destination address of this PGN shall always contain a destination specific address" and note about version 1.000
74	Sep 2005 1.200 B	PGN 129796 AIS Acknowledge correct field 10 from DD001 to DD010
75	Jul 2006 1.200 C	Power PGN Support added DF92 - DF102
76	Jul 2006 1.200 C	Power PGN Support added DD258 - DD288

Rev ID	Date Version	Description
77	Jul 2006 1.200 C	Power PGNs added: 127503 AC Input Status — 127504 AC Output Status 127506 DC Detailed Status — 127507 Charger Status 127509 Inverter Status — 127510 Charger Configuration Status 127511 Inverter Configuration Status — 127512 Automatic Generator Start Status 127513 Battery Configuration Status — 127514 Automatic Generator Start Configuration Status
78	Aug 2006 1.200 D	Meeting Updates PGN 060928,127250, int24,129039,129538,130323, DD025, DD070, DD232
79	Sep 2006 1.210	PGNs added 130312,130313,130314,130315 to replace 130311 for future designs
80	Sep 2006 1.210	PGN 128259 designate field 3 not for new designs refer to 129026 for value
81	May 2009 1.300	Revised and added AIS Class B PGNs in accordance with AIS Class B working group report dated 24 April 2006, and as modified July 2008. - Revised: 129039, 129040 - Restored from vers 1.111: 129806 - New: 129807, 129809, 129810 - Data Definitions added: DD294 - DD304
82	May 2009 1.300	Implemented structural changes to database to make database maintenance easier: - Added VersionHistory table and changed all reports to list version identified for this file when printing - Changed "Pick_PGN_Form" to also refer to version identified for this file - Added RevisionHistory table, imported revision history data from "PGNs by Number" report footer, removed revision history data from report footer - Added "RevisionHistory-Edit" form for entering/editing revision history data - Added new "RevisionHistoryReport" and Revision History button on "Pick_PGN_Form" to launch it
84	May 2009 1.300	Revised AIS Class A PGNs to reflect changes and corrections noted during Update of AIS Class B PGNs; PGNs, affected: 129794, 129795, 129797, 129798, 129801, 129802.