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

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Appendix B.1 - PGN Report

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.

							o g. o o a . a a a . o .	
Single Fra	me: Yes	Priority Default: 6	Default (Update Ra	ate:	NA milliseconds	Frequency:	NA cycles per second
Destinat	fion: Address	Query Support:		ACK Rqm	nts:			
Field #	Field Name)						Original Reference ID # 64
1	Control Byte		Byte Fi	eld Size:	Bit Fi	eld Size: 8	Request Parameter No	
	DD177 ISO 11783 ACK Status				0x01 = N $0x02 = P$	Positive Acknowledgn Negative Acknowledg PGN supported but ac OxFF = Reserved	ment;	
	DF52 B	it field	bit(n)	Range:	Variable	Resolu	tion: 1	Used to construct bit fields
2	Group Funct	ion Value		Byte Fi	eld Size:	Bit Fi	eld Size: 8	Request Parameter No
	DD178 Gro	oup Function Value			specific g	group function of a Po	GN being acknowl	his field identifies for a device the edged or declined. This field is ined is not a group function PGN.
	DF52 B	it field	bit(n)	Range:	Variable	Resolu	tion: 1	Used to construct bit fields
3	Reserved Bit	ts		Byte Fi	eld Size:	Bit Fi	eld Size: resv	24 Request Parameter No
	DD001 Res	served field			Variable	number of reserved b	oits, all set to logic	"1"
	DF52 B	it field	bit(n)	Range:	Variable	Resolu	tion: 1	Used to construct bit fields
4	PGN of Requ	ested Information		Byte Fi	eld Size:	Bit Fi	eld Size: 24	Request Parameter No
	DD009 PG	N			24-bit Pa first	rameter Group Numb	oer (PGN) expresse	ed in binary, LSB is transmitted
	DF52 B	it field	bit(n)	Range:	Variable	Resolu	tion: 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 Fran	ne: Yes	Priority Default:	6	Default U	pdate Ra	te: NA	<mark>\</mark> milliseconds	Frequency:	NA	cycles per second
Destination	on: Addres	Query Support:			ACK Rqmi	nts: Requested	d data or 059932	SO Acknowl	edge with	error code.
Field #	Field Na	me							Origina	al Reference ID # 65
1	PGN being	g requested			Byte Fie	eld Size:	Bit Fiel	d Size: 24	Req	uest Parameter Yes
	DD009 PGN					24-bit Para first	meter Group Number	(PGN) expresse	ed in binary,	LSB is transmitted
	DF52	Bit field		bit(n)	Range:	Variable	Resolutio	n: 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 Frai	ne: Yes	Priority E	Default: 6	Default l	Jpdate Ra	te:	NA milliseconds	Frequency:	NA	cycles per second	d
Destinati	ion: <mark>Addr</mark>	ess Query S	upport:		ACK Rqmi	nts:					
Field #	Field N	ame							Origina	I Reference ID # 7	71
1	Sequenc	e number of m	ulti-packet	frame	Byte Fie	eld Size:	Bit F	ield Size: 8	Requ	uest Parameter N	10
	DD180	Multi-packet fi	rame counte	er		Valid rar	nge 0x01 to 0xFF				
	DF52	Bit field		bit(n)	Range:	Variable	Resol	ution: <mark>1</mark>	Used to	construct bit fields	
2	Multi-pa	cket packetized	l data		Byte Fie	eld Size:	Bit F	ield Size: <mark>56</mark>	Requ	uest Parameter N	10
	DD181	Multi-packet p	acketized d	ata			rganized as seven 8- it would in a standar h 0xFF.	• '	•		
	DF52	Bit field		bit(n)	Range:	Variable	Resol	ution: 1	Used to	construct bit fields	

ISO Transport Protocol, Connection Management - RTS group function

hex: EC00

PGN: 060416

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 ACK Ramnts: Refer to Section 3.10 of ISO `11783-3 Destination: Address Query Support: Req'd Original Reference ID # 66 Field # Field Name 1 **RTS Group Function Code** Bit Field Size: 8 Byte Field Size: 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 = ReservedDF52 Bit field Resolution: 1 Used to construct bit fields bit(n) Range: Variable This is the RTS message, set = 0x102 Total message size, bytes Byte Field Size: 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. Valid range 0x01 to 0xFF **DD180** Multi-packet frame counter Range: Variable Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Reserved Bits Byte Field Size: Bit Field Size: resv Request Parameter No Variable number of reserved bits, all set to logic "1" **DD001** Reserved field Range: Variable Resolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Bit Field Size: 24 Request Parameter No PGN of multi-packet message Byte Field Size: DD009 PGN 24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted first **DF52** Bit field Resolution: 1 Used to construct bit fields bit(n) Range: Variable

ISO Transport Protocol, Connection Management - CTS group function

PGN: 060416 hex: EC00

Field#	Field Name					Original Reference ID # 67
1	CTS Group Function Code DD179 Group Function, Connection	n Manager	•	0x11 = 0 0x13 = 1 0x20 = 1 0xFF = 1	Bit Field Size: 8 Request to Send; Clear to Send; End of Message; Broadcast Announce Message; Abort; 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = R	Request Parameter No
	DF52 Bit field This is the CTS message, set = 0x11	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
2	Number of frames that can be sent DD180 Multi-packet frame counter		Byte Fi	eld Size: Valid ra	Bit Field Size: 8 Inge 0x01 to 0xFF	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	Number of next frame to be transmi DD180 Multi-packet frame counter		Byte Fi	eld Size: Valid ra	Bit Field Size: 8	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4	Reserved Bits DD001 Reserved field		Byte Fi	eld Size: Variable	Bit Field Size: resv 16 e 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 DD009 PGN		Byte Fi	eld Size: 24-bit P	Bit Field Size: 24 Parameter Group Number (PGN) expressed in	Request Parameter Non binary, LSB is transmitted
	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

ield#	Field Na	ame					Original Reference ID # 68
1		oup Function Code Group Function, Connection	Managen		0xFF = Abort;	to Send; f Message; cast Announce Message;	Request Parameter No
	DF52 This is the	Bit field EOM message, set = 0x13	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
2		ssage size, bytes Generic numeric ID, medium		Byte Fi	eld Size: 2 Number of rou	Bit Field Size: ute, waypoint, event, mark, etc.	Request Parameter No
	DF54 Only values	Integer, 16 bit unsigned in the range of 9 to 1785 are allo	uint16 wed.	Range:	0 to 65,532	Resolution: 1 bit	Unit-less number
3		mber of frames received Multi-packet frame counter		Byte Fi	eld Size: Valid range 0x	Bit Field Size: 8 x01 to 0xFF	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4	Reserved	l Bits Reserved field		Byte Fi	eld Size: Variable numl	Bit Field Size: resv 8 ber 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 n	nulti-packet message PGN		Byte Fi	eld Size: 24-bit Parame first	Bit Field Size: 24 ter Group Number (PGN) expressed	Request Parameter No in binary, LSB is transmitted
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

ISO Transport Protocol, Connection Management - BAM group function

PGN: 060416 hex: EC00

Field #	Field Name						Original Reference ID # 69
1	BAM Group Fu DD179 Grou	unction Code p Function, Connection l	Managem	•	0xFF = Abort;	o Send;	Request Parameter No Reserved
	2102	field nessage, set = 0x20	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
2	Total message	e size, bytes ric numeric ID, medium		Byte Fie	eld Size: 2 Number of rou	Bit Field Size: te, waypoint, event, mark, etc.	Request Parameter No
	DF54 Inte	8 ,	uint16	Range:	0 to 65,532	Resolution: 1 bit	Unit-less number
3		of frames to be transmit i-packet frame counter	ted	Byte Fie	eld Size: Valid range 0x	Bit Field Size: 8	Request Parameter No
	DF52 Bit	field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4	Reserved Bits DD001 Reser	rved field		Byte Fie	eld Size: Variable numb	Bit Field Size: resv 8 per 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-p	packet message		Byte Fi	eld Size: 24-bit Paramet first	Bit Field Size: 24 er Group Number (PGN) expressed	Request Parameter No in binary, LSB is transmitted
	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

Field #	Field Na	ame					Original Reference ID # 70
1	Abort Gr	oup Function Code		Byte Fi	eld Size:	Bit Field Size: 8	Request Parameter No
	DD179 Group Function, Connection		Manager	nent	0x11 = 0x13 = 0x20 = 0xFF = 0xFF	Request to Send; Clear to Send; End of Message; Broadcast Announce Message; Abort; 0xF, 0x12, 0x14 to 0x1F, 0x21 to 0xFE = R	leserved
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
	This is the	Abort message, set = 0xFF					
2	Reserved	d Bits		Byte Fi	eld Size:	Bit Field Size: resv 32	Request Parameter No
	DD001	Reserved field			Variabl	e 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 n	PGN of multi-packet message		Byte Fi	eld Size:	Bit Field Size: 24	Request Parameter No
	DD009	·			24-bit F first	Parameter Group Number (PGN) expressed in	n binary, LSB is transmitted
	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 Fra	ame: Yes	Priority Default:	6 Default	Update Ra	ite:	NA milliseconds	Frequency:	NA cycles per second
Destina	tion: Address	Query Support:	Req'd	ACK Rqm	<i>nts:</i> Refer t	o Section 6.4 of ISC	11783-5	
Field #	Field Nam	ne						Original Reference ID # 63
1	Unique Nun	nber (ISO Identity	Number)	Byte Fi	eld Size:	Bit Fie	ld Size: 21	Request Parameter No
	DD173 NI	MEA 2000 Unique	Number			actured device is unique,		sure that the NAME field for each A 2000 Network Management
	DF52	Bit field	bit(n)	Range:	Variable	Resoluti	ion: 1	Used to construct bit fields
2	Manufacture	er Code		Byte Fi	eld Size:	Bit Fie	ld Size: 11	Request Parameter Yes
	DD172 N	MEA 2000 Manufa	acturer Code		Assign	ned by NMEA 2000 Com	mittee	
	DF52	Bit field	bit(n)	Range:	Variable	Resoluti	ion: 1	Used to construct bit fields
3	Device Insta	ance Lower (ISO E	CU Instance)	Byte Fi	eld Size:	Bit Fie	ld Size: 3	Request Parameter Yes
	DD201 Ge	eneric instance 2 (3	3-bit)		0x0 to	0x7 = instance 0 to 7		
	DF52	Bit field	bit(n)	Range:	Variable	Resoluti	ion: 1	Used to construct bit fields
	The combination	on of fields 3 & 4 mal	ke up the 8 bit NME	EA 2000 Ins	tance. Devi	ces 0 - 252		
4	Device Insta Instance)	ance Upper (ISO F	unction	Byte Fi	eld Size:	Bit Fie	ld Size: <mark>5</mark>	Request Parameter <mark>Yes</mark>
	DD174 Ge	eneric instance (5-b	oit)		0x00 t	o $0x1F = Instance 0 to 31$	l;	
	DF52	Bit field	bit(n)	Range:	Variable	Resoluti	ion: 1	Used to construct bit fields
_								
5	Device Fund	ction (ISO Functio	on)	Byte Fi	eld Size:	Bit Fie	ld Size: 8	Request Parameter Yes
5		ction (ISO Function) MEA 2000 Function	•	Byte Fi				Request Parameter Yes 70, reference NMEA 2000, Table 8-
5	DD171 NI	•	•	·	Depen		vice Class DD17	,
5 6	DD171 NI	MEA 2000 Function	on Code	Range:	Depen 1	dent on NMEA 2000 De	vice Class DD17	Used to construct bit fields
	DD171 NI DF52 H	MEA 2000 Function	on Code	Range:	Depen 1 Variable	dent on NMEA 2000 De Resoluti Bit Fie	vice Class DD17	Used to construct bit fields
	DD171 NI DF52 I Reserved DD175 Do	MEA 2000 Function	on Code	Range:	Depen 1 Variable eld Size:	dent on NMEA 2000 De Resoluti Bit Fie	vice Class DD17 ion: 1 Id Size: 1	Used to construct bit fields
	DD171 NI DF52 I Reserved DD175 Do	MEA 2000 Function Bit field ominant Bit Bit field	bit(n)	Range: Byte Fi	Depen 1 Variable eld Size: Set = 0	dent on NMEA 2000 De Resoluti Bit Fie	vice Class DD17 ion: 1 Id Size: 1	Used to construct bit fields Request Parameter No Used to construct bit fields
6	DD171 NI DF52 I Reserved DD175 Dc DF52 I Device Class	MEA 2000 Function Bit field ominant Bit Bit field	bit(n)	Range: Byte Fi	Depen 1 Variable eld Size: Set = 0 Variable eld Size:	dent on NMEA 2000 De Resoluti Bit Fie Resoluti Resoluti Bit Fie	vice Class DD17 ion: 1 Ild Size: 1 ion: 1 Ild Size: 7	Used to construct bit fields Request Parameter No Used to construct bit fields
6	DD171 NI DF52 I Reserved DD175 Dc DF52 I Device Clas DD170 NI	MEA 2000 Function Bit field ominant Bit Bit field	bit(n)	Range: Byte Fid Range: Byte Fid	Depen 1 Variable eld Size: Set = 0 Variable eld Size:	dent on NMEA 2000 De Resoluti Bit Fie Resoluti Resoluti Bit Fie	vice Class DD17 ion: 1 ld Size: 1 ld Size: 7 DD 168, reference	Used to construct bit fields Request Parameter No Used to construct bit fields Request Parameter Yes
6	DD171 NI DF52 I Reserved DD175 D0 DF52 I Device Class DD170 NI DF52 I	MEA 2000 Function Bit field ominant Bit Bit field ss MEA 2000 Device	bit(n) Class bit(n)	Range: Byte Fic Range: Byte Fic Range:	Depen 1 Variable eld Size: Set = 0 Variable eld Size: Depen	Resoluti Bit Fie Resoluti Bit Fie And And And And And And Andrews Resoluti Resoluti Resoluti	vice Class DD17 ion: 1 ld Size: 1 ld Size: 7 DD 168, reference	Used to construct bit fields Request Parameter No Used to construct bit fields Request Parameter Yes e NMEA 2000, Table 8-1 Used to construct bit fields
7	DD171 NI DF52 I Reserved DD175 D6 DF52 I Device Class DD170 NI DF52 I System Inst	MEA 2000 Function Bit field ominant Bit Bit field ss MEA 2000 Device Bit field	bit(n) Class bit(n) Class Instance)	Range: Byte Fic Range: Byte Fic Range:	Depen 1 Variable eld Size: Set = 0 Variable eld Size: Depen Variable eld Size:	Resoluti Bit Fie Resoluti Bit Fie And And And And And And Andrews Resoluti Resoluti Resoluti	vice Class DD17 ion: 1 Id Size: 1 Id Size: 7 DD 168, reference ion: 1 Id Size: 4	Used to construct bit fields Request Parameter No Used to construct bit fields Request Parameter Yes e NMEA 2000, Table 8-1

ISO Address Claim PGN: 060928 hex: EE00

Bit Field Size: 3 9 **Industry Group** Byte Field Size: Request Parameter Yes 0 = Global;**DD168** Industry Group 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 SAEDF52 Bit field Resolution: 1 Used to construct bit fields Range: Variable bit(n) Marine Industry Group, set = 4 Bit Field Size: resv Request Parameter No 10 Reserved (ISO Self Configurable) Byte Field Size: Variable number of reserved bits, all set to logic "1" **DD001** Reserved field Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Range: Variable

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 Fra	nme: No	Priority Default: 6	Default	Update Rat	e: I	NA milliseconds	Frequency:	NA cycles per second
Destina	tion: Global	Query Support:		ACK Rqmn	ts: Refer to	Section 6.4 of ISC	D 11783-5	
Field #	Field Name)						Original Reference ID # 83
1	Unique Num	ber (ISO Identity Number)	Byte Fie	ld Size:	Bit Fie	eld Size: 21	Request Parameter No
	DD173 NM	IEA 2000 Unique Number	•			tured device is unique		re that the NAME field for each 2000 Network Management
	DF52 B	it field	bit(n)	Range:	Variable	Resolut	tion: 1	Used to construct bit fields
2	Manufacture	r Code		Byte Fie	ld Size:	Bit Fie	eld Size: 11	Request Parameter Yes
	DD172 NM	IEA 2000 Manufacturer C	ode		Assigned	by NMEA 2000 Con	nmittee	
	DF52 B	it field	bit(n)	Range:	Variable	Resolu	tion: 1	Used to construct bit fields
3	Device Insta	nce Lower (ISO ECU Inst	ance)	Byte Fie	ld Size:	Bit Fie	eld Size: 3	Request Parameter No
	DD201 Ger	neric instance 2 (3-bit)			0x0 to 0x	x7 = instance 0 to 7		
	DF52 B	it field	bit(n)	Range:	Variable	Resolut	tion: 1	Used to construct bit fields
4	Device Insta Instance)	nce Upper (ISO Function		Byte Fie	ld Size:	Bit Fie	eld Size: 5	Request Parameter No
	DD174 Ger	neric instance (5-bit)			0x00 to 0	0x1F = Instance 0 to 3	1;	
	DF52 B	it field	bit(n)	Range:	Variable	Resolu	tion: 1	Used to construct bit fields
5	Device Func	tion (ISO Function)		Byte Fie	ld Size:	Bit Fie	eld Size: 8	Request Parameter Yes
	DD171 NM	MEA 2000 Function Code			Depende 1	nt on NMEA 2000 De	evice Class DD170	, reference NMEA 2000, Table 8-
	DF52 B	it field	bit(n)	Range:	Variable	Resolut	tion: 1	Used to construct bit fields
6	Reserved Bit	ts		Byte Fie	ld Size:	Bit Fie	eld Size: 1	Request Parameter No
	DD175 Do:	minant Bit			Set = 0			
	DF52 B	it field	bit(n)	Range:	Variable	Resolut	tion: 1	Used to construct bit fields
7	Device Class	3		Byte Fie			eld Size: <mark>7</mark>	Request Parameter Yes
	DD170 NM	IEA 2000 Device Class			Depende	nt on Industry Group	DD 168, reference	NMEA 2000, Table 8-1
	DF52 B	it field	bit(n)	Range:	Variable	Resolut	tion: 1	Used to construct bit fields
8	•	ance (ISO Device Class In	stance)	Byte Fie			eld Size: 4	Request Parameter No
	DD169 Ger	neric instance (4-bit)			0x0 to 0x	xF = Instance number	0 to 15;	
	DF52 B	it field	bit(n)	Range:	Variable	Resolut	tion: 1	Used to construct bit fields
9	Industry Gro	ир		Byte Fie	ld Size:	Bit Fie	eld Size: 3	Request Parameter Yes
	DD168 Ind	ustry Group			2 = Ag 3 = Cc 4 = M 5 = Inc Cc 6 = Re	n-Highway; gricultural and Forestr onstruction;		
	DF52 B Marine Group, s	it field set = 4	bit(n)	Range:	Variable	Resolu	tion: 1	Used to construct bit fields
10	Reserved (IS	GO Self Configurable) served field		Byte Fie		Bit Fie		Request Parameter No
		it field	bit(n)	Range:		Resolu		Used to construct bit fields
			(/	J				

ISO Commanded Address

PGN: 065240 hex: FED8

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.

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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 Query Support: Opt'l Destination: Address ACK Ramnts: 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 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number This is the Reguest message, set = 0x00. Bit Field Size: 24 2 **Requested PGN** Byte Field Size: 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

NMEA - Request group function

PGN: 126208 hex: 1ED00

3	Transmission interval	Byte Field Size: 4	Bit Field Size:	Request Parameter No
	DD035 Data transmit interval	0x0000 0000 = 0xFFFF FFFE =	tween data transmissions Where: Turn-off transmission, Restore Default Interval, (added I Do not change interval	NMEA Version 1.201)
	DF65 Time interval, standard uint32	Range: 0 to ~4.295x10E+6	Resolution: 1x10E-3 s	
	OxFFFF FFFF in this field and OxFFFF in field 4: Trans	smit now without changing timing	variables.	
4	Transmission interval offset	Byte Field Size: 2	Bit Field Size:	Request Parameter No
	DD036 Data transmit offset		it time from time of request comm FFFF = Do not change offset.	nand: $0x0 = transmit$
	DF66 Time interval, .01sec uint16	Range: 0 to 655.32s	Resolution: 1x10-2sec	
	OxFFFF in this field and OxFFFF FFFF in field 3: Trans	smit 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	e, 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 spec	cific, defined at time of use	
	DF00 Undefined Undefine	d Range: undefined	Resolution: undefined	Application specific, defIned
	Requested parameter size and type is dependent on the	ne PGN and the specific request p	parameter field.	at time of use.
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	e, 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 spec	cific, defined at time of use	
	DF00 Undefined Undefine	d Range: undefined	Resolution: undefined	Application specific, defIned
	Requested parameter size and type is dependent on the	he PGN and the specific request p	parameter field.	at time of use.

Field#	Field Name			Original Reference ID # 2
1	Command Group Function Code	Byte Field Size: 1	Bit Field Size:	Request Parameter No
	DD144 Group Function, Request/Command	/Acknowledge	Message, ge Message, s, s Reply, s,	
	DF53 Integer, 8 bit unsigned uint8 This is the Command message, set = 0x01.	Range: 0 to 252	Resolution: 1 bit	Unit-less number
2	Commanded PGN	Byte Field Size:	Bit Field Size: 24	Request Parameter No
	DD009 PGN	24-bit Paramete first	er Group Number (PGN) expresse	ed in binary, LSB is transmitted
	DF52 Bit field bit(n) Range: <mark>Variable</mark>	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 $0x7 = co0x8 = do$ not ch 0x9 = return pri 0xA to $0xF = re$	iority to default;	
	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	er of reserved bits, all set to logic	"1"
	DF52 Bit field bit(n 4 Bits needed to fill out the byte) Range: <mark>Variable</mark>	Resolution: 1	Used to construct bit fields
5	Number of Pairs of Commanded Parameters to follow	s 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 paramete	r Byte Field Size: 1	Bit Field Size:	Request Parameter No
	DD005 Generic numeric ID, short	Number of rout	e, 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 DD000 Undefined	Byte Field Size: ?	Bit Field Size:	Request Parameter No
		ned Range: undefined	Resolution: undefined	Application specific, defIned
	Commanded parameter size and type is dependent			at time of use.
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 rout	e, 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 spe	ecific, defined at time of use	
		ned Range: undefined	Resolution: undefined	Application specific, defIned
	Commanded parameter size and type is dependent	on the PGN and the specific comm	nand parameter field.	at time of use.

Field #	Field N	ame					Original Reference ID # 3
1		edgment Group Function C Group Function, Request/Co		•	ield Size: 1	Message, dge Message, ls, ls Reply, ds,	Request Parameter No
	DF53	Integer, 8 bit unsigned Acknowlwdgment message, set	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
2		ed or Commanded PGN # beedged		Byte Fi	ield Size:	Bit Field Size: 24 ter Group Number (PGN) expressed	Request Parameter No in binary, LSB is transmitted
	DF52	Bit field	bit(n)	Range:	first Variable	Resolution: 1	Used to construct bit fields
			DIL(II)				
3	PGN erro	Error codes, Acknowledgen	nent	byte F	0x1 = PGN no 0x2 = PGN ter 0x3 = Access of	nporarily not available,	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
		indicates that "Request is not su be 0xFF indicating no additional	x4 - "Request Not Supported" and				
4		ssion Interval / Priority error Error codesTransmit interva			0x1 = Transmi 0x2 = Transmi 0x3 = Access	Bit Field Size: 4 T/Acknowledge, it Interval /Priority not supported, it interval is less than measurement/ denied. is not supported.	Request Parameter No calculation interval,
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
5	Paramete		ed	Byte F	ield Size: 1	Bit Field Size:	Request Parameter No
	DD006	Generic counter, short			Numeric coun	t, event counter, sequence counter	
	DF53 Value 0xFF	Integer, 8 bit unsigned indicates no fields follow	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
6	First par	ameter error code		Byte Fi	ield Size:	Bit Field Size: 4	Request Parameter No
	DD141	Error codesCommand acknowledge	owledgeme	ent	0x1 = Invalid = 0x2 = Tempor 0x3 = Request 0x4 = Access = 0	r/Acknowledge; request or command parameter field arily unable to comply; or command parameter out-of-rang denied; or Command Group Function not s	e;
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
7	repeated	Number of fields, Field nun Error codesCommand ackno			0x1 = Invalid = 0x2 = Tempor 0x3 = Request	Bit Field Size: 4 r/Acknowledge; request or command parameter field arily unable to comply; or command parameter out-of-rang	
					0x4 = Access 0x5 = Request	denied; or Command Group Function not s	upported
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

Field#	Field N	ame					Original Reference ID # 191
1	_	Request Group Function Co Group Function, Request/Cor		<i>Byte Field</i> acknowledge	Size: 1 0 = Request Mess 1 = Command Me 2 = Acknowledge 3 = Read Fields, 4 = Read Fields R 5 = Write Fields, 6 = Write Fields F	essage, Message, eply,	Request Parameter No
	DF53 This is the	Integer, 8 bit unsigned Read Fields message, set = 0x03	uint8	Range: <mark>0 t</mark>	o 252	Resolution: 1 bit	Unit-less number
2	PGN Nur DD009			Byte Field		Bit Field Size: 24 Group Number (PGN) expressed	Request Parameter No I in binary, LSB is transmitted
	DF52	Bit field	bit(n)	Range: Va	riable	Resolution: 1	Used to construct bit fields
3	DD172 DF52	NMEA 2000 Manufacturer C Bit field	bit(n)	Byte Field Range: Va	Assigned by NME	Bit Field Size: 11 EA 2000 Committee Resolution: 1	Request Parameter No Used to construct bit fields
		ified Only for Proprietary PGN Mes	ssages, O				
4	Reserve DD001	Reserved field		Byte Field		Bit Field Size: resv : of reserved bits, all set to logic "	Request Parameter No 1"
	DF52 Field Spec	Bit field ified Only for Proprietary PGN Me	bit(n) ssages, O	Range: Va therwise skip to		Resolution: 1	Used to construct bit fields
5	Industry Group DD168 Industry Group			Byte Field Size: 0 = Global; 1 = On-Highway 2 = Agricultural 3 = Construction 4 = Marine; 5 = Industrial - F Control - Sta 6 = Reserve for S 7 = Reserve for S		I and Forestry; on; Process cationary (Gen-Sets) SAE	Request Parameter No
	DF52 Field Spec	Bit field ified Only for Proprietary PGN Me:	bit(n) ssages, O	Range: Va therwise skip to		Resolution: 1	Used to construct bit fields
6	Unique I DD005	D Generic numeric ID, short		Byte Field Range: 0 t	Size: 1 Number of route,	Bit Field Size: waypoint, event, mark, etc. Resolution: 1 bit	Request Parameter No Unit-less number
7	Fields	Integer, 8 bit unsigned of pairs of Commanded Para Generic counter, short	uint8 meters	Byte Field	Size: 1	Bit Field Size:	Request Parameter No
	DD006	Generic counter, short		Panga: 0		Resolution: 1 bit	Unit loss number
•	DF53	Integer, 8 bit unsigned of pairs of Fields to Read	uint8	Range: 0 t Byte Field		Bit Field Size:	Unit-less number Request Parameter No
8		Generic counter, short Integer, 8 bit unsigned	uint8	Range: 0 t	Numeric count, ev	vent counter, sequence counter Resolution: 1 bit	Unit-less number
9	Field Nu DD005	mber of first Commanded Pa	rameter	Byte Field		Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 t	o 252	Resolution: 1 bit	Unit-less number

NMEA - Read Fields - group function

PGN: 126208 hex: 1ED00

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

Field #	Field N	ame						Original Reference ID # 192
1	_	Request Group Function Co Group Function, Request/Con		•	1 = Comr 2 = Ackno 3 = Read 4 = Read 5 = Write	Fields Reply,	d Size:	Request Parameter No
	DF53 This is the	Integer, 8 bit unsigned Read Fields Reply message, set =	uint8 = 0x04	Range:	0 to 252	Resolutio	on: 1 bit	Unit-less number
2	PGN Nur DD009			Byte Fi	eld Size: 24-bit Par first		d Size: 24 (PGN) expressed i	Request Parameter Non binary, LSB is transmitted
	DF52	Bit field	bit(n)	Range:	Variable	Resolution	on: 1	Used to construct bit fields
3	DD172 DF52	turer's Code NMEA 2000 Manufacturer Co Bit field	bit(n)	Range:	Variable	Bit Field by NMEA 2000 Comm Resolutio		Request Parameter No Used to construct bit fields
	Field Speci	ified Only for Proprietary PGN Mes	ssages, Of					
4	Reserve DD001	Bits Reserved field		Byte Fi	eld Size: Variable ı	Bit Field number of reserved bits	d Size: resv 2 s, all set to logic "1"	Request Parameter No
	DF52 Field Speci	Bit field ified Only for Proprietary PGN Mes	bit(n) ssages, Of	•	Variable kip to next field.	Resolution	on: <mark>1</mark>	Used to construct bit fields
5	Industry Group DD168 Industry Group			Byte Fi	2 = Ag 3 = Cor 4 = Ma 5 = Ind Cor 6 = Res	ıl; -Highway; ricultural and Forestry; nstruction;		Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution	on: 1	Used to construct bit fields
	Field Speci	ified Only for Proprietary PGN Mes	sages, O	therwise sl	kip to next field.			
6	Unique II DD005 DF53	D Generic numeric ID, short Integer, 8 bit unsigned	uint8		Number of to 252	Bit Field f route, waypoint, ever Resolution	nt, mark, etc.	Request Parameter No Unit-less number
7		of pairs of Commanded Paral			eld Size: 1	Bit Field		Request Parameter No
	DD006	Generic counter, short			Numeric	count, event counter, se	equence counter	
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolutio	on: 1 bit	Unit-less number
8	DD006	of pairs of Fields to Read Generic counter, short				Bit Field	equence counter	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8		0 to 252	Resolution		Unit-less number
9	Field Nui DD005	mber of first Commanded Par Generic numeric ID, short	ameter	Byte Fi	eld Size: 1 Number o	Bit Field of route, waypoint, ever		Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution	on: 1 bit	Unit-less number

NMEA - Read Fields Reply - group function

PGN: 126208 hex: 1ED00

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

Field #	Field N	ame						Original Reference ID # 193
1	_	Request Group Function Co. Group Function, Request/Con		•	1 = Comr 2 = Ackno 3 = Read 4 = Read 5 = Write	est Message, nand Message, owledge Message Fields, Fields Reply,	t Field Size:	Request Parameter No
	DF53 This is the	Integer, 8 bit unsigned Write Fields message, set = 0x05	uint8	Range:	0 to 252	Res	solution: <mark>1 bit</mark>	Unit-less number
2	PGN Nur DD009			Byte Fi	eld Size: 24-bit Par first		t Field Size: 24 umber (PGN) expr	Request Parameter No essed in binary, LSB is transmitted
	DF52	Bit field	bit(n)	Range:	Variable	Res	solution: 1	Used to construct bit fields
3		turer's Code NMEA 2000 Manufacturer Co Bit field	ode bit(n)	·	eld Size: Assigned Variable	by NMEA 2000	t Field Size: 11 Committee colution: 1	Request Parameter No Used to construct bit fields
	Field Speci	fied Only for Proprietary PGN Mes	sages, O	therwise sl	kip to next field.			
4	Reserve DD001	Bits Reserved field		Byte Fi	eld Size: Variable		t Field Size: res	-
	DF52 Field Speci	Bit field ified Only for Proprietary PGN Mes	bit(n) ssages, O	•	<mark>Variable</mark> kip to next field.		solution: 1	Used to construct bit fields
5	Industry Group DD168 Industry Group			Byte Fi	2 = Ag 3 = Co 4 = Ma 5 = Ind Co 6 = Res	al; -Highway; ricultural and Fon nstruction;	·	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Res	solution: 1	Used to construct bit fields
	Field Speci	ified Only for Proprietary PGN Mes	sages, O	therwise sl	kip to next field.			
6	Unique II DD005 DF53	D Generic numeric ID, short Integer, 8 bit unsigned	uint8		Number of to 252	of route, waypoin	t Field Size: t, event, mark, etc.	Request Parameter No Unit-less number
7		of pairs of Commanded Para			reld Size: 1		t Field Size:	Request Parameter No
	DD006	Generic counter, short			Numeric	count, event cour	nter, sequence cour	nter
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Res	solution: 1 bit	Unit-less number
8	DD006	of pairs of Fields to Written Generic counter, short				count, event cour	t Field Size:	
	DF53	Integer, 8 bit unsigned	uint8		0 to 252		colution: 1 bit	Unit-less number
9	Field Nui DD005	mber of first Commanded Par Generic numeric ID, short	ameter	Byte Fi	eld Size: 1 Number o		t Field Size: t, event, mark, etc.	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Res	olution: 1 bit	Unit-less number

NMEA - Write Fields - group function

PGN: 126208 hex: 1ED00

10	Value of DD000				eld Size: ? Application spe	Bit Field Size: ecific, defined at time of use	Request Parameter No
	DF00	Undefined	Undefined	Range:	undefined	Resolution: undefined	Application specific, defIned at time of use.
11	Variable DD005	Number of fields, field 9 re Generic numeric ID, short	epeated	Byte Fi	eld Size: 1 Number of rou	Bit Field Size: te, waypoint, event, mark, etc.	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
12	Variable DD000	Number of Fields, field 10 Undefined	repeated	Byte Fi	eld Size: ? Application spe	Bit Field Size: ecific, defined at time of use	Request Parameter No
	DF00	Undefined	Undefined	Range:	undefined	Resolution: undefined	Application specific, defined at time of use.
13	Field Nu DD005	mber of first Field to be W Generic numeric ID, short	ritten	Byte Fi	reld Size: 1	Bit Field Size: te, waypoint, event, mark, etc.	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
14	Value of DD000	first Field to be written Undefined		Byte Fi	eld Size: ? Application spe	Bit Field Size: ecific, defined at time of use	Request Parameter No
	DF00	Undefined	Undefined	Range:	undefined	Resolution: undefined	Application specific, defined at time of use.
15	Variable DD005	Number of Fields, field 13 Generic numeric ID, short	repeated	Byte Fi	eld Size: 1	Bit Field Size: te, waypoint, event, mark, etc.	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
16	Variable DD000	Number of Fields, field 14 Undefined	repeated	Byte Fi	eld Size: ? Application spe	Bit Field Size: ecific, defined at time of use	Request Parameter No
	DF00	Undefined	Undefined	Range:	undefined	Resolution: undefined	Application specific, defined at time of use.

Field #	Field N	ame						Original Reference ID # 194
1	_	Request Group Function Co Group Function, Request/Con		•	1 = Com 2 = Ackn 3 = Read 4 = Read 5 = Write	est Message, mand Message, owledge Message Fields, Fields Reply,	t Field Size:	Request Parameter No
	DF53 This is the	Integer, 8 bit unsigned Write Fields Reply message, set =	uint8 0x06	Range:	0 to 252	Res	colution: 1 bit	Unit-less number
2	PGN Nur DD009			Byte Fi	eld Size: 24-bit Pa first		t Field Size: 24 umber (PGN) expr	Request Parameter No ressed in binary, LSB is transmitted
	DF52	Bit field	bit(n)	Range:	Variable	Res	olution: 1	Used to construct bit fields
3		turer's Code NMEA 2000 Manufacturer Co Bit field	ode bit(n)	·	eld Size: Assigned Variable	by NMEA 2000	t Field Size: 11 Committee colution: 1	Request Parameter No Used to construct bit fields
	Field Speci	ified Only for Proprietary PGN Mes	sages, O	therwise sl	kip to next field			
4	Reserve DD001	Bits Reserved field		Byte Fi	eld Size: Variable		t Field Size: res ed bits, all set to lo	
	DF52 Field Speci	Bit field ified Only for Proprietary PGN Mes	bit(n) ssages, O	•	Variable kip to next field		colution: 1	Used to construct bit fields
5	Industry DD168	Group Industry Group		Byte Fi	2 = Ag 3 = Co 4 = Ma 5 = Inc Co 6 = Re	al; n-Highway; gricultural and For nstruction;	·	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Res	colution: 1	Used to construct bit fields
	Field Speci	ified Only for Proprietary PGN Mes	sages, O	therwise sl	kip to next field			
6	Unique II DD005 DF53	D Generic numeric ID, short Integer, 8 bit unsigned	uint8		Number of to 252	of route, waypoin	t Field Size: t, event, mark, etc. colution: 1 bit	Request Parameter No . Unit-less number
7		of pairs of Commanded Paral			reld Size: 1		t Field Size:	Request Parameter No
	DD006	Generic counter, short			Numeric	count, event cour	iter, sequence cour	nter
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Res	olution: 1 bit	Unit-less number
8	DD006	of pairs of Fields to Written Generic counter, short				count, event cour	t Field Size:	
	DF53	Integer, 8 bit unsigned	uint8		0 to 252		colution: 1 bit	Unit-less number
9	Field Num DD005	mber of first Commanded Par Generic numeric ID, short	ameter	Byte Fi	eld Size: 1 Number o		t Field Size: t, event, mark, etc.	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Res	olution: 1 bit	Unit-less number

NMEA - Write Fields Reply - group function

10	Value of DD000	first Commanded Parame Undefined	ter	Byte Fi	eld Size: ? Application sp	Bit Field Size: ecific, defined at time of use	Request Parameter No
	DF00	Undefined	Undefined	Range:	undefined	Resolution: undefined	Application specific, defIned at time of use.
11	Variable DD005	Number of fields, field 9 re Generic numeric ID, short	epeated	Byte Fi	eld Size: 1 Number of rou	Bit Field Size: te, waypoint, event, mark, etc.	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
12	Variable DD000	Number of Fields, field 10 Undefined	repeated	Byte Fi	eld Size: ? Application sp	Bit Field Size: ecific, defined at time of use	Request Parameter No
	DF00	Undefined	Undefined	Range:	undefined	Resolution: undefined	Application specific, defined at time of use.
13	Field Nu DD005	mber of first Field to be W Generic numeric ID, short	ritten	Byte Fi	eld Size: 1 Number of rou	Bit Field Size: te, waypoint, event, mark, etc.	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
14	Status o	f first Field Written Undefined		Byte Fi	eld Size: ? Application sp	Bit Field Size: ecific, defined at time of use	Request Parameter No
	DF00	Undefined	Undefined	Range:	undefined	Resolution: undefined	Application specific, defined at time of use.
15	Variable DD005	Number of Fields, field 13 Generic numeric ID, short	repeated	Byte Fi	eld Size: 1 Number of rou	Bit Field Size: te, waypoint, event, mark, etc.	Request Parameter No
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
16	Variable DD000	Number of Fields, field 14 Undefined	repeated	Byte Fi	eld Size: ? Application sp	Bit Field Size: ecific, defined at time of use	Request Parameter No
	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 I	PGN will be reques	ted as ne	eded.				
Single Fra	me: No	Priority Default:	6	Default Update R	ate: N	A milliseconds	Frequency:	NA cycles per second
Destinat	tion: Addre	ess Query Support:	Req'd	ACK Rqn		d data or Acknoves of reasons for		roup Function containing once.
Field #	Field Na	ame						Original Reference ID # 6
1	1 Transmitted PGN Group Function Code				ield Size: 1	Bit Fie	eld Size:	Request Parameter Yes
	DD145	Group Function, Tra	nsmit and	Receive PGN Li		nit PGN List Messag ve PGN List Message		
	DF53	Integer, 8 bit unsig	gned	uint8 Range:	0 to 252	Resolut	ion: 1 bit	Unit-less number
	This is the	Transmitted Group List,	set = 0x00					
2	First PGI	N supported		Byte F	ield Size:	Bit Fie	eld Size: 24	Request Parameter No
	DD009	PGN			24-bit Para first	ameter Group Numbe	er (PGN) express	ed in binary, LSB is transmitted
	DF52	Bit field		bit(n) Range:	Variable	Resolut	ion: 1	Used to construct bit fields
3	3 Variable Number of fields, Field number repeated			er 2 Byte F	ield Size:	Bit Fie	Request Parameter No	
	DD009	PGN			24-bit Para first	ameter Group Numbe	er (PGN) express	ed in binary, LSB is transmitted
	DF52 Bit field bit(n) Range: Variable Resolution: 1				ion: 1	Used to construct bit fields		

PGN List - Received PGN's group function

Original Reference ID #7 Field # Field Name Byte Field Size: 1 Request Parameter Yes 1 **Received PGN Group Function Code** Bit Field Size: 0 = Transmit PGN List Message, DD145 Group Function, Transmit and Receive PGN List 1 = Receive PGN List Message Resolution: 1 bit Unit-less number Range: 0 to 252 DF53 Integer, 8 bit unsigned uint8 This is the Receive Group List, set = 0x01 Bit Field Size: 24 First PGN supported Byte Field Size: Request Parameter No DD009 PGN 24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted Resolution: 1 Used to construct bit fields **DF52** Range: Variable Bit field bit(n) Bit Field Size: 24 Byte Field Size: Request Parameter No 3 Variable Number of fields, Field number 2 repeated DD009 PGN 24-bit Parameter Group Number (PGN) expressed in binary, LSB is transmitted Resolution: 1 Used to construct bit fields DF52 bit(n) Range: Variable Bit field

PGN: 126464

PGN: 126464 hex: 1EE00 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 Fra	me. Yes	Priority Default:	3 Default	Update Rat	e: 1.000 mill	liseconds	Frequency:	1	cycles per second
Ü	ion: Globa			ACK Ramn	,			••	cy 0.00 pc. 0000a
Field #	Field N		Opti	7101111911111				Origina	I Reference ID # 29
1	SID DD056	Sequence ID		Byte Fiel	An upward coun different PGNs.	nting number us For example, values to a give		nformation to used to tie to	
	DF53	Integer, 8 bit unsign	ned uint8	Range:	0 to 252	Resoluti	on: 1 bit	Unit-les	s number
2	Source DD066 Time Source			## Distance ## Distance ## Distance ## Dista			or equivalent Radio Station Time Sync, Cesium clock, Rubidium clock, Crystal clock,		
	DF52	Bit field	bit(n)	Range:	Variable	Resoluti	on: 1	Used to	construct bit fields
3	Reserved DD001 DF52	d Bits Reserved field Bit field	bit(n)			Variable number of reserved bits, all set to logic		"1"	uest Parameter No
	4 Bits need	led to fill out the byte							
4	Date DD039 DF41	Generic date Date, day count	uint16	Byte Fiel		ary 1, 1970, D	old Size: Date is relative to Ui Date is relative to Uion: 1	JTC Time.	uest Parameter No uary 1, 1970, max = ars
5	Time DD158	Generic time of day			24 hour clock, 0	= midnight, t			uest Parameter No
	DF06	Time of day	uint32	kange: (0 to 86,401 s	Kesoluti	ion: <mark>1x10E-4 s</mark>	range al	rs, 0 = midnight, lows for up to two onds 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. Priority Default: 6 Default Update Rate: NA milliseconds Single Frame: No Frequency: NA cycles per second Destination: Global Query Support: Req'd ACK Ramnts: Field Name Original Reference ID # 4 Field # NMEA 2000 Database Version Byte Field Size: Bit Field Size: Request Parameter No. 1 Number of route, waypoint, event, mark, etc. **DD007** Generic numeric ID, medium 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 referred to as Version 1.000 **NMEA Manufacturer's Product Code** Byte Field Size: 2 2 Bit Field Size: Request Parameter Yes **DD007** Generic numeric ID, medium Number of route, waypoint, event, mark, etc. Resolution: 1 bit Unit-less number DF54 Integer, 16 bit unsigned uint16 Range: 0 to 65,532 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 Bit Field Size: Request Parameter No. Length specified by PGN field definition. DD192 Generic String, ASCII, Fixed length char8(n) Range: 0 to 1,785 characters Resolution: 1 char 0 to 1,785 bytes. Character count not included, length is This is a n=32 character string, Format defined and documented by manufacturer. The beginning of the field should specified by application in clearly define Manufacturer's Product. Data Dictionary **Manufacturer's Software Version Code** Byte Field Size: char Bit Field Size: Request Parameter No. 4 Length specified by PGN field definition. **DD192** Generic String, ASCII, Fixed length char8(n) Range: 0 to 1,785 characters Resolution: 1 char 0 to 1,785 bytes. Character String, fixed count not included, length is This is a n=32 character string, Format defined and documented by manufacturer. specified by application in **Data Dictionary** Byte Field Size: char **Manufacturer's Model Version** Bit Field Size: Request Parameter No 5 Length specified by PGN field definition. **DD192** Generic String, ASCII, Fixed length String, fixed char8(n) Range: 0 to 1,785 characters Resolution: 1 char 0 to 1,785 bytes. Character count not included, length is This is a n=32 character string, Format defined and documented by manufacturer. specified by application in Data Dictionary Manufacturer's Model Serial Code Byte Field Size: char Bit Field Size: Request Parameter No Length specified by PGN field definition. **DD192** Generic String, ASCII, Fixed length Resolution: 1 char 0 to 1,785 bytes. Character char8(n) Range: 0 to 1,785 characters String, fixed count not included, length is This is a n=32 character string, Format defined and documented by manufacturer. specified by application in **Data Dictionary**

Product Information PGN: 126996 hex: 1F014 Byte Field Size: 1 7 **NMEA 2000 Certification Level** Bit Field Size: Request Parameter No 0 = Level A, **DD226** NMEA 2000 Certification Level 1 = Level BUnit-less number Range: 0 to 252 Resolution: 1 bit DF53 Integer, 8 bit unsigned uint8 **Load Equivalency** Byte Field Size: 1 Bit Field Size: Request Parameter No 8 The "Load Equivalency Number" is defined in the NMEA 2000 Standard's Main **DD257** Load Equivalency Number Document in section 2.4.7 Interface Power. Please consult this for details.

Resolution: 1 bit

Unit-less number

Range: 0 to 252

DF53

Integer, 8 bit unsigned

uint8

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. NA cycles per second NA milliseconds Single Frame: No Priority Default: 6 Default Update Rate: Frequency: Destination: Global Query Support: Opt'l ACK Ramnts: Original Reference ID # 5 Field Name Field # Byte Field Size: 8 or 16 n Bit Field Size: Installation Description, Field 1 Request Parameter No 1 **DD004** Generic name string, short Name of place, route, waypoint, destination, vessel, vehicle, etc. Resolution: 1 ASCII or 2 to 252 bytes. First byte in **DF50** String, variable, short ch8or16(n) Range: 0 to 250 ASCII or string (uint8) is the Count 0 to 125 Unicode 1 Unicode byte indicating the number Characters Character of bytes in the string, 70 ASCII or 35 Unicode characters maximum 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 $= 0 \Rightarrow$ 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. Bit Field Size: Installation Description, Field 2 Byte Field Size: 8 or 16 n 2 Request Parameter No **DD004** Generic name string, short Name of place, route, waypoint, destination, vessel, vehicle, etc. Resolution: 1 ASCII or 2 to 252 bytes. First byte in **DF50** String, variable, short ch8or16(n) Range: 0 to 250 ASCII or string (uint8) is the Count 0 to 125 Unicode 1 Unicode byte indicating the number Character Characters of bytes in the string, 70 ASCII or 35 Unicode characters maximum 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 = $0 \Rightarrow$ Unicode characters Control byte = 1 => ASCII

PGN: 126998

characters

A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

Configuration Information

DF50

PGN: 126998 hex: 1F016

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

DD004 Generic name string, short

70 ASCII or 35 Unicode characters maximum

String, variable, short

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

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 = $0 \Rightarrow$ Unicode characters Control byte = 1 => ASCII characters

A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

PGN: 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 Fra	Ŭ	Priority Default:			Jpdate Ra		50 milliseconds	Frequency:	4.	cycles per second
Destina	tion: Globa	3 11	Opt'l		ACK Rqm	ints:				
Field #	Field N	ame							Origina	al Reference ID # 54
1		Limit Exceeded Generic status pair			Byte Fi	01 = [Ye] 10 = Erro	B: , Off, Disabled, Rese s, On, Enabled, Set, "		Req	uest Parameter <mark>No</mark>
	DF52	Bit field	bi	it(n)	Range:	Variable	Resolu	tion: 1	Used to	construct bit fields
2	Off-Heading Limit Exceeded DD002 Generic status pair				Byte Fi	01 = [Ye] 10 = Erro	B: , Off, Disabled, Reset s, On, Enabled, Set, "	_	Req	uest Parameter No
	DF52 Off-Headin Control.	Bit field g Limit field can be gene		i t(n) teering	_	<mark>Variable</mark> Heading Contro	Resolu Il Standalone, Headin	_		construct bit fields
3		k Limit Exceeded Generic status pair			Byte Fi	01 = [Ye $10 = Erro$	B: , Off, Disabled, Rese s, On, Enabled, Set, "		Req	uest Parameter <mark>No</mark>
	DF52	Bit field	bi	it(n)	Range:	Variable	Resolu	tion: 1	Used to	construct bit fields
	Off-Track L	imit field can be genera	ted if the Stee	ering M						
4	Override DD163	Autopilot Override			Byte Fi	mode. A ignored b	Bit Fit 0 = No. Yes means a s long as this field is by the heading/track c teering was selected.	Yes, Steering Mo	uption of the de and Turn	Mode shall be
	DF52	Bit field	bi	it(n)	Range:	Variable	Resolu	tion: 1	Used to	construct bit fields
5	Steering DD153	Mode Steering Mode			Byte Fi	001 = No 010 = Fo 011 = He 100 = He 101 = Tr Definitio Non-Foll moved in Follow-u command Heading controlle Heading with the	B: ain Steering, on-Follow-up Device, llow-up Device, rading Control Standa rading Control, ack Control. ns: Main Steering/Ou ow-up Device – The the commanded dire p – The system provided angle and maintai Control Standalone –	tside System – The system provides notion but a specified follow-up contined at that angle. The system work works as a remotiput from an exteriorks as a track co	ne main steer on-follow-up ic angle is no trol. Rudder s as a standa tely controlled nal device. ntroller by co	control. Rudder is t maintained. is moved to the lone heading d heading controller rrecting a
	DF52	Bit field	bi	it(n)	Range:	Variable	Resolu	tion: 1	Used to	construct bit fields

PGN: 127237 hex: 1F105

6	Turn Mode DD152 Turn Method		turning capability and limited by th Turn Rate — An o capability availal whatever value o Radius — An oper available which i		olled, ed. – An operator set rudder limit d ailable, in which case the syste	em outputs rudder orders up to nes the maximum turning rols the rate of turn using trol the rate. e maximum turning capability nimum turn radius, in which	
	DF52 Bit field	bit(n)	Range: V	ariable	Resolution: 1	Used to construct bit fields	
7	Heading Reference DD117 Direction reference		Byte Field	Size: 0 = True, 1 = Magnetic, 2 = Error, 3 = Null	Bit Field Size: 2	Request Parameter No	
	DF52 Bit field	bit(n)	Range: V	ariable	Resolution: 1	Used to construct bit fields	
8	Reserved Bits DD001 Reserved field		Byte Field		Bit Field Size: resv 5 reserved bits, all set to logic "1"	Request Parameter No	
	DF52 Bit field 5 Bits needed to fill out the byte	bit(n)	Range: V	ariable	Resolution: 1	Used to construct bit fields	
9	Commanded Rudder Direction DD147 Directional Command		Byte Field	Size: MSB/LSB: 000 = No Order, 001 = Move to starbe 010 = Move to port.	Bit Field Size: 3	Request Parameter No	
	DF52 Bit field	bit(n)	Range: V	ariable	Resolution: 1	Used to construct bit fields	
10	Commanded Rudder Angle DD146 Rudder Angle Signed		Byte Field		Bit Field Size: positive values are starboard an	Request Parameter No	
	DF04 Angle, signed	int16	Range: +/	-Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg	
11	Heading-To-Steer (Course) DD113 Course		Byte Field	The horizontal direct expressed as angular	Bit Field Size: ion in which a vessel is steered distance 000 north, clockwise urse-over-ground, Track, or He	through 359 degrees. Not to	
	DF02 Angle	uint16	Range: 0	to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
12	Track DD166 Track		Byte Field	The intended or desir The track expressed i allowances made in t order to achieve the o	Bit Field Size: red horizontal direction of trave in degrees of the compass may he course for such factors as se desired track. This field represents. It may be altered dynamica radius.	differ from the course due to ea and weather conditions in ents the course line (leg)	
	DF02 Angle	uint16	Range: 0	to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	
13	Rudder Limit DD148 Angular Limit		Byte Field	Size: 2	Bit Field Size:	Request Parameter No	
	DF02 Angle	uint16	Range: 0	to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	

Heading/Track Control

PGN: 127237 hex: 1F105

14	Off-Heading Limit DD148 Angular Limit			Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DF02	Angle	uint16	Range:	0 to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1
	Off-Heading Limit field can be generated if the Ste		ne Steering	g Mode is Heading Control Standalone, Heading Control, or Track			deg = .01745 rad
15	Radius of	Turn Order		Byte Fi	ield 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 Tu	ırn Order		Byte Fi	ield 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	Resolution 0.1 deg/min
						rad/s	
17	Off-Track Limit			Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DD149 Distance ordered			A commanded of	listance 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 Fi	ield 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 Fra	ame: Yes	Priority Default:	2 De	fault Update Rat	e: 100 milli	seconds Frequen	cy: 10. cycles per second	
Destina	tion: Global	Query Support:	Opt'l	ACK Rqmn	ts:			
Field #	Field Nar	me					Original Reference ID # 53	
1	Rudder Ins	stance		Byte Fie	ld Size:	Bit Field Size: 8	Request Parameter Yes	
	DD128 (Generic instance			0 = Instance 0; 1 = Instance 1; thru n = Instance n, v 253 = Reserve 254 = Error; 255 = Not availa	e 1; 1 = Dual Engine StarBoard (for Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n)) e n, where n < 253 rve ;		
	DF52	Bit field	bi	t(n) Range:	Variable	Resolution: 1	Used to construct bit fields	
		not specified in the "Cudder Instances. (This				s PGN, the response will b	e with	
2	Direction (Order		Byte Fie	ld Size:	Bit Field Size: 3	Request Parameter No	
	DD147 I	Directional Commar	ıd		MSB/LSB: 000 = No Order, 001 = Move to st 010 = Move to po			
	DF52 Value should	Bit field be "Not Available" wh		t(n) Range: er is provided.	Variable	Resolution: 1	Used to construct bit fields	
3	Reserved			Byte Fie	ld Size:	Bit Field Size: re	esv 5 Request Parameter No	
	DD001 F	Reserved field			Variable number	of reserved bits, all set to	logic "1"	
	DF52 5 Rits needed	Bit field d to fill out the byte	bi	t(n) Range:	Variable	Resolution: 1	Used to construct bit fields	
4	Angle Orde			Byte Fie	ld Size: 2	Bit Field Size:	Request Parameter No	
•	-	Rudder Angle Signe	d	,		ere positive values are star	board and negative values are port	
	DF04 Value should	Angle, signed be "Not Available" wh		t 16 Range: Order is provided.	+/-Pi rad	Resolution: 1x10E-	4 rad Resolution ~0.0057deg	
5	Position			Byte Fie	ld Size: 2	Bit Field Size:	Request Parameter No	
	DD146 F	Rudder Angle Signe	d		Rudder angle wh	ere positive values are star	board and negative values are port	
	DF04	Angle, signed	in	t16 Range:	+/-Pi rad	Resolution: 1x10E-	4 rad Resolution ~0.0057deg	
6	Reserved	Bits Reserved field		Byte Fie		Bit Field Size: re		
	DF52	Bit field I the CAN frame.	bi	t(n) Range:		Resolution: 1	Used to construct bit fields	

Vessel Heading PGN: 127250 hex: 1F112

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

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

To obtain True Heading: Add Variation to Magnetic Heading.

The Heading Sensor Reading may or may not be corrected for Deviation and the Deviation field set to '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 Fra	ame: Yes	Priority Default:	2	Default	Update Ra	te: 100 r	milliseconds	Frequency:	10.	cycles per second
Destina	tion: Globa	Query Support:	Opt'l		ACK Rqm	nts:				
Field #	Field N	ame							Origina	al Reference ID # 56
1	SID DD056	Sequence ID			Byte Fie	different PGN SOG and RA	ounting number out out the state of the stat		nformation t used to tie t	0
	DF53	Integer, 8 bit unsig	ned	uint8	Range:	0 to 252	Resolu	tion: <mark>1 bit</mark>	Unit-les	ss number
2	Heading	Sensor Reading			Byte Fie	eld Size: 2	Bit F	ield Size:	Req	uest Parameter No
	DD118 Heading Sensor Reading					Primary outpo	ut of heading as	indicated by the hea	nding sensor	r.
	DF02	Angle		uint16	Range:	0 to 2Pi rad	Resolu	ition: <mark>1x10E-4 rad</mark>		ion ~0.0057deg, 1 01745 rad
3	Deviation	n			Byte Fie	eld Size: 2	Bit Fi	ield Size:	Req	uest Parameter No
	DD151 Magnetic Heading Correction					Positive value	es are Easterly ar	nd negative values a	re Westerly	•
	DF04	Angle, signed		int16	Range:	+/-Pi rad	Resolu	tion: 1x10E-4 rad	Resolut	ion ~0.0057deg
4	Variation	1			Byte Fie	eld Size: 2	Bit F	ield Size:	Req	uest Parameter No
	DD151	Magnetic Heading C	Correction	1		Positive value	es are Easterly ar	nd negative values a	re Westerly	
	DF04	Angle, signed		int16	Range:	+/-Pi rad	Resolu	tion: <mark>1x10E-4 rad</mark>	Resolut	ion ~0.0057deg
5	Heading	Sensor Reference			Byte Fie	eld Size:	Bit F	ield Size: 2	Req	uest Parameter No
	DD117	Direction reference				0 = True, 1 = Magnetic 2 = Error, 3 = Null	,			
	DF52	Bit field		bit(n)	Range:	Variable	Resolu	tion: 1	Used to	construct bit fields
6	Reserved	d Bits			Byte Fie	eld Size:	Bit F	ield Size: resv	6 Req	uest Parameter No
	DD001	DD001 Reserved field			Variable number of reserved bits, all se				'1"	
	DF52 Needed to	Bit field fill the CAN frame.		bit(n)	Range:	Variable	Resolu	tion: <mark>1</mark>	Used to	construct bit fields

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 Fra	me: Yes	Priority Default: 2	Def	ault Update Ra	e: 100 millisec	onds Frequency:	10. cycl	es per second		
Destinat	tion: Global	Query Support: (Opt'l	ACK Rqmr	ts:					
Field#	Field Nar	ne					Original Ref	erence ID # 90		
1	Sequence	ID		Byte Field Size: 1 Bit Field Size: Request Pa						
	DD056 S	equence ID			different PGNs . For	number used to tie related example, the SID would less to a given position. 25 alid position fixes.	be used to tie togeth	er the COG,		
	DF53	Integer, 8 bit unsigne	ed ui r	nt8 Range:	0 to 252	Resolution: 1 bit	Unit-less num	ıber		
2	Rate of Tu	rn		Byte Fie	ld Size: 4	Bit Field Size:	Request	Parameter No		
	DD224 R	Rate of Turn			$+ = \overline{\text{Bow turning to s}}$	tarboard, 1 deg/min = .00	029 rad/sec			
	DF85	Angular rate, signed	- Pre int	-	+/-67.0 rad/s (approx. 230703 deg/min	Resolution: 1/32 x 101 rad/s	E-6			
3	Reserved I	Bits		Byte Fie	ld Size:	Bit Field Size: resv	24 Request	Parameter No		
	DD001 R	Reserved field			Variable number of r	reserved bits, all set to logi	ic "1"			
DF52 Bit field		Bit field	bit	(n) Range:	Variable	Resolution: 1	Used to const	ruct 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.

Product	s that directly	interface to pito	h, roll an	d yaw t	ransduc	ers would	transmit	this PGN			
Single Fra	ame: Yes	Priority Default:	3	Default (Jpdate Ra	ate:	<mark>1,000</mark> mill	iseconds	Frequency:	1.	cycles per second
Destina	tion: Global	Query Support:	Opt'l		ACK Rqm	nts:					
Field#	Field Name		-							Origin	al Reference ID # 35
1	SID				Byte Fi	eld Size:	1	Bit F	ield Size:	Red	quest Parameter No
DD056 Sequence ID						differ SOG	ent PGNs . and RAIM	For example		used to tie	
	DF53 In	teger, 8 bit unsign	ned	uint8	Range:	0 to 252		Resolu	ıtion: 1 bit	Unit-le	ss number
2	Yaw				Byte Fi	eld Size:	2	Bit F	ield Size:	Red	quest Parameter No
	DD063 Yav	v				Oscill	ation of sh	ip about it's v	ertical axis. Bow r	noving to st	tarboard is positive.
	DF04 A	ngle, signed		int16	Range:	+/-Pi rad		Resolu	ition: 1x10E-4 rad	Resolu	tion ~0.0057deg
3	Pitch DD062 Pitc	:h			Byte Fi		2 ation of sh		ield Size: atitudinal axis. Bov		quest Parameter No
	DF04 A	ngle, signed		int16	Range:	+/-Pi rad		Resolu	ution: 1x10E-4 rad	Resolu	tion ~0.0057deg
4	Roll				Byte Fi	eld Size:	2	Bit F	ield Size:	Red	quest Parameter No
	DD061 Rol	1				Oscill	ation of sh	ip about it's l	ongitudinal axis. R	coll to the st	arboard is positive.
	DF04 A	ngle, signed		int16	Range:	+/-Pi rad		Resolu	ition: <mark>1x10E-4 rad</mark>	Resolu	tion ~0.0057deg
	Roll to starboard	l is positive +/- 180	degrees								
5	Reserved Bit	s			Byte Fi	eld Size:		Bit F	ield Size: resv	8 Red	quest Parameter No
	DD001 Reserved field			Variable number of			per of reserved bits, all set to logic "1"				
	DF52 Bi	it field		bit(n)	Range:	Variable		Resolu	ıtion: <mark>1</mark>	Used to	construct bit fields

PGN: 127257

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 Fra	me: Yes	Priority Default: 7	Default (Update Ra	<i>te:</i> 1,000 m	nilliseconds	Frequency:	 cycles per second
Destinat	tion: Global	Query Support: No		ACK Rqmi	nts:			
Field #	Field Na	me						Original Reference ID # 92
1	Sequence DD056	ID Sequence ID		Byte Fie	different PGN SOG and RAI	unting number u s . For example,	the SID would be ven position. 255=	Request Parameter No aformation together between used to tie together the COG, eno valid position fix to tie it to.
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolut	ion: <mark>1 bit</mark>	Unit-less number
2 Variation		tion Source 32 Variation Source		Byte Fie	0x00 = Manua 0x01 = Autom system" 0x02 = Autom system" 0x03 = Autom 0x04 = WMM 0x05 = WMM 0x06 = WMM	al Entry, "Variationatic - Chart, "Variationatic Table, "Variationatic Calculation, I 2000, "Variation I 2010, "Variation I 2015, "Variation I 2020, "Variation I 202	iation has been cor "Variation has be n is calc via World n is calc via World n is calc via World n is calc via World	Request Parameter No d via key entry" from cartograhy present in mputed from tabular based en derived via calculation" I Magnetic Model for 2000" I Magnetic Model for 2005" I Magnetic Model for 2010" I Magnetic Model for 2015" I Magnetic Model for 2020"
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	ion: 1	Used to construct bit fields
3	Reserved DD001 I	Bits Reserved field		Byte Fie			eld Size: resv ts, all set to logic '	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	ion: 1	Used to construct bit fields
4	•	rvice (Date) Generic date Date, day count	uint16		Days since Jar 0 to 65,532 days	nuary 1, 1970, I	eld Size: Date is relative to U ion: <mark>1 day</mark>	Request Parameter No UTC Time. 0 = January 1, 1970, max = ~179 years
5	Variation DD151	Magnetic Heading Correction		Byte Fie	Positive value		eld Size: I negative values a	Request Parameter No are Westerly.
	DF04	Angle, signed	int16	Range:	+/-Pi rad	Resolut	ion: 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. Priority Default: 2 Default Update Rate: 100 milliseconds Single Frame: Yes Frequency: 10. cycles per second Destination: Global Query Support: Yes ACK Ramnts: Field # Field Name Original Reference ID # 88 Bit Field Size: 8 1 **Engine Instance** Byte Field Size: Request Parameter Yes For Engines: **DD128** Generic instance 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 < 253253 = Reserve254 = Error; 255 = Not available Used to construct bit fields DF52 Bit field bit(n) Range: Variable Resolution: 1 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.) Byte Field Size: 2 Bit Field Size: Request Parameter No **Engine Speed** 2 **DD129** Rate of rotation **DF72** Rotational rate, unsigned Range: 0-16,383 RPM Resolution: 1/4 RPM uint16 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: <mark>1x10E+2 Pa</mark> Byte Field Size: 1 4 Engine tilt/trim Bit Field Size: Request Parameter No **DD138** Generic percent of range Resolution: 1% Range: +/- 124% Percent, Relative measure int8 Range 0 - 100%, where 0% =Full Down (trim) and 100% = Full Up (tilt) Positions **Reserved Bits** Byte Field Size: Bit Field Size: resv 16 Request Parameter No 5 **DD001** Reserved field Variable number of reserved bits, all set to logic "1" Used to construct bit fields Range: Variable Resolution: 1 DF52 Bit field bit(n) Needed to fill the CAN frame.

PGN: 127488

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. Priority Default: 2 Default Update Rate: Single Frame: No 500 milliseconds Frequency: cycles per second Destination: Global Query Support: Opt'l ACK Ramnts: Field # Field Name Original Reference ID # 47 Bit Field Size: 8 **Engine instance** Byte Field Size: Request Parameter Yes 1 For Engines: **DD128** Generic instance 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 < 253253 = Reserve254 = Error255 = Not availableUsed to construct bit fields DF52 Bit field bit(n) Range: Variable Resolution: 1 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.) Bit Field Size: Byte Field Size: 2 Request Parameter No Engine oil pressure 2 **DD049** Generic Pressure **DF47** Pressure, medium Range: 0 to 6,553,200 Pa Resolution: 1x10E+2 Pa uint16 3 Engine oil temp. Byte Field Size: 2 Bit Field Size: Request Parameter No **DD130** Temperature, high Temperature, high Range: 0 to 6,553.2 deg K Resolution: 1x10E-1 deg DF38 uint16 K Byte Field Size: 2 Bit Field Size: Engine temp. Request Parameter No **DD043** Generic Temperature Resolution: 1x10E-2 deg Range: 0 to 655.32 deg K **DF39** Temperature, low uint16 K Byte Field Size: 2 Bit Field Size: **Alternator potential** Request Parameter No 5 DD136 Voltage, DC Range: +/- 327.64 V Resolution: 1x10E-2 V DF42 int16 Voltage, high Byte Field Size: 2 6 Fuel rate Bit Field Size: Request Parameter No **DD131** Flow rate, low DF18 Flow rate, low int16 Range: +/-3.2764 cu-m/hr Resolution: 1x10E-4 cum/hr Byte Field Size: 4 7 **Total engine hours** Bit Field Size: Request Parameter No. **DD132** Run time, Engine **DF67** uint32 Range: 0 to ~4.295x10E+9 s Resolution: 1 sec Time interval, large Engine coolant pressure Byte Field Size: 2 Request Parameter No. 8 Bit Field Size: **DD049** Generic Pressure Resolution: <mark>1x10E+2 Pa</mark> **DF47** Pressure, medium uint16 Range: 0 to 6,553,200 Pa 9 **Fuel Pressure** Byte Field Size: 2 Bit Field Size: Request Parameter No **DD225** Generic Pressure High DF29 uint16 Range: 0 to 65,532,000 Pa Resolution: 1x10E+3 Pa Pressure

PGN: 127489 hex: 1F201

10 **Not Available** Byte Field Size: Bit Field Size: resv 8 Request Parameter No Variable number of reserved bits, all set to logic "1" **DD001** Reserved field Range: Variable Resolution: 1 Used to construct bit fields **DF52** Bit field bit(n) 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. 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 Resolution: 1 Used to construct bit fields Bit field Range: Variable bit(n) **Engine Discrete Status 2** Byte Field Size: Bit Field Size: 16 12 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 Byte Field Size: 1 Request Parameter No **Percent Engine Load** Bit Field Size: 13 **DD138** Generic percent of range DF30 Percent, Relative measure Range: +/- 124% Resolution: 1% int8 Range 0 - 124% **Percent Engine Torque** Byte Field Size: 1 14 Bit Field Size: Request Parameter No. **DD138** Generic percent of range Resolution: 1% Percent, Relative measure Range: +/- 124% **DF30** int8 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.

•	ame: Yes	Priority Default:		Ipdate Rai		econds Frequency:	10. cycles per second
Destina Field #	tion: <mark>Globa</mark> Field Na		Opt'l	ACK Rqmr	its:		Original Reference ID # 43
1		sion instance		Byte Fie	eld Size:	Bit Field Size: 8	Request Parameter Yes
	DD128	Generic instance		,	0 = Instance 0; 1 = Instance 1; thru n = Instance n, wh	For Engines: 0 = Single Engine or Dual Er 1 = Dual Engine StarBoard (for Multiple Engines, Insta from Bow, Port (0) to S	ngine Port
					253 = Reserve 254 = Error; 255 = Not available		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
		s not specified in the "C ransmission Instances				PGN, the response will be with	
2		sion Gear	•	Byte Fie	•	Bit Field Size: 2	Request Parameter No
	DD222	Transmission Gear		•	0 = Forward. 1 = Neutral, 2 = Reverse, 3 = [Unavailable,		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	Reserved	Bits		Byte Fie	eld Size:	Bit Field Size: resv 6	Request Parameter No
	DD001	Reserved field			Variable number of	of reserved bits, all set to logic "I	1"
	DF52 6 Bits neede	Bit field ed to fill out the byte.	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4		sion oil pressure Generic Pressure		Byte Fie	eld Size: 2	Bit Field Size:	Request Parameter No
	DF47	Pressure, medium	uint16	Range:	0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa	
5		sion oil temperature Temperature, high	•	Byte Fie	eld 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		sion Discrete Status Transmission Discre		Byte Fie	xxxx xxx1 = Chec xxxx xx1x = Over xxxx x1xx = Low xxxx 1xxx = Low xxx1 xxxx = Sail I xx1x xxxx = reser x1xx xxxx = reser 1xxx xxxx = reser	Temperature, Oil Pressure, Oil Level, Drive, ved, ved,	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
7	Reserved	Bits		Byte Fie	eld Size:	Bit Field Size: resv 8	Request Parameter No
-		Reserved field				of reserved bits, all set to logic "	
	DF52 Needed to fi	Bit field ill the CAN frame.	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

Trip Parameters, Vessel

PGN: 127496 hex: 1F208

Trip par	ameters relativ	ve to Vessel							
Single Fra	ame: No	Priority Default:	5 Def	ault Update Ra	ite: 1,000 milli	iseconds	Frequency:	1.	cycles per second
Destina	tion: Global	Query Support:	No	ACK Rqmi	nts:				
Field #	Field Name							Origina	I Reference ID # 95
1	Time to Empt	y		Byte Fie	eld Size: 4	Bit Field	Size:	Req	uest Parameter No
	DD134 Run	time, Trip				'			
	DF65 Ti	ne interval, stan	dard uin	t32 Range:	0 to ~4.295x10E+6	Resolution	n: 1x10E-3 s		
2	Distance to E	mpty		Byte Fie	eld Size: 4	Bit Field	Size:	Req	uest Parameter No
	DD199 Dist	ance, Unsigned							
	DF09 Di	stance	uin	t32 Range:	0 to ~4.295x10E+7	m Resolution	n: 1x10E-2 m		
3	Estimated Fu	el Remaining		Byte Fie	eld Size: 2	Bit Field	Size:	Req	uest Parameter No
	DD135 Volu	ıme							
	DF44 Vo	lume	uin	t16 Range:	0 to 65.532 cu m	Resolution	n: 1x10E-3 cu m	1	
4	Trip Run Tim	е		Byte Fie	eld Size: 4	Bit Field	Size:	Req	uest Parameter No
	DD134 Run	time, Trip							
	DF65 Ti	ne interval, stan	dard uin	t32 Range:	0 to ~4.295x10E+6	S Resolution	n: 1x10E-3 s		

Trip Parameters, Engine

PGN: 127497 hex: 1F209

Engine	related tri This I	-	mation.	ted as n	eeded.						
Single Fra			Priority Default:			Update Ra	te: 1,000 r	milliseconds	Frequency:	1.	cycles per second
Destina	tion: Globa	al	Query Support:	Opt'l		ACK Rqm	nts:				
Field #	Field N	ame								Origina	al Reference ID # 48
1	Engine in		e ic instance			Byte Fie	eld Size: 0 = Instance (For Engi	ield Size: 8 nes: gle Engine or Dual 1		uest Parameter <mark>Yes</mark>
							1 = Instance 1 thru	1; 1 = Dua (for Mu	Dual Engine StarBoard Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n)		
							n = Instance i 253 = Reserv 254 = Error; 255 = Not av		3		
						or an ISO F			ution: 1 esponse will be with		construct bit fields
2	Trip fuel DD135		me			Byte Fie	eld Size: 2	Bit F	ield Size:	Req	uest Parameter No
	DF44	Vol	ume		uint16	Range:	0 to 65.532 cu n	n Resolu	ution: <mark>1x10E-3 cu</mark>	m	
3	Fuel Rate	•	•			Byte Fie	eld Size: 2	Bit F	ield Size:	Req	uest Parameter No
	DF18	Flov	v rate, low		int16	Range:	+/-3.2764 cu-m/	hr Resolu	ution: <mark>1x10E-4 cu</mark> m/hr	<u> -</u>	
4	Fuel Rate	•	•			Byte Fie	eld Size: 2	Bit F	ield Size:	Req	uest Parameter No
	DF18	Flov	v rate, low		int16	Range:	+/-3.2764 cu-m/	hr Resolu	ution: <mark>1x10E-4 cu</mark> m/hr	I-	
5		Instantaneous Fuel Economy DD131 Flow rate, low				Byte Fie	eld Size: 2	Bit F	ield Size:	Req	uest Parameter No
	DF18	Flov	v rate, low		int16	Range:	+/-3.2764 cu-m/	hr Resolu	ution: 1x10E-4 cu	ļ-	

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 Ramnts: Original Reference ID # 49 Field Name Field # Byte Field Size: Bit Field Size: 8 Request Parameter Yes 1 **Engine instance 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 from Bow, Port (0) to Stern, Starboard (n)) thru n = Instance n, where n < 253253 = Reserve254 = Error: 255 = Not availableResolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Range: Variable 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.) Byte Field Size: 2 Request Parameter No 2 Rated engine speed Bit Field Size: **DD129** Rate of rotation **DF72** Rotational rate, unsigned uint16 Range: 0-16,383 RPM Resolution: 1/4 RPM Byte Field Size: 8 or 16 n Bit Field Size: 3 VIN Request Parameter No **DD004** Generic name string, short Name of place, route, waypoint, destination, vessel, vehicle, etc. Resolution: 1 ASCII or 2 to 252 bytes. First byte in **DF50** String, variable, short ch8or16(n) Range: 0 to 250 ASCII or string (uint8) is the Count 0 to 125 Unicode 1 Unicode byte indicating the number Characters Character of bytes in the string, 200 characters maximum 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 = $0 \Rightarrow$ Unicode characters Control byte = $1 \Rightarrow$ ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

Engine Parameters, Static

PGN: 127498 hex: 1F20A

Software ID

Byte Field Size: 8 or 16 n

Bit Field Size: Name of place, route, waypoint, destination, vessel, vehicle, etc.

Request Parameter No

DD004 Generic name string, short

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 = $0 \Rightarrow$ 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

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-	ame: Yes	Priority Default: 3	Default	Update Ra		illiseconds	Frequency:	NA cycles per second
Destina eld #	ation: <mark>Globa</mark> Field N			ACK Rqm	nnts:			Original Reference ID # 4
1		Bank instance Generic numeric ID, short		Byte Fi	ield Size: 1 Number of rou	Bit Fiel te, waypoint, even		Request Parameter <mark>Ye</mark>
		Integer, 8 bit unsigned is not specified in the "Commar Indicator Bank Instances. (This		or an ISO I				Unit-less number
2	Indic. 1 DD002	Generic status pair		Byte Fi	_	Disabled, Reset, Enabled, Set, "1'	_	Request Parameter N
	DF52	Bit field	bit(n)	Range:	Variable	Resolution	on: 1	Used to construct bit fields
3	Indic. 2 DD002	Generic status pair		Byte Fi		Disabled, Reset, Enabled, Set, "1'	•	Request Parameter N
	DF52	Bit field	bit(n)	Range:	Variable	Resolution	on: 1	Used to construct bit fields
4	Indic. 3 DD002	Generic status pair		Byte Fi		Disabled, Reset, Enabled, Set, "1"		Request Parameter N
	DF52	Bit field	bit(n)	Range:	Variable	Resolution	on: 1	Used to construct bit fields
5	Indic. 4 DD002	Generic status pair		Byte Fi		Disabled, Reset, Enabled, Set, "1"		Request Parameter N
	DF52	Bit field	bit(n)	Range:	Variable	Resolution	on: 1	Used to construct bit fields
6	Indic. 5 DD002	Generic status pair		Byte Fi	•	Disabled, Reset, Enabled, Set, "1'		Request Parameter N
	DF52	Bit field	bit(n)	Range:	Variable	Resolution	on: 1	Used to construct bit fields
7	Indic. 6 DD002	Generic status pair		Byte Fi		Disabled, Reset, Enabled, Set, "1'	•	Request Parameter N
	DF52	Bit field	bit(n)	Range:	Variable	Resolution	on: 1	Used to construct bit fields

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

16	Indic. 15 DD002 Generic status pair		Byte Fi	Request Parameter No		
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
17	Indic. 16 DD002 Generic status pair		Byte Fi	_	Bit Field Size: 2 Disabled, Reset, "0"], Enabled, Set, "1"], ble, Unknown]	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
18	Indic. 17 DD002 Generic status pair		Byte Fi	_	Bit Field Size: 2 Disabled, Reset, "0"], Enabled, Set, "1"], ble, Unknown]	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
19	Indic. 18 DD002 Generic status pair		Byte Fi	_	Bit Field Size: 2 Disabled, Reset, "0"], Enabled, Set, "1"], ble, Unknown]	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
20	Indic. 19 DD002 Generic status pair		Byte Fi		Bit Field Size: 2 Disabled, Reset, "0"], Enabled, Set, "1"], ble, Unknown]	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
21	Indic. 20 DD002 Generic status pair		Byte Fi		Bit Field Size: 2 Disabled, Reset, "0"], Enabled, Set, "1"], ble, Unknown]	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
22	Indic. 21 DD002 Generic status pair		Byte Fi		Bit Field Size: 2 Disabled, Reset, "0"], Enabled, Set, "1"], ble, Unknown]	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
23	Indic. 22 DD002 Generic status pair		_			Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

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

Universal commands to multiple banks of two-state devices. Single Frame: Yes Priority Default: 3 NA milliseconds NA cycles per second Default Update Rate: Frequency: Destination: Global Query Support: Opt'l ACK Ramnts: Original Reference ID # 45 Field # Field Name Switch bank instance Byte Field Size: Bit Field Size: 1 Request Parameter Yes **DD005** Generic numeric ID, short Number of route, waypoint, event, mark, etc. Range: 0 to 252 Resolution: 1 bit Unit-less number Integer, 8 bit unsigned uint8 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 Byte Field Size: Bit Field Size: 2 Request Parameter No. 00 = [Turn Off, Disable, Reset, Make "0"], **DD003** Generic command pair 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved03 = No actionResolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Range: Variable Switch 2 Byte Field Size: Bit Field Size: 2 Request Parameter No 3 **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 Bit Field Size: 2 Switch 3 Byte Field Size: Request Parameter No 00 = [Turn Off, Disable, Reset, Make "0"]. **DD003** Generic command pair 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved.03 = No actionDF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields Bit Field Size: 2 5 Switch 4 Byte Field Size: 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 Range: Variable Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Request Parameter No Switch 5 Byte Field Size: Bit Field Size: 2 6 00 = [Turn Off, Disable, Reset, Make "0"]. **DD003** Generic command pair 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved,03 = No actionResolution: 1 DF52 Bit field bit(n) Range: Variable Used to construct bit fields 7 Switch 6 Byte Field Size: Bit Field Size: 2 Request Parameter No 00 = [Turn Off, Disable, Reset, Make "0"], **DD003** Generic command pair 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved,03 = No action**DF52** Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n) Switch 7 Byte Field Size: Bit Field Size: 2 Request Parameter No 00 = [Turn Off, Disable, Reset, Make "0"], **DD003** Generic command pair 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved.03 = No actionResolution: 1 Used to construct bit fields DF52 Bit field bit(n) Range: Variable

9	Switch 8 DD003 Generic command pair				Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
10	Switch 9 DD003 Generic command pair				Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
11	Switch 10 DD003 Generic command pair		_		Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
12	Switch 11 DD003 Generic command pair		-	* * *	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
13	Switch 12 DD003 Generic command pair		_		Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
14	Switch 13 DD003 Generic command pair		-	*	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
15	Switch 14 DD003 Generic command pair		01 = [Turn 0 02 = Reserv 03 = No act	ion	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
16	Switch 15 DD003 Generic command pair				Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
17	Switch 16 DD003 Generic command pair		01 = [Turn 0 02 = Reserv 03 = No act	ion	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

18	Switch 17 DD003 Generic command pair			Bit Field Size: 2 sable, Reset, Make "0"], able, Set, Make "1"],	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
19	Switch 18 DD003 Generic command pair			Bit Field Size: 2 sable, Reset, Make "0"], able, Set, Make "1"],	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
20	Switch 19 DD003 Generic command pair		_	Bit Field Size: 2 sable, Reset, Make "0"], able, Set, Make "1"],	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
21	Switch 20 DD003 Generic command pair			Bit Field Size: 2 sable, Reset, Make "0"], able, Set, Make "1"],	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
22	Switch 21 DD003 Generic command pair		_	Bit Field Size: 2 sable, Reset, Make "0"], able, Set, Make "1"],	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
23	Switch 22 DD003 Generic command pair			Bit Field Size: 2 sable, Reset, Make "0"], able, Set, Make "1"],	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
24	Switch 23 DD003 Generic command pair			Bit Field Size: 2 sable, Reset, Make "0"], able, Set, Make "1"],	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
25	Switch 24 DD003 Generic command pair			Bit Field Size: 2 sable, Reset, Make "0"], able, Set, Make "1"],	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
26	Switch 25 DD003 Generic command pair			Bit Field Size: 2 sable, Reset, Make "0"], able, Set, Make "1"],	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields

27	Switch 26 DD003 Generic command pair		Byte Fi	-		Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
28	Switch 27 DD003 Generic command pair		Byte Fi	-	* * *	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
29	Switch 28 DD003 Generic command pair		Byte Fi		* * *	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

PGN: 127502

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 Fra	me: <mark>No</mark>	Priority Default: 6	Default	Update Rate:	1,500 milliseco	onds <i>Frequency:</i>	.7 cycles per second
Destina	tion: Globa	3 11		ACK Rqmnts:			
Field #	Field Na	nme					Original Reference ID # 128
1	AC Instan			Byte Field Siz		Bit Field Size:	Request Parameter Yes
	DD005	Generic numeric ID, short				point, event, mark, etc.	
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 2	252	Resolution: 1 bit	Unit-less number
		uent parameters pertain to this	AC source.				
2	Number of			Byte Field Siz		Bit Field Size:	Request Parameter No
		Generic counter, short				counter, sequence counter	** ** *
	DF53	Integer, 8 bit unsigned	uint8	Range: 0 to 2	252	Resolution: 1 bit	Unit-less number
		number of lines (tuples) being re	eportea.	Duta Field Ci		Dir Field Circ.	Degree of Degree of a No.
3	Line DD270	AC Line		Byte Field Siz	e: 0x00 = Line 1,	Bit Field Size: 2	Request Parameter No
	DDZTO	AC LIIIC			0x00 = Line 1, 0x01 = Line 2,		
					0x02 = Line 3 0x03 = Reserved		
	DF52	Bit field	bit(n)	Range: Varia		Resolution: 1	Used to construct bit fields
		physical connector that is supply	` ′	_			esed to construct on neids
4	Acceptab		,g porror.	Byte Field Siz		Bit Field Size: 2	Request Parameter No
•	-	AC Acceptability		-	0x00 = Bad Level,		110
		1 2			0x01 = Bad Frequenc 0x02 = Being Qualific	•	
					0x02 = Good	eu,	
	DF52	Bit field	bit(n)	Range: Varia	able	Resolution: 1	Used to construct bit fields
5	Reserve I	Bits		Byte Field Siz	ze:	Bit Field Size: resv	4 Request Parameter No
	DD001	Reserved field		7	Variable number of re	eserved bits, all set to logic	"1"
	DF52	Bit field	bit(n)	Range: Varia	able	Resolution: 1	Used to construct bit fields
6	Voltage			Byte Field Siz	ze: 2	Bit Field Size:	Request Parameter No
	DD260	Voltage, AC RMS					
	DF96	Voltage, high, unsigned	uint16	Range: +/- 6	55.32 V	Resolution: 1x10E-2 V	
7	Current			Byte Field Siz	ze: 2	Bit Field Size:	Request Parameter No
	DD269	Current, Electric, Unsigned					
	DF95	Current, electric, high	uint16	Range: 0 - 6:	553.2 A	Resolution: 1x10E-1 A	
8	Frequenc	у		Byte Field Siz	ze: 2	Bit Field Size:	Request Parameter No
	DD267	Frequency					
	DF22	Frequency, low	uint16	Range: 0 to 6	655.32 Hz	Resolution: 1x10E-2 Hz	
9	Breaker S	Bize		Byte Field Siz	ze: 2	Bit Field Size:	Request Parameter No
	DD269	Current, Electric, Unsigned					
	DF95	Current, electric, high	uint16	Range: 0 - 65	553.2 A	Resolution: 1x10E-1 A	
10	Real Pow	er		Byte Field Siz	ze: <mark>4</mark>	Bit Field Size:	Request Parameter No
	DD261	Power (watts)		-			
	DF94	Power	uint32	Range: 0 - 4,	294,967,292 W	Resolution: 1 W	
11	Reactive			Byte Field Siz		Bit Field Size:	Request Parameter No
••		Volt Amps Reactive Power	(VAR)	,			140
	DF92	Power - VAR	uint32	Range: 0 - 4,	294,967,292	Resolution: 1 VAR	
		···- · · · - ·		VAR			

AC Input Status PGN: 127503 hex: 1F20F

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 Ramnts. Field # Field Name Original Reference ID # 129 Byte Field Size: 1 **AC Instance** Bit Field Size: Request Parameter Yes Number of route, waypoint, event, mark, etc. **DD005** Generic numeric ID, short Resolution: 1 bit Unit-less number Range: 0 to 252 Integer, 8 bit unsigned uint8 The subsequent parameters pertain to this AC source **Number of lines** Byte Field Size: 1 Bit Field Size: Request Parameter No 2 Numeric count, event counter, sequence counter **DD006** Generic counter, short Unit-less number Resolution: 1 bit Integer, 8 bit unsigned Range: 0 to 252 **DF53** uint8 This is the number of lines (tuples) being reported. Bit Field Size: 2 3 Line Byte Field Size: Request Parameter No DD270 AC Line 0x00 = Line 1,0x01 = Line 20x02 = Line 30x03 = ReservedResolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Range: Variable This is the physical connector that is supplying power. In the case of split phase there are two lines. Bit Field Size: 3 4 Waveform Byte Field Size: Request Parameter No DD273 Waveform 0x00 = Sine Wave0x01 = Modified Sine Wave0x02 = Reservedthru 0x05 = Reserved0x06 = Error0x07 = Data Not AvailableResolution: 1 **DF52** Bit field bit(n) Range: Variable Used to construct bit fields **Reserve Bits** Bit Field Size: resv 3 5 Byte Field Size: Request Parameter No Variable number of reserved bits, all set to logic "1" DD001 Reserved field Resolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Range: Variable Byte Field Size: 2 Bit Field Size: Request Parameter No Voltage 6 **DD260** Voltage, AC RMS Range: +/- 655.32 V Resolution: 1x10E-2 V **DF96** Voltage, high, unsigned uint16 Current Byte Field Size: 2 Bit Field Size: Request Parameter No. 7 **DD269** Current, Electric, Unsigned **DF95** Range: 0 - 6553.2 A Resolution: 1x10E-1 A Current, electric, high uint16 Byte Field Size: 2 Bit Field Size: 8 Frequency Request Parameter No **DD267** Frequency DF22 Range: 0 to 655.32 Hz Resolution: 1x10E-2 Hz Frequency, low uint16 **Breaker Size** Byte Field Size: 2 Bit Field Size: Request Parameter No. 9 **DD269** Current, Electric, Unsigned

DF95

Real Power

DF94

10

Resolution: 1x10E-1 A

Bit Field Size:

Resolution: 1 W

DD261 Power (watts)

Power

Current, electric, high

Range: 0 - 6553.2 A

Byte Field Size: 4

Range: 0 - 4,294,967,292 W

uint16

uint32

Request Parameter No

AC C	AC Output Status								
11	Reactive Power DD262 Volt Amps Reactive Power (VAR)	Byte Field Size: 4	Bit Field Size:	Request Parameter No					
	DF92 Power - VAR uint32	Range: 0 - 4,294,967,292 VAR	Resolution: 1 VAR						
12	Power Factor DD271 Power Factor	Byte Field Size: 1 Cosine of the angle	Bit Field Size: between the AC voltage and curre	Request Parameter No					

Resolution: 0.01

Range: +/- 1.00

int8

DF97 Power Factor

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 Fra	me: Yes		Priority Default:	6	Default U	Jpdate Ra	te: 2,500	milliseconds	Frequency:	.4 cycles per second
Destina	tion: Globa	al	Query Support:	Op	t'l	ACK Rqm	nts:			
Field #	Field N	ame								Original Reference ID # 51
1	Fluid Ins	tance				Byte Fie	eld Size:	Bit I	Field Size: 4	Request Parameter Yes
	DD169 Generic instance (4-bit)				0x0 to $0xF =$	Instance number	er 0 to 15;			
	DF52 Bit field		bit(n)	Range:	Variable	Reso	lution: 1	Used to construct bit fields		
			pecified in the "Constances. (This F					f this PGN, the r	esponse will be with	
2	Fluid Type					Byte Fie	eld Size:	Bit I	Field Size: 4	Request Parameter No
	DD208 Type of Fluid				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					
	DF52 Bit field		bit(n)	bit(n) Range: Variable		Resolution: 1		Used to construct bit fields		
3	Fluid Lev	vel				Byte Fie	eld Size: 2	Bit I	Field Size:	Request Parameter No
	DD215	Gene	ric Percent of R	Range	e, Medium					
	DF84 Percent, Relative Measur		ur int16	Range:	-131.072% to 131.056%	Reso	lution: <mark>.004%</mark>			
	Range 0 -	100%,	where 0% =Emp	ty ar	nd 100% = Full					
4	Tank Cap					Byte Fie	eld Size: 4	Bit I	Field Size:	Request Parameter No
	DF86	Vol	ume. Large		uint32	Range:	0 to~4.296x10E m	E+5 cu Reso	lution: <mark>1x10E-4 cu 1</mark>	n
5	Reserve		ved field			Byte Fie	eld Size: Variable nun		Field Size: resv to logic "	
	DD001 Reserved fieldDF52 Bit fieldNeeded to fill the CAN frame.		bit(n)	Range:	Variable		lution: 1	Used to construct bit fields		

PGN: 127505

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: V	Vhile less	than 8 bytes we are anti	cipating 1	that this	message is expe	ected to grow.		
Single Fra	ame: No	Priority Default: 6	Default l	Update Ra	ate: 1,500 m	nilliseconds	Frequency:	.7 cycles per second
Destina	tion: Globa	Query Support: Yes		ACK Rqn	nnts:			
Field #	Field Na	ame						Original Reference ID # 130
1	SID DD056 Sequence ID			Byte Fi	different PGN SOG and RAI	unting number us s . For example,	the SID would be en position. 255=	Request Parameter No formation together between used to tie together the COG, no valid position fix to tie it to.
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolut	ion: 1 bit	Unit-less number
2	DC Insta			Byte Fi	ield Size: 1	Bit Fie	eld Size:	Request Parameter Yes
	DF53 The subsec	Integer, 8 bit unsigned quent parameters pertain to this Emaps to the Battery Instance field		Range:	0 to 252		ion: 1 bit	Unit-less number
3	DC Type DD288		Byte Fi	0x00 = Battery 0x01 = Alterna 0x02 = Conve 0x03 = Solar (0x04 = Wind (0x05 = Reserv thru 0xFD = Reserv 0xFE = Error 0xFF = Data N	y, ator, rtor, Cell, Generator, red,	eld Size: 8	Request Parameter No	
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	ion: 1	Used to construct bit fields
4	State of 0	Charge Generic Absolute Percentage	0-252%	Byte Fi	ield Size: 1	Bit Fie	eld Size:	Request Parameter No
	DF93 % of total c	Percent, Absolute harge remaining	uint8	Range:	0 - 252%	Resolut	ion: <mark>1</mark>	
5		Generic Absolute Percentage			ield Size: 1	_	eld Size:	Request Parameter No
	Mark Mark Mark Mark Mark Mark Mark Mark	Percent, Absolute fe remaining	uint8	Nange.	0 - 252%	Resolut	ion. 1	
6	Time Rer DD268	Time		•	ield Size: 2		eld Size:	Request Parameter No
	DF98 Time remai	Time interval, medium, u ng at current rate of discharge	uint16	Range:	0 - 65,532 minut	es Resolut	ion: 1 minute	
7	Ripple Vo	oltage AC Ripple		Byte Fi	ield Size: 2	Bit Fie	eld Size:	Request Parameter No
	DF102	AC Vrms	uint16	Range:	0 - 65.532	Resolut	ion: <mark>1000 mv</mark>	

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 .7 cycles per second Frequency: Destination: Global Query Support: Yes ACK Ramnts: Field # Field Name Original Reference ID # 131 **Charger Instance** Byte Field Size: 1 Bit Field Size: Request Parameter Yes Number of route, waypoint, event, mark, etc. **DD005** Generic numeric ID, short Range: 0 to 252 Resolution: 1 bit Unit-less number DF53 Integer, 8 bit unsigned uint8 Request Parameter Yes 2 **Battery Instance** Byte Field Size: 1 Bit Field Size: **DD005** Generic numeric ID, short Number of route, waypoint, event, mark, etc. Resolution: 1 bit Unit-less number **DF53** Integer, 8 bit unsigned uint8 Range: 0 to 252 The subsequent parameters pertain to this DC source. 3 Bit Field Size: **Operating State** Byte Field Size: Request Parameter No **DD264** Charger Operating State 0x00 = Not Charging,0x01 = Bulk,0x02 = Absorption.0x03 = Overcharge,0x04 = Equalize,0x05 = Float,0x06 = No Float0x07 = Constant VI,0x08 = Disabled,0x09 = Fault.thru 0x0D = Reserved0x0E = Error0x0F = Data Not Available**DF52** Range: Variable Resolution: 1 Used to construct bit fields Bit field bit(n) Byte Field Size: Bit Field Size: **Charge Mode** Request Parameter No. **DD265** Charger Mode 0x00 = Standalone,0x01 = Primary,0x02 = Secondary,0x03 = Echo0x04 = Reservedthru 0x0D = Reserved0x0E = Error0x0F = Data Not Available Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Range: Variable Charger Enable/Disable Byte Field Size: Bit Field Size: 2 Request Parameter No 5 MSB/LSB: **DD002** Generic status pair 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error11= [Unavailable, Unknown] **DF52** Range: Variable Used to construct bit fields Bit field bit(n) **Equalization Pending** Bit Field Size: 2 Byte Field Size: Request Parameter No. 6 **DD002** Generic status pair MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"],10 = Error,11= [Unavailable, Unknown] Resolution: 1 **DF52** Bit field bit(n) Range: Variable Used to construct bit fields

Charger Status PGN: 127507 hex: 1F213

7	Reserved DD001 Reserved field		Byte Fi	eld Size: Variable number of	Bit Field Size: resv 4 Request Parameter Not 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 Fi	eld Size: 2	Bit Field Size:	Request Parameter No	
	DD268 Time						
	DF98 Time interval, medium, u	uint16 Rang		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 Fra	ame: Yes		Priority Default:	6	Default (Update Ra	ate: 1,500 mil	liseconds	Frequency:	.7 cycles per second	
Destina	tion: Glob	al	Query Support:	Opt'l		ACK Rqm	ents:				
Field #	Field ∧	lame	•							Original Reference ID # 50	
1	Battery	nstaı	nce			Byte Fi	eld Size: 1	Bit F	Field Size:	Request Parameter Yes	
	DD005	Gen	eric numeric ID,	short			Number of route				
	DF53 Integer, 8 bit unsigned		uint8	Range:	0 to 252	Resol	ution: <mark>1 bit</mark>	Unit-less number			
			specified in the "C ry Instances. (This								
2	Battery Voltage					Byte Fi	eld Size: 2	Bit F	Field Size:	Request Parameter No	
	DD136 Voltage, DC										
	DF42 Voltage, high in			int16	Range:	+/- 327.64 V					
3	Battery	Battery Current				Byte Fi	eld Size: 2	Bit F	Field Size:	Request Parameter No	
	DD140 Current, Electric				+ = current consumed, - = current supplied						
	DF07	Cı	urrent, electric, h	igh	int16	Range:	+/- 3,276.4 A	Resol	lution: 1x10E-1 A		
4	Battery	Case	Temperature			Byte Fi	eld Size: 2	Bit F	Field Size:	Request Parameter No	
	DD043	Gen	eric Temperature	e				_			
DF39 Temperature, low		uint16	Range:	0 to 655.32 deg K	Resol	lution: 1x10E-2 deg K					
5	SID					Byte Fi	eld Size: 1	Bit F	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	In	teger, 8 bit unsig	ned	uint8	Range:	0 to 252	Resol	ution: 1 bit	Unit-less number	

Appendix B.1 - PGN Report

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 Ramnts: Field # Field Name Original Reference ID # 132 Byte Field Size: 1 **Inverter Instance** Bit Field Size: Request Parameter Yes Number of route, waypoint, event, mark, etc. **DD005** Generic numeric ID, short Range: 0 to 252 **DF53** Resolution: 1 bit Unit-less number Integer, 8 bit unsigned uint8 Request Parameter Yes 2 **AC Instance** Byte Field Size: 1 Bit Field Size: **DD005** Generic numeric ID, short Number of route, waypoint, event, mark, etc. Range: 0 to 252 Resolution: 1 bit Unit-less number Integer, 8 bit unsigned uint8 The subsequent parameters pertain to this AC source. 3 **DC Instance** Byte Field Size: Bit Field Size: Request Parameter No **DD005** Generic numeric ID, short Number of route, waypoint, event, mark, etc. Resolution: 1 bit Unit-less number Integer, 8 bit unsigned Range: 0 to 252 uint8 The subsequent parameters pertain to this DC source. Note: This maps to the Battery Instance field. Bit Field Size: 4 **Operating State** Byte Field Size: Request Parameter No **DD266** Invertor Operating State 0x00 = Invert.0x01 = AC Passthru, 0x02 = Load Sense,0x03 = Fault,0x04 = Disabled0x05 = Reservedthru 0x0D = Reserved0x0E = Error0x0F = Data Not Available**DF52** Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n) Inverter Enable/Disable Byte Field Size: Bit Field Size: 2 Request Parameter No 5 **DD002** Generic status pair MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error,11= [Unavailable, Unknown] Used to construct bit fields **DF52** Bit field bit(n) Range: Variable Resolution: 1 6 Reserved Byte Field Size: Bit Field Size: resv Request Parameter No. **DD001** Reserved field Variable number of reserved bits, all set to logic "1"

Used to construct bit fields

DF52

Bit field

Range: Variable

bit(n)

Resolution: 1

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. NA milliseconds Single Frame: No Priority Default: 6 Default Update Rate: Frequency: NA cycles per second ACK Ramnts: Destination: Global Query Support: Yes Field # Original Reference ID # 135 Field Name **Charger Instance** Byte Field Size: 1 Bit Field Size: 1 Request Parameter Yes **DD005** Generic numeric ID, short Number of route, waypoint, event, mark, etc. Integer, 8 bit unsigned Range: 0 to 252 Resolution: 1 bit Unit-less number uint8 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. Resolution: 1 bit Unit-less number Integer, 8 bit unsigned Range: 0 to 252 uint8 The subsequent parameters pertain to this DC source. Charger Enable/Disable 3 Byte Field Size: Bit Field Size: 2 Request Parameter No 00 = [Turn Off, Disable, Reset, Make "0"], **DD003** Generic command pair 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved,03 = No actionResolution: 1 DF52 Bit field bit(n) Range: Variable Used to construct bit fields 6 **Reserved Bits** Byte Field Size: Bit Field Size: resv Request Parameter No **DD001** Reserved field Variable number of reserved bits, all set to logic "1" Resolution: 1 Range: Variable Used to construct bit fields **DF52** Bit field bit(n) Byte Field Size: Bit Field Size: Request Parameter No **Charge Current Limit** 5 **DD263** Generic Absolute Percentage 0-252% Range: 0 - 252% Resolution: 1 **DF93** Percent, Absolute uint8 Limits charger output current to a percentage (0-100%) of the designed maximum. **Charging Algorithm** Byte Field Size: Bit Field Size: 4 Request Parameter No 6 0x00 = Trickle**DD272** Charging Algorithm 0x01 = CVCC (Constant Voltage Constant Current) 0x02 = 2 Stage (No float) 0x03 = 3 Stage 0x04 = Reservedthru 0x0D = Reserved0x0E = Error0x0F = Data Not Available**DF52** Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n) **Charger Mode** Byte Field Size: Bit Field Size: 4 Request Parameter No. 7 DD265 Charger Mode 0x00 = Standalone,0x01 = Primary.0x02 = Secondary,0x03 = Echo0x04 = Reservedthru 0x0D = Reserved0x0E = Error0x0F = Data Not Available DF52 Bit field bit(n) Range: Variable 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).

Charger Configuration Status

PGN: 127510 hex: 1F216

8	Estimated Battery Temp - When No Se Present	ensor	Byte Fi	ield Size:	Bit Field Size: 4	Request Parameter No	
	DD274 Batt Temp - No Sensor	0x00 = Cold 0x01 = Warm 0x02 = Hot 0x03 = Reserve thru 0x0D = Reserve 0x0E = Error 0x0F = Data No			vailable		
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields	
	If there is no battery temperature sensor or it temperature.	d to determine the battery					
9	Equalize One Time Enable/Disable		Byte Fi	ield Size:	Bit Field Size: 2	Request Parameter No	
	DD003 Generic command pair			00 = [Turn Off, Dis 01 = [Turn On, Ens 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 atte	mpt to bri	ng the bat	tery's cells up to the sam			
10	Over Charge Enable/Disable		Byte Fi	ield Size:	Bit Field Size: 2	Request Parameter No	
	DD003 Generic command pair				sable, Reset, Make "0"], able, Set, Make "1"],		
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields	
	For chargers that support regular over charging	ng, this fie	eld enables	the feature.			
11	Equailize Time DD268 Time		Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No	
	DF98 Time interval, medium, u	uint16	Range:	0 - 65,532 minutes	Resolution: 1 minute		

PGN: 127510

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. NA milliseconds Single Frame: No Priority Default: 6 Default Update Rate: Frequency: NA cycles per second ACK Ramnts: Destination: Global Query Support: Yes Field # Original Reference ID # 136 Field Name **Inverter Instance** Byte Field Size: 1 Bit Field Size: Request Parameter Yes 1 Number of route, waypoint, event, mark, etc. **DD005** Generic numeric ID, short Integer, 8 bit unsigned Range: 0 to 252 Resolution: 1 bit Unit-less number DF53 uint8 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. Unit-less number Range: 0 to 252 Resolution: 1 bit **DF53** Integer, 8 bit unsigned uint8 The subsequent parameters pertain to this AC source **DC Instance** Bit Field Size: 3 Byte Field Size: 1 Request Parameter No **DD005** Generic numeric ID, short Number of route, waypoint, event, mark, etc. Unit-less number Resolution: 1 bit Integer, 8 bit unsigned uint8 Range: 0 to 252 The subsequent parameters pertain to this DC source. Note: This maps to the Battery Instance field. 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 Bit field Range: Variable Resolution: 1 Used to construct bit fields DF52 bit(n) **Inverter Mode** Byte Field Size: Bit Field Size: 4 Request Parameter No 5 0x00 = Standalone**DD275** Inverter Mode 0x01 = Series Master 0x02 = Series Slave0x03 = Parallel Master 0x04 = Parallel Slave 0x05 = Reservedthru 0x0D = Reserved0x0E = Error0x0F = Data Not Available Bit field Range: Variable Resolution: 1 Used to construct bit fields **DF52** bit(n) Load Sense Enable/Disable Byte Field Size: Bit Field Size: 2 Request Parameter No. 6 00 = [Turn Off, Disable, Reset, Make "0"], **DD003** Generic command pair 01 = [Turn On, Enable, Set, Make "1"], 02 = Reserved,03 = No actionDF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields **Load Sense Power Threshold** Byte Field Size: Bit Field Size: 7 Request Parameter No **DD276** Power, medium (watts) Resolution: 1 W uint16 Range: 0 to 65,532 W DF28 Power 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.

Inverter Configuration Status

PGN: 127511 hex: 1F217

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.

Time interval, .01sec uint16 Range: 0 to 655.32s **DF66**

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 Fra	me: No	Priority Default: 6	Default	Update Rat	te: NA milliseconds Frequency:		Frequency:	NA cycles per second	d
Destinat	ion: Global	Query Support: Yes		ACK Rqmn	nts:				
Field #	Field Nam	ре						Original Reference ID # 13	37
1	1 AGS Instance			Byte Field Size: 1		Bit Field	Size:	Request Parameter Ye	36
	DD005 G	eneric numeric ID, short			Number of route, v	waypoint, event,	mark, etc.		
	DF53 Integer, 8 bit unsigned		uint8	Range:	0 to 252	Resolution	1 bit	Unit-less number	
2	Generator I	nstance		Byte Fie	ld Size: 1	Bit Field	Size:	Request Parameter Ye	36
	DD005 G	eneric numeric ID, short			Number of route, v	waypoint, event,	mark, etc.		
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution	1 bit	Unit-less number	
3	AGS Mode			Byte Fie	ld Size:	Bit Field	Size: 4	Request Parameter N	lc
	DD277 A	GS Mode			0x00 = Off 0x01 = On 0x02 = Automatic 0x03 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not A				
DF52 Bit field		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 Fra		Priority Default: 6	Default	Update Ra		econds Frequency:	NA cycles per second
Destinat Field #	ion: <mark>Globa</mark> Field Na	3		ACK Rqm	nts:		Original Reference ID # 138
1	Battery Ir	nstance Generic numeric ID, short		Byte Fi	eld Size: 1 Number of route, v	Bit Field Size: waypoint, event, mark, etc.	Request Parameter <mark>Yes</mark>
	DF53 The subsection	Integer, 8 bit unsigned quent parameters pertain to this D	uint8 C source.	Ŭ	0 to 252	Resolution: 1 bit	Unit-less number
2	Battery T	'			0x00 = Flooded 0x01 = GEL 0x02 = AGM 0x03 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not A	Bit Field Size: 4	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	Supports Equalization DD002 Generic status pair			Byte Fi	MSB/LSB: 00 = [No, Off, Dis. 01 = [Yes, On, Ena 10 = Error, 11 = [Unavailable,	abled, Set, "1"],	Request Parameter No
	DF52 Indicates if	Bit field the battery supports equalization.	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4	Reserved			Byte Fi	eld Size: Variable number o	Bit Field Size: resv	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
5	Nominal DD284	Voltage Nominal Voltage		Byte Fi	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 A	Bit Field Size: 4	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

Battery Configuration Status

PGN: 127513 hex: 1F219

6	DD285 Battery Chemistry		Byte Field Size: 0x00 = Lead Acid 0x01 = LiIon 0x02 = NiCad 0x03 = ZnO 0x04 = NiMH 0x05 = Reserved thru 0x0D = Reserved 0x0E = Error 0x0F = Data Not Ax	Bit Field Size: 4	Request Parameter No	
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields	
7	Battery Capacity DD283 Battery Capacity (Coulombs)		Byte Field Size: 2	Bit Field Size:	Request Parameter No	
	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 DD138 Generic percent of range		Byte Field Size: 1	Bit Field Size:	Request Parameter No	
	DF30 Percent, Relative measure	int8	Range: +/- 124%	Resolution: 1%		
9	Peukert Exponent DD286 Peukert Exponent		Byte Field Size: 1	Bit Field Size:	Request Parameter No	
	DF101 Peukert Exponent	uint8	Range: 1 - 1.5	Resolution: 0.002		
10	Charge Efficiency Factor DD138 Generic percent of range		Byte Field Size: 1	Bit Field Size:	Request Parameter No	
	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 Bit Field Size: Byte Field Size: 1 Request Parameter Yes 1 **AGS Instance DD005** Generic numeric ID, short Number of route, waypoint, event, mark, etc. Range: 0 to 252 Resolution: 1 bit Unit-less number **DF53** Integer, 8 bit unsigned uint8 Byte Field Size: 1 Bit Field Size: Request Parameter Yes **Generator Instance** 2 Number of route, waypoint, event, mark, etc. **DD005** Generic numeric ID, short Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number Byte Field Size: Bit Field Size: 4 Request Parameter No. 3 **AGS Operating State** 0x00 = Quiet Time**DD278** AGS Operating State 0x01 = Auto On0x02 = Auto Off0x03 = Manual On0x04 = Manual Off0x05 = Generator Shutdown0x06 = External Shutdown 0x07 = Fault0x08 = Suspend0x09 = Not Operating0x0A = Reservedthru 0x0D = Reserved0x0E = Error0x0F = Data Not Available **DF52** Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields **Generator State** Byte Field Size: Bit Field Size: 4 Request Parameter No **DD279** Generator State 0x00 = Preheating0x01 = Start Delay0x02 = Cranking0x03 = Starter Cooling0x04 = Warming Up0x05 = Cooling Down0x06 = Spinning Down0x07 = Shutdown Bypass0x08 = Stopping0x09 = Running0x0A = Stopped0x0B = Crank Delay 0x0C = Reserved0x0D = Reserved0x0E = Error0x0F = Data Not Available **DF52** Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n)

Appendix B.1 - PGN Report

AGS Status PGN: 127514 hex: 1F21A

Bit Field Size: 8 5 **Generator On Reason** Byte Field Size: Request Parameter No 0x00 = Not On**DD280** Generator On Reason 0x01 = DC Voltage Low0x02 = Battery State Of Charge Low 0x03 = AC Current High0x04 = Contact Closed0x05 = Manual On0x06 = Exercise0x07 = Non Quiet Time0x08 = External On Via AGS 0x09 = External On Via Generator 0x0A = Unable to Stop0x0B = Reservedthru 0xFD = Reserved0xFE = Error0xFF = Data Not Available Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Range: Variable **Generator Off Reason** Bit Field Size: 8 Byte Field Size: Request Parameter No 6 0x00 = Not Off**DD281** Generator Off Reason 0x01 = DC Voltage High0x02 = Battery State Of Charge High 0x03 = AC Current Low0x04 = Contact Opened0x05 = Reached Absorption0x06 = Reached Float0x07 = Manual Off0x08 = Max Run Time0x09 = Max Auto Cycle0x0A = Exercise Done0x0B = Quiet Time0x0C = External Off Via AGS 0x0D = Safe Mode0x0E = External Off Via Generator 0x0F = External Shutdown0x10 = Auto Off0x11 = Fault0x12 = Unable to Start0x13 = Reservedthru 0xFD = Reserved0xFE = Error0xFF = Data Not Available Used to construct bit fields DF52 Bit field bit(n) Range: Variable Resolution: 1

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.

-	me: Yes	Priority Default		ault Update Ra	,	liseconds Frequenc	y: 1. cycles per second
Destina Field #	tion: <mark>Globa</mark> Field Na	3 11	Opt'l	ACK Rqmi	nts:		Original Reference ID # 32
1	Sequenc DD056	e ID Sequence ID		Byte Fie	An upward coundifferent PGNs SOG and RAIM	. For example, the SID would	Request Parameter No ed information together between d be used to tie together the COG, 255=no valid position fix to tie it to.
	DF53	Integer, 8 bit unsig	gned uir	nt8 Range:	0 to 252	Resolution: 1 bit	Unit-less number
2	Speed Water Referenced DD044 Generic Speed			Byte Fie	eld Size: 2	Bit Field Size:	Request Parameter No
	DF35	Speed	uin	t16 Range:	0 to 655.32 m/s	Resolution: 1x10E-2	2 m/s 1 Knot = 0.5144 m/s
3	•	round Referenced Generic Speed		Byte Fie	eld Size: 2	Bit Field Size:	Request Parameter No
	DF35 Not for new	Speed designs value to be of	uin otained from PG	•	0 to 655.32 m/s e to be set to Not Ava	Resolution: $1 \times 10E-2$ ailable.	1 Knot = 0.5144 m/s
4	Speed Water Referenced Type DD293 Speed Water Reference Typ			Byte Fie	00 = Paddle WH 01 = Pitot Tube 02 = Doppler L 03 = Correlation 04 = EM Log (I 05 through 128 129 through 25: 253 = Not Supp 254 = Error	og n Log (Ultra-Sound) Electro - Magnetic) Reserved 2 Generic Speed Sources othe orted Change/Not Available	Request Parameter No
	DF52 Added as o	Bit field f version 1.210. Previous	bit ously was reserv		Variable	Resolution: 1	Used to construct bit fields
5	Reserved	l Bits Reserved field		Byte Fie		Bit Field Size: reserved bits, all set to lo	
	DF52 Needed to t	Bit field fill the CAN frame.	bit	(n) Range:	Variable	Resolution: 1	Used to construct bit fields

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.

uie uan	suucei io	the waterline. Negative of	iiset iiuiii	pers brown	de the distance noi	ii iile iialisuucei ic	the part of the keel of interes	ι.
Single Fra	ame: Yes	Priority Default: 3	Default	Update Rat	e: 1,000 millise	conds Frequer	ncy: 1. cycles per secon	nd
Destina	tion: Glob	al Query Support: Opt'l		ACK Rqmn	ts:			
Field#	Field N	lame					Original Reference ID #	60
1	SID			Byte Fie	ld Size: 1	Bit Field Size:	Request Parameter	No
	DD056 Sequence ID				different PGNs . For SOG and RAIM val	or example, the SID wo	lated information together between old be used to tie together the COG, . 255=no valid position fix to tie it to	Э.
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number	
2	Water De	epth, Transducer		Byte Fie	ld Size: 4	Bit Field Size:	Request Parameter	No
	DD162 Water Depth At Transduce				Depth relative to the Range" field.	e transducer location. l	Range of value specified in "Maximu	m
	DF09	Distance	uint32	Range:	0 to ~4.295x10E+7 m	Resolution: 1x10E	2-2 m	
3	Offset			Byte Fie	ld Size: 2	Bit Field Size:	Request Parameter	No
	DD161	Transducer Offset				esent distance from tra tance from the transduc	nsducer to water line and negative cer to the keel.	
	DF46	Distance, signed, medium	int16	Range:	+/- 32.764 m	Resolution: 1x10E	2-3 m	
4	Reserve	d Bits		Byte Fie	ld Size:	Bit Field Size: re	esv 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	s
	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: cycles per second Destination: Global Query Support: Opt'l ACK Ramnts: Original Reference ID # 39 Field # Field Name **Measurement Date** Byte Field Size: 2 Bit Field Size: Request Parameter No. 1 Days since January 1, 1970, Date is relative to UTC Time. **DD039** Generic date Range: 0 to 65,532 days Resolution: 1 day 0 = January 1, 1970, max =**DF41** Date, day count uint16 ~179 years Byte Field Size: 4 2 **Measurement Time** Bit Field Size: Request Parameter No 24 hour clock, 0 = midnight, time is in UTC **DD158** Generic time of day **DF06** Time of day uint32 Range: 0 to 86,401 s Resolution: 1x10E-4 s \sim 24 hours, 0 = midnight, range allows for up to two leap seconds per day Byte Field Size: 4 Bit Field Size: 3 **Total Cumulative Distance** Request Parameter No. **DD120** Distance, voyage Range: 0 to ~4.295x10E+9 m Resolution: 1 m DF11 Distance, long uint32 Byte Field Size: Request Parameter No 4 **Distance Since Last Reset** Bit Field Size: **DD120** Distance, voyage DF11 Distance, long Range: 0 to ~4.295x10E+9 m Resolution: 1 m

Appendix B.1 - PGN Report

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. 1,000 milliseconds Single Frame: No Priority Default: 2 Default Update Rate: Frequency: cycles per second Destination: Global Query Support: Yes ACK Ramnts: Field # Field Name Original Reference ID # 87 Sequence ID Byte Field Size: Bit Field Size: Request Parameter No 1 **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. Range: 0 to 252 Resolution: 1 bit **DF53** Integer, 8 bit unsigned uint8 Unit-less number Byte Field Size: 2 2 Target ID # Bit Field Size: Request Parameter Yes **DD007** Generic numeric ID, medium Number of route, waypoint, event, mark, etc. Resolution: 1 bit Unit-less number **DF54** Integer, 16 bit unsigned uint16 Range: 0 to 65,532 **Track Status** Byte Field Size: Bit Field Size: 4 Request Parameter Yes 3 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 Range: Variable Resolution: 1 Used to construct bit fields bit(n) Byte Field Size: Bit Field Size: 2 Request Parameter No **Bearing Reference** 0 = True,**DD218** Direction reference for target 1 = Magnetic,2 = Error,3 = ReleativeResolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Range: Variable **Reserved Bits** Bit Field Size: resv 2 Byte Field Size: Request Parameter No 5 Variable number of reserved bits, all set to logic "1' **DD001** Reserved field Used to construct bit fields **DF52** Bit field Range: Variable Resolution: 1 bit(n) 2 Bits needed to fill out the byte **Bearing** Byte Field Size: Bit Field Size: Request Parameter No 6 Degrees clockwise relative to True North. DD127 Generic Direction -True Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 DF02 Angle uint16 Range: 0 to 2Pi rad deg = .01745 radByte Field Size: 4 **Distance** Bit Field Size: Request Parameter No 7 **DD115** Distance DF15 Range: $+/-\sim 2.147 \times 10E + 7 \text{ m}$ Resolution: 1x10E-2 m Distance, signed int32 Course Byte Field Size: Bit Field Size: Request Parameter No 8 DD127 Generic Direction -True Degrees clockwise relative to True North. Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 DF₀2 Angle uint16 deg = .01745 rad9 Speed Byte Field Size: 2 Bit Field Size: Request Parameter No **DD044** Generic Speed Resolution: 1x10E-2 m/s 1 Knot = 0.5144 m/s**DF35** Speed uint16 Range: 0 to 655.32 m/s

Tracked Target Data PGN: 128520 hex: 1F608 10 **CPA** Byte Field Size: 4 Bit Field Size: Request Parameter No **DD115** Distance Range: $+/-\sim 2.147 \times 10E + 7 \text{ m}$ Resolution: 1x10E-2 m **DF15** Distance, signed int32 **TCPA** Byte Field Size: 4 Bit Field Size: Request Parameter No 11 **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 Range: $+/- \sim 2.148 \times 10 E + 6 \text{ s}$ Resolution: 1x10E-3 s int32 **UTC of Fix** Byte Field Size: 4 12 Bit Field Size: Request Parameter No **DD158** Generic time of day 24 hour clock, 0 = midnight, time is in UTC **DF06** Time of day Range: 0 to 86,401 s Resolution: 1x10E-4 s \sim 24 hours, 0 = midnight, uint32 range allows for up to two leap seconds per day Byte Field Size: 8 or 16 n 13 Name Bit Field Size: Request Parameter No DD004 Generic name string, short Name of place, route, waypoint, destination, vessel, vehicle, etc. Resolution: 1 ASCII or 2 to 252 bytes. First byte in **DF50** String, variable, short ch8or16(n) Range: 0 to 250 ASCII or string (uint8) is the Count 0 to 125 Unicode 1 Unicode byte indicating the number Characters Character 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 = $0 \Rightarrow$ Unicode characters Control byte = $1 \Rightarrow$ ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

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Reference Target

DF52

DD002 Generic status pair

Bit field

PGN: 128520

Request Parameter No

Used to construct bit fields

Byte Field Size:

Range: Variable

bit(n)

MSB/LSB:

10 = Error

00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"],

11= [Unavailable, Unknown]

Bit Field Size: 2

Resolution: 1

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 Fra	me: Yes		Priority Default:	2	Defau	lt Update Rate	: 100 mill	iseconds	Frequency:	10.	cycles per secon	d	
Destinat	ion: Globa	al	Query Support:	Opt'l		ACK Ramnts	S:						
Field #	Field N	ame								Origin	Original Reference ID # 18		
1	Latitude					Byte Field	d Size: 4	Bit Fie	eld Size:	Req	uest Parameter N	۷o	
	DD022 Latitude, WGS-84												
	DF23	La	titude		int32	Range: +	/- 90 deg	Resolut	tion: 1x10E-7 de	eg "-" = So	outh, resolution ~1.1		
										cm			
2	Longitud	le				Byte Field	Size: 4	Bit Fie	eld Size:	Req	uest Parameter N	۷o	
	DD023 Longitude, WGS-84					Longitude refere	nced to WGS-	84					
	DF25	Lo	ngitude		int32	Range: +	/- 180 deg	Resolut	tion: 1x10E-7 de	eg "-" = W	est, resolution ~1.1		
										cm			

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 Frai	ne: Yes	Priority Default: 2	Default (Update Rat	e: 250 mill	liseconds <i>Frequenc</i> y	/: 4. cycles per second
Destinati	ion: Globa	Query Support: C	Opt'l	ACK Rqmn	ts:		
Field#	Field Na	ame					Original Reference ID # 31
1	SID DD056	Sequence ID		Byte Fiel	An upward cour different PGNs . SOG and RAIM	For example, the SID would	Request Parameter No ed information together between I be used to tie together the COG, 255=no valid position fix to tie it to.
	DF53	Integer, 8 bit unsigne	ed uint8	Range:		Resolution: 1 bit	Unit-less number
2 COG Reference DD117 Direction reference				Byte Fiel	d Size: 0 = True, 1 = Magnetic, 2 = Error, 3 = Null	Bit Field Size: 2	Request Parameter No
	DF52 Bit field		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	DF52	Bits Reserved field Bit field led to fill out the byte	bit(n)	Byte Fiel	Variable number	Bit Field Size: res r of reserved bits, all set to lo Resolution: 1	<u> </u>
4		Over Ground Course-Over-Ground (Angle	COG) uint16	Byte Fiel		Bit Field Size: the path over ground actuall Resolution: 1x10E-4	•
5	•	ver Ground Generic Speed Speed	uint16	Byte Fiel	d Size: 2	Bit Field Size: Resolution: 1x10E-2	Request Parameter No m/s 1 Knot = 0.5144 m/s
6	DF52	d Bits Reserved field Bit field fill the CAN frame.	bit(n)	Byte Fiel	Variable number	Bit Field Size: res r of reserved bits, all set to lo Resolution: 1	

Position Delta, High Precision Rapid Update

hex: 1F803

PGN: 129027

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 Fran	ne: Yes	Priority Default:	2 D	efault Update Rate	: 100 millisecond	s Frequency:	10. cycles pe	r second				
Destinati	ion: <mark>Globa</mark> l	Query Support:	No	ACK Rqmnts	:							
Field #	Field Na	me					Original Reference	e ID # 93				
1	Sequence	ID		Byte Field	l Size: 1	Bit Field Size:	Request Paran	neter 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 unsig	ned 1	iint8 Range: <mark>0</mark>	to 252 Re	esolution: <mark>1 bit</mark>	Unit-less number					
2	Time Delta	a		Byte Field	l Size: 1 E	Bit Field Size:	Request Paran	neter No				
	DD233	Time Value (Short re	esolution 5	msec)								
	DF88	Time Interval, shor	t i	iint8 Range: <mark>0</mark>	to 1.26 sec Re	esolution: <mark>5x10E-3 sec</mark>						
3	Latitude D			Byte Field	I Size: 3	Bit Field Size:	Request Paran	neter No				
	DF89	Latitude, 24 bit	i	nt24 Range: +	/-83 sec (") Re	esolution: 1x10E-5 sec(")					
4 Longitude		e Delta		Byte Field	l Size: 3	Bit Field Size:	Request Paran	neter No				
	DD235 Longitude											
	DF90 Longitude, 24 bit		i	nt24 Range: +	/-83 sec (") Re	esolution: <mark>1x10E-5 sec("</mark>)					

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.

Designation Global Chargy Support No Picel of Name Sequence ID Sequence ID Byte Field Size:	•	me: Yes	Priority Default: 2	Default l	Jpdate Ra		milliseco	onds Frequency:	10.	cycles per second
Sequence ID Byte Field Size: Bit Field Size: Request Parameter No An upward counting number used to it creletate information together between different POSs. For example, the SID would be used to the together between different POSs. For example, the SID would be used to the together between different POSs. For example, the SID would be used to the together the COS, SOG and RAIM values to a given position. 255—no valid position fix to the it to. Range to up 250 for valid position fixs. DF53					ACK Rqn	ints:			Origi	nal Reference ID # 04
An apward counting number used to its related information together between different PCNs. For example, the SID work used to its oppleth 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 fixs. DF53 Integer, 8 bit unsigned uint8 Range: 0 to 250 Resolution: 1 bit Unit-less number DF53 Integer, 8 bit unsigned uint8 Range: 0 to 250 Resolution: 1 bit Unit-less number DD233 Time Value (Short resolution 5 msec) DF88 Time Interval, short uint8 Range: 0 to 1.26 sec Resolution: 5x10F-3 sec 3 GNSS Quality DD067 Quality, GNSS Byte Field Size: Bit Field Size: 4 Request Parameter No DD067 Quality, GNSS Byte Field Size: 8 Bit Field Size: 4 Request Parameter No DD067 Quality, GNSS Byte Field Size: 4 Repulsed Parameter No DD067 Quality, GNSS Byte Field Size: 5 Bit Field Size: 4 Request Parameter No DD067 Quality, GNSS Byte Field Size: 5 Bit Field Size: 4 Request Parameter No DD067 Quality, GNSS Byte Field Size: 5 Bit Field Size: 4 Request Parameter No DD067 Quality, GNSS Byte Field Size: 5 Bit Field Size: 6 Bit Field Size: 6 Bit Field Size: 6 Bit Field Size: 6 Bit Field Size: 7 Bit Field Size: 8 Bit Field Size: 8 Bit Field Size: 8 Bit Field Size: 8 Bit Field Size: 7 Bequest Parameter No DD067 Byte Field Size: 8 Bit Field Size					Dista C	iald Cina. 4		Dit Field Circs		
### DD233 Time Value (Short resolution 5 msec) DP88 Time Interval, short uint8 Range: 0 to 1.26 sec Resolution: 5x10E-3 sec	1	_			Byte Fi	An upward of different PG SOG and RA	Ns . For e	number used to tie related example, the SID would be to a given position. 25:	information be used to tie	together between together the COG,
DD233 Time Value (Short resolution 5 msec) DF88 Time Interval, short		DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252		Resolution: 1 bit	Unit-l	ess number
3 GNSS Quality DD067 Quality, GNSS 0 = no GPS, 1 = GNSS fix, 2 = DCNSS fix, 3 = Precise GNSS s, 4 = RTIK Fixed Integer, 5 = RTIK 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: Used to construct bit fields 1 = Magnetic, 2 = Error, 3 = Null 3 = Null 3 = Null 1 = Magnetic, 2 = Error, 3 = Null 1 = Nul	2			5 msec)	Byte Fi	ield Size: 1		Bit Field Size:	Re	quest Parameter <mark>No</mark>
DD067 Quality, GNSS		DF88	Time Interval, short	uint8	Range:	0 to 1.26 sec		Resolution: 5x10E-3 se	ec	
A Direction DD117 Direction reference Byte Field Size: 0 = True, 1 = Magnetic, 2 = Error, 3 = Null DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields Freserved Bits DD001 Reserved field Variable number of reserved bits, all set to logic "1" DF52 Bit field DF52 Bit field Byte Field Size: Bit Field Size: Bit F	3		•		Byte Fi	0 = no GPS, 1 = GNSS fi 2 = DGNSS 3 = Precise 0 4 = RTK Fix 5 = RTK Flo 6 = Estimate 7 = Manual 8 = Simulate 9-13 = Reser 14 = Error, 15 = Null. * higher resolu	fix, fix, GNSS*, ked Integer oat, ed (DR) m Input, e mode, rved, *Precise G	r, node, SNSS means no deliberate	e degradation	n (such as SA) and
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 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 DD165 Course-Over-Ground (COG) DF02 Angle bit(n) Range: O to 2Pi rad Resolution: 1x10E-4 rad Resolution actually followed by a vessel. Request Parameter No DP165 Resolution actually followed by a vessel.		DF52	Bit field	bit(n)	Range:	Variable			Used	to construct bit fields
5 Reserved Bits DD001 Reserved field DF52 Bit field DD165 Course-Over-Ground (COG) DD165 Course-Over-Ground (COG) DF02 Angle DF02 Angle DF02 Angle DF03 Altitude DD165 DD165 DD165 DD165 DD165 Size: DF03 Altitude DD166	4				Byte Fi	0 = True, 1 = Magneti 2 = Error,	c,	Bit Field Size: 2	Re	quest Parameter <mark>No</mark>
DD001 Reserved field DF52 Bit field Dit(n) Range: Variable number of reserved bits, all set to logic "1" Used to construct bit fields Course Over Ground DD165 Course-Over-Ground (COG) DF02 Angle DF02 Angle DF03 Altitude Byte Field Size: 2 Bit Field Size: Request Parameter No The direction of the path over ground actually followed by a vessel. Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 deg = .01745 rad Request Parameter No DD236 Altitude Byte Field Size: 3 Bit Field Size: Request Parameter No DD236 Altitude		DF52	Bit field	bit(n)	Range:	Variable		Resolution: 1	Used	to construct bit fields
6 Course Over Ground DD165 Course-Over-Ground (COG) DF02 Angle Uint16 Range: O to 2Pi rad Byte Field Size: DF02 Altitude Delta DD236 Altitude Byte Field Size: Bit Field Size: Request Parameter No Resolution: 1x10E-4 rad deg = .01745 rad Byte Field Size: Bit Field Size: Request Parameter No Byte Field Size: Bit Field Size: Request Parameter No Byte Field Size: Request Parameter No Byte Field Size: Bit Field Size: Request Parameter No Byte Field Size: Byte Field Size: Bit Field Size: Bit Field Size: Byte Field Si	5				Byte Fi		mber of re			equest 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 deg = .01745 rad 7 Altitude Delta DD236 Altitude Byte Field Size: 3 Bit Field Size: Request Parameter No		DF52	Bit field	bit(n)	Range:	Variable		Resolution: 1	Used	to construct bit fields
deg = .01745 rad 7 Altitude Delta Byte Field Size: 3 Bit Field Size: Request Parameter No DD236 Altitude	6				Byte Fi		n of the pa			
DD236 Altitude		DF02	Angle	uint16	Range:	0 to 2Pi rad		Resolution: 1x10E-4 ra		0
DF91 Altitude, 24 bit int24 Range: +/-8,388m Resolution: 1x10E-3m	7				Byte Fi	ield Size: 3		Bit Field Size:	Re	quest Parameter <mark>No</mark>
		DF91	Altitude, 24 bit	int24	Range:	+/-8,388m		Resolution: 1x10E-3m	l	

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 Fra	me: No	Priority Default: 3	Default	Update Ra	te: 1,000 mil	lliseconds	Frequency:	1.	cycles per second
Destinat	tion: Globa	Query Support: Opt	t'I	ACK Rqmi	nts:				
Field #	Field Na	ame						Origina	I Reference ID # 19
1	SID DD056	Sequence ID		Byte Fie	An upward coundifferent PGNs	nting number us . For example, I values to a give	Id Size: ed to tie related info the SID would be us en position. 255=no on fixes.	ormation to sed to tie to	ogether the COG,
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resoluti	on: 1 bit	Unit-less	s number
2	Position DD039	date Generic date		Byte Fie	eld Size: 2 Days since Janu	_	Id Size: ate is relative to UT		uest Parameter No
	DF41	Date, day count	uint16	Range:	0 to 65,532 days	Resoluti	on: <mark>1 day</mark>	0 = Janu ~179 ye	ary 1, 1970, max = ars
3	Position DD158	time Generic time of day		Byte Fie	eld Size: 4 24 hour clock, (ld Size: ime is in UTC	Requ	uest Parameter <mark>No</mark>
	DF06	Time of day	uint32	Range:	0 to 86,401 s	Resoluti	on: <mark>1x10E-4 s</mark>	range all	rs, 0 = midnight, lows for up to two onds per day
4	Latitude DD202				eld Size: 8 Latitude referen	_	ld Size:	Requ	uest Parameter No
	DF76	Latitude (Extended)	int64	Range:	+/- 90 deg	Resoluti	on: <mark>1x10E-16 deg</mark>	"-" = So	uth, resolution ~.01 ter
5	Longitud	le Longitude (Extended Res	solution)	Byte Fie	eld Size: 8 Longitude reference		ld Size:	Requ	uest Parameter No
	DF77	Longitude (Extended)	int64	Range:	+/- 180 deg	Resoluti	on: <mark>1x10E-16 deg</mark>	"-" = We	est, resolution ~.01 ter
6	Altitude DD204 DF78	Altitude (Extended Resol Distance (Extended)	ution) int64	·	Altitude referen	ced to WGS-84	on: 1x10E-6 m	Requ	uest Parameter <mark>No</mark>
7	Type of S DD207			Byte Fie		Bit Fie SS ONASS AS(WAAS) AS+GLONASS	ld Size: <mark>4</mark>	Requ	uest Parameter <mark>No</mark>
	DF52	Bit field	bit(n)	Range:	Variable	Resoluti	on: 1	Used to	construct bit fields

GNSS Position Data
PGN: 129029
hex: 1F805

8	Method, GNSS		Byte Fie	ld Size:	Bit Field Size: 4	Request Parameter No
	DD067 Quality, GNSS				degradation (such as SA) and ies are used to correct atmospheric	
	DF52 Bit field Position Fixed Method	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
9	Integrity		Byte Fie	ld Size:	Bit Field Size: 2	Request Parameter No
	DD209 GNSS Integrity			0 = No Integrity c 1 = Safe, 2 = Caution, 3 = Unsafe * means the rece	hecking,* iver does not have this capabi	lity
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
10	Reserved Bits DD001 Reserved field		Byte Fie		Bit Field Size: resv	6 Request Parameter No
	DF52 Bit field 6 Bits needed to fill out the byte	bit(n)	Range:		Resolution: 1	Used to construct bit fields
11	Number of SVs		Byte Fie	ld Size: 1	Bit Field Size:	Request Parameter No
	DD006 Generic counter, short			Numeric count, ev	vent counter, sequence counter	r
	DF53 Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
12	HDOP DD055 DOP		Byte Fie	geometry to positi is being introduce		
	DF69 Ratio, Relative measure	int16	Range:	+/-327.64	Resolution: 1x10E-2	Unit-less number
13	PDOP DD055 DOP		Byte Fie	geometry to positi is being introduce		
	DF69 Ratio, Relative measure	int16	Range:	+/-327.64	Resolution: 1x10E-2	Unit-less number
14	Geoidal Separation DD069 Geoidal Separation		Byte Fie	The difference bet the reference datu	Bit Field Size: tween the earth ellipsoid and r m used in the position solutio ace datum is defined in this pa	
	DF15 Distance, signed	int32	Range:	+/-~2.147x10E+7 m	Resolution: 1x10E-2 m	1
15	Number of Reference Stations DD006 Generic counter, short		Byte Fie		Bit Field Size: vent counter, sequence counte	Request Parameter No
	DF53 Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number

GNSS Position Data PGN: 129029 hex: 1F805

16	Reference Station Type"1" DD070 Ref Station Type		Reference Station Type. 0x0=GPS; 0x1=GLONASS; 0x2 to 0xD=Reserved; 0XE=Error; 0XF=Null		3;	Request Parameter No	
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields	
17	Reference Station ID"1"		Byte Fi	ield Size:	Bit Field Size: 12	Request Parameter No	
	DD071 Ref Station			r as provided by the Service			
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields	
18	Age of DGNSS Corrections "1" DD060 Differential Age		Byte Fi	ield Size: 2 Age of Differen	Bit Field Size:	Request Parameter No	
	DF66 Time interval, .01sec	uint16	Range:	0 to 655.32s	Resolution: 1x10-2sec		
19	Reference Station Type "n"		Byte Fi	ield Size:	Bit Field Size: 4	Request Parameter No	
	DD070 Ref Station Type			Reference Station 0x0=GPS; 0x1=GLONASS 0x2 to 0xD=Res 0XE=Error; 0XF=Null	3;		
	DF52 Bit field Variable Number of fields, Field number 1	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields	
20	Reference Station ID "n" DD071 Ref Station	о гереатец	Byte Fi		Bit Field Size: 12 on ID. Reference Station number ence document required]	Request Parameter No r as provided by the Service	
	DF52 Bit field Variable Number of fields, Field number 1	bit(n) 9 repeated	Range:	Variable	Resolution: 1	Used to construct bit fields	
21	Age of DGNSS Reference Station " DD060 Differential Age	n"	Byte Fi	ield Size: 2 Age of Differen	Bit Field Size: tial corrections	Request Parameter No	
	DF66 Time interval, .01sec	uint16	Range:	0 to 655.32s	Resolution: 1x10-2sec		

Time & Date PGN: 129033 hex: 1F809

This PGN has a single transmission that provides:

- UTC Time
- UTC Date
- Local offset

DF71

Time interval, medium

int16

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: cycles per second Destination: Global Query Support: Opt'l ACK Ramnts: Field # Field Name Original Reference ID # 40 Byte Field Size: 2 Date Bit Field Size: Request Parameter No Days since January 1, 1970, Date is relative to UTC Time. **DD039** Generic date 0 = January 1, 1970, max =**DF41** Date, day count uint16 Range: 0 to 65,532 days Resolution: 1 day ~179 years Byte Field Size: 4 Time Bit Field Size: Request Parameter No 2 **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 \sim 24 hours, 0 = midnight, range allows for up to two leap seconds per day **Local Offset, Minutes** Byte Field Size: 2 Bit Field Size: Request Parameter No 3 **DD121** Time, Local Offset Local offset from UTC to obtain Local Time. This value includes Time Zone, daylight Savings Time, etc.

Range: +/-32,764 minutes

Resolution: 1.0 minute

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 Fra		Priority Default:		Update Rate		lliseconds	Frequency:	NA cycles per second
Field #	tion: <mark>Global</mark> Field Name	Query Support:	NO	ACK Rqmnt.	S."			Original Reference ID # 109
1	Message ID	Message Identifi	er	Byte Field	Message Identif	fier (range of 0 to	d Size: 6 63). M.1371 for more i	Request Parameter No
	1 = Autonomous 2 = Assigned Sc	t field ly Scheduled Positi heduled Position Ro conse to interrogation	eport Message,			Resolutio		Used to construct bit fields
2	Repeat Indicator DD185 AIS Repeater Indicator DF52 Bit field			Byte Field	Used by the rep (range of 0 to 3 0 = Default 1 = First retrans 2 = Second retr 3 = Final retran See the latest v	eater to indicate below. Smission ansmission smission ersion of ITU-R 1	M.1371 for more	
		t field	bit(n)	Range: N		Resolution Bit Field		Used to construct bit fields
3	DF55 In	eric numeric ID, teger, 32 bit unsig mobile station repo	gned uint32	Byte Field Range: (<u> </u>	e, waypoint, even	nt, mark, etc.	Request Parameter No Unit-less number
4	Longitude	gitude, WGS-84	J	Byte Field	d Size: 4 Longitude refer	Bit Field		Request Parameter No
		ongitude bile station reporting	int32 g its position.	Range: +	-/- 180 deg	Resolutio	on: <mark>1x10E-7 deg</mark>	"-" = West, resolution ~1.1 cm
5	Latitude DD022 Lati	tude, WGS-84		Byte Field	d Size: 4 Latitude referen	Bit Field	d Size:	Request Parameter No
		titude e station reporting i	int32 ts position.	Range: +	-/- 90 deg	Resolutio	on: <mark>1x10E-7 deg</mark>	"-" = South, resolution ~1.1 cm
6	Position Accuracy DD184 AIS Position Accuracy		у	Byte Field	0=low accuracy 1=high accurac	y>10m such as no y <10m such as I		
	DF52 Bi	t field	bit(n)	Range: \		ersion of ITU-R N Resolution	M.1371 for more i	Used to construct bit fields
7			nicu	Byte Field		Bit Field n use (default),	d Size: 1	Request Parameter No
					See the latest ve	ersion of ITU-R N	И.1371 for more i	nformation.
	DF52 Bi	t field	bit(n)	Range: \	Variable	Resolutio	on: 1	Used to construct bit fields

PGN: 129038 hex: 1F80E

8	Time Stamp		Byte Fi	ield Size:	Bit Field Size: 6	Request Parameter No
	DD186 AIS Time Stamp			60=time stamp no 61=positioning sy 62=Electronic pos mode,	d when the report was generated, of available (default), vistem is in manual input mode, sition fixing system operates in estable vistem is inoperative	timated (dead reckoning)
				See the latest ver	sion of ITU-R M.1371 for more in	nformation.
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
9	COG DD165 Course-Over-Ground (COG)		Byte Fi	The direction of t	Bit Field Size: he path over ground actually follo	Request Parameter No wed by a vessel.
	DF02 Angle COG of mobile station reporting its position.	uint16	Range:	0 to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
10	SOG DD044 Generic Speed		Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DF35 Speed SOG of mobile station reporting its position.	uint16	Range:	0 to 655.32 m/s	Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s
11	Communication State		Byte Fi	ield Size:	Bit Field Size: 19	Request Parameter No
	DD187 AIS Communication State			allocation algorith	ion State contains information use nms and synchronization informat sion of ITU-R M.1371 for more in	ion formation.
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
12	AIS Transceiver Information DD246 AIS Transceiver Information		Byte Fi	ield Size: 0 = Channel A VI 1 = Channel B VI 2 = Channel A VI 3 = Channel B VI 4 = Own informat 5-31 = Reserved.	DL reception, DL transmission,	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
13	True Heading DD127 Generic Direction -True		Byte Fi	ield Size: 2 Degrees clockwis	Bit Field Size: e relative to True North.	Request Parameter No
	DF02 Angle True Heading of mobile station reporting its p	uint16 position.	Range:	0 to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
14	Rate of Turn DD150 Rate of Turn		Byte Fi	ield Size: 2 + = Bow turning	Bit Field Size: to starboard, 1 deg/min = .00029 r	Request Parameter No
	DF73 Angular rate, signed Rate of turn of mobile station reporting its po	int16	Range:	+/-1.0 rad/s	Resolution: 1/32 x 10E-3 rad/s	Resolution 0.1 deg/min

PGN: 129038 hex: 1F80E

15	Navigational Status			eld 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 sh HS, or MP, or IMO hazard or pollutant category C (HSC), 10 = reserved for future amendment of navigational status for s 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 in	nformation.				
	DF52 Bit fie	eld bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields				
16	Reserved for Reserved	gional Applications ed field	Byte Fi	eld Size: Variable	Bit Field Size: resv 4 e number of reserved bits, all set to logic "1					
	DF52 Bit fie	eld 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 accommodated 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 Fi	eld Size:	Bit Field Size: resv 1	Request Parameter No				
	DD001 Reserve	ed field		Variable	e number of reserved bits, all set to logic "1	"				
	DF52 Bit fie		•	Variable	Resolution: 1	Used to construct bit fields				
	AIS message can al	•	d. Normally	, spare or res	age such that future definition within the erved bits in NMEA 2000 are encoded oded as logic 0's.					

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 Fra		Priority Default: 4	Default	Update Ra		econds Freq	uency: NA cycles per second
	tion: <mark>Global</mark> Field Name	Query Support: No		ACK Rqmi	nts:		Original Reference ID # 122
Field #				Byte Fie	old Sizo:	Bit Field Size	
1	Message ID	Message Identifier		Буце гле		r (range of 0 to 63).	Request Parameter NO
	DD 100 7 Hz	Wiessage Identifier					
				_			for more information.
		it field	bit(n)	_	Variable	Resolution: 1	Used to construct bit fields
		Class B Equipment Position R	eport ivies			50.50.00	
2	Repeat Indic			Byte Fie		Bit Field Size	Request Parameter No any times a message has been repeated
	AIS 681'UU	Repeater Indicator			(range of 0 to 3).	ter to indicate now in	any times a message has been repeated
					0 = Default		
					1 = First retransm	ission	
					2 = Second retrans 3 = Final retransm		
							1 for more information.
	DF52 B	it field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	User ID			Byte Fie		Bit Field Size	, ·
	DD010 Ger	neric numeric ID, large			Number of route,	waypoint, event, mar	
		teger, 32 bit unsigned	uint32	Range:	0 to 4,294,967,292	Resolution: 1 b	it Unit-less number
		f mobile station reporting pos	ition.				
4	Longitude	:		Byte Fie	eld Size: 4 Longitude reference	Bit Field Size	: Request Parameter No
		igitude, WGS-84		-			107 - 1
		ongitude	int32	Range:	+/- 180 deg	Resolution: 1x1	"-" = West, resolution ~1.1
	Longitude of fric	bile station reporting position	•				
5	Latitude			Byte Fie	eld Size: 4	Bit Field Size	: Request Parameter No
	DD022 Lat	itude, WGS-84			Latitude reference	ed to WGS-84	
	DF23 La	atitude	int32	Range:	+/- 90 deg	Resolution: 1x1	0E-7 deg "-" = South, resolution ~1.1
	Latitude of mobi	le station reporting position.					cm
6	Position Acc	uracy		Byte Fie	ald Size:	Bit Field Size	: 1 Request Parameter No
0		Position Accuracy		Dyte i ie			rential GNSS (default),
	22.0. 111.	, 1 05141011 1 10041410 j				<10m such as DGNS	
					See the latest vers	ion of ITU-R M.1371	for more information.
	DF52 B	it field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
7	RAIM-flag			Byte Fie		Bit Field Size	: 1 Request Parameter No
•	DD189 AIS	RAIM-flag		2,10 / 10	$0 = \text{RAIM not in } \iota$		rioquest unameter 110
		Č			1 = RAIM in use		
					See the latest vers	ion of ITU-R M.1371	for more information.
	DF52 B	it field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

PGN: 129039 hex: 1F80F

8	Time Stamp		Byte Fi	eld Size:	Bit Field Size: 6	Request Parameter No
	DD186 AIS Time Stamp		·	0-59=UTC se 60=time starr 61=positionir 62=Electronic mode,	econd when the report was generated, up not available (default), ng system is in manual input mode, c position fixing system operates in esung system is inoperative	
				See the lates	t version of ITU-R M.1371 for more i	nformation.
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
9	COG DD165 Course-Over-Ground (Co	OG)	Byte Fi	eld Size: 2 The direction	Bit Field Size: of the path over ground actually follo	Request Parameter No owed by a vessel.
	DF02 Angle COG of mobile station reporting position	uint16	Range:	0 to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
10	SOG DD044 Generic Speed		Byte Fi	eld Size: 2	Bit Field Size:	Request Parameter No
	DF35 Speed SOG of mobile station reporting position	uint16	Range:	0 to 655.32 m/s	Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s
11	Communication State DD187 AIS Communication State	te	Byte Fi		Bit Field Size: 19 incation State contains information ustorithms and synchronization information	
				See the latest	version of ITU-R M.1371 for more in	formation.
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
	DD246 AIS Transceiver Informa	tion		1 = Channel 1 2 = Channel 2 3 = Channel 1	A VDL reception, B VDL reception, A VDL transmission, B VDL transmission, rmation not broadcast, ved.	
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
13	True Heading DD167 Heading		Byte Fi	expressed in	Bit Field Size: al direction in which a ship actually peangular units from a reference direction clockwise through 359 degrees.	on, usually from 000 at the
	DF02 Angle True heading of mobile station reporting	uint16 g position. A val	_	0 to 2Pi rad 5 indicates that dat	Resolution: 1x10E-4 rad a is not available.	Resolution ~0.0057deg, 1 deg = .01745 rad
14	Reserved for Regional Application DD001 Reserved field	ns	Byte Fi	eld Size: Variable num	Bit Field Size: resv 8 Bit Field Size: resv 8	
	DF52 Bit field This field mirrors the "Reserved for Reg that future definition within the AIS mess in NMEA 2000 are encoded with logic 1 0's.	sage can also b	ns" bit field e accomo	dated within this fie	ld. Normally, spare or reserved bits	Used to construct bit fields
15	Reserved for Regional Application DD001 Reserved field	ns	Byte Fi	eld Size: Variable num	Bit Field Size: resv 2 aber of reserved bits, all set to logic "1	
	DF52 Bit field This field mirrors the "Reserved for Reg that future definition within the AIS mess in NMEA 2000 are encoded with logic 1 0's.	sage can also b	ns" bit field e accomo	dated within this fie	ld. Normally, spare or reserved bits	Used to construct bit fields

PGN: 129039 hex: 1F80F

16	Class B DD294	unit flag AIS ClassB Unit Flag		Byte Fi		Bit Field Size: 1 B SOTDMA unit B "CS" unit	Request Parameter No		
					See the la	test version of ITU-R M.1371 for more is	nformation.		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields		
17	Class B	Display Flag		Byte Fi	eld Size:	Bit Field Size: 1	Request Parameter No		
	DD295 AIS Class B Display Flag				and 14	splay available; not capable of displaying pped with integrated display displaying I			
					See the la	test version of ITU-R M.1371 for more is	nformation.		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields		
18	Class B	DSC Flag		Byte Fi	eld Size:	Bit Field Size: 1	Request Parameter No		
	DD296	AIS Class B DSC Flag				quipped with DSC function upped with DSC function (dedicated or tin	ne-shared)		
					See the la	test version of ITU-R M.1371 for more is	nformation.		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields		
19	Class B	Band Flag		Byte Fi	eld Size:	Bit Field Size: 1	Request Parameter No		
	DD297	AIS Class B Band Flag			1 = Capal	ble of operating over the upper 525 kHz lole of operating over the whole marine bath 22 flag" is 0)			
					See the la	test version of ITU-R M.1371 for more is	nformation.		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields		
20		Msg 22 Flag		Byte Fi	eld Size:	Bit Field Size: 1	Request Parameter No		
	DD298	AIS Class B Msg 22 Flag				equency management via Message 22, o ency management via Message 22	perating on AIS1 and AIS2 only		
					See the la	test version of ITU-R M.1371 for more i	nformation.		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields		
21	Mode Fla	ag		Byte Fi	eld Size:	Bit Field Size: 1	Request Parameter No		
	DD299	AIS Mode Flag				on operating in autonomous mode = defau on operating in assigned mode	ılt		
			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		nication State Selector Flag		•	eld Size:	Bit Field Size: 1	Request Parameter No		
	DD245	AIS Communication State Se	lctor Flag			MA communication state, A communication state follows.			
					See the la	test version of ITU-R M.1371 for more is	nformation.		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields		

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 Fra		Priority Default: 4	Default	Update Ra		liseconds	Frequency:	NA cycles per second			
Destina. F ield #	tion: <mark>Global</mark> Field Nam	Query Support: No		ACK Rqmi	nts:			Original Reference ID # 123			
	Message ID			Byte Fie	ald Size:	Rit Eid	eld Size: 6	Request Parameter No			
1	_	IS Message Identifier		Буте гте	Message Identif			Request Parameter NO			
	22.00	is message racinities			See the latest version of ITU-R M.1371 for more information.						
	DE53	D:4 C:-1.1	1.4()	Panga:							
		Bit field I Class B Equipment Position	bit(n) Report	Kange.	Variable	Resolut	1011.	Used to construct bit fields			
2	Repeat Indi	• •	Кероп	Byte Fie	ald Size:	Rit Fid	eld Size: 2	Request Parameter No			
2	-	IS Repeater Indicator		Dyto 110		eater to indicat		message has been repeated			
					0 = Default 1 = First retrans 2 = Second retra 3 = Final retrans	ansmission smission					
	DE53	Bit field	1.4()	Panga:		Resolut	R M.1371 for more	Used to construct bit fields			
	DF52 User ID	bit field	bit(n)		Variable	•	eld Size:				
3		eneric numeric ID, large		Byte Fie	eld Size: 4 Number of route			Request Parameter No			
		Integer, 32 bit unsigned	uint32	Range:	0 to 4,294,967,292		tion: 1 bit	Unit-less number			
		of mobile station reporting po		3.	0 10 1,25 1,507,252		1 Oil				
4	Longitude	1 31		Byte Fie	eld Size: 4	Bit Fie	eld Size:	Request Parameter No			
	DD023 Lo	ongitude, WGS-84			Longitude refere	enced to WGS-	84				
		Longitude nobile station reporting position	int32 on.	Range:	+/- 180 deg	Resolut	tion: 1x10E-7 deg	"-" = West, resolution ~1.1 cm			
5	Latitude			Byte Fie	eld Size: 4	Bit Fie	eld Size:	Request Parameter No			
·		atitude, WGS-84			Latitude referen						
	DF23	Latitude	int32	Range:	+/- 90 deg	Resolut	tion: 1x10E-7 deg	"-" = South, resolution ~1.1			
	Latitude of mo	bile station reporting position						cm			
6	Position Ad	CUITACV		Byte Fie	ald Size:	Rit Eid	eld Size: 1	Request Parameter No			
Ü		IS Position Accuracy		Dyle 11e		>10m such as a	nondifferential GNS				
					See the latest ve	rsion of ITU-R	M.1371 for more i	nformation.			
	DF52	Bit field	bit(n)	Range:	Variable	Resolut		Used to construct bit fields			
7	RAIM-flag		320(23)	Byte Fie		Bit Fie	eld Size: 1	Request Parameter No			
•	DD189 AIS RAIM-flag			2,10	0 = RAIM not in 1 = RAIM in use	n use (default),		rioquoser anameter <mark>110</mark>			
					See the latest ve	rsion of ITU-R	M.1371 for more i	nformation.			
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	tion: 1	Used to construct bit fields			

PGN: 129040 hex: 1F810

8	Time Stamp DD186 AIS Time Stamp		Byte Fi	60=ti 61=pe 62=E mode 63=pe	me stamp not a ositioning syste lectronic position, ositioning syste	m is inoperative	estimated (dead reckoning)
	DE52 D: C 11	1.47	Dangar		he latest version	n of ITU-R M.1371 for mor	
	DF52 Bit field	bit(n)		Variable		Resolution: 1	Used to construct bit fields
9	COG DD165 Course-Over-Ground (COG)		Byte Fi		irection of the	Bit Field Size: path over ground actually for	Request Parameter No llowed by a vessel.
	DF02 Angle COG of mobile station reporting position.	uint16	Range:	0 to 2Pi 1		Resolution: 1x10E-4 rad	
10	SOG DD044 Generic Speed		Byte Fi	eld Size:	2	Bit Field Size:	Request Parameter No
	DF35 Speed SOG of mobile station reporting position.	uint16	Range:	0 to 655.	32 m/s	Resolution: 1x10E-2 m	$\frac{7}{8}$ 1 Knot = 0.5144 m/s
11	Reserved for Regional Applications DD001 Reserved field		Byte Fi	<i>eld Size:</i> Varia	ble number of 1	Bit Field Size: resverseserved bits, all set to logic	8 Request Parameter No
	DF52 Bit field This field mirrors the "Reserved for Regional that future definition within the AIS message in NMEA 2000 are encoded with logic 1's, he 0's.	can also b	ns" bit field e accomo	dated withir	n this field. Norr	nally, spare or reserved bits	
12	Reserved for Regional Applications DD001 Reserved field		Byte Fi	<i>eld Size:</i> Varia	ble number of 1	Bit Field Size: resverseserved bits, all set to logic	4 Request Parameter No
	DF52 Bit field This field mirrors the "Reserved for Regional that future definition within the AIS message in NMEA 2000 are encoded with logic 1's, he 0's.	can also b	ns" bit field e accomo	dated withir	n this field. Norr	nally, spare or reserved bits	
13	NMEA 2000 Reserved DD001 Reserved field		Byte Fi	eld Size: Varia	ble number of t	Bit Field Size: resv	4 Request Parameter No
	DF52 Bit field Used to align subsequent data on byte boun	bit(n) dary.	Range:	Variable		Resolution: 1	Used to construct bit fields
14	Ship/Cargo Type DD193 Ship/Cargo Type	j	Byte Fi	1-99= 100-1	(See the latest 99=Reserved f	Bit Field Size: 8 to ship (default), version of ITU-R M.1371 Sor Regional (See the latest version future (See the latest version)	
	DF52 Bit field	bit(n)	Range:	Variable		Resolution: 1	Used to construct bit fields
15	True Heading DD165 Course-Over-Ground (COG)		Byte Fi		irection of the p	Bit Field Size: path over ground actually for	Request Parameter No llowed by a vessel.
	DF02 Angle True Heading of mobile station reporting its	uint16 position.	Range:	0 to 2Pi 1		Resolution: 1x10E-4 rad	
16	NMEA 2000 Reserved DD001 Reserved field		Byte Fi	<i>eld Size:</i> Varia	ble number of 1	Bit Field Size: resv	4 Request Parameter No
	DF52 Bit field Used to align subsequent data on byte boun	bit(n) dary.	Range:	Variable		Resolution: 1	Used to construct bit fields

PGN: 129040 hex: 1F810

17		Type of Electronic Positioning Device DD191 AIS Electronic Positioning Device		1 = GPS, 2 = GLONASS, 3 = Combined GPS/4 4 = Loran-C, 5 = Chayka, 6 = Integrated Navig 7 = Surveyed (Base : 8 = Galilieo 9-15 = Reserved for			LONASS, tion System, tation),	Request Parameter No	
	DF52	Bit field	bit(n)	Range:	See the Variable	latest version	of ITU-R M.1371 for more in Resolution: 1	Used to construct bit fields	
18		Distance, medium		Byte Fi	eld Size: 2 Depend	lent upon PG F	Bit Field Size:	Request Parameter No	
	DF75 Length of n	Distance, Medium nobile station reporting its position		•	0 to 6553.2		Resolution: 1x10E-1 m		
19	Ship Bea	· · · · · · · · · · · · · · · · · · ·		Byte Fi	eld Size: 2	lent upon PG F	Bit Field Size: Field definition. Resolution: 1x10E-1 m	Request Parameter No	
		obile station reporting its position		Ŭ					
20	DD194 DF75	Reference Point from Starbo Distance, medium Distance, Medium Ference point from starboard side able.	uint16	Range:	0 to 6553.2	lent upon PG F 2 m	Bit Field Size: Field definition. Resolution: 1x10E-1 m f 65535 indicates that data	Request Parameter No	
21		Reference Point aft of Ship's Distance, medium	s Bow		•	lent upon PG F	Bit Field Size: Field definition.	Request Parameter No	
	DF75 Position refines not available	Distance, Medium ference point from aft of ship's bo able.	uint16 w of mobile	_	to 6553.2 porting its po		Resolution: 1x10E-1 m of 65535 indicates that data		
22	Name DD192	Generic String, ASCII, Fixed	l length	Byte Fi	eld Size: <mark>C</mark> Length		Bit Field Size: GN field definition.	Request Parameter No	
	DF63 This is a 20	String, fixed O character string, see ITU-R M.1			0 to 1,785 ation.	characters	Resolution: 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary	
23		minal Equipment (DTE) Data Terminal Equipment (D	OTE)	Byte Fi	eld Size: 0=Avai 1=not a	lable, wailable.	Bit Field Size: 1	Request Parameter No	
	DF52	Bit field	h:4()	Range:	See the Variable	latest version	of ITU-R M.1371 for more in Resolution: 1	formation. Used to construct bit fields	
24	Mode Fla		bit(n)		eld Size: 0 = Stat 1 = Stat	tion operating	Bit Field Size: 1 in autonomous mode = defau in assigned mode	Request Parameter No It	
	DESA	DE52 Die Gold			See the latest Range: Variable		of ITU-R M.1371 for more in		
	DF52	Bit field	bit(n)	Range:	variable		Resolution: 1	Used to construct bit fields	

AIS Class B Extended Position Report

PGN: 129040 hex: 1F810

Bit Field Size: resv 4 25 **Spare** Byte Field Size: Request Parameter No

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

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

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 Transceiver Information Byte Field Size: Bit Field Size: 5 Request Parameter No. 26

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

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 PC	SN will normally be	e requested as r	needed.				
Single Fra	ame: No	Priority Default:	6 Default U	Jpdate Ra	nte: 10,000 milli	seconds	Frequency:	.1 cycles per second
Destina Field #	tion: <mark>Global</mark> Field Nan	Query Support: ne	Opt'l	ACK Rqm	nts:			Original Reference ID # 20
1	Local Datu DD068 D			Byte Fie	4-character code The datum's are of	defined in the IHO are the datum ID a ivision code. A s	rrently being outp O Publication S-6 as per the IHO tal	Request Parameter No out for the position solution. 60, Appendices B and C. The bles. The fourth char is the stee datum or subdivision
	DF63	String, fixed	char8(n)	Range:	0 to 1,785 character	<mark>rs Resolution</mark>	: <mark>1 char</mark>	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
2	Delta Latitu	ıde		Byte Fie	eld Size: 4	Bit Field	Size:	Request Parameter No
	DD106 L	atitude, Offset						datum is offset from the dicated: Plocal datum = Pref
	DF23 '+' is North	Latitude	int32	Range:	+/- 90 deg	Resolution	1x10E-7 deg	"-" = South, resolution ~1.1 cm
3	Delta Long DD107 L	itude ongitude, Offset		Byte Fie			tion in the local	Request Parameter No datum is offset from the dicated: Plocal datum = Pref
	DF25 '+' is East	Longitude	int32	Range:	+/- 180 deg	Resolution	1x10E-7 deg	"-" = West, resolution ~1.1 cm
4	Delta Altitu			Byte Fie	eld Size: 4	Bit Field	Size:	Request Parameter No
	DF15 '+' is Up	Distance, signed	int32	Range:	+/-~2.147x10E+7 n	m Resolution	1x10E-2 m	
5	Reference DD068 D			Byte Fie	4-character code The datum's are of	defined in the IHO are the datum ID a ivision code. A n	rrently being outp O Publication S-6 as per the IHO tal	Request Parameter No put for the position solution. 50, Appendices B and C. The bles. The fourth char is the set the datum or subdivision
	DF63	String, fixed	char8(n)	Range:	0 to 1,785 character	<mark>rs Resolution</mark>	: 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary

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: Field # Field Name Original Reference ID # 21 Byte Field Size: 4 Bit Field Size: Request Parameter No. 1 Delta X Delta Shift in X, Y, or Z axis from WGS 84. **DD108** Axis Delta shift Distance, signed Range: $+/-\sim 2.147 \times 10E + 7 \text{ m}$ Resolution: 1x10E-2 m **DF15** int32 2 Delta Y Byte Field Size: 4 Bit Field Size: Request Parameter No **DD108** Delta Shift in X, Y, or Z axis from WGS 84. Axis Delta shift Range: $+/-\sim 2.147 \times 10E + 7 \text{ m}$ Resolution: 1x10E-2 m **DF15** Distance, signed int32 Byte Field Size: 4 Delta Z Bit Field Size: Request Parameter No 3 Delta Shift in X, Y, or Z axis from WGS 84. **DD108** Axis Delta shift **DF15** int32 Range: $+/-\sim 2.147 \times 10E + 7 \text{ m}$ Resolution: 1x10E-2 m Distance, signed Byte Field Size: 4 Rotation in X Bit Field Size: Request Parameter No 4 **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. Resolution: Floats, radian **DF70** Angle, tiny float32 Range: Variable radians Byte Field Size: 4 5 Rotation in Y 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. Range: Variable radians Resolution: Floats, radian **DF70** Angle, tiny float32 6 Rotation in Z Byte Field Size: 4 Bit Field Size: Request Parameter No. Rotational shift in X, Y, or Z axis from WGS 84. Rotations presented use the **DD109** Axis Rotational shift 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 Scale Byte Field Size: 4 Bit Field Size: Request Parameter No. 7 DD110 Scale Scale factor expressed in parts-per-million 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. Semi-major axis (a) of the User Datum ellipsoid. **DD111** Ellipsoid Semi-major Axis **DF15** Distance, signed Range: $+/-\sim 2.147 \times 10E + 7 \text{ m}$ Resolution: 1x10E-2 m int32 Byte Field Size: 4 **Ellipsoid Flattening Inverse** Bit Field Size: Request Parameter No. 9 **DD112** Ellipsoid Flattening Inverse Flattening (1/f) of the user Datum ellipsoid. Resolution: Floats Unit-less number **DF49** Ratio. Relative measure float32 Range: Variable Byte Field Size: Bit Field Size: Request Parameter No. 10 **Datum Name** 4-character code for the datum currently being output for the position solution. DD068 Datum 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. Resolution: 1 char char8(n) Range: 0 to 1,785 characters 0 to 1,785 bytes. Character **DF63** String, fixed count not included, length is specified by application in Data Dictionary

Cross Track Error PGN: 129283

hex: 1F903

	cycles per second
Destination: Global Query Support: Opt'l ACK Ramnts:	
3 11	Reference ID # 34
1 SID Byte Field Size: An upward counting number used to tie related information togodifferent PGNs. For example, the SID would be used to tie togo SOG and RAIM values to a given position. 255=no valid position Range 0 to 250 for valid position fixes.	gether the COG,
DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less n	number
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	est Parameter No
DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to co	onstruct bit fields
· ·	est Parameter <mark>No</mark>
DD001 Reserved field Variable number of reserved bits, all set to logic "1"	
DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to co 2 Bits needed to fill out the byte	onstruct bit fields
4 Navigation Terminated DD002 Generic status pair MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error, 11 = [Unavailable, Unknown]	est Parameter No
Flag should be set as follows: NO - when Navigation is running normally, YES - In the last PGN when Navigation was Terminated (manually or automatically),	onstruct bit fields
ERROR - in case of a navigation error, UNAVAIL - if flag is not supported.	
5 XTE Byte Field Size: 4 Bit Field Size: Reque- DD114 XTE Cross-track-error of a route. "-" = Left of track, need to steer rig	est Parameter No ight
DF15 Distance, signed int32 Range: +/-~2.147x10E+7 m Resolution: 1x10E-2 m	
	est 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 co	onstruct 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.

-	me: No		efault: 3	Default	Update Ra		liseconds	Frequency:	1.	cycles per second
Destina i eld #	tion: <mark>Globa</mark> Field Na		oport: Opt'l		ACK Rqm	nnts:			Origina	al Reference ID # 3
1	SID DD056	Sequence ID			Byte Fi		For example, to values to a give	ed to tie related in the SID would be no position. 255	nformation t used to tie t	uest Parameter Nogether between ogether the COG, sition fix to tie it to.
	DF53	Integer, 8 bit	unsigned	uint8	Range:	0 to 252	Resolution	on: 1 bit	Unit-les	s number
2		to Destination Distance, Unsignature			Byte Fi	eld Size: 4	Bit Fiel	ld Size:	Req	uest Parameter <mark>N</mark> o
	DF09	Distance		uint32	Range:	0 to ~4.295x10E+7	<mark>7 m</mark> Resolution	on: <mark>1x10E-2 m</mark>		
3		Bearing Ref. Direction refere	ence		Byte Fi	eld Size: 0 = True, 1 = Magnetic, 2 = Error, 3 = Null	Bit Fiel	ld Size: 2	Req	uest Parameter <mark>N</mark> o
	DF52	Bit field		bit(n)	Range:	Variable	Resolution	on: 1	Used to	construct bit fields
4	•	cular Crossed Generic status p	oair		Byte Fi	eld Size: MSB/LSB: 00 = [No, Off, E 01 = [Yes, On, F 10 = Error, 11 = [Unavailabl	Disabled, Reset, Enabled, Set, "1	_	Req	uest Parameter <mark>N</mark> o
	DF52	Bit field		bit(n)	Range:	Variable	Resolution	on: 1	Used to	construct bit fields
5		i rcle Entered Generic status p	air		Byte Fi	MSB/LSB: 00 = [No, Off, Down of the content of the	Disabled, Reset, Enabled, Set, "1		Req	uest Parameter <mark>N</mark> o
	DF52	Bit field		bit(n)	Range:	Variable	Resoluti	on: 1	Used to	construct bit fields
6	Calculati DD119	on Type Calculation Typ	oe		Byte Fi	old Size: 0 = Great Circle 1 = Rhumb Line 2 = Error, 3 = Null	calculations,	ld Size: 2	Req	uest Parameter <mark>N</mark> i
	DF52	Bit field		bit(n)	Range:	Variable	Resoluti	on: 1	Used to	construct bit fields
7	ETA Time	Generic time of	day		Byte Fi	teld Size: 4 24 hour clock, 0	•	ld Size: me is in UTC	Req	uest Parameter <mark>N</mark> o
	DF06	Time of day		uint32	Range:	0 to 86,401 s	Resolutio	on: <mark>1x10E-4 s</mark>	range al	ars, 0 = midnight, lows for up to two onds per day
8	ETA Date	Generic date			Byte Fi	ield Size: 2 Days since Janu	4	Id Size:	,	uest Parameter N
	DF41	Date, day cou	nt	uint16	Range:	0 to 65,532 days	•	on: 1 day		nary 1, 1970, max =

Navigation Data PGN: 129284 hex: 1F904

9	Bearing, Origin To Destination Waypoint DD164 Bearing	angular distance f	Byte Field Size: Bit Field Size: Request Parameter No 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 uint10	6 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	angular distance f	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 uint10	6 Range: 0 to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad						
11	Origin Waypoint Number DD010 Generic numeric ID, large	Byte Field Size: 4 Number of route,	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No						
	DF55 Integer, 32 bit unsigned uint3 2 Applies to current route and at this time is limited to	- , , ,	Resolution: 1 bit	Unit-less number						
12	Destination Waypoint Number DD010 Generic numeric ID, large	Byte Field Size: 4 Number of route,	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No						
	DF55 Integer, 32 bit unsigned uint3 2 Applies to current route and at this time is limited to	, , ,	Resolution: 1 bit	Unit-less number						
13	Destination Wpt Latitude DD022 Latitude, WGS-84	Byte Field Size: 4 Latitude reference	Bit Field Size: ed to WGS-84	Request Parameter No						
	DF23 Latitude int32	Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm						
14	Destination Wpt Longitude DD023 Longitude, WGS-84	Byte Field Size: 4 Longitude reference	Bit Field Size: ced to WGS-84	Request Parameter No						
	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		present ahead or starboard transver port transverse speed.	erse speed and negative values						
	DF87 Speed, signed - large int16	Range: +/- 327.66 m/s (+/- 636 knots)	Resolution: 1x10E-2 m/s							
	Positive value indicates approaching Wpt, negative i	ndicates moving away from Wpt								

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 Fra		Priority Detault: 6	Default	Update Rate		iseconds Fr	equency:	NA cycles per second
Desilila Field #	tion: <mark>Global</mark> Field Nam	Query Support: No		ACK Rqmnts	S.*			Original Reference ID # 105
1	Start RPS#	eneric numeric ID, medi	um	Byte Field		Bit Field S.	ize:	Request Parameter No
		Integer, 16 bit unsigned equence Number (RPS#) o	uint16 f the Origin V	Range: 0		Resolution: 1		Unit-less number
2	nltems DD007 G	eneric numeric ID, medi	um	Byte Field		Bit Field S.e., waypoint, event, n		Request Parameter <mark>Yes</mark>
	n RPS#'s requ	Integer, 16 bit unsigned lested/sent. I in the request, the default	uint16 is n = 2.	Range: 0	to 65,532	Resolution:]	l bit	Unit-less number
3	Database II	eneric numeric ID, medi	um	Byte Field		Bit Field S.e., waypoint, event, n		Request Parameter No
	DF54	Integer, 16 bit unsigned	uint16	Range: 0	to 65,532	Resolution:	l bit	Unit-less number
4	Route ID DD007 G	eneric numeric ID, medi	um	Byte Field		Bit Field S., waypoint, event, n		Request Parameter No
	DF54	Integer, 16 bit unsigned	uint16	Range: 0	to 65,532	Resolution:	l bit	Unit-less number
5	_	direction in route avigation Direction		Byte Field	d Size: 0=Forward, 1=Reverse, 2-5 Reserved, 6= Error, 7=Null (info not	Bit Field S.	ize: <mark>4 </mark>	Request Parameter No
	DF52	Bit field	bit(n)	Range: \	/ariable	Resolution:	[Used to construct bit fields
	Forward=incre	easing Route Point Sequence	ce Number (F	RPS#)				
6		tary Route/WP data ava eneric status pair	iilable	Byte Field	MSB/LSB: 00 = [No, Off, Γ	Bit Field S. Disabled, Reset, "0"] Enabled, Set, "1"], de, Unknown]	<u> </u>	Request Parameter No
	YES=there are	Bit field e supplementary data availa ID, Route ID, WPID/RPS# y data.		Range: \textsquare\tex		Resolution: 5		Used to construct bit fields
7	Reserved b	its eserved field		Byte Field		Bit Field So r of reserved bits, al		Request Parameter No
	DF52	Bit field	bit(n)	Range: 🐧	/ariable	Resolution:	[Used to construct bit fields
			-					

Navigation - Route/WP information

PGN: 129285 hex: 1F905

8	Route Na	ime	Byte Fi	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		
	Max 30 ASO	CII or Unicode Characters				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.		
9	Reserved	Reserved field	Byte Fi	eld Size: Variable number of re	Bit Field Size: resv 8			
	DF52	Bit field	bit(n) Range:	Variable	Resolution: 1	Used to construct bit fields		
10	WPID DD007	Generic numeric ID, mediu		eld Size: 2 Number of route, way	Bit Field Size: ypoint, event, mark, etc.	Request Parameter No		
		Integer, 16 bit unsigned valid data if the Waypoint exist	s in the WP-List.	0 to 65,532	Resolution: 1 bit	Unit-less number		
		ints shall be included in the ord			1			
11	WP Name DD004	Generic name string, short	Byte Fi	Name of place, route	Bit Field Size: , waypoint, destination, vessel	Request Parameter No		
	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,		
	Max. 30 AS	CII or Unicode Characters				including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.		
12	WP Latitu	ude Latitude, WGS-84	Byte Fi	eld Size: 4 Latitude referenced to	Bit Field Size:	Request Parameter No		
	DF23	Latitude	int32 Range:	+/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm		

Navigation - Route/WP information PGN: 129285 hex: 1F905 Byte Field Size: 4 Bit Field Size: 13 **WP Longitude** Request Parameter No Longitude referenced to WGS-84 DD023 Longitude, WGS-84 "-" = West, resolution ~1.1 Resolution: 1x10E-7 deg DF25 Longitude int32 Range: +/- 180 deg Byte Field Size: ? 14 Fields 10 thru 13 repeat as needed Bit Field Size: Request Parameter No **DD000** Undefined Application specific, defined at time of use Resolution: undefined **DF00** Undefined Undefined Range: undefined Application specific, defIned

PGN: 129285

at time of use.

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 Fra	ame: Yes	Priority Default: 3	Default (Update Rate	e: 1,000 mill	iseconds Fre	quency:	1. 0	cycles per second	
Destina	tion: Globa	Query Support: Opt'l		ACK Ramnt	'S:					
Field #	Field Na	ame						Original	Reference ID # 33	
1	SID			Byte Field	d Size: 1	Bit Field Siz	e:	Reque	est Parameter <mark>No</mark>	
	DD056	Sequence ID			different PGNs . SOG and RAIM	ting number used to For example, the SII values to a given pos for valid position fixe	D would be us ition. 255=no	ed to tie tog	gether the COG,	
	DF53	Integer, 8 bit unsigned	uint8	Range: () to 252	Resolution: 1	bit	Unit-less	number	
2	Set Reference			Byte Field Size:		Bit Field Siz	e: <mark>2</mark>	Request Parameter No		
	DD117	117 Direction reference			0 = True, 1 = Magnetic, 2 = Error, 3 = Null					
	DF52	Bit field	bit(n)	Range: \	Variable	Resolution: 1		Used to c	onstruct bit fields	
3	Reserved Bits DD001 Reserved field			Byte Field Size: Variable number of		Bit Field Size of reserved bits, all		•	Request Parameter No	
	DF52 6 Bits need	Bit field led to fill out the byte	bit(n)	Range: \	Variable	Resolution: 1		Used to co	onstruct bit fields	
4	Set	•		Byte Field	d Size: 2	Bit Field Siz	e:	Reque	est Parameter No	
	DD048 Current flow direction			Direction towards which current flows. Degrees relative to True North.						
	DF02	Angle	uint16	Range: (to 2Pi rad	Resolution: 13	x10E-4 rad	Resolution deg = .01	n ~0.0057deg, 1 745 rad	
5	Drift DD044	Generic Speed		Byte Field	d Size: 2	Bit Field Siz	e:	Reque	est Parameter No	
	DF35	Speed	uint16	Range: () to 655.32 m/s	Resolution: 13	x10E-2 m/s	1 Knot =	0.5144 m/s	
6	Reserved Bits			Byte Field			e: resv 16	_	est Parameter No	
	DD001	Reserved field			Variable number	of reserved bits, all	set to logic "1"			
	DF52 Needed to	Bit field fill the CAN frame.	bit(n)	Range: \	Variable	Resolution: 1		Used to co	onstruct bit fields	

Time to/from Mark PGN: 129301 hex: 1F915

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

Single Fra	me: No	Priority Default: 3	Default	Update Rat	e: 1,000 millis	econds <i>Frequenc</i> y	/: 1. cycles per second
Destina	tion: Globa	al Query Support: Opt'l		ACK Rqmn	ts:		
Field#	Field N	ame					Original Reference ID # 41
1	SID DD056	Sequence ID		Byte Fie	An upward counting different PGNs . F	For example, the SID would	Request Parameter No ed information together between d be used to tie together the COG, 255=no valid position fix to tie it to.
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
2		psed (from) or to-go to mark Time-elapsed/Time-to-go	(Byte Fie	Id Size: 4 Time interval in m event.	Bit Field Size: illi-sec. "-" = time elapse	Request Parameter No d since event, "+" = time to go before
	DF40	Time interval, signed, sta	int32	Range:	+/- ~2.148x10E+6 s	Resolution: 1x10E-3	S
3	Mark Typ DD122	oe Mark Type		Byte Fie	1d Size: 0 = Collision, 1 = Turning Poi 2 = Reference (g 3 = Wheelover, 4 = Waypoint, 5-13 = Reserved, 14 = Error, 15 = Null		Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4	Reserved DD001 DF52	d Bits Reserved field Bit field	bit(n)	Byte Fie Range:	Variable number o	Bit Field Size: res of reserved bits, all set to lo Resolution: 1	· ·
		ded to fill out the byte	DIL(II)		. 414010		
5	Mark ID DD010	Generic numeric ID, large		Byte Fie		Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	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 F	PGN w	ill normally b	e reque	sted as	needed.		,	
Single Fr	ame: No		Priority Default:	6	Default	Update Ra		conds Frequency:	NA cycles per second
	ation: Globa		Query Support:	Opt'l		ACK Rqmi	nts:		
Field #	Field Na	ame							Original Reference ID # 38
1	SID DD056	Seque	nce ID			Byte Fie	different PGNs . For	example, the SID would be use to a given position. 255=	Request Parameter Nonformation together between used to tie together the COG, eno valid position fix to tie it to.
	DF53	Integ	er, 8 bit unsig	gned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
2	Bearing F	Ref.				Byte Fie	eld Size:	Bit Field Size: 2	Request Parameter No
	DD117	Directi	on reference				0 = True, 1 = Magnetic, 2 = Error, 3 = Null		
	DF52	Bit fi	eld		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	Calculati	on Typ	е			Byte Fie	eld Size:	Bit Field Size: 2	Request Parameter No
	DD119	Calcul	ation Type				0 = Great Circle calc 1 = Rhumb Line calc 2 = Error, 3 = Null		
	DF52	Bit fi	eld		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4	Reserved		ed field			Byte Fie	eld Size: Variable number of 1	Bit Field Size: resverseserved bits, all set to logic	Request Parameter No
	DF52 4 Bits need	Bit fi	eld out the byte		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
5	Bearing, DD164	_	To Destinatio	on		Byte Fie		m a reference direction, measure	Request Parameter No rom another, expressed as the sured from 000 at the reference
	DF02	Angl	e		uint16	Range:	0 to 2Pi rad	Resolution: 1x10E-4 rac	Resolution ~0.0057deg, 1 deg = .01745 rad
6	Distance DD199		ce, Unsigned			Byte Fie	eld Size: 4	Bit Field Size:	Request Parameter No
	DF09	Dista	nce		uint32	Range:	0 to ~4.295x10E+7 m	Resolution: 1x10E-2 m	
7	Origin Ma					Byte Fie	old Size: 0 = Collision, 1 = Turning Point, 2 = Reference (get) 3 = Wheelover, 4 = Waypoint, 5-13 = Reserved, 14 = Error, 15 = Null		Request Parameter No
	DF52	Bit fi	eld		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

Bearing and Distance between two Marks

PGN: 129302 hex: 1F916

8	Destination Mark Type		Byte Field Size:	Bit Field Size: 4	Request Parameter No
	DD122 Mark Type		0 = Collision, 1 = Turning Poi 2 = Reference (g 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, v	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, v	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 **SV Elevation Mask** Byte Field Size: 2 Bit Field Size: Request Parameter No 1 Angle above or below the horizon. -90° to +90°; negative below the horizon **DD054** Elevation Resolution: 1x10E-4 rad Resolution ~0.0057deg DF04 Angle, signed int16 Range: +/-Pi rad Do not use satellites below this value 2 **PDOP Mask** Byte Field Size: 2 Bit Field Size: Request Parameter No. Dilution of Precision (DOP) indicates the contribution of satellite configuration DD055 DOP 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). Resolution: 1x10E-2 Range: +/-327.64 Unit-less number Ratio, Relative measure, int16 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. Dilution of Precision (DOP) indicates the contribution of satellite configuration DD055 DOP 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). Resolution: 1x10E-2 Unit-less number Ratio, Relative measure, int16 Range: +/-327.64 When exceeded GNSS Receiver shall switch from 3D to 2D mode Request Parameter No **SNR Mask** Byte Field Size: 2 Bit Field Size: **DD057** SNR Value SNR expressed in C/No dB, relative measure Range: +/- 327.64 dB Resolution: 1x10E-2 dB int16 Do not use satellites below this value **GNSS Mode** Bit Field Size: 3 5 Byte Field Size: Request Parameter No DD058 Mode, GNSS 0 = 1D, 1 = 2D2 = 3D,3 = Auto,4-5 = Reserved6 = Error,7 = Null**DF52** Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields **DGNSS Mode** Byte Field Size: Bit Field Size: 3 Request Parameter No 6 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 = NullDF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields Position / Velocity Filter Byte Field Size: Bit Field Size: 2 Request Parameter No 7 MSB/LSB: **DD002** Generic status pair 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error. 11= [Unavailable, Unknown] **DF52** Resolution: 1 Used to construct bit fields Bit field bit(n) Range: Variable

GNSS Control Status PGN: 129538 hex: 1FA02 Byte Field Size: 2 8 **Max Correction Age** Bit Field Size: Request Parameter No Age of Differential corrections **DD060** Differential Age Range: 0 to 655.32s Resolution: 1x10-2sec **DF66** Time interval, .01sec uint16 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 Range: +/-~2.147x10E+7 m Resolution: 1x10E-2 m **DF15** Distance, signed int32 Bit Field Size: 2 10 Use Antenna Altitude for 2D Mode Byte Field Size: Request Parameter No **DD002** Generic status pair MSB/LSB: 00 = [No, Off, Disabled, Reset, "0"], 01 = [Yes, On, Enabled, Set, "1"], 10 = Error,

Range: Variable

bit(n)

11= [Unavailable, Unknown]

Resolution: 1

DF52 Bit field

00 = Use last good calculated Altitude for 2D mode

PGN: 129538

Used to construct bit fields

GNSS DOPs PGN: 129539 hex: 1FA03

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

	me: Yes	Priority Default:		ılt Update R	ate: 1,000 mi	Iliseconds Frequency:	1. cycles per second
	tion: <mark>Globa</mark> Field Na	9	Opt'l	ACK Rqn	nnts:		Original Reference ID # 22
F <u>ield #</u> 1	SID DD056	Sequence ID		Byte Fi	different PGNs SOG and RAIM	. For example, the SID would	Request Parameter No d information together between be used to tie together the COG, 55=no valid position fix to tie it to.
	DF53	Integer, 8 bit unsig	ned uint	Range:	0 to 252	Resolution: 1 bit	Unit-less number
2	Set Mode DD058	Mode, GNSS		Byte Fi	0 = 1D, 1 = 2D, 2 = 3D, 3 = Auto, 4-5 = Reserved 6 = Error, 7 = Null	Bit Field Size: 3	Request Parameter No
	DF52	Bit field	bit(r) Range:	Variable	Resolution: 1	Used to construct bit fields
3	Op Mode DD058	Mode, GNSS		Byte Fi	ield Size: 0 = 1D, 1 = 2D, 2 = 3D, 3 = Auto, 4-5 = Reserved 6 = Error, 7 = Null	Bit Field Size: 3	Request Parameter No
	DF52	Bit field	bit(r) Range:	Variable	Resolution: 1	Used to construct bit fields
4	Reserve DD001 DF52 2 Bits need	Reserved field Bit field led to fill out the byte	bit(r	_	ield Size: Variable numbe Variable	Bit Field Size: resver of reserved bits, all set to log	
5	HDOP DD055	Ţ.		Byte Fi	geometry to pos is being introdu		* * * * * * * * * * * * * * * * * * * *
	DF69	Ratio, Relative me	asure, int1	Range:	+/-327.64	Resolution: 1x10E-2	Unit-less number
6	VDOP DD055	DOP		Byte Fi	geometry to pos is being introdu		
	DF69	Ratio, Relative me	asure, int1	Range:	+/-327.64	Resolution: 1x10E-2	Unit-less number
7	TDOP DD055			_	geometry to pos is being introdu (Vertical), TDC	sitioning error. A lower DOP valued. Reported as components: DP (Time). Minimum DOP value.	ne is 1.0 (no error introduced).
	DF69	Ratio, Relative me	asure, int1	h Kange:	+/-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 Fra	me: No	Priority Default:	6	Default (Update Rat	te: 1,000 millis	econds <i>Frequence</i>	cy: 1. cycles per second
	tion: Global	Query Support:	Opt'l		ACK Rqmn	nts:		
Field #	Field Nam	e						Original Reference ID # 23
1	DD056 Se	equence ID			Byte Fie	An upward counting different PGNs . If SOG and RAIM vo.	For example, the SID wou	Request Parameter No ted information together between ld be used to tie together the COG, 255=no valid position fix to tie it to.
	DF53	Integer, 8 bit unsig	ned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
2	Mode				Byte Fie	ld Size:	Bit Field Size: 2	Request Parameter No
	DD072 Ra	ange Residual Mod	le			after the position. 0=range residuals	sed in position calculation were used to calculate dat were calculated after the p	
	DF52	Bit field		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	Reserve Bit DD001 Re	s eserved field			Byte Fie		Bit Field Size: reserved bits, all set to lead to be a set to	
		Bit field to fill out the byte		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4	Number of S	SVs eneric counter, sho	rt		Byte Fie	<u></u>	Bit Field Size: vent counter, sequence cou	Request Parameter No
	DF53	Integer, 8 bit unsig	ned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
5	PRN "1"				Byte Fie	ld Size: 1	Bit Field Size:	Request Parameter No
	DD074 Sa	tellite ID Number			Byto No.	0 = value not 1-32 = GPS, 33-64 = SBAS, Sa 65-96 = GLONAS For GLONASS, sa numbers are 1 thro this gives a range	used, stellite, Based Augmentati S. stellites are identified by 6 bugh 24 for the full GLON	on System (ie WAAS) 4+satellite slot number. The slot IASS constellation of 24 satellites, mbers 89 through 96 are available if
		ntellite ID Number Integer, 8 bit unsign	ned	uint8	Range:	0 = value not 1-32 = GPS, 33-64 = SBAS, Sa 65-96 = GLONAS For GLONASS, sa numbers are 1 thro this gives a range slot numbers abov	used, stellite, Based Augmentati S. stellites are identified by 6 pugh 24 for the full GLON of 65 through 88. The nu	on System (ie WAAS) 4+satellite slot number. The slot IASS constellation of 24 satellites, mbers 89 through 96 are available if
6		Integer, 8 bit unsig	ned	uint8	Í	0 = value not 1-32 = GPS, 33-64 = SBAS, Sa 65-96 = GLONAS For GLONASS, sa numbers are 1 thro this gives a range slot numbers abov 0 to 252 Id Size: 2	used, stellite, Based Augmentati S. stellites are identified by 6 ough 24 for the full GLON of 65 through 88. The nu e 24 are allocated to on-or Resolution: 1 bit Bit Field Size:	on System (ie WAAS) 4+satellite slot number. The slot ASS constellation of 24 satellites, mbers 89 through 96 are available if bit spares.
6	DF53 I Elevation "1 DD054 EI DF04 A	Integer, 8 bit unsign I" evation Angle, signed	ned	uint8	Range: Byte Fie	0 = value not 1-32 = GPS, 33-64 = SBAS, Sa 65-96 = GLONAS For GLONASS, sa numbers are 1 thro this gives a range slot numbers abov 0 to 252 Id Size: 2 Angle above or be +/-Pi rad	used, stellite, Based Augmentati S. stellites are identified by 6 ough 24 for the full GLON of 65 through 88. The nu e 24 are allocated to on-or Resolution: 1 bit Bit Field Size: low the horizon90° to + Resolution: 1x10E	on System (ie WAAS) 4+satellite slot number. The slot IASS constellation of 24 satellites, mbers 89 through 96 are available if bit spares. Unit-less number Request Parameter No 90°; negative below the horizon 4 rad Resolution ~0.0057deg
7	DF53 I Elevation "1 DD054 El DF04 A	Integer, 8 bit unsign I" evation Angle, signed			Range: Byte Fie	0 = value not 1-32 = GPS, 33-64 = SBAS, Sa 65-96 = GLONAS For GLONASS, sa numbers are 1 thro this gives a range of slot numbers abov 0 to 252 Id Size: 2 Angle above or be +/-Pi rad Id Size: 2	used, atellite, Based Augmentati S. atellites are identified by 6 bugh 24 for the full GLON of 65 through 88. The nu e 24 are allocated to on-or Resolution: 1 bit Bit Field Size: low the horizon90° to + Resolution: 1x10E- Bit Field Size: e relative to True North.	on System (ie WAAS) 4+satellite slot number. The slot IASS constellation of 24 satellites, mbers 89 through 96 are available if bit spares. Unit-less number Request Parameter No 90°; negative below the horizon 4 rad Resolution ~0.0057deg Request Parameter No
	DF53 I Elevation "1 DD054 El DF04 A Azimuth "1" DD127 G	Integer, 8 bit unsignum I" evation Angle, signed	rue		Range: Byte Fie Range: Byte Fie	0 = value not 1-32 = GPS, 33-64 = SBAS, Sa 65-96 = GLONAS For GLONASS, sa numbers are 1 thro this gives a range of slot numbers abov 0 to 252 Id Size: 2 Angle above or be +/-Pi rad Id Size: 2	used, stellite, Based Augmentati S. stellites are identified by 6 ough 24 for the full GLON of 65 through 88. The nu e 24 are allocated to on-or Resolution: 1 bit Bit Field Size: low the horizon90° to + Resolution: 1x10E- Bit Field Size:	on System (ie WAAS) 4+satellite slot number. The slot IASS constellation of 24 satellites, mbers 89 through 96 are available if bit spares. Unit-less number Request Parameter No 90°; negative below the horizon 4 rad Resolution ~0.0057deg Request Parameter No
	DF53 1 Elevation "7 DD054 El DF04 A Azimuth "1" DD127 Go DF02 A	Integer, 8 bit unsign I" evation Angle, signed eneric Direction -T Angle	rue	int16 uint16	Range: Byte Fie Range: Byte Fie Range:	0 = value not 1-32 = GPS, 33-64 = SBAS, Sa 65-96 = GLONAS For GLONASS, sa numbers are 1 thro this gives a range slot numbers abov 0 to 252 Id Size: 2 Angle above or be +/-Pi rad Id Size: 2 Degrees clockwise 0 to 2Pi rad Id Size: 2 SNR expressed in	used, atellite, Based Augmentati S. atellites are identified by 6 ough 24 for the full GLON of 65 through 88. The nu e 24 are allocated to on-or Resolution: 1 bit Bit Field Size: low the horizon90° to + Resolution: 1x10E- Bit Field Size: e relative to True North. Resolution: 1x10E- Bit Field Size: C/No	on System (ie WAAS) 4+satellite slot number. The slot IASS constellation of 24 satellites, mbers 89 through 96 are available if bit spares. Unit-less number Request Parameter No 4 rad Resolution ~0.0057deg Request Parameter No 4 rad Resolution ~0.0057deg, 1 deg = .01745 rad Request Parameter No
7	DF53 I Elevation "1 DD054 El DF04 A Azimuth "1' DD127 G6 DF02 A SNR "1" DD057 SN DF31 G	Integer, 8 bit unsign I" evation Angle, signed eneric Direction -T Angle NR Value dB, relative measur	rue	int16	Range: Byte Fie Range: Byte Fie Range: Byte Fie Range:	0 = value not 1-32 = GPS, 33-64 = SBAS, Sa 65-96 = GLONAS For GLONASS, sa numbers are 1 thro this gives a range of slot numbers abov 0 to 252 Ind Size: 2 Angle above or be +/-Pi rad Ind Size: 2 Degrees clockwise 0 to 2Pi rad Ind Size: 2 SNR expressed in +/- 327.64 dB	used, stellite, Based Augmentati S. stellites are identified by 6 ough 24 for the full GLON of 65 through 88. The nu e 24 are allocated to on-or Resolution: 1 bit Bit Field Size: e relative to True North. Resolution: 1x10E- Bit Field Size: e relative to True North. Resolution: 1x10E- Bit Field Size: C/No Resolution: 1x10E- Bit Field Size: C/No	on System (ie WAAS) 4+satellite slot number. The slot IASS constellation of 24 satellites, mbers 89 through 96 are available if bit spares. Unit-less number Request Parameter No 90°; negative below the horizon 4 rad Resolution ~0.0057deg Request Parameter No 4 rad Resolution ~0.0057deg, 1 deg = .01745 rad Request Parameter No
7	DF53 1 Elevation "1 DD054 El DF04 A Azimuth "1' DD127 G DF02 A SNR "1" DD057 SN DF31 G Range Resi	Integer, 8 bit unsign I" evation Angle, signed eneric Direction -T Angle NR Value dB, relative measur	rue	int16 uint16	Range: Byte Fie Range: Byte Fie Range: Byte Fie Range:	0 = value not 1-32 = GPS, 33-64 = SBAS, Sa 65-96 = GLONAS For GLONASS, sa numbers are 1 thro this gives a range slot numbers abov 0 to 252 Id Size: 2 Angle above or be +/-Pi rad Id Size: 2 Degrees clockwise 0 to 2Pi rad Id Size: 2 SNR expressed in	used, stellite, Based Augmentati S. stellites are identified by 6 bugh 24 for the full GLON of 65 through 88. The nu e 24 are allocated to on-or Resolution: 1 bit Bit Field Size: low the horizon90° to + Resolution: 1x10E- Bit Field Size: e relative to True North. Resolution: 1x10E- Bit Field Size: C/No Resolution: 1x10E- Bit Field Size: C/No Resolution: 1x10E- Bit Field Size:	on System (ie WAAS) 4+satellite slot number. The slot IASS constellation of 24 satellites, mbers 89 through 96 are available if bit spares. Unit-less number Request Parameter No 4 rad Resolution ~0.0057deg Request Parameter No 4 rad Resolution ~0.0057deg, 1 deg = .01745 rad Request Parameter No

GNSS Sats in View PGN: 129540 hex: 1FA04

10	PRN Status "1"		Byte Fi	ield Size:		Bit Field Size:	4	Request Parameter No
	DD124 PRN Usage Status			1 = T 2 = U 3 = E 4 = T 5 = u 6-13 = E 14 = E	Jsed in solution Differential Con Tracked with Dissed with Diffe Reserved,	t used in solution, n without Differer rrections available ifferential Correction rential Correction	ions,	18,
	DF52 Bit field b	it(n)	Range:	Variable		Resolution: 1		Used to construct bit fields
11	Reserved Bits DD001 Reserved field		Byte Fi	ield Size: Variabl	e number of re	Bit Field Size: eserved bits, all set		Request Parameter No
	DF52 Bit field b 4 Bits needed to fill out the byte	it(n)	Range:	Variable		Resolution: 1		Used to construct bit fields
12	PRN "n" DD074 Satellite ID Number		Byte Fi	1-32 = 33-64 = 65-96 = For GL number this giv	SBAS, Satell GLONASS. ONASS, satell rs are 1 through ses a range of 6	ite, Based Augme ites are identified a 24 for the full G	by 64+satellit LONASS con e numbers 89	e slot number. The slot stellation of 24 satellites, through 96 are available if
	DF53 Integer, 8 bit unsigned u Variable Number of fields, Field number 5 repea		Range:	0 to 252		Resolution: 1 bi	t	Unit-less number
13	Elevation "n" DD054 Elevation		Í		-		, ,	Request Parameter No tive below the horizon
	DF04 Angle, signed in Variable Number of fields, Field number 6 repeated		Range:	+/-Pi rad		Resolution: 1x1	0E-4 rad	Resolution ~0.0057deg
14	Azimuth "n" DD127 Generic Direction -True		Byte Fi	ield Size: 2 Degrees		Bit Field Size: ative to True Nort	h.	Request Parameter No
	DF02 Angle ui Variable Number of fields, Field number 7 repea		Range:	0 to 2Pi rad	d	Resolution: 1x1		Resolution $\sim 0.0057 \text{deg}$, 1 $\text{deg} = .01745 \text{ rad}$
15	SNR "n" DD057 SNR Value		Byte Fi	ield Size: 2 SNR ex	xpressed in C/N	Bit Field Size: No		Request Parameter No
	DF31 dB, relative measure in Variable Number of fields, Field number 8 repeated in the second seco		Range:	+/- 327.64	dB	Resolution: 1x1	0E-2 dB	
16	Range Residuals "n" DD073 Range Residuals		Byte Fi	ield Size: 4 Range l	Residual value	Bit Field Size: in meters		Request Parameter No
	DF79 Distance signed fine in Variable number of fields, Filed Number 9 repeated in the signal of		Range:	+/-~2.147x	x10E+4 m	Resolution: 1x1	0E-5 m	
17	PRN Status "n" DD124 PRN Usage Status		Í	1 = T 2 = U 3 = I 4 = T 5 = U 6-13 = I 15 = D	Jsed in solution Differential Con Tracked with D Used with Diffe Reserved,	Bit Field Size: t used in solution, n without Differer rrections available differential Correction rential Correction	itial correction , ions, s,	
	DF52 Bit field b Variable Number of fields, Field number 10 repe	` '	Range:	Variable		Resolution: 1		Used to construct bit fields

GNSS Sats in View PGN: 129540 hex: 1FA04

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 NA cycles per second Frequency: Destination: Global Query Support: Opt'l ACK Ramnts: Original Reference ID # 24 Field # Field Name PRN Byte Field Size: Bit Field Size: Request Parameter No. 1 **DD074** Satellite ID Number 0 = value not used. 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASSFor 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. Resolution: 1 bit Integer, 8 bit unsigned Range: 0 to 252 Unit-less number **DF53** uint8 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. Resolution: 1 bit Unit-less number Integer, 16 bit unsigned uint16 Range: 0 to 65,532 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 Byte Field Size: Bit Field Size: 16 Request Parameter No **Eccentricity** DD084 Eccentricity, e Eccentricity, e. Reference ICD-GPS-200 Table 20-VI for scaling factors and **DF52** Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields **Almanac Reference Time** Byte Field Size: Bit Field Size: 8 Request Parameter No. 5 Almanac reference time. Reference ICD-GPS-200 Table 20-VI for scaling factors **DD085** Almanac Reference Time, toa and units. Resolution: 1 Used to construct bit fields **DF52** Range: Variable Bit field bit(n) Bit Field Size: 16 6 **Inclination Angle** Byte Field Size: Request Parameter No. Inclination angle. Reference ICD-GPS-200 Table 20-VI for scaling factors and **DD086** Almanac parameter, (sigma)I Bit field Range: Variable Resolution: 1 Used to construct bit fields DF52 bit(n) Bit Field Size: 16 Rate of Right Ascension Byte Field Size: Request Parameter No. 7 Rate of right ascension, OMEGADOT. Reference ICD-GPS-200 Table 20-VI for **DD087** Almanac parameter, OMEGADOT scaling factors and units. **DF52** Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n) Root of Semi-major Axis Byte Field Size: Bit Field Size: 24 Request Parameter No. 8 Root of semi-major axis. Reference ICD-GPS-200 Table 20-VI for scaling factors **DD088** Almanac parameter, (A)1/2 Range: Variable Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Byte Field Size: Bit Field Size: 24 Request Parameter No **Argument of Perigee** 9 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

GPS Almanac Data
PGN: 129541
hex: 1FA05

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

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:

Global Query Support:

Opt'l ACK Rqmnts:

Field # Field Name

Original Reference ID # 26

Destina	tion: Global Query Support: Opt'l		ACK Rqmnts:		
Field #	Field Name				Original Reference ID # 26
1	SID DD056 Sequence ID		different PGNs SOG and RAIM v	Bit Field Size: ing number used to tie related info For example, the SID would be us values to a given position. 255=no r valid position fixes.	ed to tie together the COG,
	DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
2	RMS of Position Uncertainty DD075 Error Distances		Byte Field Size: 2 Error distances ex	Bit Field Size: spressed in meters.	Request Parameter No
	DF13 Distance, short	uint16	Range: 0 to 655.32 m	Resolution: 1x10E-2 m	
3	STD of Major axis DD075 Error Distances		Byte Field Size: 2 Error distances ex	Bit Field Size:	Request Parameter No
	DF13 Distance, short	uint16	Range: 0 to 655.32 m	Resolution: 1x10E-2 m	
4	STD of Minor axis DD075 Error Distances		Byte Field Size: 2 Error distances ex	Bit Field Size: spressed in meters.	Request Parameter No
	DF13 Distance, short	uint16	Range: 0 to 655.32 m	Resolution: 1x10E-2 m	
5	Orientation of Major axis DD127 Generic Direction -True		Byte Field Size: 2 Degrees clockwise	Bit Field Size: e relative to True North.	Request Parameter No
	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 ex	spressed 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 ex	pressed 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 ex	pressed in meters.	
	DF13 Distance, short	uint16	Range: 0 to 655.32 m	Resolution: 1x10E-2 m	

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.

DD209 GNSS Integrity 0 = No Integrity checking.* 1 = Safe, 2 = Cautton, 3 = Unsafe	Single Fra			Update Rate: NA millise		NA cycles per second
Sequence ID Byto Field Size: Bit Field Size: Request Parameter No. SoC and RAIM values to a given position. 255-inc valid position fixe.				ACK Ramnts:		Original Reference ID # 84
An upward counting number used to the related information integrible releveen different PNNs. For example, the STD would be used to the together the COG, SOG and RAMI values to a given position. 255-and valid position fix to the it to. Range to 250 for valid position fixes. DFS3 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number DD209 GNSS Integrity DFS2 Bit field bit(n) Range: 0 to 252 Resolution: 1 bit Unit-less number DFS2 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields a great manuscript of the same three-view does not have this capability DFS2 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields DFS2 Bit field bit(n) Range: Variable unmber of reserved bits, all set to logic "1" DFS3 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields DFS2 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields DFS2 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields DFS2 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields DFS2 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields DFS2 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields DFS2 Bit field Size: Request Parameter Note of the properties of the pro				Byte Field Size: 1	Bit Field Size	
Distance, short, signed Intide expected error Distance, short, signed Distance, short, s	•	-		An upward countin different PGNs . Fo SOG and RAIM va	ng number used to tie related into or example, the SID would be to lues to a given position. 255=1	formation together between used to tie together the COG,
DD209 GNSS Integrity 1		DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
Byte Field Size: Bit Field Size: GeV S Request Parameter No.	2			0 = No Integrity ch 1 = Safe, 2 = Caution, 3 = Unsafe	ecking,*	Request Parameter No
DD001 Reserved field bit(n) Range: Variable number of reserved bits, all set to logic "1" DF52 Bit field bit(n) Range: Variable Resolution: Used to construct bit fields 4 Latitude expected error DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 5 Longitude expected error DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 6 Altitude expected error DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 6 Altitude expected error DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 7 SV ID of most likely failed sat DD074 Satellite ID Number DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m DF15 Integer, 8 bit unsigned wint8 Range: 0 to 252 Resolution: 1 bit Unit-less 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 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 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 are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The number 89 through 96 are available if 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 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 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 are 1 through 24 f		DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Latitude expected error DD220 Measure DF14 Distance, short, signed Int16 Range: +/-327.64 m Resolution: Ix10E-2 m	3					
DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m 5 Longitude expected error DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m 6 Altitude expected error DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m 7 SV ID of most likely failed sat DD074 Satellite ID Number DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m 8 byte Field Size: 1 Bit Field Size: Request Parameter No. 1-32 - GIPS, 3-3-64 - SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 - GLONASS. For GLONASS, satellites are identified by 64+satellite slot numbers are 1 through 24 for the full CloNASS constellation of 24 satellites, this gives a range of 65 through 96 are available if slot numbers above 24 are allocated to on-orbit spares. DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number 8 Probability of missed detection DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m 9 Estimate of pseudorange bias DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m 10 Std Deviation of bias Byte Field Size: 2 Bit Field Size: Request Parameter Note DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m 10 Std Deviation of bias Byte Field Size: 2 Bit Field Size: Request Parameter Note DD220 Measure		DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
Byte Field Size: 2 Bit Field Size: Request Parameter No.	4			Byte Field Size: 2	Bit Field Size:	Request Parameter No
DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 8 Aktitude expected error DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 7 SV ID of most likely failed sat DD074 Satellite ID Number Byte Field Size: 1 Bit Field Size: Request Parameter No. 1x10E-2 m 8 Byte Field Size: 1 Bit Field Size: Request Parameter No. 1x10E-2 m 9 DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number Byte Field Size: 2 Bit Field Size: Request Parameter No. 1x10E-2 m 9 Estimate of pseudorange bias DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure		DF14 Distance, short, signed	int16	Range: +/-327.64 m	Resolution: 1x10E-2 m	
Byte Field Size: 2 Bit Field Size: Request Parameter No. DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m Byte Field Size: 1 Bit Field Size: Request Parameter No. DD074 Satellite ID Number Byte Field Size: 1 Bit Field Size: Request Parameter No. DD074 Satellite ID Number Byte Field Size: 1 Bit Field Size: Request Parameter No. DD074 Satellite ID Number Byte Field Size: 1 Bit Field Size: Request Parameter No. DD074 Satellite ID Number Satellite Sa	5	•		Byte Field Size: 2	Bit Field Size:	Request Parameter No
DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m Pyte Field Size: 1 Bit Field Size: Request Parameter No. 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 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 Byte Field Size: 2 Bit Field Size: Request Parameter No. 0 DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m Byte Field Size: 2 Bit Field Size: Request Parameter No. 0 DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m Byte Field Size: 2 Bit Field Size: Request Parameter No. 0 DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m Pyte Field Size: 2 Bit Field Size: Request Parameter No. 0 DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: Ix10E-2 m Byte Field Size: 2 Bit Field Size: Request Parameter No. 0 DD220 Measure		DF14 Distance, short, signed	int16	Range: +/-327.64 m	Resolution: 1x10E-2 m	
7 SV ID of most likely failed sat DD074 Satellite ID Number Byte Field Size: 0 = value not used, 1-32 = GFS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS, attellite, Based Augmentation System (ie WAAS) 65-96 = GLONASS, satellites are identified by 64+satellite slot number. The slot numbers are 1 through 24 for the full GLONASS constellation of 24 satellites, this gives a range of 65 through 88. The numbers 89 through 96 are available if slot numbers above 24 are allocated to on-orbit spares. DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number 8 Probability of missed detection DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 9 Estimate of pseudorange bias DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure	6			Byte Field Size: 2	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 Probability of missed detection DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 9 Estimate of pseudorange bias Byte Field Size: 2 Bit Field Size: Request Parameter No DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias Byte Field Size: 2 Bit Field Size: Request Parameter No DD220 Measure DD220 Measure DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias Byte Field Size: 2 Bit Field Size: Request Parameter No DD220 Measure		DF14 Distance, short, signed	int16	Range: +/-327.64 m	Resolution: 1x10E-2 m	
8 Probability of missed detection DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 9 Estimate of pseudorange bias DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m PF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure Byte Field Size: 2 Bit Field Size: Request Parameter No. DD220 Measure	7	· ·		0 = value not u 1-32 = GPS, 33-64 = SBAS, Sat 65-96 = GLONASS For GLONASS, sat numbers are 1 throughing gives a range o	used, cellite, Based Augmentation Systs. cellites are identified by 64+sate ugh 24 for the full GLONASS of 65 through 88. The numbers	stem (ie WAAS) ellite slot number. The slot constellation of 24 satellites, 89 through 96 are available if
DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 9 Estimate of pseudorange bias Byte Field Size: 2 Bit Field Size: Request Parameter No DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias Byte Field Size: 2 Bit Field Size: Request Parameter No DD220 Measure		DF53 Integer, 8 bit unsigned	uint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
9 Estimate of pseudorange bias Byte Field Size: 2 Bit Field Size: Request Parameter No. DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias Byte Field Size: 2 Bit Field Size: Request Parameter No. DD220 Measure	8	•		Byte Field Size: 2	Bit Field Size:	Request Parameter No
DD220 Measure DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m 10 Std Deviation of bias DD220 Measure Byte Field Size: 2 Bit Field Size: Request Parameter No. 2		DF14 Distance, short, signed	int16	Range: +/-327.64 m	Resolution: 1x10E-2 m	
10 Std Deviation of bias Byte Field Size: 2 Bit Field Size: Request Parameter No. DD220 Measure	9			Byte Field Size: 2		Request Parameter No
DD220 Measure		DF14 Distance, short, signed	int16	Range: +/-327.64 m	Resolution: 1x10E-2 m	
DF14 Distance, short, signed int16 Range: +/-327.64 m Resolution: 1x10E-2 m	10			Byte Field Size: 2	Bit Field Size:	Request Parameter No
		DF14 Distance, short, signed	int16	Range: +/-327.64 m	Resolution: 1x10E-2 m	

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 Fra	me: Yes	Priority Default:	6 Defau	lt Update Rat	e: NA millis	seconds Freq	uency:	NA cycles per second
Destinat	ion: Global	Query Support:	Opt'l	ACK Rqmn	ts:			
Field#	Field Nan	ne						Original Reference ID # 85
1	Radial Pos	ition Error Maximur	n threshold	Byte Fiel	ld Size: 2	Bit Field Size:		Request Parameter No
	DD075 E	rror Distances			Error distances ex	pressed in meters.		
	DF13	Distance, short	uint1	6 Range: (0 to 655.32 m	Resolution: 1x1	0E-2 m	
2	Probability	of False Alarm		Byte Fiel	ld Size: 1	Bit Field Size:	•	Request Parameter No
	DD138 G	Seneric percent of rar	nge					
	DF30	Percent, Relative me	easure int8	Range:	+/- 124%	Resolution: 1%		
3	Probability	of Missed Detectio	n	Byte Fiel	ld Size: 1	Bit Field Size:	-	Request Parameter No
	DD138 G	Seneric percent of rar	nge					
	DF30	Percent, Relative me	easure int8	Range:	+/- 124%	Resolution: 1%		
4	Pseudoran Constant	ge Residual Filterin	g Time	Byte Fiel	ld Size: 2	Bit Field Size.	-	Request Parameter No
	DD210 T	ime Value, resolutio	n 1 sec		Time in seconds			
	DF80	Time, 1sec	uint1	6 Range: (0 to 65532 seconds	Resolution: 1 se	econd	
5	Reserved E	Bits		Byte Fiel	ld Size:	Bit Field Size.	resv 16	Request Parameter No
	DD001 R	eserved field			Variable number	of reserved bits, all se	t 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. Priority Default: 6 Default Update Rate: Single Frame: No NA milliseconds Frequency: NA cycles per second Destination: Global Query Support: No ACK Ramnts: Field # Field Name Original Reference ID # 89 Sequence ID Byte Field Size: 1 Bit Field Size: Request Parameter No 1 An upward counting number used to tie related information together between **DD056** Sequence ID 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. Range: 0 to 252 Resolution: 1 bit Unit-less number **DF53** Integer, 8 bit unsigned uint8 Byte Field Size: 2 2 **RMS Std Dev of Range Inputs** Bit Field Size: Request Parameter No **DD219** Standard Deviation uint16 Range: 0 to 655.32 m Resolution: 1x10E-2 m Distance, short RMS value of the standard deviation of the range inputs to the navigation process. Range inputs include pseudoranges & DGNSS corrections. Std Dev major error ellipse Byte Field Size: 2 Bit Field Size: Request Parameter No **DD219** Standard Deviation Resolution: 1x10E-2 m uint16 Range: 0 to 655.32 m DF13 Distance, short Standard deviation of the semi-major axis of error ellipse (meters) 4 Std Dev minor error ellipse Byte Field Size: 2 Bit Field Size: Request Parameter No **DD219** Standard Deviation uint16 Range: 0 to 655.32 m Resolution: 1x10E-2 m **DF13** Distance, short Standard deviation of the semi-minor axis of error ellipse (meters). Orientation of error ellipse Byte Field Size: 2 Bit Field Size: Request Parameter No. 5 **DD127** Generic Direction -True Degrees clockwise relative to True North. uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 DF02 Angle deg = .01745 radOrientation of semi-major axis of error ellipse (from true north) Byte Field Size: 2 6 Std Dev Latitude error Bit Field Size: Request Parameter No. **DD219** Standard Deviation Distance, short Range: 0 to 655.32 m Resolution: 1x10E-2 m uint16 Standard deviation of Latitude error (meters) 7 Std Dev Longitude error Byte Field Size: 2 Bit Field Size: Request Parameter No **DD219** Standard Deviation Distance, short uint16 Range: 0 to 655.32 m Resolution: 1x10E-2 m **DF13** Standard deviation of Longitude error (meters) Byte Field Size: Bit Field Size: Request Parameter No Std Dev Altitude error 8 **DD219** Standard Deviation DF13 Distance, short Range: 0 to 655.32 m Resolution: 1x10E-2 m mint16 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

sequenc	e ib lieid.									
Single Fra	me: No	Priority Default:		Default	Update Ra		iseconds	Frequency:	NA	cycles per second
Destinat	ion: Global	Query Support:	Opt'l		ACK Rqm	nts:				
Field #	Field Nar	me							Original	Reference ID # 86
1	Sequence				Byte Fi	eld Size: 1	Bit Field		,	est Parameter No
	DD056 S	Sequence ID				An upward coun different PGNs . SOG and RAIM Range 0 to 250 f	For example, the values to a given	e SID would be a position. 255=	used to tie to	
	DF53	Integer, 8 bit unsig	ned	uint8	Range:	0 to 252	Resolution	n: 1 bit	Unit-less	number
2	Reference	Station ID			Byte Fi	eld Size:	Bit Field	Size: 12	Requ	est Parameter No
	DD071 R	Ref Station				Reference Station Provider.[Reference			as provided	by the Service
	DF52	Bit field		bit(n)	Range:	Variable	Resolution	n: 1	Used to o	construct bit fields
3	Reference	Station Type			Byte Fi	eld Size:	Bit Field	Size: 4	Requ	est Parameter No
	DD070 F	Ref Station Type				Reference Station 0x0=GPS; 0x1=GLONASS; 0x2 to 0xD=Rese 0XE=Error; 0XF=Null	;			
	DF52	Bit field		bit(n)	Range:	Variable	Resolution	n: 1	Used to o	construct bit fields
4	Time of co	rrections			Byte Fi	eld Size: 2	Bit Field	Size:	Requ	est Parameter No
	DD211 T	Time Value, resoluti	ion 0.1 se	ec		Time in seconds	•			
	DF81	Time, 0.1sec		uint16	Range:	0 to 6553.2 second	s Resolution	n: 1 x 10E-1 se	c	
5	Station He	alth			Byte Fi	eld Size:	Bit Field	Size: 4	Requ	est Parameter No
	DD212 S	Station Heath				0x00 = Not Worl 0x01 = Unmonit 0x02 = Healthy & 0x03 = Healthy & 0x04 = In Test M 0x05 - 0x15 = Re	ored, & Operational, & in Test Mode, Mode - DO NOT	USE,		
	DF52	Bit field		bit(n)	Range:	Variable	Resolution	n: 1	Used to o	construct bit fields
6	Reserved I	Bits			Byte Fi	eld Size:	Bit Field	Size: resv	4 Requ	est Parameter No
	DD001 R	Reserved field				Variable number	of reserved bits,	all set to logic "	1"	
	DF52 4 Bits needed	Bit field d to fill out the byte		bit(n)	Range:	Variable	Resolution	n: <u>1</u>	Used to o	construct bit fields
7	Satellite ID)			Byte Fi	eld Size: 1	Bit Field	Size:	Requ	est Parameter No
	DD074 S	Satellite ID Number Integer, 8 bit unsig		uint8	Range:	0 = value no 1-32 = GPS, 33-64 = SBAS, S 65-96 = GLONA For GLONASS, numbers are 1 th this gives a range slot numbers about	Satellite, Based A ASS. satellites are ider trough 24 for the e of 65 through 8	ntified by 64+sat full GLONASS 8. The numbers ed to on-orbit sp	ellite slot nu constellation 89 through	mber. The slot of 24 satellites, 96 are available if
	D1 33	integer, o on ansig	,1104	amo		0 10 232	000.000	1 010	C 1110 2000	

DGNSS Corrections PGN: 129549 hex: 1FA0D Byte Field Size: 4 8 **PRC** Bit Field Size: Request Parameter No **DD213** Distance, int 32 4dp Range: +/-~2.147x10E+5 m Resolution: 1x10E-4 m **DF83** Distance, signed 4dp int32 9 **RRC** Byte Field Size: 2 Bit Field Size: Request Parameter No DD214 Generic Speed Range: +/-3.2764 m/s Resolution: 1x10E-4 m/s **DF82** Speed, signed 4dpt int16 Byte Field Size: 2 10 **UDRE** Bit Field Size: Request Parameter No **DD195** Distance, short Dependent upon PG Field definition. **DF13** Range: 0 to 655.32 m Resolution: 1x10E-2 m Distance, short uint16 value 655.32 (all 1's) indicates satellite invalid do not use or stop using immediately. IOD Byte Field Size: 1 Bit Field Size: Request Parameter No 11 Number of route, waypoint, event, mark, etc. DD005 Generic numeric ID, short **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

Destination: Global Cucry Support: Opt ACK Rammts:	GNSS o	common diffe	erential correction	n receiver param	neter stat	us.			
The channel DD076 Receiver channel number	•				•		NA millised	conds Frequency.	NA cycles per second
DD076 Receiver channel number DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Resolution: 1 bit Unit-less number				Opt'l	ACK Rqn	nnts:			Original Reference ID # 27
Prequency DD077 Differential Correction Receiver frequency This is the input frequency of the correction receiver. DF21 Frequency Uint32 Range: DF22 Bit field Size: DF23 Serial Interface Bit Rate DD078 Differential Correction Broadcast Bit Rate DD078 Differential Correction Broadcast Bit Rate DD078 Differential Correction Broadcast Bit Rate This is the bit rate of the correction receiver. DF21 Serial Interface Detection Broadcast Bit Rate DF52 Bit field Size: DF53 Bit field Size: DF54 Bit field Size: DF55 Bit field Size: DF55 Bit field Size: DF56 Bit field Size: DF57 Bit field Size: DF58 Bit field Size: DF59 Bit field Size: DF59 Bit field Size: DF50 Bit Field Size: DF50 Bit Field Size: DF51 Bit Field Size: DF52 Bit field Size: DF52 Bit field Size: DF53 Bit Field Size: DF54 Bit Field Size: DF55 Bit Field Size: DF55 Bit Field Size: DF55 Bit Field Size: DF56 Bit Field Size: DF57 Bit Field Size: DF58 Bit Field Size: DF58 Bit Field Size: DF59 Bit Field Size: DF59 Bit Field Size: DF50 Bit Field Size: DF51 Bit Field Size: DF52 Bit Field Size: DF52 Bit Field Size: DF53 Bit Field Size: DF54 Bit Field Size: DF55 Bit Field Size: DF55 Bit Field Size: DF55 Bit Field Size: DF56 Bit Field Size: DF57 Bit Field Size: DF58 Bit Field Size:	1		eceiver channel nur	mber	Byte Fi	The c	hannel number	of the correction receiver	•
DD077 Differential Correction Receiver frequency DF21 Frequency uint32 Range: 0 to ~4.295x10E+10 Hz Resolution: 10 Hz Hz 3 Serial Interface Bit Rate DD078 Differential Correction Broadcast Bit Rate DD078 Differential Correction Broadcast Bit Rate DD078 Differential Correction Broadcast Bit Rate DD079 Mode, Bit Rate DD079 Mode, Bit Rate DD079 D		DF53 I	nteger, 8 bit unsign	ned uint8	Range:	0 to 252		Resolution: 1 bit	Unit-less number
3 Serial Interface Bit Rate DD078 Differential Correction Broadcast Bit Rate 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: Used to construct bit field DD079 Mode, Bit Rate DF52 Bit field bit(n) Range: Variable Resolution: Used to construct bit field EBror, 7 = Null. DF52 Bit field bit(n) Range: Variable Resolution: Used to construct bit field EBror, 7 = Null. DF52 Bit field bit(n) Range: Variable Resolution: Used to construct bit field EBror, 7 = Null. DF52 Bit field Bit(n) Range: Variable Resolution: Used to construct bit field EBror, 7 = Null. DF52 Bit field Bit(n) Range: Variable Resolution: Used to construct bit field EBror, 7 = Null. DF52 Bit field Source DD125 Differential Source DD125 Differential Source 0 = Auto Select,	2		fferential Correction	on Receiver frequ	-	•			Request Parameter No exceiver.
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 field 4 Serial Interface Detection Mode DD079 Mode, Bit Rate DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit field 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 field For a parameter. DF52 Bit field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Field Size: Bit Field Size: Bit Field Size: Used to construct bit field Byte Field Size: Bit Fie		DF21 F	Frequency	uint32	Range:		95x10E+10	Resolution: 10 Hz	
4 Serial Interface Detection Mode 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 field 5 Differential Source DD125 Differential Source 0 = Auto Select,	3			on Broadcast Bit I	•	This i 0 = 2 1 = 5 2 = 1 3 = 2 4 = 3 5 = 5 6 = 1 7 = 2 8 = 4 9 = 9 10 = 1 12 = 3 13-29 30 = 1	25bps, 60bps, 00bps, 00bps, 000bps, 000bps, 200bps, 2400bps, 2400bps, 2400bps, 2400bps, 25000bps		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 field 5 Differential Source DD125 Differential Source 0 = Auto Select,		DF52 H	Bit field	bit(n)	Range:	Variable		Resolution: 1	Used to construct bit fields
5 Differential Source DD125 Differential Source Byte Field Size: Bit Field Size: 4 Request Parameter 0 = Auto Select,	4			de	Byte Fi	This i 0 = A 1 = M 2-5 = 6 = E	uto bit rate set, Ianual bit rate s Reserved rror,	operation for the correction	Request Parameter Non receiver.
DD125 Differential Source 0 = Auto Select,		DF52 H	Bit field	bit(n)	Range:	Variable		Resolution: 1	Used to construct bit fields
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	5				Byte Fi	0 = 1 = 1	Loran Commur MSK Beacon, FM Subcarrier AIS (Automati Other Ground- SBAS (Satellit Other Satellite, = Reserved, Error,	c Identification System), based Radio, e Based Augmentation Sy	Request Parameter No
DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fie	_	DF 52 H	Bit field	bit(n)	Range:	Variable		Resolution: 1	Used to construct bit fields

GNSS Differential Correction Receiver Interface

PGN: 129550 hex: 1FA0E

7	Differential Operation Mode DD126 Differential Operating Mode		Byte Field Size: 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 DD001 Reserved field			Byte Fi	eld Size: Variable number of r	Bit Field Size: resv 8	
	DF52 Needed to 1	Bit field fill the CAN frame.	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

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. Priority Default: 6 Default Update Rate: NA milliseconds Single Frame: No Frequency: NA cycles per second Destination: Global Query Support: Opt'l ACK Ramnts: Field # Field Name Original Reference ID # 28 1 SID Byte Field Size: Bit Field Size: Request Parameter No An upward counting number used to tie related information together between **DD056** Sequence ID 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** Range: 0 to 252 Resolution: 1 bit Unit-less number Integer, 8 bit unsigned uint8 Byte Field Size: 1 2 Channel 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 Signal Strength Byte Field Size: 4 Bit Field Size: Request Parameter No 3 Correction Receiver Signal Strength DD080 This is the signal strength expressed in dB with respect to 1uV/m. **DF16** Electric field Range: +/-327.64 dB re: uV/m Resolution: 1x10E-2 dB int32 re: uV/m Signal SNR Byte Field Size: 2 Bit Field Size: Request Parameter No 4 **DD081** SNR Value SNR expressed in dB. Range: +/- 327.64 dB Resolution: 1x10E-2 dB DF31 dB, relative measure int16 Byte Field Size: 4 Bit Field Size: Frequency Request Parameter No 5 **DD077** Differential Correction Receiver frequency This is the input frequency of the correction receiver. **DF21** Frequency uint32 Range: 0 to ~4.295x10E+10 Resolution: 10 Hz Hz Bit Field Size: 6 **Station Type** Byte Field Size: Request Parameter No **DD070** Ref Station Type Reference Station Type. 0x0=GPS: 0x1=GLONASS; 0x2 to 0xD=Reserved; 0XE=Error; 0XF=Null Resolution: 1 **DF52** Bit field bit(n) Range: Variable Used to construct bit fields Station ID Bit Field Size: 12 Byte Field Size: 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

PGN: 129551 hex: 1FA0F

8	Different	ial Signal Bit Rate		Byte Fi	eld Size:	Bit Field Size: 5	Request Parameter No
		Differential Correction Broad	cast Bit F	Rate	This is the bit rate of 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	the correction receiver.	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
9		ial Signal Detection Mode Mode, Bit Rate		Byte Fi	This is the mode of o 0 = Auto bit rate set, 1 = Manual bit rate set 2-5 = Reserved 6 = Error, 7 = Null.	Bit Field Size: 3 3 3 speration for the correction receivet,	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
10		Correction Source Generic status pair		Byte Fi	MSB/LSB: 00 = [No, Off, Disab 01 = [Yes, On, Enabl 10 = Error, 11= [Unavailable, Un	led, Set, "1"],	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
11	Reserved DD001	d Bits Reserved field		Byte Fi	eld Size: Variable number of r	Bit Field Size: resv 2 reserved bits, all set to logic "1"	
	DF52 2 Bits need	Bit field led to fill out the byte	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
12	DD125	ial Source Differential Source		ŕ	5 = Other Ground-l 6 = SBAS (Satellite 7 = Other Satellite, 8-13 = Reserved, 14 = Error, 15 = No Selection	c Identification System), based Radio, e Based Augmentation System,	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
13		ce Last Sat Differential Sync Differential Age		Byte Fi	eld Size: 2 Age of Differential co	Bit Field Size: orrections	Request Parameter No
	DF66	Time interval, .01sec	uint16	Range:	0 to 655.32s	Resolution: 1x10-2sec	
14		Service ID No. Satellite Service ID		Byte Fi	eld Size: Satellite Service ID n document required]	Bit Field Size: 16 number as provided by the Serv	Request Parameter No vice Provider.[Reference
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

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 NA cycles per second Frequency: Destination: Global Query Support: Opt'l ACK Ramnts: Original Reference ID # 30 Field # Field Name PRN Byte Field Size: Bit Field Size: Request Parameter No. 1 **DD074** Satellite ID Number 0 = value not used. 1-32 = GPS, 33-64 = SBAS, Satellite, Based Augmentation System (ie WAAS) 65-96 = GLONASSFor 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. Range: 0 to 252 Resolution: 1 bit **DF53** Integer, 8 bit unsigned Unit-less number uint8 Byte Field Size: 2 2 NA Bit Field Size: Request Parameter No **DD094** Almanac parameter, NA Calendar day count within the four year period beginning with the previous leap Resolution: 1 bit Unit-less number **DF54** Integer, 16 bit unsigned uint16 Range: 0 to 65,532 Bit Field Size: resv 3 **Reserved Bits** Byte Field Size: 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 CnA Byte Field Size: Bit Field Size: 1 Request Parameter No. Generalized health of the Satellite, reference GLONASS ICD. **DD095** Almanac parameter, CnA Resolution: 1 Range: Variable Used to construct bit fields **DF52** Bit field bit(n) HnA Byte Field Size: Bit Field Size: 5 Request Parameter No 5 Carrier frequency number respectively, reference GLONASS ICD. DD096 Almanac parameter, HnA Range: Variable Resolution: 1 Used to construct bit fields **DF52** Bit field bit(n) (epsilon)nA Byte Field Size: Bit Field Size: 16 Request Parameter No. 6 Eccentricity, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused bits DD097 Almanac parameter, (epsilon)nA with zeros). Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Range: Variable Byte Field Size: Bit Field Size: 8 (deltaTnA)DOT Request Parameter No Rate of change of the draconitic circling time, reference GLONASS ICD Section **DD098** Almanac parameter, (deltaTnA)DOT 4.5 Table 4.3 (fill unused bits with zeros). **DF52** Range: Variable Resolution: 1 Used to construct bit fields Bit field bit(n) Bit Field Size: 16 (omega)nA Byte Field Size: Request Parameter No 8 Argument of Perigee, reference GLONASS ICD Section 4.5 Table 4.3 (fill unused DD099 Almanac parameter, (omega)nA bits with zeros). **DF52** Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields (delta)TnA Bit Field Size: 24 9 Byte Field Size: Request Parameter No Correction to the average value of the draconitic circling time, reference **DD100** Almanac parameter, (delta)TnA GLONASS ICD Section 4.5 Table 4.3 (fill unused bits with zeros). Resolution: 1 DF52 Bit field bit(n) Range: Variable Used to construct bit fields

GLONASS Almanac Data

PGN: 129556 hex: 1FA14

10	tnA			Byte Fi	eld Size:	Bit Field Size: 24	Request Parameter No	
	DD101	Almanac parameter, tnA				sion node, almanac reference tin 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 Fi	eld 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)in	A		Byte Fi	eld Size:	Bit Field Size: 24	Request Parameter No	
	DD103	Almanac parameter, (delta)in	A			average value of the inclination a 4.3 (fill unused bits with zeros).	angle, reference GLONASS ICD	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields	
13	tcA			Byte Fi	eld Size:	Bit Field Size: 28	Request Parameter No	
	DD104	Almanac parameter, (tau)cA			System time scale unused bits with z		S ICD Section 4.5 Table 4.3 (fill	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields	
14	tnA			Byte Fi	eld Size:	Bit Field Size: 12	Request Parameter No	
	DD105	Almanac parameter, (tau)nA			Course value of th 4.3 (fill unused bit	te time scale shift, reference GLO ts with zeros).	ONASS ICD Section 4.5 Table	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields	

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 Fra	ame: <mark>No</mark>	Priority Default: 6	Default	Update Ra	ate: N	A milliseconds	Frequency:	NA	cycles per second
Destina Field #	tion: <mark>Globa</mark> Field Na	2		ACK Rqm	ints:			Original	Reference ID # 121
1	Message DD188	AIS Message Identifier		Byte Fi	eld Size: Message I	<i>Bit Fie</i> dentifier (range of 0	eld Size: <mark>6</mark> to 63).	Requ	est Parameter No
					See the lat	est version of ITU-R	M.1371 for more	information.	
	DF52	Bit field	bit(n)	Range:	Variable	Resolu	tion: 1	Used to o	construct bit fields
	17 = GNSS	Broadcast Binary Message							
2	Repeat In	dicator		Byte Fi	eld Size:	Bit Fie	eld Size: 2	Requ	est Parameter No
	DD185	AIS Repeater Indicator			Used by the (range of (ne repeater to indicate to 3).	e how many times	a message ha	as been repeated
					2 = Second	lt etransmission d retransmission retransmission			
					See the la	test version of ITU-I	R M.1371 for more	information	
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	tion: 1	Used to o	construct bit fields
3	Source II DD010) Generic numeric ID, large	e	Byte Fi	eld Size: 4 Number of	Bit Fit froute, waypoint, ev	eld Size: ent, mark, etc.	Requ	est Parameter No
	DF55	Integer, 32 bit unsigned per of base station reporting I	uint32		0 to 4,294,96	7,292 Resolut	tion: 1 bit	Unit-less	number
4	NMEA 20	00 Reserved Reserved field			eld Size: Variable n	Bit Figure			est Parameter No
	DF52	Bit field In subsequent data on byte b	bit(n)	Range:	Variable	Resolu	tion: 1	Used to o	construct bit fields
5		sceiver Information	ouridary.	Ryte Fi	eld Size:	Rit Fi	eld Size: 5	Regu	est Parameter No
3		AIS Transceiver Informat	ion	Byte Th	0 = Chann 1 = Chann 2 = Chann 3 = Chann	tel A VDL reception, tel B VDL reception, tel A VDL transmiss tel B VDL transmiss information not broad	ion,	Nogu	est raiameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	tion: 1	Used to o	construct bit fields
6	Spare DD001	Reserved field		Byte Fi	<i>eld Size:</i> Variable n	Bit Figure			est Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolu	tion: 1	Used to o	construct bit fields
	This field m	irrors the "Spare" bit field fou ge can also be accomodated s, however for AIS PGNs the	nd within the o	correspondi d. Normally	ing AIS message , spare or reserv	ved bits in NMEA 20			
7	Longitud	e Longitude, WGS-84		Byte Fi	eld Size: 4 Longitude	Bit Fig	eld Size: 84	Requ	est Parameter No
	DF25	Longitude f base station reporting DGN	int32 SS informatio		+/- 180 deg	Resolu	tion: 1x10E-7 deg	"-" = We	st, resolution ~1.1

AIS DGNSS Broadcast Binary Message

PGN: 129792 hex: 1FB00

8	DD022 Latitude, WGS-84			Byte Fi	ield Size: 4 Latitude referen	Request Parameter No	
	DF23 Latitude of	Latitude base station reporting DGNSS i	int32 nformation.	Range:	+/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
9	NMEA 20	000 Reserved		Byte F	ield Size:	Bit Field Size: resv 3	
	DD001	Reserved field			Variable numbe	er of reserved bits, all set to logic "1	"
	DF52 Used to ali	Bit field gn subsequent data on byte bou	bit(n) indary.	Range:	Variable	Resolution: 1	Used to construct bit fields
10	Spare DD001	Reserved field		Byte Fi	ield Size: Variable numbe	Bit Field Size: resv 5 or of reserved bits, all set to logic "1	
	AIS messa	Bit field nirrors the "Spare" bit field found ge can also be accomodated wi l's, however for AIS PGNs the u	thin this field	orrespond d. Normally	, spare or reserved bi	ts in NMEA 2000 are encoded	Used to construct bit fields
11	Number DD007	of Bits in Binary Data Field Generic numeric ID, mediu	m	Byte Fi	ield Size: 2 Number of route	Bit Field Size: e, waypoint, event, mark, etc.	Request Parameter No
	DF54 Indicates the	Integer, 16 bit unsigned he number of binary data bits that	uint16 at are contai	•	0 to 65,532 the Binary Data field.	Resolution: 1 bit	Unit-less number
12	Binary Data DD142 Binary Bit Field			Byte Field Size: Binary data bit fie		<i>Bit Field Size</i> : n	Request Parameter No
	DF52 Differential Data Field.	Bit field correction data. See ITU-R M.1	bit(n) 371-1. The s	ŭ	Variable field is provided in fie	Resolution: 1 ld 10, Number of Bits in Binary	Used to construct bit fields

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 Fra		Priority Default: 7	Default	Update Rate		econds Frequenc	cy: NA cycles per second
Destina. ⊏ield #	tion: <mark>Global</mark> Field Nan	Query Support: No		ACK Rqmnts	S:		Original Reference ID # 110
1	Message II			Byte Field	d Size:	Bit Field Size: 6	Request Parameter No
•	_	IS Message Identifier		_,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		(range of 0 to 63).	
					See the latest versi	on of ITU-R M.1371 for i	more information.
	DF52	Bit field	bit(n)	Range: \	Variable	Resolution: 1	Used to construct bit fields
	4 = Base Stat 11 = UTC and	ion Report I Date Response		_			
2	Repeat Ind	icator		Byte Field	d Size:	Bit Field Size: 2	Request Parameter No
	DD185 A	IS Repeater Indicator			Used by the repeat (range of 0 to 3).	ter to indicate how many t	times a message has been repeated
					0 = Default		
					1 = First retransmi 2 = Second retrans		
					3 = Final retransm	ission	
					See the latest vers	ion 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		Bit Field Size:	Request Parameter No
		eneric numeric ID, large				waypoint, event, mark, etc	
		Integer, 32 bit unsigned of station reporting its UTC a	uint32	Range: (to 4,294,967,292	Resolution: 1 bit	Unit-less number
4	Longitude	or station reporting its or o a	na date.	Byte Field	d Size: 4	Bit Field Size:	Request Parameter No
	•	ongitude, WGS-84		ĺ	Longitude reference	ced to WGS-84	
	DF25	Longitude	int32	Range: +	-/- 180 deg	Resolution: 1x10E-	
	Longitude of s	station reporting its UTC and d	ate.				cm
5	Latitude			Byte Field	d Size: 4	Bit Field Size:	Request Parameter No
	DD022 L	atitude, WGS-84			Latitude reference	d to WGS-84	
		Latitude	int32	Range: +	-/- 90 deg	Resolution: 1x10E-	
	Latitude of sta	ition reporting its UTC and dat	e.				cm
6	Position ac	curacy		Byte Field	d Size:	Bit Field Size: 1	Request Parameter No
	DD184 A	IS Position Accuracy				0m such as nondifferentia 10m such as DGNSS	al GNSS (default),
					See the latest versi	on of ITU-R M.1371 for i	more information.
	DF52	Bit field	bit(n)	Range: \	Variable	Resolution: 1	Used to construct bit fields
7	RAIM-flag			Byte Field	d Size:	Bit Field Size: 1	Request Parameter No
	DD189 A	IS RAIM-flag			0 = RAIM not in u 1 = RAIM in use	ise (default),	
					See the latest versi	on of ITU-R M.1371 for i	more information.
	DF52	Bit field	bit(n)	Range: \	Variable Variable	Resolution: 1	Used to construct bit fields

PGN: 129793 hex: 1FB01

8	NMEA 2000 F DD001 Res			Byte Fi	eld Size: Variable number of r	Bit Field Size: resv 6	Request Parameter No
		it field ubsequent data on byte bound	bit(n) ary.	Range:	Variable	Resolution: 1	Used to construct bit fields
9	Position time		· J	Byte Fi	eld Size: 4 24 hour clock, 0 = n	Bit Field Size:	Request Parameter No
		ime of day n of station reporting its UTC a	uint32 nd date.	Range:	0 to 86,401 s	Resolution: 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
10	Communicat DD187 AIS	tion State S Communication State		Byte Fi	allocation algorithms	Bit Field Size: 19 State contains information use and synchronization information	on
	DF52 B	it field	bit(n)	Range:	Variable	of ITU-R M.1371 for more inf Resolution: 1	Used to construct bit fields
11		ver Information	DIL(II)		eld Size:	Bit Field Size: 5	Request Parameter No
	DD246 AIS	S Transceiver Information			0 = Channel A VDL 1 = Channel B VDL 2 = Channel A VDL 3 = Channel B VDL 4 = Own information 5-31 = Reserved.	reception, reception, transmission, transmission,	, <u></u>
	DF52 B	it field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
12	Position Date DD039 Ger			Byte Fi	eld Size: 2 Days since January 1	Bit Field Size: , 1970, Date is relative to UT	Request Parameter No C Time.
	DF41 D	ate, day count	uint16	Range:	0 to 65,532 days	Resolution: 1 day	0 = January 1, 1970, max = ~179 years
13	NMEA 2000 F			Byte Fi	eld Size:	Bit Field Size: resv 4	Request Parameter No
		it field	bit(n)	Range:	Variable Variable	Resolution: 1	Used to construct bit fields
		ubsequent data on byte bound	/	rango.	Variable	recolution.	escu to construct bit fields
14		tronic Positioning Device		Byte Fi	eld Size:	Bit Field Size: 4	Request Parameter No
	DD191 AIS	S Electronic Positioning De	evice Typ	oe	0 = Undefined (defauted 1 = GPS, 2 = GLONASS, 3 = Combined GPS/04 = Loran-C, 5 = Chayka, 6 = Integrated Navig 7 = Surveyed (Base States and Sta	GLONASS, ation System, Station), future use.	
	DF52 B	it field	hit(m)	Range:	Variable	of ITU-R M.1371 for more inf Resolution: 1	Used to construct bit fields
15	Spare Spare	II IICIU	bit(n)		eld Size:	Bit Field Size: resv 10	
13	-	served field		Dy to 11		reserved bits, all set to logic "1"	
	DF52 B	it field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
	AIS message ca	s the "Spare" bit field found wi an also be accomodated within owever for AIS PGNs the unus	n this field	I. Normally	, spare or reserved bits in	NMEA 2000 are encoded	

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 Fra	nme: No	Priority Default: 6		Jpdate Rate:	NA millis	econds Freque	ency: NA cycles per second
Destina Field #	tion: <mark>Globa</mark> Field Na	5 11	lo	ACK Rqmnts:			Original Reference ID # 111
1	Message			Byte Field S	Size:	Bit Field Size:	
•	_	AIS Message Identifier	r	Dyto 1 lold C		(range of 0 to 63).	140
		C			See the letest vers	ion of ITU-R M.1371 f	or more information
	DF52	Bit field	bit(n)	Range: Var		Resolution: 1	Used to construct bit fields
		atic and Voyage Related [runger van	iabic	r to conducting 1	esset to constitue on neith
2	Repeat Ir			Byte Field S	Size:	Bit Field Size:	2 Request Parameter No
	DD185	AIS Repeater Indicator	r		Used by the repeat (range of 0 to 3).	ter to indicate how man	y times a message has been repeated
					0 = Default 1 = First retransmi 2 = Second retrans 3 = Final retransm	smission	
					See the latest vers	sion of ITU-R M.1371	For more information.
	DF52	Bit field	bit(n)	Range: Var	riable	Resolution: 1	Used to construct bit fields
3	User ID DD010	Generic numeric ID, la	ırge	Byte Field S		Bit Field Size: waypoint, event, mark,	Request Parameter No etc.
	DF55 MMSI numl	Integer, 32 bit unsignoer of mobile station repor			4,294,967,292 data.	Resolution: 1 bit	Unit-less number
4	IMO	Generic numeric ID, la		Byte Field S	Size: 4	Bit Field Size: waypoint, event, mark,	Request Parameter No
	DF55 IMO numbe	Integer, 32 bit unsigner of mobile station reporting			4,294,967,292 ata.	Resolution: 1 bit	Unit-less number
5	Call Sign	Generic String, ASCII,	, Fixed length	Byte Field S		Bit Field Size: by PGN field definition	Request Parameter No
	DF63 This is a 7 (String, fixed character string, see ITU-F	` '	_	1,785 characters	Resolution: 1 cha	ot o 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
6	Name DD192	Generic String, ASCII,	Fixed length	Byte Field S		Bit Field Size: by PGN field definition.	Request Parameter No
	DF63 This is a 20	String, fixed character string, see ITU			1,785 characters	Resolution: <mark>1 cha</mark>	ot o 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
7	Ship/Car DD193	go Type Ship/Cargo Type		Byte Field S	0=Not Available of 1-99= (See the late 100-199=Reserved	d for Regional (See the	Request Parameter No .1371 Section 3.3.8.2.3.2 Table 18), latest version of ITU-R M.1371), est version of ITU-R M.1371).
	DF52	Bit field	bit(n)	Range: Var	riable	Resolution: 1	Used to construct bit fields

AIS Class A Static and Voyage Related Data

PGN: 129794 hex: 1FB02

8	Ship Length DD194 Distance, medium	Byte Field Size: 2 Dependent upon P	Bit Field Size:	Request Parameter No
		nt16 Range: 0 to 6553.2 m	Resolution: 1x10E-1 m	
9	Ship Beam DD194 Distance, medium	Byte Field Size: 2 Dependent upon P	Bit Field Size:	Request Parameter No
	DF75 Distance, Medium uii Beam of mobile station reporting its static and vo	nt16 Range: 0 to 6553.2 m yage related data. A value of 65535 indic	Resolution: 1x10E-1 m cates that data is not available.	
10	Position Reference Point from Starboard DD194 Distance, medium	Byte Field Size: 2 Dependent upon P	Bit Field Size: G Field definition.	Request Parameter No
	DF75 Distance, Medium uin Position reference point from starboard side of m 65535 indicates that data is not available.	nt16 Range: 0 to 6553.2 m obile station reporting its static and voya	Resolution: 1x10E-1 m ge related data. A value of	
11	Position Reference Point aft of Ship's Bo DD194 Distance, medium	w Byte Field Size: 2 Dependent upon P	Bit Field Size: G Field definition.	Request Parameter No
	DF75 Distance, Medium uii Position reference point from aft of ship's bow of 65535 indicates that data is not available.	nt16 Range: 0 to 6553.2 m mobile station reporting its static and voy	Resolution: 1x10E-1 m yage related data. A value of	
12	Estimated Date of Arrival DD039 Generic date	Byte Field Size: 2 Days since January	Bit Field Size: y 1, 1970, Date is relative to UT	Request Parameter No
	DF41 Date, day count uin EDA of mobile station reporting its static and voy	nt16 Range: 0 to 65,532 days age related data.	Resolution: 1 day	0 = January 1, 1970, max = ~179 years
13	Estimated Time of Arrival DD158 Generic time of day	Byte Field Size: 4	Bit Field Size: midnight, time is in UTC	Request Parameter No
	·	nt32 Range: 0 to 86,401 s	Resolution: 1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
14	Draft DD196 Draft	Byte Field Size: 2 The depth of a ship the keel.	Bit Field Size: p in the water. The vertical dista	Request Parameter No
	DF13 Distance, short ui	nt16 Range: 0 to 655.32 m	Resolution: 1x10E-2 m	
15	Destination DD192 Generic String, ASCII, Fixed len	Byte Field Size: char ngth Length specified b	Bit Field Size: y PGN field definition.	Request Parameter No
	DF63 String, fixed cha This is a 20 character string, see ITU-R M.1371-	r8(n) Range: 0 to 1,785 characters I for more information.	Resolution: 1 char	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary
16	AIS Version DD304 AIS Version Indicator		Bit Field Size: 2 Stant with AIS edition 0 Spliant with AIS editions 1, 2, and	Request Parameter No
		See the latest versi	on of ITU-R M.1371 for more in	formation.
	DF52 Bit field bi	t(n) Range: Variable	Resolution: 1	Used to construct bit fields

AIS Class A Static and Voyage Related Data

PGN: 129794 hex: 1FB02

17	Type of Electronic Positioning Device				Byte Field Size: Bit Field Size: 4 Request Parame					
	DD191	AIS Electronic Positioning I	Device Typ	oe .	4 = Loran-C, 5 = Chayka, 6 = Integrate 7 = Surveyed 8 = Galilieo	SS, ed GPS/GLONASS,				
					See the latest	version of ITU-R M.1371 for more information.				
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields			
18		Data Terminal Equipment (DTE) DD242 Data Terminal Equipment (DTE)		Byte Fi	eld Size: 0=Available, 1=not availal	Request Parameter No				
					See the latest	version of ITU-R M.1371 for more in	nformation.			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields			
19	Spare DD001	Reserved field		Byte Fi	eld Size: Variable nun	Bit Field Size: resv 1 aber of reserved bits, all set to logic "	Request Parameter No			
	AIS messa		hin this field	orrespond d. Normally	, spare or reserved	g AIS message such that future definition within the spare or reserved bits in NMEA 2000 are encoded				
20	AIS Transceiver Information DD246 AIS Transceiver Information			Byte Fi	1 = Channel 2 = Channel 3 = Channel	Bit Field Size: 5 A VDL reception, B VDL reception, A VDL transmission, B VDL transmission, ormation not broadcast, ved.	Request Parameter No			
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields			

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 Fra		Priority Default: 5	Default	Update Ra		seconds Frequer	ncy: NA cycles per second
	tion: Global	Query Support: No		ACK Rqm	nts:		Original Defendance ID # 440
Field #	Field Nam						Original Reference ID # 112
1	Message ID			Byte Fi	eld Size:	Bit Field Size: 6 r (range of 0 to 63).	Request Parameter No
	אויטט A	IS Message Identifier			Message Identifie	r (range of 0 to 65).	
					See the latest vers	ion of ITU-R M.1371 for	r more information.
		Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
	6 = Addressed	d Binary Message.				=	
2	Repeat Indi	icator IS Repeater Indicator		Byte Fi	Used by the repeating (range of 0 to 3).	Bit Field Size: 2 ter to indicate how many	Request Parameter No times a message has been repeated
					0 = Default 1 = First retransm 2 = Second retran 3 = Final retransm	smission	
					See the latest vers	sion of ITU-R M.1371 fo	or more information.
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	Source ID			Byte Fi	eld Size: 4	Bit Field Size:	Request Parameter No
	DD010 G	eneric numeric ID, large			Number of route,	waypoint, event, mark, e	tc.
		Integer, 32 bit unsigned of source station.	uint32	Range:	0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
4	NMEA 2000	Reserved		Byte Fi	eld Size:	Bit Field Size: r	esv 1 Request Parameter No
	DD001 R	eserved field			Variable number	of reserved bits, all set to	logic "1"
		Bit field subsequent data on byte bound	bit(n) lary.	Range:	Variable	Resolution: 1	Used to construct bit fields
5	AIS Transc	eiver Information		Byte Fi	eld Size:	Bit Field Size: 5	Request Parameter No
	DD246 A	IS Transceiver Information			0 = Channel A VI 1 = Channel B VI 2 = Channel A VI 3 = Channel B VI 4 = Own informat 5-31 = Reserved.	OL reception, OL transmission, OL transmission,	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
6	Sequence N	Number IS Sequence Number		Byte Fi	eld Size: Range 0-3	Bit Field Size: 2	Request Parameter No
					See the latest vers	ion of ITU-R M.1371 for	r more information.
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
7	Destination	n ID eneric numeric ID, large		Byte Fi	eld Size: 4 Number of route,	Bit Field Size: waypoint, event, mark, e	Request Parameter No
		Integer, 32 bit unsigned r of destination station.	uint32	Range:	0 to 4,294,967,292	Resolution: 1 bit	Unit-less number

AIS Addressed Binary Message

PGN: 129795 hex: 1FB03

8	NMEA 2000 Reserved DD001 Reserved field		Byte Field Size: Variable number o			Bit Field Size: resv mber of reserved bits, all set to logic	6 Request Parameter No			
	DF52 Used to ali	Bit field gn subsequent data on byte bour	bit(n) ndary.	Range:	Variable	Resolution: 1	Used to construct bit fields			
9 Retransmit Fla		mit Flag AIS Retransmit Flag			ield Size: 0=No retran 1=retransmi		Request Parameter No			
				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 DD001 Reserved field			Byte Field Size: Variable number		Bit Field Size: resv mber of reserved bits, all set to logic	1 Request Parameter No			
	AIS messa	·	hin this field	correspond d. Normally	, spare or reserve	Resolution: 1 such that future definition within the d bits in NMEA 2000 are encoded I as logic 0's.	Used to construct bit fields			
11	Number	of Bits in Binary Data Field Generic numeric ID, medium			ield Size: 2	Bit Field Size: oute, waypoint, event, mark, etc.	Request Parameter No			
	DF54 Indicates the	Integer, 16 bit unsigned he number of binary data bits tha	uint16 t are contai	_	0 to 65,532 the Binary Data fie	Resolution: 1 bit	Unit-less number			
12	Binary D DD142	Pata Binary Bit Field		Byte Fi	ield Size: Binary data	Bit Field Size: n	Request Parameter No			
	DF52 Application	Bit field n specific data.	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields			

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 Fra	me: No	Priority Default: 7		Jpdate Ra	ate: NA mill	iseconds Frequency:	NA cycles per second		
Destina Field #	tion: <mark>Global</mark> Field Naı	Query Support: No		ACK Rqm	nnis:		Original Reference ID # 113		
1	Message ID DD188 AIS Message Identifier			Byte Fi	eld Size: Message Identifi	Bit Field Size: 6 er (range of 0 to 63).	Request Parameter No		
			See the latest version of ITU-R M.1371 for more information.						
		Bit field cknowledge Message, Related Acknowledge Message.	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields		
2	Repeat Indicator DD185 AIS Repeater Indicator			Byte Fi	Request Parameter No a message has been repeated information.				
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields		
3	DF55	Generic numeric ID, large Integer, 32 bit unsigned er of source station for this ackno	uint32 owledge.		Number of route 0 to 4,294,967,292	Bit Field Size: , waypoint, event, mark, etc. Resolution: 1 bit	Request Parameter No Unit-less number		
4	NMEA 2000 Reserved			Byte Fi	eld Size:	Bit Field Size: resv	1 Request Parameter No		
	DD001 Reserved field			Variable number of reserved bits, all set to logic			'1"		
	DF52 Used to align	Bit field subsequent data on byte bound	bit(n) dary.	Range:	Variable	Resolution: 1	Used to construct bit fields		
5	AIS Transceiver Information DD246 AIS Transceiver Information		,	Byte Field Size: 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 Fi	eld Size: Variable number	Bit Field Size: resv			
	AIS message with logic 1's	e can also be accomodated with , however for AIS PGNs the unu	n this field	orrespond d. Normally served bits	Range: Variable Resolution: 1 Used to construct or responding AIS message such that future definition within the . Normally, spare or reserved bits in NMEA 2000 are encoded erved bits are to be encoded as logic 0's.				
7	Destinatio	n ID"1" Generic numeric ID, large		Byte Fi	eld Size: 4 Number of route	Bit Field Size: , waypoint, event, mark, etc.	Request Parameter No		
	DF55 MMSI numbe	Integer, 32 bit unsigned er of first destination for this ackr	uint32 nowledge.	Range:	0 to 4,294,967,292	Resolution: 1 bit	Unit-less number		

AIS Acknowledge PGN: 129796 hex: 1FB04

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

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 Fra	me: No	Priority Default: 5	Default	Update Ra	nte: NA r	milliseconds	Frequency:	NA cycles per second
Destina Field #	tion: <mark>Global</mark> Field Nar	Query Support: No		ACK Rqm	nts:			Original Reference ID # 114
1	Message ID DD188 AIS Message Identifier			Byte Fi	eld Size: Message Iden	Bit Fi	to 63).	Request Parameter No
					See the latest	version of ITU-F	R M.1371 for more	information.
		Bit field oadcast Message.	bit(n)	Range:	Variable	Resolu	ition: <mark>1</mark>	Used to construct bit fields
2	Repeat Indicator DD185 AIS Repeater Indicator			Byte Fi	eld Size: Used by the r (range of 0 to	epeater to indica	ield Size: 2 te how many times	Request Parameter No a message has been repeated
					0 = Default 1 = First retra 2 = Second re 3 = Final retra	etransmission ansmission	D.W. 1271.5	
	DF52	Bit field	bit(n)	Range:	Variable Variable	Resolu	R M.1371 for more	Used to construct bit fields
3	Source ID	Generic numeric ID, large	bit(ii)		eld Size: 4	_	ield Size:	Request Parameter No
	DF55 MMSI numbe	Integer, 32 bit unsigned er of source station.	uint32	Range:	0 to 4,294,967,2	Resolu	tion: <mark>1 bit</mark>	Unit-less number
4	NMEA 2000 Reserved DD001 Reserved field			Byte Field Size: Bit Field Size: resv 1 Request Variable number of reserved bits, all set to logic "1"				
	DF52 Used to align	Bit field subsequent data on byte boun	bit(n) dary.	Range:	Variable	Resolu	ıtion: <mark>1</mark>	Used to construct bit fields
5	AIS Transceiver Information DD246 AIS Transceiver Information			Byte Fi	1 = Channel l 2 = Channel l 3 = Channel l	A VDL reception B VDL reception A VDL transmiss B VDL transmiss rmation not broa	sion, sion,	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolu	ition: 1	Used to construct bit fields
6	Spare DD001 Reserved field			Byte Fi	eld Size: Variable num		ield Size: resv	2 Request Parameter No
	AIS message	Bit field rors the "Spare" bit field found vecan also be accomodated with however for AIS PGNs the uni	in this field	correspondi d. Normally	, spare or reserved	bits in NMEA 20	efinition within the	Used to construct bit fields
7		Bits in Binary Data Field Generic numeric ID, medium	ļ	Byte Fi	eld Size: 2 Number of ro	Bit Fi	ield Size: vent, mark, etc.	Request Parameter No
	DF54 Indicates the	Integer, 16 bit unsigned number of binary data bits that	uint16 are contai	_	0 to 65,532 the Binary Data fiel		tion: <mark>1 bit</mark>	Unit-less number

AIS Binary Broadcast Message PGN: 129797

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

PGN: 129797

hex: 1FB05

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.

	aning in t ame: No	uture	revisions of the Priority Default:			Update Ra	te: NA	milliseconds	Frequency:	NA cycles per second
Ü	tion: Glob	al	Query Support:			ACK Rqm			, ,	, ,
Field#	Field N	ame								Original Reference ID # 115
1	Message DD188		Message Identii	fier		Byte Fie	eld Size: Message Id	Bit F entifier (range of	Field Size: 6 0 to 63).	Request Parameter No
							See the late	st version of ITU-	R M.1371 for more	information.
	DF52 9 = SAR A		field Position Report M	1essage	bit(n)	Range:	Variable	Resol	ution: <mark>1</mark>	Used to construct bit fields
2	Repeat I DD185		or Repeater Indica	ator		Byte Fie	Used by the (range of 0) 0 = Default 1 = First ret 2 = Second 3 = Final ret	e repeater to indicate to 3). transmission retransmission etransmission	ŕ	Request Parameter No a message has been repeated
	DE53	D.,	C. 11		1.46.	Panga:			-R M.1371 for more	
	DF52	Bit	field		bit(n)		Variable		ution: 1	Used to construct bit fields
3	User ID DD010	Gene	ric numeric ID	large		Byte Fie	eld Size: 4 Number of	route, waypoint, e	Field Size: event, mark, etc.	Request Parameter No
	DF55	Inte	eger, 32 bit uns SAR aircraft repo	igned	uint32	Range:	0 to 4,294,967		ution: <mark>1 bit</mark>	Unit-less number
4	Longitud	de	itude, WGS-84			Byte Fie	eld Size: 4 Longitude 1	Bit F	Field Size: S-84	Request Parameter No
	DF25 Longitude		ngitude aircraft reporting	j position.	int32	Range:	+/- 180 deg	Resol	ution: <mark>1x10E-7 de</mark> g	"-" = West, resolution ~1.1 cm
5	Latitude DD022		ude, WGS-84			Byte Fie	eld Size: 4 Latitude ref	Bit F	Field Size:	Request Parameter No
	DF23 Latitude of		itude ircraft reporting μ	oosition.	int32	Range:	+/- 90 deg	Resol	ution: <mark>1x10E-7 de</mark> g	"-" = South, resolution ~1.1 cm
6	Position DD184		racy Position Accura	acy		Byte Fie	0=low accu		Field Size: 1 s nondifferential GN as DGNSS	Request Parameter No SS (default),
						_			R M.1371 for more	
	DF52		field		bit(n)		Variable		ution: 1	Used to construct bit fields
7	RAIM-Fia	•	RAIM-flag			Byte Fie	eld Size: 0 = RAIM i 1 = RAIM i	not in use (default	Field Size: 1	Request Parameter No
							See the late	st version of ITU-	R M.1371 for more	information.
	DF52	Bit	field		bit(n)	Range:	Variable	Resol	ution: 1	Used to construct bit fields

PGN: 129798 hex: 1FB06

8	8 Time Stamp Byte Field Size: Bit Field Size: DD186 AIS Time Stamp 0-59=UTC second when the report was					Bit Field Size: 6	Request Parameter No				
	DD100	Als Time Stamp		60=time stamp not available (default), 61=positioning system is in manual input mode, 62=Electronic position fixing system operates in estimated (dead reckon							
					mode,		estimated (dead reckoning)				
					63=positionin	g system is inoperative					
						version of ITU-R M.1371 for more	e information.				
	DF52	Bit field	bit(n)		Variable	Resolution: 1	Used to construct bit fields				
9	COG	G 0 G 1/G0G)		Byte Fi	eld Size: 2	Bit Field Size: of the path over ground actually fo	Request Parameter No				
	DD165	Course-Over-Ground (COG)		Dongo			•				
	DF02 COG of SA	Angle AR aircraft reporting position.	uint16	Range:	0 to 2Pi rad	Resolution: 1x10E-4 rac	Resolution ~0.0057deg, 1 deg = .01745 rad				
10	sog			Byte Fi	eld Size: 2	Bit Field Size:	Request Parameter No				
	DD044	Generic Speed									
	DF35 SOG of SA	Speed AR aircraft reporting position.	uint16	Range:	0 to 655.32 m/s	Resolution: 1x10E-2 m/	1 Knot = 0.5144 m/s				
11	Commur	nication State		Byte Fi	eld Size:	Bit Field Size: 19	Request Parameter No				
	DD187	AIS Communication State			allocation algo	ication State contains information or orithms and synchronization inform	nation				
						version of ITU-R M.1371 for more					
	DF52	Bit field	bit(n)		Variable	Resolution: 1	Used to construct bit fields				
12		AIS Transceiver Information		Byte Fi	eld Size: 0 = Channel A	Bit Field Size: 5 A VDL reception,	Request Parameter No				
	DD240	Als Transcerver information			1 = Channel E	VDL reception,					
						A VDL transmission, B VDL transmission,					
					4 = Own infor 5-31 = Reserv	mation not broadcast,					
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields				
13	Altitude			Byte Fi	eld Size: 4	Bit Field Size:	Request Parameter No				
	DD115	Distance									
	DF15	Distance, signed SAR aircraft reporting position.	int32	Range:	+/-~2.147x10E+	7 m Resolution: 1x10E-2 m					
14		d for Regional Applications		Rvte Fi	eld Size:	Bit Field Size: resv	8 Request Parameter No				
'-		Reserved field				per of reserved bits, all set to logic					
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields				
	definition w	nirrors the "Reserved for Regional within the AIS message can also be ncoded with logic 1's, however for	e accomod	lated within	n this field. Normally	, spare or reserved bits in NMEA					
15		minal Equipment (DTE)			eld Size:	Bit Field Size: 1	Request Parameter No				
-		Data Terminal Equipment (D'	TE)	-	0=Available, 1=not availab	le.					
					See the latest	version of ITU-R M.1371 for more	on of ITU-R M.1371 for more information.				
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields				

AIS SAR Aircraft Position Report

PGN: 129798 hex: 1FB06

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 accommodated 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.

PGN: 129799 hex: 1FB07

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

The Rad	-		Il transmit and			-			-	er products. n a low duty cy	olo	
Single Fra		IIIIOIIII	Priority Default:			Jpdate Ra		-	quesi oi oi iseconds	Frequency:		A cycles per second
-	tion: Globa	al	Query Support:		Delault	ACK Rami		INA	130001103	r requericy.	IV.	eyolos por socoria
Field #	Field N		Оиегу Зирроп.	Ори		ACK KYIIII	113.				Origi	nal Reference ID # 62
						5 . 5		4	577.5			
1	Rx Frequ	-	Tx or Rx Fred	mency		Byte Fie	eld Size:	4	Bit F	Field Size:	Re	equest Parameter No
				lucite		Danger	0.4	205 10E 1	O Possi	ution 10 II		
	DF21	Frec	quency		uint32		0 to ~4. Hz	295x10E+1	.0 Result	ution: <mark>10 Hz</mark>		
2	Tx Frequ	iency				Byte Fie	eld Size:	4	Bit F	Field Size:	Re	equest Parameter No
	DD016	Radio	Tx or Rx Freq	quency								
	DF21	Free	quency		uint32	Range:	0 to ~4. Hz	295x10E+1	0 Resolu	ution: <mark>10 Hz</mark>		
3	Radio Cl	nannel				Byte Fie	eld Size:	char	6 Bit F	ield Size:	Re	equest Parameter No
	DD017	Radio	Tx or Rx Cha	nnel			with secon char first tran- indi- char	leading zero and and third anel numbers digit 9 follor smit frequence cating the co	os as required digit give the se; each with le wed by zero. cy is being un ast station's cy, "0" other	d. MF/HF teletype te frequency bands leading zeros as re The next number sed as a simplex c transmit frequency	e channels to e; and the fo quired. VH is "1" indic hannel frequency is being using three nur	
	of mismato	cessary h.	ng, fixed to supply both F	RX/TX fre	` '	I channel b	ut if both		frequency ta	ution: 1 char lkes priority in caso	e count specif Data	,785 bytes. Character not included, length is ied by application in Dictionary
4	Tx Powe		Tx Power			вуте гл	eld Size:	2	Bit F	Field Size:		equest Parameter <mark>No</mark>
	DF28	Pow	/er		uint16	Range:	0 to 65,	532 W	Resol	ution: <mark>1 W</mark>		
	If equipments	nt has ii	nsufficient resolu	ition to a	pply a comn	nanded pov	ver, the n	ext lower ava	ailable powe	r setting should be		
5	Mode					Byte Fie	eld Size:		Bit F	Field Size: 8	Re	equest Parameter No
	DD019	Mode	e, Radiotelepho	ne			0 = 1 = 2 = 3 = 4 = 5 = 6 = 7 = 8 = 10 = 11-2 = 254	F1B/J2B AR	nplex, telephone; plex, telephone; one; one; C NBDP, tel Q NBDP, te eive only, tel eprinter/DSC tape recorde Morse key/h GC, FAX-mand;	one; one; ex/teleprinter; lex/teleprinter; leprinter/DSC; C; r; lead set; chine;		
	DF52	Bit	field		bit(n)	Range:	Variable	e	Resol	ution: 1	Used	to construct bit fields
6	Channel DD020		width Channel Band	lwidth		Byte Fie	eld Size:	2	Bit F	Field Size:	Re	equest Parameter No
	DF26	Free	quency, mid		uint16	Range:	0 to 65,	532 Hz	Resol	ution: <mark>1 Hz</mark>		
	If equipme	nt has i	nsufficient resolu	ition to a	pply a comn	nanded bar	ndwidth, t	ne closest av	/ailable setti	ing should be used	d.	

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 Fra		Priority Default: 7	Default (Update Ra	ate: NA mi	lliseconds	Frequency:	NA cycles per second
Destina Field #	tion: <mark>Global</mark> Field Nam	Query Support: No		ACK Rqm	ints:			Original Reference ID # 116
1	Message ID			Byte Fi	eld Size: Message Identif		eld Size: 6 to 63).	Request Parameter No
					See the latest ve	ersion of ITU-R	M.1371 for more	information.
		Bit field and Date Inquiry Message	bit(n)	Range:	Variable	Resolu	tion: 1	Used to construct bit fields
2	Repeat Indi DD185 A	cator IS Repeater Indicator		Byte Fi	eld Size: Used by the rep (range of 0 to 3	eater to indicat	eld Size: 2 e how many times	Request Parameter No a message has been repeated
					0 = Default 1 = First retrans 2 = Second retr 3 = Final retran	ansmission smission	2.14.1051.6	
	DF52	Bit field	bit(n)	Range:	Variable	Resolui	R M.1371 for more tion: 1	Used to construct bit fields
3	Source ID	eneric numeric ID, large	BIL(II)		eld Size: 4 Number of rout	Bit Fie	eld Size:	Request Parameter No
		Integer, 32 bit unsigned of station which inquires UTC.	uint32	Range:	0 to 4,294,967,292	2 Resolu	tion: <mark>1 bit</mark>	Unit-less number
4	NMEA 2000 DD001 R	Reserved eserved field		Byte Fi	eld Size: Variable numbe		eld Size: resv	
		Bit field subsequent data on byte bound	bit(n) lary.	Range:	Variable	Resolu	tion: <mark>1</mark>	Used to construct bit fields
5		eiver Information IS Transceiver Information		Byte Fi	eld Size: 0 = Channel A 1 = Channel B 2 = Channel A 3 = Channel B 4 = Own inform 5-31 = Reserver	VDL reception, VDL reception, VDL transmiss VDL transmiss nation not broad	ion, ion,	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolu	tion: 1	Used to construct bit fields
6	Spare DD001 Re	eserved field		Byte Fi	eld Size: Variable numbe		eld Size: resv	Request Parameter No
	This field mirro	Bit field ors the "Spare" bit field found w can also be accomodated withi however for AIS PGNs the unu	n this field	correspond d. Normally	, spare or reserved b	its in NMEA 20	finition within the	Used to construct bit fields
7	Destination DD010 G	ID eneric numeric ID, large		Byte Fi	eld Size: 4 Number of rout		eld Size: ent, mark, etc.	Request Parameter No
		Integer, 32 bit unsigned of station which is inquired.	uint32	Range:	0 to 4,294,967,29	2 Resolu	tion: <mark>1 bit</mark>	Unit-less number

AIS UTC/Date Inquiry

PGN: 129800 hex: 1FB08

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 accommodated 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.

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 Fra		Default	Update Ra		seconds Frequency:	NA cycles per second
Destina Field #	tion: Global Query Support: No Field Name		ACK Rqmi	1ts:		Original Reference ID # 117
1	Message ID DD188 AIS Message Identifier		Byte Fie		Bit Field Size: 6 or (range of 0 to 63).	Request Parameter No
				See the latest vers	sion of ITU-R M.1371 for mor	re information.
	DF52 Bit field 12 = Addressed Safety Related Message	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
2	Repeat Indicator DD185 AIS Repeater Indicator		Byte Fie	Used by the repea (range of 0 to 3). 0 = Default 1 = First retransm 2 = Second retran 3 = Final retransm	nission Ismission nission	Request Parameter No
			-		sion of ITU-R M.1371 for mo	
	DF52 Bit field	bit(n)		Variable	Resolution: 1	Used to construct bit fields
3	Source ID DD010 Comorio numerio ID James		Byte Fie		Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DD010 Generic numeric ID, large DF55 Integer, 32 bit unsigned MMSI number of station which is the source	uint32		0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
4	NMEA 2000 Reserved	0	Byte Fie	eld Size:	Bit Field Size: resv	1 Request Parameter No
-	DD001 Reserved field		•	Variable number	of reserved bits, all set to logic	
	DF52 Bit field Used to align subsequent data on byte bour	bit(n) ndary.	Range:	Variable	Resolution: 1	Used to construct bit fields
5	AlS Transceiver Information DD246 AIS Transceiver Information	ı	Byte Fie	0 = Channel A VI 1 = Channel B VI 2 = Channel A VI 3 = Channel B VI	DL reception, DL transmission,	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
6	Sequence Number DD243 AIS Sequence Number		Byte Fie	Range 0-3	Bit Field Size: 2	Request Parameter No
			_		sion of ITU-R M.1371 for mor	
	DF52 Bit field	bit(n)		Variable	Resolution: 1	Used to construct bit fields
7	Destination ID		Byte Fie		Bit Field Size:	Request Parameter No
	DD010 Generic numeric ID, largeDF55 Integer, 32 bit unsignedMMSI number of station which is the destination	uint32 ation of this	•	Number of route, 0 to 4,294,967,292	waypoint, event, mark, etc. Resolution: 1 bit	Unit-less number

AIS Addressed Safety Related Message

PGN: 129801 hex: 1FB09

8	NMEA 2000 Reserved DD001 Reserved field		Byte Field Size: Variable number of			Bit Field Size: reserved bits, all set to logic "1"		Request Parameter No	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1		Used to construct bit fields	
	Used to ali	gn subsequent data on byte bo	undary.						
9	Retransr	nit Flag		Byte Fi	eld Size:	Bit Field Siz	ze: 1	Request Parameter No	
	DD244	AIS Retransmit Flag		0=No retransmission, 1=retransmitted.		,			
					See the latest version	of ITU-R M.13	71 for more inf	re information.	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1		Used to construct bit fields	
10	Spare			Byte Fi	eld Size:	Bit Field Siz	re: resv 1	Request Parameter No	
	DD001	Reserved field			Variable number of r	eserved bits, all	set to logic "1"		
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1		Used to construct bit fields	
	AIS messa	nirrors the "Spare" bit field foun ge can also be accomodated w I's, however for AIS PGNs the u	ithin this field	d. Normally served bits	r, spare or reserved bits in lare to be encoded as logic	NMEA 2000 are			
11	•	elated Text		Byte Fi	eld Size: 8 or 16 n	Bit Field Siz		Request Parameter No	
	DD004	Generic name string, short			Name of place, route	, waypoint, desti	ination, vessel,	vehicle, etc.	
	DF50	String, variable, short	ch8or16(n) Range:	0 to 250 ASCII or 0 to 125 Unicode Characters		ASCII or Unicode haracter	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number	
	Maximum s	size is 156 8-bit ASCII characte	ers.					of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.	

PGN: 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 Fra	ame: No	Priority Default: 5	Default (Update Ra	te: NA	milliseconds	Frequency:	NA cycles per second	
Destina Field #	tion: <mark>Globa</mark> Field Na	3 11		ACK Rqm	nts:			Original Reference ID # 118	
		· · ·		Duta Fi	-1-1 0:	D# E	intel Cine C		
1	Message	AIS Message Identifier		вуте гі	eld Size: Message Ide	entifier (range of 0	ield Size: 6	Request Parameter No	
	DD 100	THIS INCSSAGE Identifier			C		•		
					See the lates		R M.1371 for more		
	DF52	Bit field	bit(n)	Range:	Variable	Resolu	ıtion: 1	Used to construct bit fields	
	14 = Safety Related Broadcast Message.								
2	Repeat In			Byte Fie	eld Size:	Bit Field Size: 2 Request Parameter			
	DD185	AIS Repeater Indicator			(range of 0 t		te how many times	s a message has been repeated	
					0 5 6 1				
					0 = Default 1 = First ret	ransmission			
					2 = Second	retransmission			
					3 = Final ret	ransmission			
					See the late	st version of ITU-	R M.1371 for more	e information.	
	DF52	Bit field	bit(n)	Range:	Variable	Resolu	ıtion: <mark>1</mark>	Used to construct bit fields	
3	Source ID			Byte Fie	eld Size: 4	Bit Fi	ield Size:	Request Parameter No	
	DD010	Generic numeric ID, large			Number of r	oute, waypoint, ev	vent, mark, etc.		
	DF55	Integer, 32 bit unsigned	uint32	Range:	0 to 4,294,967,	,292 Resolu	ıtion: <mark>1 bit</mark>	Unit-less number	
	MMSI numb	per of station which is the source	of the mes	ssage.					
4	NMEA 20	00 Reserved		Byte Fie	eld Size:	Bit Fi	ield Size: resv	1 Request Parameter No	
	DD001	Reserved field			Variable nui	mber of reserved b	oits, all set to logic	"1"	
	DF52	Bit field	bit(n)	Range:	Variable	Resolu	ıtion: <mark>1</mark>	Used to construct bit fields	
	Used to alig	n subsequent data on byte boun	dary.						
5	AIS Trans	sceiver Information		Byte Fie	eld Size:	Bit Fi	ield Size: 5	Request Parameter No	
	DD246	AIS Transceiver Information				A VDL reception B VDL reception			
						A VDL transmiss			
						B VDL transmiss			
					4 = Own inf 5-31 = Rese	formation not broat rved.	ideast,		
	DF52	Bit field	bit(n)	Range:	Variable	Resolu	ıtion: 1	Used to construct bit fields	
6	Spare			Byte Fie	eld Size:	Bit Fi	ield Size: resv	2 Request Parameter No	
	DD001	Reserved field			Variable nui	mber of reserved b	oits, all set to logic	"1"	
	DF52	Bit field	bit(n)	Range:	Variable	Resolu	ıtion: 1	Used to construct bit fields	
		irrors the "Spare" bit field found v							
		ge can also be accomodated with					000 are encoded		
	with logic 1:	s, however for AIS PGNs the uni	izea oi tes	served bits	are to be effcoded	as logic u.s.			

AIS Safety Related Broadcast Message

PGN: 129802 hex: 1FB0A

7 **Safety Related Text** Byte Field Size: 8 or 16 n

Bit Field Size: Name of place, route, waypoint, destination, vessel, vehicle, etc.

Request Parameter No

DD004 Generic name string, short

Resolution: 1 ASCII or

1 Unicode Character

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

Characters

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16).

Control byte = 0 => Unicode characters

Control byte = 1 => ASCII

characters

A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

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 Fra	ame: No Priority Default: 7		Update Rate		econds <i>Frequency</i>	/: NA cycles per second
	ation: Global Query Support: N	10	ACK Rqmni	ts:		Odelant Batanana IB # 440
Field #	Field Name					Original Reference ID # 119
1	Message ID	_	Byte Fiel	d Size: Message Identifier	Bit Field Size: 6	Request Parameter No
	DD188 AIS Message Identifier			Wessage Identifier	(range of 0 to 63).	
					on of ITU-R M.1371 for n	nore information.
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
	15 = Interrogation Message					-
2	Repeat Indicator		Byte Fiel		Bit Field Size: 2	Request Parameter No
	DD185 AIS Repeater Indicator	r		(range of 0 to 3).	er to indicate now many ti	mes a message has been repeated
				0 = Default		
				1 = First retransmi 2 = Second retrans		
				3 = Final retransm	ission	
				See the latest vers	ion of ITU-R M.1371 for 1	more information.
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	Source ID		Byte Fiel	d Size: 4	Bit Field Size:	Request Parameter No
	DD010 Generic numeric ID, la	irge		Number of route, v	vaypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsign MMSI number of interrogating station		Range: (to 4,294,967,292	Resolution: 1 bit	Unit-less number
4	NMEA 2000 Reserved		Byte Fiel	d Size:	Bit Field Size: res	v 1 Request Parameter No
	DD001 Reserved field			Variable number o	f reserved bits, all set to lo	gic "1"
	DF52 Bit field Used to align subsequent data on byte	bit(n) e boundary.	Range:	Variable	Resolution: 1	Used to construct bit fields
5	AIS Transceiver Information		Byte Fiel	d Size:	Bit Field Size: 5	Request Parameter No
	DD246 AIS Transceiver Inform	mation		0 = Channel A VD 1 = Channel B VD 2 = Channel A VD 3 = Channel B VD	L reception, L transmission,	_
				4 = Own informati		
			_	5-31 = Reserved.		
	DF52 Bit field	bit(n)	Range:		Resolution: 1	Used to construct bit fields
6	Spare		Byte Fiel		Bit Field Size: res	
	DD001 Reserved field	• •			of reserved bits, all set to lo	
	DF52 Bit field This field mirrors the "Spare" bit field	bit(n)	Range: '		Resolution: 1	Used to construct bit fields
	AIS message can also be accomodal with logic 1's, however for AIS PGNs	ed within this fiel	d. Normally,	spare or reserved bits i	in NMEA 2000 are encode	
7	Destination ID 1		Byte Fiel	d Size: 4	Bit Field Size:	Request Parameter No
	DD010 Generic numeric ID, la	irge		Number of route, v	vaypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsign MMSI number of first interrogated sta		Range: (to 4,294,967,292	Resolution: 1 bit	Unit-less number

AIS Interrogation PGN: 129803 hex: 1FB0B

8	NMEA 2000 Reserved DD001 Reserved field	Byte Fi	<i>ield Size:</i> Variable nur	Bit Field Size: resv 2 nber of reserved bits, all set to logic "1"	Request Parameter No
	DF52 Bit field Used to align subsequent data on byte bounda	. ,	Variable	Resolution: 1	Used to construct bit fields
9	Message ID 1.1 DD188 AIS Message Identifier	•	ield Size: Message Ide	Bit Field Size: 6 ntifier (range of 0 to 63).	Request Parameter No
			See the lates	t version of ITU-R M.1371 for more in	formation.
	DF52 Bit field I First Requested message type from first interro	()	Variable	Resolution: 1	Used to construct bit fields
10	Slot Offset 1.1 DD007 Generic numeric ID, medium	·	ield Size: 2 Number of r	Bit Field Size: oute, waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned under Response Slot offset for first requested messages		0 to 65,532 ogated station.	Resolution: 1 bit	Unit-less number
11	Spare DD001 Reserved field	Byte Fi	ield Size: Variable nur	Bit Field Size: resv 2 nber of reserved bits, all set to logic "1"	
	DF52 Bit field IThis field mirrors the "Spare" bit field found with AIS message can also be accommodated within with logic 1's, however for AIS PGNs the unuse	nin the correspond this field. Normally	, spare or reserve	d bits in NMEA 2000 are encoded	Used to construct bit fields
12	Message ID 1.2 DD188 AIS Message Identifier		ield Size:	Bit Field Size: 6 ntifier (range of 0 to 63).	Request Parameter No
			See the lates	t version of ITU-R M.1371 for more in	formation.
	DF52 Bit field I Second requested message type from first inte		Variable	Resolution: 1	Used to construct bit fields
13	Slot Offset 1.2	·	ield Size: 2	Bit Field Size:	Request Parameter No
	DD007 Generic numeric ID, medium	,		oute, waypoint, event, mark, etc.	,
	DF54 Integer, 16 bit unsigned under the Response Slot offset for second requested metals.		0 to 65,532 d interrogated station	Resolution: 1 bit	Unit-less number
14	NMEA 2000 Reserved DD001 Reserved field	Byte Fi	ield Size: Variable nur	Bit Field Size: resv 6 nber of reserved bits, all set to logic "1"	
	DF52 Bit field I Used to align subsequent data on byte bounda	310(11)	Variable	Resolution: 1	Used to construct bit fields
15	Spare DD001 Reserved field	Byte Fi	ield Size: Variable nur	Bit Field Size: resv 2 nber of reserved bits, all set to logic "1"	
	DF52 Bit field This field mirrors the "Spare" bit field found with AIS message can also be accommodated within with logic 1's, however for AIS PGNs the unuse	nin the correspond this field. Normally	, spare or reserve	d bits in NMEA 2000 are encoded	Used to construct bit fields
16	Destination ID 2	Byte Fi	ield Size: 4	Bit Field Size:	Request Parameter No
	DD010 Generic numeric ID, large		Number of r	oute, waypoint, event, mark, etc.	
	DF55 Integer, 32 bit unsigned with MMSI number of second interrogated station.	int32 Range:	0 to 4,294,967,	292 Resolution: 1 bit	Unit-less number
17	NMEA 2000 Reserved DD001 Reserved field	Byte Fi	ield Size: Variable nur	Bit Field Size: resv 2 nber of reserved bits, all set to logic "1"	
		. ,	Variable	Resolution: 1	Used to construct bit fields

AIS Interrogation PGN: 129803 hex: 1FB0B

Bit Field Size: 6 18 Message ID 2.1 Byte Field Size: Request Parameter No Message Identifier (range of 0 to 63). **DD188** AIS Message Identifier See the latest version of ITU-R M.1371 for more information. Bit field Range: Variable Resolution: 1 Used to construct bit fields DF52 bit(n) Requested message type from second interrogated station. Slot Offset 2.1 Byte Field Size: 2 Bit Field Size: Request Parameter No 19 **DD007** Generic numeric ID, medium Number of route, waypoint, event, mark, etc. uint16 Range: 0 to 65,532 Resolution: 1 bit Unit-less number DF54 Integer, 16 bit unsigned Response slot offset for requested message from second interrogated station. Bit Field Size: resv 2 20 **Spare** Byte Field Size: Request Parameter No Variable number of reserved bits, all set to logic "1" **DD001** Reserved field DF52 Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n) 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.

PGN: 129803

Appendix B.1 - PGN Report

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 Fra		Priority Default: 7	Default	Update Rat		econds Freque	ncy: NA cycles per second
	tion: Global	Query Support: No		ACK Rqmn	ts:		Original Reference ID # 120
Field #	Field Nar			Puto Fio	ld Sizo:	Dit Field Size:	Original Reference ID # 120
1	Message II	AIS Message Identifier		Byte Fie		Bit Field Size: (range of 0 to 63).	Request Parameter No
	22.00	no nacoonge racininer			C	, ,	
	DE52	D:4 6:-13	1.4()	Panga:		on of ITU-R M.1371 for Resolution: 1	Used to construct bit fields
	DF52 16 = Assigne	Bit field d Mode Command Message	bit(n)	Range:	variable	Resolution. 1	Osed to construct bit fields
2	Repeat Ind			Byte Fie	ld Size:	Bit Field Size:	2 Request Parameter No
_	DD185 A	AIS Repeater Indicator		Í		<u> </u>	y times a message has been repeated
					0 = Default 1 = First retransmi 2 = Second retrans 3 = Final retransm	smission ission	
		5. 4.1.		5		ion of ITU-R M.1371 f	
	DF52	Bit field	bit(n)	Range:		Resolution: 1	Used to construct bit fields
3	Source ID	Generic numeric ID, large		Byte Fie		Bit Field Size: waypoint, event, mark,	Request Parameter No
	DF55		uint32	Pange:		Resolution: 1 bit	Unit-less number
		Integer, 32 bit unsigned er of assigning station.	umt32	range.	0 to 4,294,967,292	resolution. 1 bit	Offit-less fluffiber
4		0 Reserved		Byte Fie	ld Size:	Bit Field Size:	resv 1 Request Parameter No
	DD001 F	Reserved field			Variable number of	of reserved bits, all set t	o logic "1"
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
		subsequent data on byte bound	dary.	Data Eta	14.0°	D'' E'- 14 O' [Democrat Democratics N
5		ceiver Information AIS Transceiver Information		Byte Fie	0 = Channel A VE 1 = Channel B VE 2 = Channel A VE 3 = Channel B VE 4 = Own informati 5-31 = Reserved.	DL reception, DL transmission, DL transmission,	5 Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
6	Spare DD001 F	Reserved field		Byte Fie		Bit Field Size: of reserved bits, all set t	
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
	AIS message	rors the "Spare" bit field found w can also be accomodated with however for AIS PGNs the unu	in this field	d. Normally,	spare or reserved bits	in NMEA 2000 are enc	
7	Destination				Id Size: 4	Bit Field Size:	Request Parameter No
-	DD010	Generic numeric ID, large				waypoint, event, mark,	
	DF55 MMSI numbe	Integer, 32 bit unsigned er of destination station A.	uint32	Range:	0 to 4,294,967,292	Resolution: 1 bit	Unit-less number

AIS Assignment Mode Command

PGN: 129804 hex: 1FB0C

8	Offset A DD007 Generic numeric ID, medium	Byte Field Size: 2 Number of route	Bit Field Size: , waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 Offset from Current slot to first assigned slot.		Resolution: 1 bit	Unit-less number
9	Increment A DD007 Generic numeric ID, medium	Byte Field Size: 2 Number of route	Bit Field Size: , waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 Increment to next assigned slot.	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
10	Destination ID B DD010 Generic numeric ID, large	Byte Field Size: 4 Number of route	Bit Field Size: , waypoint, event, mark, etc.	Request Parameter No
	DF55 Integer, 32 bit unsigned uint32 MMSI number of destination station B.	Range: 0 to 4,294,967,292	Resolution: 1 bit	Unit-less number
11	Offset B DD007 Generic numeric ID, medium	Byte Field Size: 2 Number of route	Bit Field Size: , waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 Offset from Current slot to first assigned slot.	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
12	Increment B DD007 Generic numeric ID, medium	Byte Field Size: 2 Number of route	Bit Field Size: , waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 Increment to next assigned slot.	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
13	Spare DD001 Reserved field	Byte Field Size: Variable number	Bit Field Size: resv 4	
	DF52 Bit field bit(n) This field mirrors the "Spare" bit field found within the AIS message can also be accommodated within this field with logic 1's, however for AIS PGNs the unused or not be accommodated.	e corresponding AIS message such eld. Normally, spare or reserved bit	s in NMEA 2000 are encoded	Used to construct bit fields

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 Fra		Priority Default: 7	Default	Update Rai	te: NA n	nilliseconds	Frequency:	NA cycles per second
Destina Field #	tion: <mark>Globa</mark> Field Na			ACK Rqmr	nts:			Original Reference ID # 124
-				D . E		D:: E:		
1	Message			Byte Fie			eld Size: 6	Request Parameter No
	188	AIS Message Identifier			Message Iden	tifier (range of 0 t	10 63).	
					See the latest	version of ITU-R	M.1371 for more in	formation.
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	ion: 1	Used to construct bit fields
	20 = Data L	ink Management Message						
2	Repeat In	dicator		Byte Fie	ld Size:	Bit Fie	eld Size: 2	Request Parameter No
	DD185	AIS Repeater Indicator			Used by the re (range of 0 to		e how many times a	message has been repeated
					0 = Default 1 = First retra 2 = Second re 3 = Final retra	etransmission		
					See the latest	version of ITU-R	M.1371 for more in	nformation.
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	ion: <mark>1</mark>	Used to construct bit fields
3	Source S	tation ID		Byte Fie	ld Size: 4	Bit Fie	eld Size:	Request Parameter No
	DD010	Generic numeric ID, large			Number of ro	ute, waypoint, eve	ent, mark, etc.	
	DF55	Integer, 32 bit unsigned per of base station transmitting m	uint32		0 to 4,294,967,2	92 Resolut	ion: 1 bit	Unit-less number
4		00 Reserved	idilagoilloi	Byte Fie	ald Size:	Rit Fie	eld Size: resv 1	Request Parameter No
7		Reserved field		Dyto 110			ts, all set to logic "1"	
	DF52	Bit field	hit(n)	Range:		Resolut	-	Used to construct bit fields
		n subsequent data on byte boun	bit(n)	range.	v arrable	Nesoluti	1011.	Osed to construct bit fields
5		sceiver Information	iddi y.	Byte Fie	uld Sizo:	Dit Ein	eld Size: 5	Request Parameter No
5		AIS Transceiver Information		Byterio	0 = Channel A 1 = Channel B 2 = Channel A 3 = Channel B	A VDL reception, 3 VDL reception, A VDL transmissi 3 VDL transmissi rmation not broad	on, on,	Neguest Falameter NO
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	ion: 1	Used to construct bit fields
6	Spare			Byte Fie	ld Size:	Bit Fie	eld Size: resv 2	Request Parameter No
	DD001	Reserved field			Variable num	ber of reserved bi	ts, all set to logic "1"	"
	DF52	Bit field	bit(n)	Range:	Variable	Resolut	ion: 1	Used to construct bit fields
	AIS messag	irrors the "Spare" bit field found v ge can also be accomodated with s, however for AIS PGNs the uni	nin this field	d. Normally,	spare or reserved	bits in NMEA 200		

AIS Data Link Management Message

PGN: 129805 hex: 1FB0D

7	Offset Number 1 DD007 Generic numeric ID, medium	Byte Field Size: 2 Number of route	Bit Field Size: e, waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 0=Not available, 1-4095=respective reserved offset number.	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information. Number of Slots 1	Puto Field Size: 1	Bit Field Size:	Poguest Parameter No.
8	DD005 Generic numeric ID, short	Byte Field Size: 1 Number of route	e, waypoint, event, mark, etc.	Request Parameter No
	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	e, waypoint, event, mark, etc.	
	DF53 Integer, 8 bit unsigned uint8 0=Not available, 1-7=respective time-out value in minutes. See ITU-R M.1371-1 for more information.	Range: 0 to 252	Resolution: 1 bit	Unit-less number
10	Increment 1	Byte Field Size: 2	Bit Field Size:	Request Parameter No
	DD007 Generic numeric ID, medium		e, waypoint, event, mark, etc.	110
	DF54 Integer, 16 bit unsigned uint16 0=Not available, 1-2047=respective increment to repeat reservation blo	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information.			
11	Offset Number 2 DD007 Generic numeric ID, medium	Byte Field Size: 2 Number of route	Bit Field Size: e, waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 0=Not available, 1-4095=respective reserved offset number. See ITU-R M.1371-1 for more information.	Range: 0 to 65,532	Resolution: <mark>1 bit</mark>	Unit-less number
12	Number of Slots 2 DD005 Generic numeric ID, short	Byte Field Size: 1 Number of route	Bit Field Size: e, waypoint, event, mark, etc.	Request Parameter No
	 DF53 Integer, 8 bit unsigned uint8 0=Not available, 1-15=respective number of reserved consecutive slots See ITU-R M.1371-1 for more information. 	Range: 0 to 252	Resolution: 1 bit	Unit-less number
13	Time Out 2	Byte Field Size: 1	Bit Field Size:	Request Parameter No
	DD005 Generic numeric ID, short		e, waypoint, event, mark, etc.	11.73.000 . 3.311.000 . 110
	DF53 Integer, 8 bit unsigned uint8 0=Not available, 1-7=respective time-out value in minutes.	Range: 0 to 252	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information.			

AIS Data Link Management Message

PGN: 129805 hex: 1FB0D

14	Increment 2 DD007 Generic numeric ID, medium	Byte Field Size: 2 Number of route,	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 0=Not available, 1-2047=respective increment to repeat reservation blo	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information.			
15	Offset Number 3 DD007 Generic numeric ID, medium	Byte Field Size: 2 Number of route,	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 0=Not available, 1-4095=respective reserved offset number. See ITU-R M.1371-1 for more information.	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
4.0	Number of Slots 3	Byte Field Size: 1	Bit Field Size:	Poqueet Peremeter No.
16	DD005 Generic numeric ID, short		waypoint, event, mark, etc.	Request Parameter No
	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 DD005 Generic numeric ID, short	Byte Field Size: 1 Number of route,	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DF53 Integer, 8 bit unsigned uint8 0=Not available, 1-7=respective time-out value in minutes.	Range: 0 to 252	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information.	Byte Field Size: 2	Bit Field Size:	Dogwood Doromotor No.
18	Increment 3 DD007 Generic numeric ID, medium	•	waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 0=Not available, 1-2047=respective increment to repeat reservation blo	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information.			
19	Offset Number 4 DD007 Generic numeric ID, medium	Byte Field Size: 2 Number of route,	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint16 0=Not available, 1-4095=respective reserved offset number.	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information.			
20	Number of Slots 4 DD005 Generic numeric ID, short	Byte Field Size: 1 Number of route,	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DF53 Integer, 8 bit unsigned uint8 0=Not available, 1-15=respective number of reserved consecutive slots	Range: 0 to 252	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information.			

AIS Data Link Management Message

PGN: 129805 hex: 1FB0D

21	Time Out 4 DD005 Generic numeric ID, short		Byte Field Size: 1 Number o	Request Parameter No	
	DF53 Integer, 8 bit unsigned 0=Not available, 1-7=respective time-out value in minutes.	iint8	Range: 0 to 252	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information.				
22	Increment 4 DD007 Generic numeric ID, medium		Byte Field Size: 2 Number o	Bit Field Size: f route, waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned under the open of the	int16	Range: 0 to 65,532	Resolution: 1 bit	Unit-less number
	See ITU-R M.1371-1 for more information.				
23	Spare DD001 Reserved field		Byte Field Size: Variable n	Bit Field Size: resv 6	
	DF52 Bit field It This field mirrors the "Spare" bit field found with AIS message can also be accommodated within with logic 1's, however for AIS PGNs the unuse	this field	d. Normally, spare or reserv	ved bits in NMEA 2000 are encoded	Used to construct bit fields

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 Fra		Priority Default: 7	Default	Update Ra		liseconds	Frequency:	NA cycles per second
Destina. Field #	tion: <mark>Globa</mark> Field N	2		ACK Rqm	nts:			Original Reference ID # 202
1	Message DD188	AIS Message Identifier		Byte Fi	eld Size: Message Identif		ld Size: 6 0 63).	Request Parameter No
					See the latest ve	rsion of ITU-R	M.1371 for more i	nformation.
	DF52 22 = Chanr	Bit field nel Management Message.	bit(n)	Range:	Variable	Resoluti	on: <mark>1</mark>	Used to construct bit fields
2	Repeat I			Byte Fi	Used by the report (range of 0 to 3)	eater to indicate	how many times a	Request Parameter No n message has been repeated
					0 = Default 1 = First retrans 2 = Second retra 3 = Final retrans	ansmission smission	M.1371 for more	information
	DF52	Bit field	bit(n)	Range:	Variable	Resoluti		Used to construct bit fields
3	Station I	D Generic numeric ID, large		Byte Fi	eld Size: 4 Number of route		ld Size: nt, mark, etc.	Request Parameter No
	DF55 MMSI num	Integer, 32 bit unsigned ber of base station.	uint32	Range:	0 to 4,294,967,292	<mark>.</mark> Resoluti	on: <mark>1 bit</mark>	Unit-less number
4		000 Reserved Reserved field		Byte Fi	eld Size: Variable numbe		Id Size: resv s, all set to logic "	Request Parameter No 1"
	DF52 Used to ali	Bit field gn subsequent data on byte boun	bit(n) dary.	Range:	Variable	Resoluti	on: <mark>1</mark>	Used to construct bit fields
5	AIS Transceiver Information DD246 AIS Transceiver Information			Byte Field Size: 0 = Channel A VDL re 1 = Channel B VDL re 2 = Channel A VDL tr 3 = Channel B VDL tr 4 = Own information r 5-31 = Reserved.		VDL reception, VDL reception, VDL transmission VDL transmission	DL reception, DL transmission, DL transmission,	
	DF52	Bit field	bit(n)	Range:	Variable	Resoluti	on: 1	Used to construct bit fields
6	Spare DD001	Reserved field		Byte Fi	eld Size: Variable numbe		Id Size: resv 2 s, all set to logic "	Request Parameter No
	DF52 Bit field bit(n) This field mirrors the "Spare" bit field found within the calls message can also be accomodated within this field with logic 1's, however for AIS PGNs the unused or res				, spare or reserved bi	ts in NMEA 200	nition within the	Used to construct bit fields
7	Channel				eld Size: 2 Number of route	Bit Fie	ld Size: nt, mark, etc.	Request Parameter No
	DF54 Channel nu	Integer, 16 bit unsigned umber according to recommendation	uint16 on ITU-R		0 to 65,532 nnex 4.	Resoluti	on: <mark>1 bit</mark>	Unit-less number

PGN: 129806 hex: 1FB0E

8	Channel DD007	B Generic numeric ID, med	ium	Byte Fi	ield Size: 2 Number of route	Bit Field Size: , waypoint, event, mark, etc.	Request Parameter No
	DF54 Channel nu	Integer, 16 bit unsigned umber according to recommer	uint16 Indation ITU-R N	_	0 to 65,532 nnex 4.	Resolution: 1 bit	Unit-less number
9	NMEA 20	000 Reserved Reserved field			ield Size:	Bit Field Size: resv 3	
	DF52 Used to ali	Bit field gn subsequent data on byte b	bit(n) oundary.	Range:	Variable	Resolution: 1	Used to construct bit fields
10	Power DD252	AIS Power		Byte Fi	ield Size: 0=High (default) 1=low.	Bit Field Size: 1	Request Parameter No
	DE 50	D: 6 11	•••	Danner		rsion of ITU-R M.1371 for more in	
	DF52	Bit field	bit(n)		Variable	Resolution: 1	Used to construct bit fields
11	Tx/Rx Mo	ode AIS Tx/Rx Mode		Byte Fi	1=Tx A, Rx A/R 2=Tx B, Rx A/R 3-15=not used.	х В,	Request Parameter No
	DE54	D'. C 11	1.4()	Donasi		rsion of ITU-R M.1371 for more in	
	DF52	Bit field	bit(n)		Variable	Resolution: 1	Used to construct bit fields
12		sst Longitude Corner 1 Longitude, WGS-84		Byte Fi	ield Size: 4 Longitude refere	Bit Field Size: nced to WGS-84	Request Parameter No
	DF25 North East	Longitude longitude corner of geographi	int32 c area designa	_	+/- 180 deg s message.	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
13		est Latitude Corner 1 Latitude, WGS-84		Byte Fi	ield Size: 4 Latitude reference	Bit Field Size: ced to WGS-84	Request Parameter No
	DF23 Latitude int32 North East latitude corner of geographic area designate			_	+/- 90 deg nessage.	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
14		est Longitude Corner 2 Longitude, WGS-84		Byte Fi	ield Size: 4 Longitude refere	Bit Field Size:	Request Parameter No
	DF25 South Wes	Longitude It longitude corner of geograph	int32 nic area design		+/- 180 deg is message.	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
15		est Latitude Corner 2 Latitude, WGS-84		Byte Fi	ield Size: 4 Latitude reference	Bit Field Size: ced to WGS-84	Request Parameter No
	DF23 South Wes	Latitude It latitude cornerof geographic	int32 area designate	_	+/- 90 deg message.	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
16	NMEA 20	000 Reserved		Byte Fi	ield Size:	Bit Field Size: resv 1	110
	DD001	DD001 Reserved field			Variable number	of reserved bits, all set to logic "	."
	DF52 Used to ali	Bit field gn subsequent data on byte b	bit(n) oundary.	Range:	Variable	Resolution: 1	Used to construct bit fields
17	Address	ed or Broadcast Message AIS Addressed or Broadc	Indicator	•		Bit Field Size: 1 graphical area message (default), ssage (to individual station(s)).	Request Parameter No
					See the latest ver	rsion of ITU-R M.1371 for more in	nformation.
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

AIS Channel Management

PGN: 129806 hex: 1FB0E

18	Channel A Bandwidth		Byte Fi	eld 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 la	atest version of ITU-R M.1371 for more i	nformation.				
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields				
19	Channel B Bandwidth		Byte Fi	eld 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 Fi	eld 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 bo	oundary.								
21	Transitional Zone Size		Byte Fi	eld Size:	Bit Field Size: 3	Request Parameter No				
	DD256 AIS Transitional Zone Siz	e		See the la	atest version of ITU-R M.1371 for more i	nformation.				
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields				
22	Spare		Byte Fi	eld 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 four AIS message can also be accommodated with logic 1's, however for AIS PGNs the	vithin this field	d. Normally	, spare or rese	rved bits in NMEA 2000 are encoded					

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 are used by each station that receives the message to determine if the message content applies to that station.

•	rame: No Priority Default: 7	Default	Update Rate		econds Frequency:	NA cycles per second			
Destina Field #	ation: <mark>Global</mark>		ACK Rqmnt	ts:		Original Reference ID # 201			
1	Message ID		Byte Fiel	ld Size:	Bit Field Size: 6	Request Parameter No			
•	DD188 AIS Message Identifier		Dyto 1 to	Message Identifier (range of 0 to 63).					
				See the latest versi	ion of ITU-R M.1371 for more i	nformation.			
	DF52 Bit field	bit(n)	Range:		Resolution: 1	Used to construct bit fields			
	23 = Group Assignment Command for AIS	` '							
2	Repeat Indicator		Byte Fiel	d Size:	Bit Field Size: 2	Request Parameter No			
	DD185 AIS Repeater Indicator			Used by the repeat (range of 0 to 3).	ter to indicate how many times a	a message has been repeated			
				0 = Default 1 = First retransmi 2 = Second retrans 3 = Final retransm	smission				
				See the latest vers	sion of ITU-R M.1371 for more	information.			
	DF52 Bit field	bit(n)	Range: 1	Variable	Resolution: 1	Used to construct bit fields			
3	Source ID		Byte Fiel	d 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 MMSI number of base station	uint32	Range: (to 4,294,967,292	Resolution: 1 bit	Unit-less number			
4	Spare		Byte Fiel	d Size:	Bit Field Size: resv 2	Request Parameter No			
	DD001 Reserved field			Variable number of	of reserved bits, all set to logic "	1"			
	DF52 Bit field	bit(n)	Range: 1		Resolution: 1	Used to construct bit fields			
	This field mirrors the "Spare" bit field fountheAIS message can also be accomodate encodedwith logic 1's, however for AIS PC	d within this	field. Normal	ly, spare or reserved b	its in NMEA 2000 are				
5	Tx/Rx Mode		Byte Fiel	d Size:	Bit Field Size: 4	Request Parameter No			
	DD253 AIS Tx/Rx Mode			0=Tx A/Tx B, Rx 1=Tx A, Rx A/Rx 2=Tx B, Rx A/Rx 3-15=not used.	В,				
				See the latest versi	ion of ITU-R M.1371 for more i	nformation.			
	DF52 Bit field	bit(n)	Range: 1	Variable	Resolution: 1	Used to construct bit fields			
6	NMEA 2000 Reserved		Byte Fiel	d Size:	Bit Field Size: resv 2	Request Parameter No			
	DD001 Reserved field			Variable number of	of reserved bits, all set to logic "	1"			
	DF52 Bit field Used to align subsequent data on byte bo	bit(n) undary	Range: \	Variable	Resolution: 1	Used to construct bit fields			
7	North East Longitude Corner 1 DD023 Longitude, WGS-84		Byte Fiel	d Size: 4 Longitude reference	Bit Field Size: ced to WGS-84	Request Parameter No			
	DF25 Longitude North East Longitude corner of geographic	int32 c area design	_	+/- 180 deg message	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm			

AIS Class B Group Assignment

PGN: 129807 hex: 1FB0F

North East Latitude Corner 1DD022 Latitude, WGS-84		Byte Field Size: 4 Latitude referenced			Bit Field Size: to WGS-84		Request Parameter No		
	DF23 North East	Latitude Latitude corner of geographic a	int32 area designa	_	+/- 90 deg message.		Resolution: 1x10E-7	deg	"-" = South, resolution ~1.1 cm
9		South West Longitude Corner 2 DD023 Longitude, WGS-84		Byte Fi	eld Size: 4 Longitude	referenced	Bit Field Size: to WGS-84		Request Parameter No
	DF25 South Wes	Longitude at Longitude corner of geograph	int32 ic area desig		+/- 180 deg is message.		Resolution: 1x10E-7	deg	"-" = West, resolution ~1.1 cm
10		est Latitude Corner 2 Latitude, WGS-84		Byte Fi	eld Size: 4 Latitude re	eferenced t	Bit Field Size: o WGS-84		Request Parameter No
	DF23 South Wes	Latitude at Latitude corner of geographic	int32 area designa	_	+/- 90 deg message.		Resolution: 1x10E-7 deg		"-" = South, resolution ~1.1 cm
11	Station 7	Гуре		Byte Fi	eld 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				
		5. 4		5		est version	of ITU-R M.1371 for m	ore info	
	DF52 Specifies to	Bit field ype of AIS Station this is intend	bit(n) ed for.	Range:	Variable		Resolution: 1		Used to construct bit fields
12		NMEA 2000 Reserved			eld Size:		Bit Field Size: res	v 4	Request Parameter No
	DD001	Reserved field		Variable number of			eserved bits, all set to lo	gic "1"	
	DF52 Used to ali	Bit field gn subsequent data on byte bo	bit(n) undary	Range:	Variable		Resolution: 1		Used to construct bit fields
13		l Cargo Filter Ship/Cargo Filter		Byte Fi	1 - 99 - Se 100 - 199 200 - 255	= Reserved = Reserved	Bit Field Size: 8 1.1371Table 50 1 for regional use 1 for future use of ITU-R M.1371 for m	ore info	Request Parameter No
	DF52	Bit field	bit(n)	Range:	Variable		Resolution: 1		Used to construct bit fields
14	Spare DD001	Reserved field		Byte Fi	eld Size: Variable n	umber of r	Bit Field Size: res	_	Request Parameter No
	theAIS me	Bit field nirrors the "Spare" bit field foun ssage can also be accomodate th logic 1's, however for AIS PO	d within this f	orrespondi ield. Norm	ally, spare or res	served bits	in NMEA 2000 are		Used to construct bit fields
15		000 Reserved			eld Size:		Bit Field Size: res	v 2	Request Parameter No
	DD001	Reserved field		Variable number of			eserved bits, all set to lo	gic "1"	
	DF52 Used to ali	DF52 Bit field bit(n) Range: Variable Resolution: 1							Used to construct bit fields

PGN: 129807 hex: 1FB0F

16	Reporting Interval			Byte Fi	ield Size:	Bit Field Size: 4	4 Request Parameter No					
	DD302	AIS Reporting Inte	rval for Class B		1 = 10 mi 2 = 6 min 3 = 3 min 4 = 1 min 5 = 30 sec 6 = 15 sec 7 = 10 sec 8 = 5 sec 9 = 2 sec 10 = Next 11 = Next							
					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 Tir	ne		Byte Fi	eld Size:	Bit Field Size: 4	4 Request Parameter No					
	DD303	AIS Quiet Time				iet time commanded iiet time of 1 to 15 min						
					See the la	test 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 DD001	Reserved field		Byte Fi	ield Size: Bit Field Size: resv 6 Request Parameter Note Variable number of reserved bits, all set to logic "1"							
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields					
	theAIS mes	ssage can also be acc	omodated within this f	ield. Norm	ally, spare or re	e such that future definition within served bits in NMEA 2000 are 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 NA cycles per second Frequency: Destination: Global Query Support: Opt'l ACK Ramnts: Original Reference ID # 61 Field # Field Name **DSC Format Symbol** Rit Field Size: 1 Byte Field Size: Request Parameter No Integer numbers within the range 000 to 127 representing DSC Symbols defined **DD011** DSC Symbol Definitions by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand Resolution: 1 bit Unit-less number DF53 Integer, 8 bit unsigned uint8 Range: 0 to 252 Byte Field Size: 1 **DSC Category Symbol** Bit Field Size: Request Parameter No 2 Integer numbers within the range 000 to 127 representing DSC Symbols defined **DD011** DSC Symbol Definitions by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand Range: 0 to 252 Resolution: 1 bit Unit-less number **DF53** Integer, 8 bit unsigned uint8 **DSC Message Address** Byte Field Size: Bit Field Size: Request Parameter No 3 char **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 Nature Of Distress or 1st Telecommand Byte Field Size: 1 Bit Field Size: Request Parameter No. Integer numbers within the range 000 to 127 representing DSC Symbols defined **DD011** DSC Symbol Definitions by ITU-R M.493 Table 3 for: Phasing and Unique Functions; Format Specifier; Category; Nature of Distress; First Telecommand; Second Telecommand Range: 0 to 252 Resolution: 1 bit Unit-less number **DF53** Integer, 8 bit unsigned uint8 **Subsequent Communication Mode or 2nd** Byte Field Size: Bit Field Size: Request Parameter No 5 **Telecommand 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 nint8 Range: 0 to 252 Resolution: 1 bit Unit-less number

DSC Call Information PGN: 129808 hex: 1FB10

Proposed Rx Frequency/Channel 6

DD017 Radio Tx or Rx Channel

Byte Field Size: char Bit Field Size: Request Parameter No

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

DD017 Radio Tx or Rx Channel

Byte Field Size: char Bit Field Size: Request Parameter No.

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**

DD015 DSC Symbol String

Byte Field Size: 8 or 16 n Bit Field Size: Request Parameter Yes

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

16 ASCII characters maximum, no Unicode

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 => Unicodecharacters Control byte = 1 => ASCII

characters A string with no characters

(total length of 2 bytes, i.e. Count = 2) is a null string.

Latitude of Vessel Reported

DD022 Latitude, WGS-84 Latitude

Byte Field Size: 4 Latitude referenced to WGS-84

Bit Field Size:

Request Parameter No

int32 Range: +/- 90 deg

Resolution: 1x10E-7 deg

"-" = South, resolution ~ 1.1

DF23

DSC Call Information PGN: 129808 hex: 1FB10

10	Longitude of Vessel Reported DD023 Longitude, WGS-84		Byte Fi	eld Size: 4 Longitude referenced	Bit Field Size: I to WGS-84	Request Parameter No	
	DF25 Longitude	int32	Range:	+/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm	
11	Time of Position DD158 Generic time of day		Byte Fi	eld Size: 4 24 hour clock, 0 = n	Bit Field Size: nidnight, time is in UTC	Request Parameter No	
	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 Fi	eld Size: char 5	Bit Field Size:	Request Parameter No	
	DD012 DSC Address or Geograph	ic Area		DSC symbols define area as defined in IT	s having only decimal values in d by ITU-R M.493 are used to ou U-R M.493-9 Section 5. This r SI, or a geographic area.	code the address or geographic	
	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 DD011 DSC Symbol Definitions		Byte Fi	by ITU-R M.493 Tal	Bit Field Size: nin the range 000 to 127 repressible 3 for: Phasing and Unique F Distress; First Telecommand; S	functions; Format Specifier;	
	DF53 Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number	
14	Expansion Enabled DD002 Generic status pair		Byte Fi	eld Size: MSB/LSB: 00 = [No, Off, Disab 01 = [Yes, On, Enab 10 = Error, 11= [Unavailable, University of the common comm	led, Set, "1"],	Request Parameter No	
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields	
15	Reserved Bits		Byte Fi	eld Size:	Bit Field Size: resv 6	Request Parameter No	
	DD001 Reserved fieldDF52 Bit field6 Bits needed to fill out the byte	bit(n)	Range:	Variable number of a	reserved bits, all set to logic "1" Resolution: 1	Used to construct bit fields	
16	Calling Rx Frequency/Channel DD017 Radio Tx or Rx Channel		Byte Field Size: Char 6 Bit Field Size: Request F MF/HF telephone channels to have first digit 3 followed by ITU cha with leading zeros as required. MF/HF teletype channels to have fir second and third digit give the frequency bands; and the fourth to si channel numbers; each with leading zeros as required. VHF channe first digit 9 followed by zero. The next number is "1" indicating the transmit frequency is being used as a simplex channel frequency, or indicating the coast station's transmit frequency is being used as a s channel frequency, "0" otherwise. The remaining three numbers are 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	

DSC Call Information PGN: 129808 hex: 1FB10

17 Calling Tx Frequency/Channel Byte Field Size: char Bit Field Size: Request Parameter No MF/HF telephone channels to have first digit 3 followed by ITU channel numbers DD017 Radio Tx or Rx Channel 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. Resolution: 1 char 0 to 1,785 bytes. Character **DF63** String, fixed char8(n) Range: 0 to 1,785 characters 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 Range: 0 to 86,401 s Resolution: 1x10E-4 s \sim 24 hours, 0 = midnight, uint32 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. Range: 0 to 65,532 days 0 = January 1, 1970, max =**DF41** Date, day count uint16 Resolution: 1 day ~179 years **DSC Equipment Assigned Message ID** Byte Field Size: 2 Bit Field Size: Request Parameter Yes 20 **DD007** Generic numeric ID, medium Number of route, waypoint, event, mark, etc. uint16 Range: 0 to 65,532 Integer, 16 bit unsigned Resolution: 1 bit Unit-less number DF54 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. Byte Field Size: 1 21 **DSC Expansion Field Symbol** 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. Unit-less number Range: 0 to 252 Resolution: 1 bit DF53 Integer, 8 bit unsigned uint8

DSC Call Information PGN: 129808 hex: 1FB10

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

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.

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 $= 0 \Rightarrow$ 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.

23 Variable Number Of Fields, Field 21 Repeated, Expansion Field Type

DD014 DSC Expansion Symbol Definitions

Byte Field Size: 1

Bit Field Size:

Request Parameter No

Integer numbers within the range 000 to 127 representing DSC Symbols defined by ITU-R M.821 Table 1.

DF53 Integer, 8 bit unsigned Range: 0 to 252

Resolution: 1 bit

Unit-less number

Variable Number Of Fields, Field 22 24 Repeated, Expansion Field Data

DD015 DSC Symbol String

Byte Field Size: 8 or 16 n Bit Field Size: Request Parameter No

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

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.

uint8

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.

Appendix B.1 - PGN Report

DSC Call Information

PGN: 129808

Version 1.300 - 01-May-09

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 Fra	me: No	Priority Default: 6	Default l	Jpdate Ra	ate: N	<mark>4</mark> milliseconds	Frequency:	NA cycles per second
Destina	tion: Globa	al Query Support: No		ACK Rqm	ints:			
Field #	Field Na	ame						Original Reference ID # 199
1	Message	ID		Byte Fi	eld Size:	Bit F	Field Size: 6	6 Request Parameter No
	DD188 AIS Message Identifier				Message Io	lentifier (range of	0 to 63).	
					See the lat	est version of ITU-	R M.1371 for more	e information.
	DF52	Bit field	bit(n)	Range:	Variable	Resol	ution: 1	Used to construct bit fields
	24 = AIS CI	ass B Static Data Part A						
2	Repeat Indicator			Byte Fi	eld Size:	Bit F	Field Size: 2	2 Request Parameter No
	DD185	AIS Repeater Indicator			Used by the (range of 0		ate how many time	s a message has been repeated
					2 = Second 3 = Final r	etransmission I retransmission etransmission	-R M.1371 for mor	re information.
	DF52	Bit field	bit(n)	Range:	Variable	Resol	ution: 1	Used to construct bit fields
3	User ID			Byte Fi	eld Size: 4	Bit F	ield Size:	Request Parameter No
	DD010	Generic numeric ID, large			Number of	route, waypoint, e	event, mark, etc.	
	DF55 MMSI numb	Integer, 32 bit unsigned per of mobile station reporting	uint32 its static infor	_	0 to 4,294,96	<mark>7,292 Resol</mark>	ution: <mark>1 bit</mark>	Unit-less number
4	Name			Byte Fi	eld Size: cha	n Bit F	Field Size:	Request Parameter No
	DD192	Generic String, ASCII, Fi	xed length		Length spe	cified by PGN fiel	d definition.	
	DF63 20 characte	String, fixed or string, default value is "@@	` /	_	<mark>0 to 1,785 ch</mark>		ution: <mark>1 char</mark>	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary

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 Fra		Priority Default: 6	Default (Update Ra	ate: N	A milliseconds	Frequency:	NA cycles per second	
	tion: <mark>Global</mark> Field Nam	Query Support: No		ACK Rqn	nnts:			Original Reference ID # 200	
Field #				5 / 5		D''	<i>5</i> : 440: 5	Original Reference ID # 200	
1	Message ID			Byte Fi	ield Size:	<i>Bit</i> dentifier (range of	Field Size: 6	6 Request Parameter No	
	וסס Al	S Message Identifier			Wiessage ii	ientifier (range of	10 10 03).		
					See the lat	est version of ITU	J-R M.1371 for more	e information.	
		Bit field s B static data Part B	bit(n)	Range:	Variable	Reso	olution: <mark>1</mark>	Used to construct bit fields	
2	Repeat Indi	cator		Byte Fi	ield Size:	Bit	Field Size: 2	2 Request Parameter No	
	DD185 Al	S Repeater Indicator			Used by the (range of (•	cate how many times	s a message has been repeated	
					See the la	test version of IT	U-R M.1371 for mor	e information.	
	DF52	Bit field	bit(n)	Range:	Variable	Reso	olution: 1	Used to construct bit fields	
3	User ID			Byte Fi	ield Size: 4	Bit	Field Size:	Request Parameter No	
	DD010 Ge	eneric numeric ID, large			Number of	route, waypoint,	event, mark, etc.		
		nteger, 32 bit unsigned of mobile station reporting its	uint32 s static infor		0 to 4,294,96	7,292 Reso	olution: <mark>1 bit</mark>	Unit-less number	
4	Type of Shi	o and Cargo		Byte Fi	ield Size:	Bit	Field Size: 8	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 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	Reso	olution: 1	Used to construct bit fields	
5	Vendor ID DD192 Ge	eneric String, ASCII, Fixe	d length	Byte Fi	ield Size: cha Length spe	n Bit	Field Size: eld definition.	Request Parameter No	
	DF63	String, fixed	char8(n)	Range:	0 to 1,785 ch	aracters Resc	olution: 1 char	0 to 1,785 bytes. Character	
	7 character string - Unique identification of the unit by a available = default)			a number a	as defined by the	manufacturer; ("	@@@ <mark>@@@@" = N</mark>	count not included, length is specified by application in Data Dictionary	
6	Call Sign			Byte Fi	ield Size: <mark>cha</mark>		Field Size:	Request Parameter No	
		eneric String, ASCII, Fixe	d length		Length spe	cified by PGN fi	eld definition.		
		String, fixed ing - See the latest version o	. ,		0 to 1,785 chapter information; (olution: <mark>1 char</mark> " = not available =	0 to 1,785 bytes. Character count not included, length is specified by application in Data Dictionary	

AIS Class B "CS" Static Data Report, Part B

PGN: 129810 hex: 1FB12

7	Ship Length DD194 Distance, medium	Byte Field Size: 2	Bit Field Size: PG Field definition.	Request Parameter No	
	·	Range: 0 to 6553.2 m	Resolution: 1x10E-1 m		
	DF75 Distance, Medium uint16 Length of mobile station reporting its static data; Valid "Reference Point Position Aft of Bow", a value of 6553 IMO Circular 227 Section 5.3 Ships Dimensions or NM only if field 3 "User ID" contains a value <= 999999999				
8	Ship Beam	Byte Field Size: 2	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 valu only if field 3 "User ID" contains a value <= 999999999		ot available (This field is valid		
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 starboa 63, a value of 65535 indicates that data is not availabl Dimensions or NMEA 0400 Section 19.3.2 Vessel Ref value <= 999999999)	e. For more information, see IMO	Circular 227 Section 5.3 Ships		
10	Reference Point Position Aft of Bow DD194 Distance, medium	Byte Field Size: 2 Dependent upon	Bit Field Size: PG Field definition.	Request Parameter No	
	DF75 Distance, Medium uint16	Range: 0 to 6553.2 m	Resolution: 1x10E-1 m		
	Distance to reference point measured aft from the bow a value of 65535 indicates that data is not available. F Dimensions or NMEA 0400 Section 19.3.2 Vessel Ref 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		
	DD001 Reserved field	Variable number	of reserved bits, all set to logic "1	"	
	DF52 Bit field bit(n) Used to aligh subsequent fields on a byte boundary.	Range: Variable	Resolution: 1	Used to construct bit fields	
13	Spare DD001 Reserved field	Byte Field Size: Variable number	Bit Field Size: resv 6 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 AIS message can also be accomodated within this par reserved bits in NMEA 2000 are encoded with logic 1's encoded as logic 0's.	ameter group while maintaining fi	eld order; Normally, spare or		

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 Fra	nme: No	Priority Default: 3	Default	Update Rate:	1,000 milli	seconds	Frequency:	1.	cycles per second
Destina	tion: Global	Query Support: Opt'l		ACK Rqmnts: N	lone				
Field#	Field Name							Origin	al Reference ID # 9
1	Group Repeti	tion Interval (GRI)		Byte Field S	Size: 4	Bit Fiel	d Size:	Req	uest Parameter <mark>Yes</mark>
	DD027 Lora	nn-C GRI			Group Repetition sec. (i.e., 9960 =		in nano-sec. Often	cited in u	units of 10 micro-
	DF45 Ti	me interval, precise	int32 Range: +/- 2.14 s Resolution: 1x10E-9 s		on: 1x10E-9 s				
2	Master Range			Byte Field S	Size: 4	Bit Fiel	d Size:	Req	uest Parameter No
	DD029 Lora	an - Range (Time)			The actual propaganon-sec.	gation time of a	a Loran-C signal from	m the stat	ion to a receiver in
	DF45 Ti	me interval, precise	int32	Range: +/-	2.14 s	Resolutio	on: 1x10E-9 s		
3	V Secondary	TD		Byte Field S	Size: 4	Bit Fiel	d Size:	Req	uest Parameter No
	DD028 Lora	nn-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 Tin	me interval, precise	int32	Range: +/-	2.14 s	Resolution	on: 1x10E-9 s		
4	W Secondary	TD		Byte Field S	Size: 4	Bit Fiel	d Size:	Req	uest Parameter No
	DD028 Lora	an-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 Ti	me interval, precise	int32	Range: +/-	2.14 s	Resolution	on: 1x10E-9 s		
5	X Secondary	TD		Byte Field S	Size: 4	Bit Fiel	d Size:	Req	uest Parameter No
	DD028 Lora	an-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 Ti	me interval, precise	int32	Range: +/-	2.14 s	Resolution	on: 1x10E-9 s		
6	Y Secondary	TD		Byte Field S	Size: 4	Bit Fiel	d Size:	Req	uest Parameter No
	DD028 Lora	Loran-C Time difference (TD) in nano-sec. The a secondary station signal minus the arrival time of							
	DF45 Ti	me interval, precise	int32	Range: +/-	2.14 s	Resolution	on: 1x10E-9 s		

Loran-C TD Data PGN: 130052 hex: 1FC04

7	Z Secondary TD DD028 Loran-C TD			Bit Field Size: ifference (TD) in nano-sec. The a	
	DF45 Time interval, precise	int32	Range: +/- 2.14 s	Resolution: 1x10E-9 s	
8	Station status: Master DD030 Loran-C station status		Byte Field Size: MSB: to LSB: xxx1 = Station in xx1x = Low SNI x1xx = Cycle err 1xxx = Blink where x =	R,	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
9	Station status: V DD030 Loran-C station status		Byte Field Size: MSB: to LSB: xxx1 = Station in xx1x = Low SNI x1xx = Cycle err 1xxx = Blink where x =	R,	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
10	Station status: W DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in xx1x = Low SNI x1xx = Cycle err 1xxx = Blink where x =	Request Parameter No	
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
11	Station status: X DD030 Loran-C station status		MSB: to LSB: xxx1 = Station in xx1x = Low SNI x1xx = Cycle err 1xxx = Blink where x =	R,	Request Parameter No
	DF52 Bit field	bit(n)	Range: Variable	Resolution: 1	Used to construct bit fields
12	Station status: Y DD030 Loran-C station status		Byte Field Size: MSB: to LSB: xxx1 = Station in xx1x = Low SNI x1xx = Cycle err 1xxx = Blink where x =	R,	Request Parameter No
	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 ii xx1x = Low SNI x1xx = Cycle err 1xxx = Blink where x =	R,	

Loran-C TD Data PGN: 130052 hex: 1FC04

Bit Field Size: 4 14 Mode Byte Field Size: 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 = Reserved0xE = Error,0xF = Data not available **DF52** Bit field bit(n) Range: Variable Resolution: 1 Used to construct bit fields Bit Field Size: resv 15 **Reserved Bits** Byte Field Size: Request Parameter No. Variable number of reserved bits, all set to logic "1" **DD001** Reserved field Resolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Range: Variable Needed to fill the CAN frame.

Loran-C TD Data

Appendix B.1 - PGN Report

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 Fra	nme: No	Priority Default: 3	Default	Update Rate:	1,000 mill	liseconds	Frequency:	1.	cycles per second
Destina	tion: Global	Query Support: C	Opt'l	ACK Rqmnts: N	None				
Field #	Field Name							Origina	al Reference ID # 10
1	Group Repetitio	n Interval (GRI)		Byte Field S	Size: 4	Bit Fie	ld Size:	Req	uest Parameter <mark>Yes</mark>
	DD027 Loran-	C GRI			Group Repetition sec. (i.e., 9960 =		in nano-sec. Ofte)	en cited in	units of 10 micro-
	DF45 Time	interval, precise	int32	Range: +/-	2.14 s	Resoluti	on: 1x10E-9 s		
2	Master Range			Byte Field S	Size: 4	Bit Fie	ld Size:	Req	uest Parameter No
	DD029 Loran	- Range (Time)			The actual propa	agation time of	a Loran-C signal f	rom the sta	tion to a receiver in
	DF45 Time	interval, precise	int32	Range: +/-	2.14 s	Resoluti	on: 1x10E-9 s		
3	V Secondary Ra	nge		Byte Field S	Size: 4	Bit Fie	ld Size:	Req	uest Parameter No
DD029 Loran - Range (*		- Range (Time)			The actual propa	agation time of	a Loran-C signal f	rom the sta	tion to a receiver in
	DF45 Time	interval, precise	int32	Range: +/-	2.14 s	Resoluti	on: 1x10E-9 s		
4	W Secondary Ra	ange		Byte Field S	Size: 4	Bit Fie	ld Size:	Req	uest Parameter No
	DD029 Loran	- Range (Time)			The actual propa	agation time of	a Loran-C signal fi	rom the sta	tion to a receiver in
	DF45 Time	interval, precise	e int32	Range: +/-	2.14 s	Resoluti	on: 1x10E-9 s		
5	X Secondary Ra	nge		Byte Field S	Size: 4	Bit Fie	ld Size:	Req	uest Parameter No
	DD029 Loran	- Range (Time)			The actual propa	agation time of	a Loran-C signal f	rom the sta	tion to a receiver in
	DF45 Time	interval, precise	int32	Range: +/-	2.14 s	Resoluti	on: 1x10E-9 s		
6	Y Secondary Ra	nge		Byte Field S	Size: 4	Bit Fie	ld Size:	Req	uest Parameter No
	DD029 Loran	- Range (Time)			The actual propa	agation time of	a Loran-C signal fi	rom the sta	tion to a receiver in
	DF45 Time	interval, precise	int32	Range: +/-	2.14 s	Resoluti	on: 1x10E-9 s		

Loran-C Range Data

7 **Z Secondary Range** Byte Field Size: 4 Bit Field Size: Request Parameter No The actual propagation time of a Loran-C signal from the station to a receiver in **DD029** Loran - Range (Time) nano-sec. Time interval, precise int32 Range: +/- 2.14 s Resolution: 1x10E-9 s DF45 Bit Field Size: 4 Request Parameter No Station status: Master Byte Field Size: 8 **DD030** Loran-C station status MSB: to LSB: xxx1 = Station in use,xx1x = Low SNR,x1xx = Cycle error,1xxx = Blinkwhere x = don't care Range: Variable Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Station status: V Byte Field Size: Bit Field Size: 4 Request Parameter No. 9 **DD030** Loran-C station status MSB: to LSB: xxx1 = Station in use,xx1x = Low SNR,x1xx = Cycle error,1xxx = Blinkwhere x = don't care Resolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Range: Variable Request Parameter No 10 Station status: W Byte Field Size: Bit Field Size: 4 MSB: to LSB: **DD030** Loran-C station status xxx1 = Station in use.xx1x = Low SNR, x1xx = Cycle error,1xxx = Blinkwhere x = don't care **DF52** Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n) Station status: X Byte Field Size: Bit Field Size: 4 11 Request Parameter No **DD030** Loran-C station status MSB: to LSB: xxx1 = Station in use,xx1x = Low SNR,x1xx = Cycle error,1xxx = Blinkwhere x = don't care DF52 Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n) Station status: Y Bit Field Size: 4 Request Parameter No Byte Field Size: 12 **DD030** Loran-C station status MSB: to LSB: xxx1 = Station in use,xx1x = Low SNR,x1xx = Cycle error,1xxx = Blinkwhere x = don't care DF52 Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n) Station status: Z Bit Field Size: 4 13 Byte Field Size: Request Parameter No. **DD030** Loran-C station status MSB: to LSB: xxx1 = Station in use.xx1x = Low SNR,x1xx = Cycle error,1xxx = Blinkwhere x = don't care Resolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Range: Variable

PGN: 130053

PGN: 130053 hex: 1FC05

Loran-C Range Data

PGN: 130053 hex: 1FC05

14	Mode DD025 Mode, Data		Byte Field Size: 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:		Resolution: 1	Used to construct bit fields			
15	Reserved Bits DD001 Reserved field		Byte Fi	eld Size: Variable nu	Bit Field Size: resv amber of reserved bits, all set to logic "	Request Parameter No			
	DF52 Bit field Needed to fill the CAN frame.	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields			

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.

Singie Fra	me: No	Priority Default: 3	Default C	ipaate Rate:	1,000 millis	seconas <i>Frequ</i>	ency:	1. cycles per second
Destinat	ion: Globa	al Query Support: Opt'l		ACK Rqmnts: No	ne			
Field#	Field N	ame					(Original Reference ID # 11
1	Group R	epetition Interval (GRI)		Byte Field Size	e: <mark>4</mark>	Bit Field Size:		Request Parameter Yes
	DD027	Loran-C GRI			roup Repetition ec. (i.e., 9960 = 9		-sec. Often cit	ed in units of 10 micro-
	DF45	Time interval, precise	int32	Range: +/- 2.	14 s	Resolution: 1x1(E-9 s	
2	Station i	dentifier		Byte Field Size	e: <mark>char 1</mark>	Bit Field Size:		Request Parameter Yes
	DD031	Loran-C Station ID		1-	character code f	for the Loran-C station	M = master,	V, W, X, Y, Z
	DF63	String, fixed	char8(n)	Range: 0 to 1	,785 character	Resolution: 1 ch		to 1,785 bytes. Character
							sı	ount not included, length is secified by application in ata Dictionary
3	Station S	SNR		Byte Field Size	e: 2	Bit Field Size:		Request Parameter No
	DD026	Loran-C SNR		S	ignal at standard	sampling point / RMS	noise in 3kH	z BW at 100KHz
	DF31	dB, relative measure	int16	Range: +/- 32	7.64 dB	Resolution: 1x10	E-2 dB	
4	Station E	ECD		Byte Field Size	e: <mark>4</mark>	Bit Field Size:		Request Parameter No
	DD032	Loran-C ECD		E	nvelope-to-Cycl	e Discrepancy (ECD)	of the Loran-C	pulse
	DF45	Time interval, precise	int32	Range: +/- 2.	14 s	Resolution: 1x10)E-9 s	
5	Station A	ASF		Byte Field Size	e: <mark>4</mark>	Bit Field Size:		Request Parameter No
	DD033 Loran-C ASF				dditional Secono om a Loran-C st	• •	ciated with the	e propagation of the signal
	DF45	Time interval, precise	int32	Range: +/- 2.	14 s	Resolution: 1x1(E-9 s	

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 Fra	-	000116	Priority Dei				Jpdate R			lliseconds	Frequency:	NA cycles per second
•	tion: Globa	al	Query Sup			Doladii	ACK Ran		INA IIII	iliaccorida	rrequeriey.	TVA Cycles per second
Field #	Field N		диегу Зир	port.	162		ACK NYII	uns.				Original Reference ID # 96
1	Start Dat		e ID ric numeric	ID, n	nedium	1	Byte F	ield Size Nu			Field Size: event, mark, etc.	Request Parameter <mark>Yes</mark>
	If not speci	se ID r fied in	eger, 16 bit equested/sea the request, latabase doe	nt. the rep	oly shall		the lowest		e Database I	D.	lution: <mark>1 bit</mark>	Unit-less number
2	nItems DD007	Gene	ric numeric	ID, n	nedium	1	Byte F	ield Size Nu			Field Size: event, mark, etc.	Request Parameter <mark>Yes</mark>
		es requ	eger, 16 bit lested/sent. the request,	Ü		uint16 include all		0 to 65	•		ution: 1 bit sport protocol spa	Unit-less number
3			tabases ava			1	Byte F	ield Size Nu			Field Size: event, mark, etc.	Request Parameter No
	DF54	Inte	eger, 16 bit	unsig	ned	uint16	Range:	0 to 65	5,532	Resol	ution: <mark>1 bit</mark>	Unit-less number
4	Database DD007		ric numeric	ID, n	nedium	1	Byte F	ield Size Nu	-		Field Size: event, mark, etc.	Request Parameter No
	DF54 Databases		eger, 16 bit be included ir			uint16 he order of	_	<mark>0 to 65</mark> g ID.	5,532	Resol	ution: <mark>1 bit</mark>	Unit-less number
5	Databas	e Nam						ield Size			Field Size: int, destination, ve	Request Parameter No ssel, vehicle, etc.
	DF50	Stri	ng, variable	e, shor	rt c	h8or16(n) Range:		O ASCII or 5 Unicode eters	Resol	ution: 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.

Route and WP Service - Database List

PGN: 130064 hex: 1FC10

6	Database Timestamp DD158 Generic time of day		Byte Fi	ield Size: 4 24 hour clock, 0 =	Bit Field Size: midnight, time is in UTC	Request Parameter No
	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 Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DD039 Generic date			Days since January	y 1, 1970, Date is relative to UT	C 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 DD238 WP Position Resolution		Byte Fi	0= [>0.1min.], 1= [<=0.1&>0.01 3= [<=0.001 &>0 4= [<=0.000 1 &>0 7= Not available (i (1min. = 0.01667d)	.0001] >=0.000 001min.] 5-6 =reserved not known)	
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
9	Reserved Bits DD001 Reserved field		Byte Fi	ield Size: Variable number o	Bit Field Size: resv 4 f reserved bits, all set to logic "1"	Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
10	Number of Routes in Database DD007 Generic numeric ID, media	ım	Byte Fi	ield Size: 2 Number of route, v	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolution: 1 bit	Unit-less number
11	Number of WPs in Database DD010 Generic numeric ID, large		Byte Fi	ield Size: 4 Number of route, v	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DF55 Integer, 32 bit unsigned Includes WPs from the WP-List and all ot	uint32 ner WPs embe	•	0 to 4,294,967,292 Routes	Resolution: 1 bit	Unit-less number
12	Number of Bytes in Database DD010 Generic numeric ID, large		Byte Fi	ield Size: 4 Number of route, v	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	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 DD000 Undefined		Byte Fi	ield Size: ? Application specif	Bit Field Size: ic, defined at time of use	Request Parameter No
	DF00 Undefined	Undefined	Range:	undefined	Resolution: undefined	Application specific, defIned at time of use.

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.

		Driggity Default					NA millised			N1/	avalos per second
Single Fra		Priority Default:		Delault	Update Ra		IVA IIIIIISEC	onus	Frequency:	IN.	cycles per second
	tion: Globa	5 11	Yes		ACK Rqm	ints:					
Field #	Field N	ame								Origir	nal Reference ID # 97
1	Start Ro	ute ID			Byte Fi	eld Size: 2		Bit Fie	eld Size:	Re	quest Parameter <mark>Yes</mark>
	DD007	Generic numeric ID,	medium		Number of route, waypoint, event, mark, etc.						
	DF54	Integer, 16 bit unsi	gned	uint16	Range:	0 to 65,532		Resolut	ion: 1 bit	Unit-le	ess number
	If not speci	D requested/sent. fied in the request, the re ested Route is not availa									
2	nltems			-	Byte Fi	eld Size: 2		Bit Fie	eld Size:	Re	quest Parameter Yes
_	DD007	Generic numeric ID,		Í	Number	1,00					
	DF54 Integer, 16 bit unsigned uint				Range:	0 to 65,532		Resolut	ion: 1 bit	Unit-le	ess number
	If not speci	equested/sent. fied in the request, the re rotocol space permits).	eply shall	include al	l Routes av	ailable in the	Database (o	r as many	of them as the		
3	Number	of Routes available i	n Databa	se	Byte Fi	eld Size: 2		Bit Fie	eld Size:	Re	quest Parameter No
	DD007	Generic numeric ID,	medium		Number of route, waypoint, event, mark, etc.						
	DF54	Integer, 16 bit unsi	gned	uint16	Range:	0 to 65,532	,	Resolut	ion: 1 bit	Unit-le	ess number
4	Databas	e ID			Byte Fi	eld Size: 2		Bit Fie	eld Size:	Re	quest Parameter Yes
	DD007	Generic numeric ID,	medium			Number	of route, wa	ypoint, ev	ent, mark, etc.		
	DF54	Integer, 16 bit unsi	gned	uint16	Range:	0 to 65,532		Resolut	ion: 1 bit	Unit-le	ess number
		specified in the request. fied in the request, the re				List PGN".					
5	Route ID	1			Byte Fi	eld Size: 2		Bit Fie	eld Size:	Re	quest Parameter No
	DD007	Generic numeric ID,		Number of route, waypoint, event, mark, etc.							
	DF54	Integer, 16 bit unsi	gned	uint16	Range:	0 to 65,532		Resolut	ion: 1 bit	Unit-le	ess number
	Routes shall be included in this PGN in the order of in-										

6

Route Name

PGN: 130065 hex: 1FC11

Request Parameter No

Name of place, route, waypoint, destination, vessel, vehicle, etc. **DD004** Generic name string, short 2 to 252 bytes. First byte in Resolution: 1 ASCII or **DF50** String, variable, short ch8or16(n) Range: 0 to 250 ASCII or string (uint8) is the Count 0 to 125 Unicode 1 Unicode byte indicating the number Character Characters 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 $= 0 \Rightarrow$ 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. Bit Field Size: resv Request Parameter No 7 reserved Byte Field Size: Variable number of reserved bits, all set to logic "1" **DD001** Reserved field Resolution: 1 **DF52** Bit field bit(n) Range: Variable Used to construct bit fields 8 **WP Identification Method** Byte Field Size: Bit Field Size: 2 Request Parameter No 0=WP's in WP-List, **DD240** WP Identification Method 1=WP embedded in Rute, 2=Reserved 3=Null (info not available) Resolution: 1 Range: Variable Used to construct bit fields **DF52** Bit field bit(n) Bit Field Size: 4 9 **Route Status** Byte Field Size: Request Parameter No **DD239** Route Status 0=Active. 1=Inactive, 2=Deleted. 3-13= Reserved, 14=Error, 15= Null Resolution: 1 Used to construct bit fields Range: Variable DF52 Bit field bit(n) Byte Field Size: ? 10 Fields 5 thru 9 repeat as needed Bit Field Size: Request Parameter No **DD000** Undefined Application specific, defined at time of use Resolution: undefined Application specific, defIned **DF00** Undefined Undefined Range: undefined at time of use.

Byte Field Size: 8 or 16 n

Bit Field Size:

Route and WP Service - Route/WP-List Attributes

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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".

	uest for thi	is e the same transi is PGN shall return Priority Default:	059392 with a		ACK if the	PGN is sup	•	Frequency:	NA cycles per second
Destinat Field #	tion: <mark>Global</mark> Field Na	9	Yes	ACK Rqm	nnts:				Original Reference ID # 98
1		Generic numeric ID,		·	Numb	2 per of route, wa	-	, mark, etc.	Request Parameter <mark>Yes</mark>
2		Integer, 16 bit unsig Generic numeric ID,	medium	Byte Fi		er of route, wa	•	Size:	Unit-less number Request Parameter Yes
	DF54 Set to 65535	Integer, 16 bit unsign (NA) to access the WF		_	0 to 65,53	32	Resolution	n: 1 bit	Unit-less number
3		P-List Name Generic name string,	short	Byte Fi	ield Size: Name		Bit Field e, waypoint, d	Size: lestination, vess	Request Parameter No el, vehicle, etc.
	DF50	String, variable, sho	ort ch8or16 (n) Range:	0 to 250 0 to 125 Character	Unicode	Resolution	n: 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		P-List Timestamp Generic time of day		Byte Fi		ur clock, 0 = 1	Bit Field midnight, tim		Request Parameter No
	DF06	Time of day	uint32	Range:	0 to 86,4	01 s	Resolution	1x10E-4 s	~24 hours, 0 = midnight, range allows for up to two leap seconds per day

Route and WP Service - Route/WP-List Attributes

PGN: 130066 hex: 1FC12

5	Route/WP-List Datestamp DD039 Generic date		Byte Fi	eld Size: 2 Days since Januar	Bit Field Size: y 1, 1970, Date is relative to U	Request Parameter No 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 DD237 Changed at timestamp flag		Byte Fi	eld Size: 0000 0000 = No c		Request Parameter No
				0xxx xx1x = WP: 0xxx x1xx = Char 0xxx 1xxx = Rout 0xx1 xxxx = Rese 0x1x xxxx = Rese 01xx xxxx = Othe	e: Change supplementary parar rved rved r not specifyed change flag is not supported	meters (or new added) List, and/or name changed/added
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
7	Number of WPs in the Route/WP-Li DD007 Generic numeric ID, mediu		Byte Fi	eld Size: 2 Number of route,	Bit Field Size: waypoint, event, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolution: 1 bit	Unit-less number
8	Critical supplementary parameters DD258 Critical supplementary Rou	ite paramete	Byte Fi	eld Size:	Bit Field Size: 8	Request Parameter No
				downloaded and a parameters will no	e e e e e lags represents a parameter. If a ppended to the Route information to be safe.	flag is '1', the parameter must be on. Ignoring any of these
	DD50 D: C 11	1.44	Danner		all be transmitted as '0's.	TT 1
	DF52 Bit field	bit(n)		Variable	Resolution: 1	Used to construct bit fields
9	Navigation Method DD119 Calculation Type		Byte Fi	eld Size: 0 = Great Circle c 1 = Rhumb Line c 2 = Error,	,	Request Parameter No
				3 = Null		
	DF52 Bit field Not applicable to the WP-List NOTE: This is the default Navigation Meth supplementary parameters.	bit(n) nod for the Ro	Range:	Variable	Resolution: 1 legs. Ref. field 8, Critical	Used to construct bit fields
10	Not applicable to the WP-List NOTE: This is the default Navigation Meth		oute. It may	Variable	legs. Ref. field 8, Critical Bit Field Size: 2 st, in Rute,	Used to construct bit fields Request Parameter No

Route and WP Service - Route/WP-List Attributes

PGN: 130066 hex: 1FC12

11	Route Status		Byte Fi	ield 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 F	ield Size: 2	Request Parameter No					
	DD149 Distance ordered			A commanded dist	ance 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 Fi	ield Size:	Bit Field Size: resv 0	Request Parameter No				
	DD001 Reserved field			Variable number o	f reserved bits, all set to logic "1	."				
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields				
			urn, etc). Fields are normally not reserved at the end of a PGN y be appended to an existing (non-single frame) PGN. This is a							

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. Default Update Rate: Single Frame: No Priority Default: 7 **NA** milliseconds Frequency: NA cycles per second Destination: Global Query Support: Yes ACK Ramnts: Original Reference ID # 99 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. Integer, 16 bit unsigned Range: 0 to 65,532 Resolution: 1 bit Unit-less number uint16 RPS# of the 1st requested/sent Waypoint. If not specified in the request, the default is the first RPS# (=0) of the Route Byte Field Size: 2 Bit Field Size: nitems Request Parameter Yes 2 **DD007** Generic numeric ID, medium Number of route, waypoint, event, mark, etc. Integer, 16 bit unsigned uint16 Range: 0 to 65,532 Resolution: 1 bit Unit-less number **DF54** 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). Byte Field Size: 2 Request Parameter No 3 Number of WPs in the Route Bit Field Size: **DD007** Generic numeric ID, medium Number of route, waypoint, event, mark, etc. uint16 Range: 0 to 65,532 Resolution: 1 bit Unit-less number Integer, 16 bit unsigned The receiver will use this parameter to determine if it has received all WPs of the complete route. **Database ID** Byte Field Size: 2 Bit Field Size: Request Parameter Yes **DD007** Generic numeric ID, medium Number of route, waypoint, event, mark, etc. Unit-less number Range: 0 to 65,532 Resolution: 1 bit DF54 Integer, 16 bit unsigned uint16 Request Parameter Yes Byte Field Size: 2 Bit Field Size: 5 Route ID **DD007** Generic numeric ID. medium Number of route, waypoint, event, mark, etc. Integer, 16 bit unsigned Resolution: 1 bit Unit-less number **DF54** uint16 Range: 0 to 65,532 **WPID** Byte Field Size: 2 Bit Field Size: Request Parameter No. 6 **DD007** Generic numeric ID, medium Number of route, waypoint, event, mark, etc. Resolution: 1 bit Integer, 16 bit unsigned uint16 Range: 0 to 65,532 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).

Route and WP Service - Route - WP Name & Position

PGN: 130067 hex: 1FC13

7	WP Name	Byte Field Size: 8 or 16 n	Bit Field Size:	Request Parameter No
	DD004 Generic name string, short	Name of place, rou	ite, 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
	Max. 30 ASCII or Unicode Characters			of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.
8	WP Latitude DD022 Latitude, WGS-84	Byte Field Size: 4 Latitude referenced	Bit Field Size:	Request Parameter No
	DF23 Latitude DF23 Latitude	int32 Range: +/- 90 deg	Resolution: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
9	WP Longitude DD023 Longitude, WGS-84	Byte Field Size: 4 Longitude reference	Bit Field Size: red to WGS-84	Request Parameter No
	DF25 Longitude	int32 Range: +/- 180 deg	Resolution: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
10	Fields 6 thru 9 repeat as needed DD000 Undefined	Byte Field Size: ? Application specifi	Bit Field Size: ic, defined at time of use	Request Parameter No
	DF00 Undefined	Undefined Range: undefined	Resolution: undefined	Application specific, defIned at time of use.

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 Fra	ame: No	Priority Default:	7 Default	Update Rate:	NA milli	seconds	Frequency:	NA cycles per second
Destina	tion: Globa	Query Support:	Yes	ACK Rqmnts:				
Field #	Field Na	ame						Original Reference ID # 100
1	Start RPS	S#		Byte Field S	Size: 2	Bit Fie	eld Size:	Request Parameter Yes
	DD007	Generic numeric ID,	medium		Number of route,	, waypoint, eve	ent, mark, etc.	
	DF54	Integer, 16 bit unsig	gned uint16	Range: 0 to	65,532	Resolut	ion: <mark>1 bit</mark>	Unit-less number
	1st RPS# re	equested/sent						
2	nltems			Byte Field S	Size: 2	Bit Fie	eld Size:	Request Parameter Yes
	DD007 Generic numeric ID, medium				Number of route,	, waypoint, eve	ent, mark, etc.	
	DF54	Integer, 16 bit unsig	gned uint16	Range: 0 to	65,532	Resolut	ion: 1 bit	Unit-less number
	n RPS# red	quested/sent						
3	Number o	of WPs in the Route		Byte Field S	Size: 2	Bit Fie	eld Size:	Request Parameter No
	DD007 Generic numeric ID, medium				Number of route,	, waypoint, eve	ent, mark, etc.	
	DF54	Integer, 16 bit unsig	gned uint16	Range: 0 to	65,532	Resolut	ion: 1 bit	Unit-less number
4	Database	: ID		Byte Field S	Size: 2	Bit Fie	eld Size:	Request Parameter Yes
	DD007	Generic numeric ID,	medium		Number of route,	, waypoint, eve	ent, mark, etc.	
	DF54	Integer, 16 bit unsi	gned uint16	Range: 0 to	65,532	Resolut	ion: <mark>1 bit</mark>	Unit-less number
5	Route ID			Byte Field S	Size: 2	Bit Fie	eld Size:	Request Parameter Yes
	DD007	Generic numeric ID,	medium		Number of route,	, waypoint, eve	ent, mark, etc.	
	DF54	Integer, 16 bit unsig	gned uint16	Range: 0 to	65,532	Resolut	ion: <mark>1 bit</mark>	Unit-less number
6	WPID			Byte Field S	Size: 2	Bit Fie	eld Size:	Request Parameter No
	DD007	Generic numeric ID,	medium		Number of route,	, waypoint, eve	ent, mark, etc.	
	DF54	Integer, 16 bit unsig	gned uint16	Range: 0 to	65,532	Resolut	ion: <mark>1 bit</mark>	Unit-less number

Route and WP Service - Route - WP Name

PGN: 130068 hex: 1FC14

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.

String, variable, short

Max. 30 ASCII or Unicode Characters

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 = $0 \Rightarrow$ 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.

field 6 thru 7 repeat as needed 8

DD000 Undefined

Byte Field Size: ?

Bit Field Size: Application specific, defined at time of use Request Parameter No.

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.

		e the same transfer				ON is summa	الم ما	
		PGN shall return 059 cription of the Route						
	rame: No	Priority Default: 7		Update Ra		NA millisecon		ncy: NA cycles per second
Destin	ation: Global	Query Support: Ye.	S	ACK Rqn	nnts:			
Field#	Field Nam	е						Original Reference ID # 101
1	Start RPS#			Byte Fi	ield Size: 2		Bit Field Size:	Request Parameter <mark>Yes</mark>
	DD007 Ge	eneric numeric ID, med	lium		Number	of route, wayp	oint, event, mark,	etc.
	DF54	nteger, 16 bit unsigned	uint16	Range:	0 to 65,532	F	Resolution: 1 bit	Unit-less number
	1st RPS# requ							
		in the request, the defaut RPS# has no valid data				et DDC#		
2	nltems	u IXI S# Has Ho Valla data	i, the uclauit ic	<u>'</u>	ield Size: 2	5t IXI 3π.	Bit Field Size:	Request Parameter Yes
2		eneric numeric ID, med	lium	Dyte i i		of route, wayp	oint, event, mark,	•
		Integer, 16 bit unsigned		Range:	0 to 65,532		Resolution: 1 bit	Unit-less number
	n RPS# reques	-	ı umtı	range.	0 10 05,552	,	tesolution. 1 Dit	Cint-less number
		in the request, the reply	shall include al	I RPS# wit	h valid data (o	r as many the t	ransfer protocol sp	ace
	permits).							
3	Number of Nav	Waypoints with a spec	cific XTE	Byte Fi	ield Size: 2		Bit Field Size:	Request Parameter No
		eneric numeric ID, med	lium		Number	of route, wavn	oint, event, mark,	etc.
		Integer, 16 bit unsigned		Range:	0 to 65,532	**	Resolution: 1 bit	Unit-less number
		y be less than Number of		_	0 10 05,552	,	todolation. 1 bit	Chit less humber
4	Database ID	•	тауронно н. н.		ield Size: 2		Bit Field Size:	Request Parameter Yes
•		eneric numeric ID, med	lium			of route, wayp	oint, event, mark,	
	DF54	Integer, 16 bit unsigned	d uint16	Range:	0 to 65,532	F	Resolution: 1 bit	Unit-less number
5	Route ID				ield Size: 2		Bit Field Size:	Request Parameter Yes
Ū		eneric numeric ID, med	lium	_,,		of route, wayp	oint, event, mark,	
	DF54	Integer, 16 bit unsigned	d uint16	Range:	0 to 65,532	F	Resolution: 1 bit	Unit-less number
6	RPS#			Bvte Fi	ield Size: 2		Bit Field Size:	Request Parameter No
·		eneric numeric ID, med	lium	, ,		of route, wayp	oint, event, mark,	
	DF54 1	Integer, 16 bit unsigned	d uint16	Range:	0 to 65,532	F	Resolution: 1 bit	Unit-less number
	Waypoints with	nout individually specific 2	XTE Limit or Na	vigation M	lethod shall no	t be included.		
7	XTE limit in	the leg after WP		Byte Fi	ield Size: 2		Bit Field Size:	Request Parameter No
	DD149 Di	stance ordered			A comn	anded distance	e like radius order,	off-track limit, etc.
	DF74	Distance, rough	int16	Range:	+/-32,764 r	n F	Resolution: 1 m	
	No negative va	alues. The limit applies to	both sides of the	ne track.				
8	Nav. Metho	d in the leg after WP		Byte Fi	ield Size:		Bit Field Size:	Request Parameter No
	DD119 Ca	alculation Type						
	DF52	Bit field	bit(n)	Range:	Variable	F	Resolution: 1	Used to construct bit fields

Route and WP Service - XTE Limit & Navigation Method

PGN: 130069 hex: 1FC15

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	n: <mark>1</mark>	Used to construct bit fields	
10	Fields 6 th	Byte Field Size: ?			Bit Field	Size:	Request Parameter No		
	DD000 Undefined				Application	specific, defined at ti	me of use		
	DF00	Undefined	Undefined	Range:	undefined	Resolution	ution: 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 Fra	ame: No		Priority Default:	7	Default (Update Ra	ate: N	<mark>A</mark> millisecond	s Frequency:	NA cycles per second
Destina	tion: Globa	al	Query Support:	Yes		ACK Rqm	ents:			
Field #	Field N	ame								Original Reference ID # 102
1	Start ID					Byte Field Size: Number of route, waypoint, event, mark, etc.			Request Parameter Yes	
	DD007	Ger	neric numeric ID,	mediur	n					
	DF54	In	teger, 16 bit unsi	igned	uint16	Range:	0 to 65,532	Re	esolution: 1 bit	Unit-less number
			ent WPID in a WP-l							
			n the request, the c							
		steu	WPID/RPS# does	HOL Have	e a Comme					Decision (Decision of a V
2	nitems DD007	Cor	neric numeric ID,	modiu	m	вуте гі	eld Size: 2		Bit Field Size: int, event, mark, etc.	Request Parameter Yes
			,			Dongo				I Init less much a
	DF54		iteger, 16 bit unsi	igned	uint16	Range.	0 to 65,532	Re	esolution: 1 bit	Unit-less number
	If not speci		quested/sent. n the request, the c	default is	the all the \	Naypoints	with a Comment	(or as many t	he transfer protocol	
	permits).									
3			Ps with Comme			Byte Fi	eld Size: 2		Bit Field Size:	Request Parameter No
		Ger	neric numeric ID,	mediui	n				int, event, mark, etc.	
	DF54	In	teger, 16 bit unsi	igned	uint16	Range:	0 to 65,532	Re	esolution: 1 bit	Unit-less number
4	Database) ID				Byte Fi	eld Size: 2	L	Bit Field Size:	Request Parameter Yes
	DD007	Ger	neric numeric ID,	mediur	n		Number of	f route, waypoi	nt, event, mark, etc.	
	DF54	In	teger, 16 bit unsi	igned	uint16	Range:	0 to 65,532	Re	esolution: 1 bit	Unit-less number
5	Route ID					Byte Fi	eld Size: 2	I	Bit Field Size:	Request Parameter Yes
	DD007	Ger	neric numeric ID,	mediur	n		Number of	froute, waypoi	int, event, mark, etc.	
	DF54	In	teger, 16 bit unsi	igned	uint16	Range:	0 to 65,532	Re	esolution: 1 bit	Unit-less number
	Set to 6553	85 (N	A) to access the W	P-List in	the Databa	se.				
6	WPID / R	PS#				Byte Fi	eld Size: 2	L	Bit Field Size:	Request Parameter No
DD007 Generic numeric ID, medium					Number of	froute, waypoi	int, event, mark, etc.			
	DF54	In	teger, 16 bit unsi	igned	uint16	Range:	0 to 65,532	Re	esolution: 1 bit	Unit-less number
			ised when address ised when address	0						

Route and WP Service - WP Comment

PGN: 130070 hex: 1FC16

7 Comment Byte Field Size: 8 or 16

Bit Field Size:

Request Parameter No

DD198 Generic name string, Medium

Max 1782 ASCII or 891 Unicode characters

Medium size text strings.

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 $= 0 \Rightarrow$ 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.

Fields 6 thru 7 repeat as needed

Byte Field Size: ? Application specific, defined at time of use

Bit Field Size:

Request Parameter No

DF00

DD000 Undefined 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.

F

For a co	omplete des	scription of the Re	oute an	d WP PG	Ns, see t	he application not	e in Append	dix D.	
Single Fra	ame: <mark>No</mark>	Priority Default	t: 7	Default	Update Ra		iseconds	Frequency:	NA cycles per second
Destina	tion: Global	3 11	t: Yes		ACK Rqn	nnts:			
Field #	Field Na	me							Original Reference ID # 103
1	Start Rout				Byte Fi	eld Size: 2		eld Size:	Request Parameter Yes
	DD007 (Generic numeric ID), mediu	m		Number of route	e, waypoint, ev	ent, mark, etc.	
	DF54	Integer, 16 bit uns	signed	uint16	Range:	0 to 65,532	Resolut	tion: 1 bit	Unit-less number
		requested/sent.	ranki aha	ما المعادية	the levelet	Doute ID with a Comm	a a m t		
						Route ID with a Comn the next highest Route			
2	nitems	Tours has no con	minorit, u	io dolddir re	-	eld Size: 2	1	eld Size:	Request Parameter Yes
		Generic numeric ID), mediu	m	Dylo 11	Number of route			request raidinoter 163
	DF54	Integer, 16 bit uns		uint16	Range:	0 to 65,532	• •	tion: 1 bit	Unit-less number
	n Routes req	-	signed	umito	. ianger	0 10 03,332	, 1000141	1 oit	Carries admiser
		•	reply sha	all include al	II Routes w	ith a Comment in the D	Database (or a	s many of them as	
	the transport	protocol space perm	nits).						
3	Number of	f Routes with Com	nments		Byte Fi	eld Size: 2	Bit Fie	eld Size:	Request Parameter No
	DD007	Generic numeric ID), mediu	m		Number of route	, waypoint, ev	ent, mark, etc.	
	DF54	Integer, 16 bit uns	signed	uint16	Range:	0 to 65,532	Resolut	tion: 1 bit	Unit-less number
4	Database	ID			Byte Fi	eld Size: 2	Bit Fie	eld Size:	Request Parameter Yes
	DD007	Generic numeric ID), mediu	m		Number of route	, waypoint, ev	ent, mark, etc.	
	DF54	Integer, 16 bit uns	signed	uint16	Range:	0 to 65,532	Resolut	tion: 1 bit	Unit-less number
5	Route ID				Byte Fi	eld Size: 2	Bit Fie	eld Size:	Request Parameter No
	DD007	Generic numeric ID), mediu	m		Number of route	, waypoint, ev	ent, mark, etc.	
	DF54	Integer, 16 bit uns	signed	uint16	Range:	0 to 65,532	Resolut	tion: 1 bit	Unit-less number
6	Comment				Byte Fi	eld Size: 8 or 16	Bit Fie	eld Size:	Request Parameter No
	DD198	Generic name string	g, Mediu	ım		Medium size tex	t strings.		
	DF51	String, variable, n	nedium	ch8or16(1	n) Range:	0 to 1,782 ASCII o	r Resolut	tion: 1 ASCII or	3 to 1,785 bytes. First and
		8,		(-		0 to 891 Unicode		1 Unicode	Second bytes in string
						Characters		Character	(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 = $1 \Rightarrow$ ASCII
									characters A string with no characters
									(total length of 3 bytes, i.e.
									Count $= 3$) is a null string.

Route and WP Service - Route Comment

PGN: 130071 hex: 1FC17

7 Fields 5 thru 6 repeat as needed

DD000 Undefined

DF00 Undefined

Byte Field Size: ?

Undefined Range: undefined

Bit Field Size:

Request Parameter No

Application specific, defined at time of use

Resolution: undefined

Application specific, defIned at time of use.

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 Fra		Priority Default: 7	Default U			nilliseconds	Frequency:	NA cycles per second
Destina Field #	tion: <mark>Globa</mark> Field Na			ACK Rqm	nts:			Original Reference ID # 104
1	Start Data	-	um	Byte Fie	eld Size: 2	Bit Fi	ield Size:	Request Parameter Yes
	If not specif	Integer, 16 bit unsigned se ID requested/sent. ied in the request, the reply stated Database has no Comme		he lowest		Comment.	tion: <mark>1 bit</mark>	Unit-less number
2	nitems DD007	Generic numeric ID, medi	um	Byte Fie	eld Size: 2 Number of rou	Bit Fi	eld Size: vent, mark, etc.	Request Parameter <mark>Yes</mark>
	If not specif	Integer, 16 bit unsigned s requested/sent. ied in the request, the reply slace permits).	uint16 nall include all		0 to 65,532 s with a Comment (o		tion: 1 bit em as the transpor	Unit-less number
3		of Databases with comme Generic numeric ID, medi		Byte Fie	eld Size: 2 Number of rou	Bit Fi	eld Size: vent, mark, etc.	Request Parameter No
	DF54	Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolu	tion: 1 bit	Unit-less number
4	Database DD007	ID Generic numeric ID, medi	um	Byte Fie	eld Size: 2 Number of rou	Bit Fi	eld Size: vent, mark, etc.	Request Parameter No
	DF54	Integer, 16 bit unsigned	uint16	Range:	0 to 65,532	Resolu	tion: <mark>1 bit</mark>	Unit-less number
5	Commen	t text Generic name string, Med	ium	Byte Fie	eld Size: 8 or 16 Medium size t		eld Size:	Request Parameter No
	DF51 Max. 1782	String, variable, medium		Range:	0 to 1,782 ASCI 0 to 891 Unicode Characters		tion: 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 (Char8) or Unicode characters 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.
6		hru 5 repeat as needed Undefined		Byte Fie	eld Size: ? Application sp	Bit Fi	ield Size:	Request Parameter No
	DF00	Undefined	Undefined	Range:	undefined	Resolu	tion: undefined	Application specific, defIned at time of use.

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#.

			ne same tra SN shall ret						e PGN is s	supported.			
Single Fra			Priority Defa			-	Ipdate Ra		NA millis		Frequency:	NA cycles per secon	nd
Destina	tion: Globa	al	Query Supp	ort: Yes	S		ACK Rqn	nnts:					
Field #	Field N	ame										Original Reference ID # 1	108
1	Start RP	_	ric numeric	ID, med	lium		Byte Fi	ield Size: Num			eld Size: ent, mark, etc.	Request Parameter <mark>Y</mark>	'es
		equest fied in	eger, 16 bit u ed/sent the request, tl PS# has no v	ne defaul	It is the		S# with va			Resolui	tion: <mark>1 bit</mark>	Unit-less number	
2	nItems DD007	Gene	ric numeric	ID, med	lium		Byte Fi	ield Size: Num			eld Size: ent, mark, etc.	Request Parameter <mark>Y</mark>	'es
	DF54 n RPS# rec If not speci permits).	questec				vint16 clude all		0 to 65,5			tion: 1 bit protocol space	Unit-less number	
3	Number of Turn DD007		ypoints with	-		adius	Byte Fi		2 ber of route.		eld Size:	Request Parameter	No
	DF54	Inte	eger, 16 bit u	ınsigned	lι	iint16 ypoints ii	_	0 to 65,5		• •	tion: 1 bit	Unit-less number	
4	Database	e ID	ric numeric			,		ield Size:			eld Size: ent, mark, etc.	Request Parameter <mark>Y</mark>	'es
	DF54	Inte	ger, 16 bit u	ınsigned	lι	int16	Range:	0 to 65,5	532	Resolut	tion: 1 bit	Unit-less number	
5	Route ID		ric numeric	ID, med	lium		Byte Fi	ield Size: Num			eld Size: ent, mark, etc.	Request Parameter <mark>Y</mark>	'es
	DF54	Inte	ger, 16 bit u	ınsigned	lι	int16	Range:	0 to 65,5	532	Resolut	tion: 1 bit	Unit-less number	
6	RPS# DD007	Gene	ric numeric	ID, med	lium		Byte Fi	ield Size: Num			eld Size: ent, mark, etc.	Request Parameter	No
	DF54 Waypoints		eger, 16 bit u he Route-def	_		i int16 o Radius		0 to 65,5 be include		Resolut	tion: <mark>1 bit</mark>	Unit-less number	
7	Radius o		nce ordered				Byte Fi	i eld Size : A co			eld Size: dius order, off-trac	Request Parameter ck limit, etc.	No
	DF74 No negativ		tance, rough	l		int16	Range:	+/-32,76	4 m	Resolut	tion: <mark>1 m</mark>		
8	Fields 6 DD000		repeated as	neede	d		Byte Fi	i eld Size : Appl		Bit Fie	eld Size: t time of use	Request Parameter	No
	DF00	Uno	lefined		Un	defined	Range:	undefine	ed	Resolui	tion: undefined	Application specific, defIn at time of use.	ed

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.

	ly should use the same transfer protocol a uest for this PGN shall return 059392 with		the PGN is supported.		
Single Fra	ame: No Priority Default: 7 Defa	ault Update Rate:	NA milliseconds	Frequency:	NA cycles per second
Destina Field #	tion: Global Query Support: Yes Field Name	ACK Rqmnts:			Original Reference ID # 107
1	Start WPID DD007 Generic numeric ID, medium	Byte Field Size	Bit F	iield Size: vent, mark, etc.	Request Parameter <mark>Yes</mark>
	DF54 Integer, 16 bit unsigned uint 1st requested/sent WPID. If not specified in the request, the default is the low If the requested Waypoint is not valid, the default in the requested Waypoint is not valid, the default in the sequested Waypoint is not valid.	vest WPID with a valid V	Waypoint.	ution: <mark>1 bit</mark>	Unit-less number
2	nltems DD007 Generic numeric ID, medium	Byte Field Size No	e: 2 Bit F	ield Size: vent, mark, etc.	Request Parameter <mark>Yes</mark>
	DF54 Integer, 16 bit unsigned uint n Waypoints requested/sent. Non-valid Waypoints shall be skipped and is not in If not specified in the request, the reply shall include protocol space permits).	ncluded in this count.	,,	tion: 1 bit f as the transport	Unit-less number
3	Number of valid WPs in the WP-List	Byte Field Size	e: 2 Bit F	ield Size:	Request Parameter No
	DD007 Generic numeric ID, medium	Nu	umber of route, waypoint, e	vent, mark, etc.	
	DF54 Integer, 16 bit unsigned uin t	16 Range: 0 to 6	5,532 Resolu	ution: 1 bit	Unit-less number
4	Database ID DD007 Generic numeric ID, medium	Byte Field Size	Bit F umber of route, waypoint, e	ield Size: vent, mark, etc.	Request Parameter <mark>Yes</mark>
	DF54 Integer, 16 bit unsigned uin t	16 Range: 0 to 6	5,532 Resolu	ution: 1 bit	Unit-less number
5	reserved DD007 Generic numeric ID, medium	Byte Field Size	Bit F umber of route, waypoint, e	ield Size: vent, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uin t	16 Range: 0 to 6	5,532 Resolu	ution: 1 bit	Unit-less number
6	WPID DD007 Generic numeric ID, medium	Byte Field Size	Bit F umber of route, waypoint, e	ield Size: vent, mark, etc.	Request Parameter No
	DF54 Integer, 16 bit unsigned uint The Waypoints shall be included in the order of inc Non-valid WPs shall not be included.		5,532 Resolu	ution: 1 bit	Unit-less number

Route and WP Service - WP List - WP Name & Position

PGN: 130074 hex: 1FC1A

7	WP Name	е	Byte Fi	ze:	Request Parameter No				
	DD004	Generic name string, short		Name of place, route,	waypoint, dest	ination, vessel,	sel, vehicle, etc.		
	DF50	String, variable, short	ch8or16(n) Range:	0 to 250 ASCII or 0 to 125 Unicode Characters		ASCII or Unicode Character	2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number		
	Max. 30 AS	CII or Unicode Characters		Characters		indiactel .	of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters Control byte = 1 => ASCII characters A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.		
8	WP Latitu	ude Latitude, WGS-84	Byte Fi	ield Size: 4	Bit Field Si.	ze:	Request Parameter No		
	DF23	Latitude	int32 Range:	+/- 90 deg	Resolution: 1	x10E-7 deg	"-" = South, resolution ~1.1 cm		
9	WP Long	litude Longitude, WGS-84	Byte Fi	ield Size: 4 Longitude referenced	Bit Field Sinto WGS-84	ze:	Request Parameter No		
	DF25	Longitude	int32 Range:	+/- 180 deg	Resolution: 1	x10E-7 deg	"-" = West, resolution ~1.1 cm		
10		thru 9 repeat as needed Undefined	Byte Fi	ield Size: ? Application specific,	Bit Field Si		Request Parameter No		
	DF00	Undefined	Undefined Range:	undefined	Resolution: u	ındefined	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 Fra	ame: Yes	Priority Default: 2	Default (upaate Ra	ate: 100 mili	ilseconds Frequency:	10. cycles per second
Destina	tion: Globa	al Query Support:		ACK Rqn	nnts:		
Field#	Field N	ame					Original Reference ID # 81
1	Sequence DD056	se ID Sequence ID		Byte Fi	different PGNs . SOG and RAIM	For example, the SID would	Request Parameter No information together between be used to tie together the COG, 5=no valid position fix to tie it to.
	DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
2	Wind Sp DD044	eed Generic Speed		Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DF35 Speed		uint16	Range:	0 to 655.32 m/s	Resolution: 1x10E-2 1	$\frac{m}{s}$ 1 Knot = 0.5144 m/s
3	Wind Dir	rection Wind Direction		Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DF02	Angle	uint16	Range:	0 to 2Pi rad	Resolution: 1x10E-4 1	Resolution ~0.0057deg, 1 deg = .01745 rad
4	Wind Reference			Byte Fi	ield Size:	Bit Field Size: 3	Request Parameter No
	DD205	Wind Reference			using COG/SOC 0x01 = Theoretic calculated using 0x02 = Apparen 0x03 = Theoretic calculated using 0x04 = Theoretic	cal Wind (ground referenced, a COG/SOG) t Wind (relative to the vessel of cal (Calculated to Centerline of COG/SOG) cal (Calculated to Centerline of Heading/Speed through Wate	enterline) f the vessel, refernced to ground; f the vessel, refernced to water;
	DF52	Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
5	Reserve DD001	Reserved field		Byte Fi	ield Size: Variable number	Bit Field Size: resv r of reserved bits, all set to log	
	DF52 Needed to	Bit field fill the CAN frame.	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields

Environmental Parameters

PGN: 130310 hex: 1FD06

Local at	mospheric	environmental con	ditions						
Single Fra	ame: Yes	Priority Default:	5 Defau	lt Update Rat	e: 500 mil	liseconds	Frequency:	2.	cycles per second
Destina	tion: Global	Query Support:	Opt'l	ACK Rqmn	ts:				
Field #	Field Nar	ne						Origina	al Reference ID # 46
1	Sequence	ID		Byte Fie	ld Size: 1	Bit Fie	ld Size:	Req	uest Parameter No
	DD056 S	sequence ID			different PGNs .	. For example, I values to a give		used to tie	
	DF53	Integer, 8 bit unsign	ed uint8	Range:	0 to 252	Resoluti	on: 1 bit	Unit-les	ss number
2	Water Tem	op Generic Temperature		Byte Fie	ld Size: 2	Bit Fie	ld Size:	Req	uest Parameter No
	DF39	Temperature, low	uint1	6 Range:	0 to 655.32 deg K	Resoluti	on: <mark>1x10E-2 deg</mark> K		
3		mbient Air Temp. Generic Temperature		Byte Fie	ld Size: 2	Bit Fie	ld Size:	Req	uest Parameter No
	DF39	Temperature, low	uint1	6 Range:	0 to 655.32 deg K	Resoluti	on: 1x10E-2 deg K		
4	•	ric Pressure Generic Pressure		Byte Fie	ld Size: 2	Bit Fie	ld Size:	Req	uest Parameter <mark>No</mark>
	DF47	Pressure, medium	uint1	6 Range:	0 to 6,553,200 Pa	Resoluti	ion: 1x10E+2 Pa		
5	Reserved I	Bits Reserved field		Byte Fie			Id Size: resv 8		uest Parameter No
	DF52 Needed to fill	Bit field the CAN frame.	bit(n)) Range:	Variable	Resoluti	ion: <mark>1</mark>	Used to	construct bit fields

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 Fra	ame: Yes	Priority Default: 5	Default l	Jpdate Ra	te: 500 millis	econds Frequency:	cycles per second
Destina	tion: Global	Query Support: Opt'l		ACK Rqm.	nts:		
Field #	Field Name	9					Original Reference ID # 91
1	Sequence ID			Byte Fie	eld Size: 1	Bit Field Size:	Request Parameter No
	DD056 Sec	quence ID			different PGNs . I SOG and RAIM v	ng number used to tie related in For example, the SID would be alues to a given position. 255= valid position fixes.	
	DF53 In	nteger, 8 bit unsigned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
2	Temperature	Instance		Byte Fie	eld Size:	Bit Field Size: 6	Request Parameter No
	DD229 Ter	mperature Instance			0x00 = Sea Tempe 0x01 = Outside Te 0x02 = Inside Ten 0x03 = Engine Ro 0x04 = Main Cabi 0x05 = Reserve, thru 0x3E = Reserve, 0x3F = Data Not A	emperature, aperature, om Temperature, n Temperature,	
		it field contents of field 4	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	3 Humidity Instance DD230 Humidity Instance			Byte Fi	eld Size: 0x00 = Inside Hur 0x01 = Outside Hur 0x02 = reserved, 0x03 = Data Not A	umidity,	Request Parameter No
		it field contents of field 5	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4	Temperature			Byte Fie	eld Size: 2	Bit Field Size:	Request Parameter No
	DF39 T	emperature, low	uint16	Range:	0 to 655.32 deg K	Resolution: 1x10E-2 deg	
5	Humidity DD231 Hu	midity		Byte Fie	eld Size: 2 Relative Humidity	Bit Field Size:	Request Parameter No
	DF84 Percent, Relative Measur		int16	Range:	-131.072% to 131.056%	Resolution: .004%	
6	Atmospheric Pressure DD049 Generic Pressure			Byte Fie	eld Size: 2	Bit Field Size:	Request Parameter No
	DF47 P	ressure, 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.

SID DD056 Sequence IID An upward counting number used to the related information together between FORS - For example, the SID would be used to tie together the SOG and RAIM values to a given position. 255=no valid position fix to Range to 250 for valid position fix to the distributi	Single Frai		Priority Default: 5	Default U	Jpdate Ra	,	seconds F	requency:	.5 cycles per second
SID DD056 Sequence IID An upward counting number used to the related information together between FORS - For example, the SID would be used to tie together the SOG and RAIM values to a given position. 255=no valid position fix to Range to 250 for valid position fix to the distributi					ACK Rqmi	nts:			Original Reference ID # 196
An upward counting number used to fire related information tegether the SOG and RAM values to a given position. 255=no valid position fix 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 Temperature instance DD128 Generic instance Byte Field Size: Bit Field Size: B Request Parar. For Engines: 1 = Instance 1: Bit Field Size: B Request Parar. For Engines: 0 = Instance 1: Botal Engine Ort 1 = Dotal Engine Port 1 = Instance 1: 1 = Dotal Engine Starboard (for Multiple Engines, Instances will start from Bow, Port (0) to Stern, Starboard (n)) n = Instance n, where n < 253 233 = Reserve 234 = Error; 255 = Not available DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct b Ryle Field Size: B Field Size: B Request Parar. DD291 Temperature Source Byte Field Size: B Field Size: B Request Parar. 0 0 Sea Temperature 0 0 Sea Temperature 0 1 = Outside Temperature 0 2 = Instita Temperature 0 3 = Engine Room Temperature 0 4 = Main Cabin Temperature 0 5 = Live Well Temperature 0 6 = Bait Well Temperature 0 6 = Bait Well Temperature 0 9 = Dew Point Temperature 0 9 = Dew Point Temperature 1 = Wind Chill Temperature 2 = Instance 1					Ryto Fig	ald Size: 1	Rit Field 9	Sizo:	
## DD128 Generic instance ## DD129 Instance or instance	ı		equence ID		Dyte i le	An upward count different PGNs . SOG and RAIM v	ing number used to For example, the savalues to a given p	to tie related inf SID would be uposition. 255=r	formation together between used to tie together the COG,
DD128 Generic instance Description For Engines Description Dual Engine Port		DF53	Integer, 8 bit unsigned	uint8	Range:	0 to 252	Resolution:	1 bit	Unit-less number
253 = Reserve 254 = Error; 255 = Not available DF52 Bit field bit(n) Range: Variable Resolution: 1 Used to construct by Size: Bit Field Size:	2	•			Byte Fie	0 = Instance 0; 1 = Instance 1;	For Engines: 0 = Single Enginesist 1 = Dual Enginesist (for Multiple	gine or Dual Er ne StarBoard Engines, Insta	ances will start
Temperature Source DD291 Temperature Source ### DD292						253 = Reserve 254 = Error;			
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 06 = Bait Well Temperature 07 = Refrigeration Temperature 09 = Dew Point Temperature 10 = Wind Chill Temperature, Apparent 11 = Wind Chill Temperature, Apparent 11 = Wind Chill Temperature, Apparent 11 = Heat Index Temperature 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 by Sylve Field Size: Request Parant DD043 Generic Temperature DF39 Temperature DF39 Temperature Byte Field Size: Byte Field Size: Resolution: 1x10E-2 deg K 5 Set Temperature Byte Field Size: Byte Field Size: Request Parant DD043 Generic Temperature Byte Field Size: Byte Field Size: Request Parant DD043 Generic Temperature		DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
4 Actual Temperature DD043 Generic Temperature DF39 Temperature, low uint16 Range: 0 to 655.32 deg K Set Temperature DD043 Generic Temperature Byte Field Size: 2 Bit Field Size: Request Parameters Byte Field Size: 2 Bit Field Size: Request Parameters Byte Field Size: Request Parameters Byte Field Size: Request Parameters DD043 Generic Temperature	3	•			Byte Fie	00 = Sea Tempers 01 = Outside Temp 02 = Inside Temp 03 = Engine Rooi 04 = Main Cabin 05 = Live Well To 06 = Bait Well To 07 = Refrigeratio 08 = Heating Sys 09 = Dew Point T 10 = Wind Chill 11 = Wind Chill 12 = Heat Index T 13 = Freezer Tem 14 through 128 R 129 through 252 253 = Not Suppor	ature Inperature Inperature Inperature In Temperature In Temperature In Temperature In Temperature Item Temperature Item Temperature Itemperature It	arent oretical ure Sources oth	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 DD043 Generic Temperature Byte Field Size: 2 Bit Field Size: Request Parameters Byte Field Size: Request Parameters DD043 Generic Temperature		DF52	Bit field	bit(n)	Range:	Variable	Resolution:	1	Used to construct bit fields
5 Set Temperature Byte Field Size: 2 Bit Field Size: Request Parameter DD043 Generic Temperature	4	DD043 G	eneric Temperature	uint16	•		Resolution:	1x10E-2 deg	Request Parameter No
DF39 Temperature, low uint16 Range: 0 to 655.32 deg K Resolution: 1x10E-2 deg K	5	DD043 G		uint16			Bit Field S	Size: 1x10E-2 deg	Request Parameter No

Temperature PGN: 130312 hex: 1FD08

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

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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 Humidity Source (field 3) with a Humidity Instance (field 2) of 2. Using Set Humidity (field 5) this PGN can also be used to control humidity or to report a targeted humidity. This PGN is a rework of PGN 130311and was introduced in version 1.210 of this standard, it is to used for new designs.

•	me: Yes	Priority Default:	5	Default	Update Rat	e: NA millise	econds Frequency.	NA cycles per second
Destina		Query Support:	Opt'l		ACK Rqmn	ts:		Original Defendance ID # 400
Field #	Field Nan	ne						Original Reference ID # 198
1	SID DD056 S	equence ID			Byte Fie		Bit Field Size:	Request Parameter No d information together between
	DD000 S	equence 1D				different PGNs . For SOG and RAIM va	or example, the SID would	be used to tie together the COG, 55=no valid position fix to tie it to.
	DF53	Integer, 8 bit unsig	ned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number
2	Humidity In	stance			Byte Fie	ld Size:	Bit Field Size: 8	Request Parameter No
	DD128 Generic instance					0 = Instance 0; 1 = Instance 1; thru n = Instance n, who		ırd
						253 = Reserve 254 = Error; 255 = Not available	e	
	DF52	Bit field		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
3	Humidity S	ource			Byte Fie	ld Size:	Bit Field Size: 8	Request Parameter No
	DD292 Humidity Source					253 = Not Supporte 254 = Error	dity served eneric Humidity Sources of	ther than those defined
	DF52	Bit field		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
4	Actual Hum	•			Byte Fie	Id Size: 2 Relative Humidity	Bit Field Size:	Request Parameter No
	DF84	Percent, Relative M	Ieasur	int16	_	-131.072% to 131.056%	Resolution: .004%	
5	Set Humidi DD231 H	-			Byte Fie	Id Size: 2 Relative Humidity	Bit Field Size:	Request Parameter No
	DF84	Percent, Relative M	Ieasur	int16	_	-131.072% to 131.056%	Resolution: .004%	
6	Reserve Bi	ts			Byte Fie	ld Size:	Bit Field Size: resv	Request Parameter No
	DD001 Reserved field					Variable number of	reserved bits, all set to log	ic "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	ult Update Rate: 2,000 milliseconds Frequency:		ncy: .5 cycles per second			
Destinat	tion: Global	Query Support:			ACK Rqmr					
Field#	Field Nar	ne						Original Reference ID # 195		
1	SID				Byte Fie	ld Size: 1	Bit Field Size:	Request Parameter No		
	DD056 Sequence ID					different PGNs SOG and RAIM	. For example, the SID wo	lated information together between uld be used to tie together the COG, . 255=no valid position fix to tie it to.		
	DF53	Integer, 8 bit unsig	ned	uint8	Range:	0 to 252	Resolution: 1 bit	Unit-less number		
2	Pressure I	nstance			Byte Fie	ld Size:	Bit Field Size: 8	Request Parameter No		
	DD128 Generic instance			0 = Instance 0; 1 = Instance 1; thru n = Instance n, wher			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)) here n < 253			
						253 = Reserve 254 = Error;				
					255 = Not avail	able				
	DF52	Bit field		bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields		
3	Pressure S	Source			Byte Fie	ld Size:	Bit Field Size: 8	Request Parameter No		
	DD289 F	ressure 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 DD290 P	ressure			Byte Fie	ld Size: 4	Bit Field Size:	Request Parameter No		
	DF103	Pressure		int32	Range:	+/- 2.1E8	Resolution: 1E-1 I	Pa Pa		
5	Reserve B	its			Byte Fie	ld Size:	Bit Field Size: r	esv 8 Request Parameter No		
	DD001 R	001 Reserved field			Variable number of reserved bits, all			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 (Default Update Rate: NA millis		seconds Frequency:	NA cycles per second		
Destina	tion:	Query Support: Opt'l		ACK Rqmni	ts:				
Field #	Field Na	ame					Original Reference ID # 197		
1	SID DD056	Sequence ID		Byte Fiel	different PGNs . I SOG and RAIM v	Bit Field Size: ng number used to tie related inf For example, the SID would be u alues to a given position. 255=n r valid position fixes.	sed to tie together the COG,		
	DF53 Integer, 8 bit unsigned		uint8	Range: () to 252	Resolution: 1 bit	Unit-less number		
2	Pressue Instance DD128 Generic instance			Byte Fiel	d Size: 0 = Instance 0; 1 = Instance 1; thru	Bit Field Size: 8 Request Parameter No 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))			
	DE52	Dit Sold	1:4 ()	Pango: 1	253 = Reserve 254 = Error; 255 = Not availab	r; available			
	DF52	Bit field	bit(n)	Range:		Resolution: 1	Used to construct bit fields		
3	Pressure DD289	Pressure Source		Byte Fiel	00 = Atmospheric 01 = Water Pressu 02 = Steam Pressu	ire	Request Parameter No		
					253 = Reserved 254 = Error	Air Pressure essure	han those defined		
	DF52	Bit field	bit(n)	Range: 1	04 = Hydraulic Pr 05 through 128 Re 129 through 252 0 253 = Reserved 254 = Error 255 = No Change	Air Pressure essure eserved Generic Pressure Sources other th	han those defined Used to construct bit fields		
4	DF52 Pressure DD290		bit(n)		04 = Hydraulic Pro 05 through 128 Re 129 through 252 Q 253 = Reserved 254 = Error 255 = No Change	Air Pressure essure esserved Generic Pressure Sources other tl / Data Not Available			
4	Pressure DD290		bit(n)		04 = Hydraulic Pro 05 through 128 Re 129 through 252 C 253 = Reserved 254 = Error 255 = No Change Variable d Size: 4	Air Pressure essure eserved Generic Pressure Sources other the / Data Not Available Resolution: 1	Used to construct bit fields		
5	Pressure DD290 DF103	Pressure Pressure	,	Byte Fiel	04 = Hydraulic Pro 05 through 128 Re 129 through 252 0 253 = Reserved 254 = Error 255 = No Change Variable d Size: 4 +/- 2.1E8 d Size:	Air Pressure essure esserved Generic Pressure Sources other th / Data Not Available Resolution: 1 Bit Field Size:	Used to construct bit fields Request Parameter No Request Parameter No		

Tide Station Data PGN: 130320 hex: 1FD10

Tide station measurement data including station location, numeric identifier, and name. cycles per second Single Frame: No Priority Default: 6 Default Update Rate: 1.000 milliseconds Frequency: Destination: Global Query Support: Opt'l ACK Ramnts. Original Reference ID # 12 Field # Field Name Mode Byte Field Size: Request Parameter No 1 DD025 Mode, Data 0x0 = Autonomous mode,0x1 = Differential, enhanced mode, 0x2 = Estimated mode,0x3 = Simulator mode,0x4 = Manual mode,0x5 to 0xD = Reserved0xE = Error. 0xF = Data not available Range: Variable Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) 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 Used to construct bit fields Resolution: 1 DF52 Bit field Range: Variable bit(n) **Reserved Bits** Byte Field Size: Bit Field Size: resv Request Parameter No 3 Variable number of reserved bits, all set to logic "1" **DD001** Reserved field Bit field Range: Variable Resolution: 1 Used to construct bit fields DF52 bit(n) 2 Bits needed to fill out the byte Bit Field Size: Measurement date Byte Field Size: 2 Request Parameter No 4 Days since January 1, 1970, Date is relative to UTC Time. **DD039** Generic date 0 = January 1, 1970, max =Range: 0 to 65,532 days Resolution: 1 day **DF41** Date, day count uint16 ~179 years 5 Measurement time Byte Field Size: 4 Bit Field Size: Request Parameter No 24 hour clock, 0 = midnight, time is in UTC **DD158** Generic time of day Time of day Resolution: 1x10E-4s \sim 24 hours, 0 = midnight, **DF06** uint32 Range: 0 to 86,401 s range allows for up to two leap seconds per day Station location, latitude Byte Field Size: 4 Bit Field Size: Request Parameter No 6 Latitude referenced to WGS-84 **DD022** Latitude, WGS-84 "-" = South, resolution ~ 1.1 Range: +/- 90 deg Resolution: 1x10E-7 deg DF23 Latitude int32 Byte Field Size: 4 Bit Field Size: Station location, longitude Request Parameter No Longitude referenced to WGS-84 **DD023** Longitude, WGS-84 "-" = West, resolution ~ 1.1 Range: +/- 180 deg Resolution: 1x10E-7 deg DF25 Longitude int32 Tide level Byte Field Size: Bit Field Size: Request Parameter No 8 **DD041** Tide Level This value is relative to mean lower low water (MLLW). Resolution: 1x10E-3 m Range: +/- 32.764 m **DF46** Distance, signed, medium int16

Tide Station Data PGN: 130320 hex: 1FD10

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

Bit Field Size:

Request Parameter Yes

Station ID String

10

DD004 Generic name string, short

String, variable, short

Byte Field Size: 8 or 16 n Name of place, route, waypoint, destination, vessel, vehicle, etc.

0 to 125 Unicode

Characters

Resolution: 1 ASCII or 1 Unicode

ch8or16(n) Range: 0 to 250 ASCII or

Character

15 characters maximum.

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

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte $= 0 \Rightarrow$ Unicode characters Control byte = $1 \Rightarrow ASCII$ characters A string with no characters

(total length of 2 bytes, i.e. Count = 2) is a null string.

11 Station Name String

DF50

Byte Field Size: 8 or 16 n

Bit Field Size: Name of place, route, waypoint, destination, vessel, vehicle, etc.

Request Parameter No

DD004 Generic name string, short

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 $= 0 \Rightarrow$ Unicode characters Control byte $= 1 \Rightarrow ASCII$

characters

A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

50 characters maximum.

Appendix B.1 - PGN Report

Version 1.300 - 01-May-09 PGN: 130320 Page 215 of 229

PGN: 130321 hex: 1FD11

Salinity	station m	easurement data in	cluding station	location,	numeric identifier	, and name.		
Single Fra		Priority Default:		lt Update R	,	illiseconds	Frequency:	 cycles per second
	tion: Glob	3 11	Opt'l	ACK Rqn	nnts:			
Field #	Field N	lame						Original Reference ID # 13
1	Mode DD025	Mode, Data		Byte F	0x0 = Autonon 0x1 = Differen 0x2 = Estimate 0x3 = Simulate 0x4 = Manual 0x5 to 0xD = F 0xE = Error, 0xF = Data not	nous mode, tial, enhanced moded and mode, or mode, mode, Reserved	<i>d Size:</i> 4	Request Parameter No
	DF52	Bit field	bit(n	Range:	Variable	Resolutio	n: 1	Used to construct bit fields
2	Reserve	d Bits		Byte F	ield Size:	Bit Field	Size: resv 4	Request Parameter No
	DD001	Reserved field			Variable numb	er of reserved bits	, all set to logic "1"	
	DF52	Bit field	bit(n	Range:	Variable	Resolutio	n: 1	Used to construct bit fields
	4 Bits need	ded to fill out the byte						
3	Measure	ement Date		Byte F	ield Size: 2	Bit Field	d Size:	Request Parameter No
	DD039	Generic date			Days since Jan	uary 1, 1970, Da	te is relative to UTO	C Time.
	DF41	Date, day count	uint1	6 Range:	0 to 65,532 days	Resolutio	n: <mark>1 day</mark>	0 = January 1, 1970, max = ~179 years
4		ement time		Byte F	ield Size: 4	Bit Field		Request Parameter No
		Generic time of day						
	DF06	Time of day	uint3	<u>z</u> Range:	0 to 86,401 s	Resolutio	n: <mark>1x10E-4 s</mark>	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
5	Station I	ocation, latitude		Byte F	ield Size: 4	Bit Field	l Size:	Request Parameter No
	DD022	Latitude, WGS-84			Latitude refere	nced to WGS-84		
	DF23	Latitude	int32	Range:	+/- 90 deg	Resolutio	n: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
6	Station location, longitude DD023 Longitude, WGS-84			Byte F	ield Size: 4	Bit Field		Request Parameter No
		_		Dongo	Ü			" " XX/+ 1 1
	DF25	Longitude	int32	Range.	+/- 180 deg	Resolutio	n: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
7	Salinity			Byte F	ield Size: 4	Bit Field	l Size:	Request Parameter No
	DD042 Salinity measure							ns of salts per kilogram of sea as 35 parts per thousand.
_	DF49	Ratio, Relative me	asure float3	2 Range:	Variable	Resolutio	n: Floats	Unit-less number
8	Water Te	emperature		Byte F	ield Size: 2	Bit Field	d Size:	Request Parameter No
	DD043	Generic Temperature	e			_		
	DF39	Temperature, low	uint1	6 Range:	0 to 655.32 deg K	Resolutio	n: 1x10E-2 deg K	

Salinity Station Data

PGN: 130321 hex: 1FD11

9 Station ID String Byte Field Size: 8 or 16 n

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.

Bit Field Size:

Request Parameter Yes

DD004 Generic name string, short

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

Resolution: 1 ASCII or ch8or16(n) Range: 0 to 250 ASCII or

1 Unicode

DF50 String, variable, short

0 to 125 Unicode

Characters

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 $= 0 \Rightarrow$ 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.

Byte Field Size: 8 or 16 n

Bit Field Size: Name of place, route, waypoint, destination, vessel, vehicle, etc.

Request Parameter No.

DD004 Generic name string, short

ch8or16(n) Range: 0 to 250 ASCII or

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,

Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or

including the Count and

Unicode characters (Char16). Control byte = 0 => Unicode characters

Control byte = $1 \Rightarrow$ ASCII characters

A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

10 **Station Name String**

DF50 String, variable, short

0 to 125 Unicode Characters

50 characters maximum.

PGN: 130321

Version 1.300 - 01-May-09

Appendix B.1 - PGN Report

Current Station Data PGN: 130322 hex: 1FD12

Current station measurement data including station location, numeric identifier, and name. cycles per second Single Frame: No Priority Default: 6 Default Update Rate: 1.000 milliseconds Frequency: Destination: Global Query Support: Opt'l ACK Ramnts. Original Reference ID # 14 Field # Field Name Mode Byte Field Size: Bit Field Size: Request Parameter No 1 DD025 Mode, Data 0x0 = Autonomous mode,0x1 = Differential, enhanced mode, 0x2 = Estimated mode,0x3 = Simulator mode,0x4 = Manual mode,0x5 to 0xD = Reserved0xE = Error.0xF = Data not available Range: Variable Resolution: 1 Used to construct bit fields **DF52** Bit field bit(n) 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 Resolution: 1 Used to construct bit fields **DF52** Bit field bit(n) Range: Variable **Reserved Bits** Bit Field Size: resv Request Parameter No. 3 Byte Field Size: **DD001** Reserved field Variable number of reserved bits, all set to logic "1' Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Range: Variable 1 Bits needed to fill out the byte Measurement date Byte Field Size: 2 Bit Field Size: Request Parameter No. 4 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 Measurement time Byte Field Size: 4 Bit Field Size: Request Parameter No. 5 **DD158** Generic time of day 24 hour clock, 0 = midnight, time is in UTC Resolution: 1x10E-4 s \sim 24 hours, 0 = midnight, **DF06** Time of day uint32 Range: 0 to 86,401 s range allows for up to two leap seconds per day Byte Field Size: 4 Bit Field Size: Request Parameter No Station location, latitude **DD022** Latitude, WGS-84 Latitude referenced to WGS-84 "-" = South, resolution ~ 1.1 **DF23** Range: +/- 90 deg Resolution: 1x10E-7 deg Latitude int32 7 Station location, longitude Byte Field Size: 4 Bit Field Size: Request Parameter No **DD023** Longitude, WGS-84 Longitude referenced to WGS-84 Range: +/- 180 deg Resolution: 1x10E-7 deg "-" = West, resolution ~ 1.1 **DF25** Longitude int32 Measurement depth Byte Field Size: 4 Bit Field Size: Request Parameter No 8 Water depth measured from the water surface DD047 Water Depth **DF09** Range: 0 to ~4.295x10E+7 m Resolution: 1x10E-2 m Distance uint32

Current Station Data PGN: 130322 hex: 1FD12

9	Current spo	eed Generic Speed		Byte Fi	eld Size: 2	Bit Field Size:	Request Parameter No
	DF35	Speed	uint16	Range:	0 to 655.32 m/s	Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s
10	DD048 C	w direction Current flow direction Angle	uint16		eld Size: 2 Direction towards 0 to 2Pi rad	Bit Field Size: s which current flows. Degrees re Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1
11	Water Tem	perature Generic Temperature		Byte Fi	eld Size: 2	Bit Field Size:	deg = .01745 rad Request Parameter No
	DF39	Temperature, low	uint16	Range:	0 to 655.32 deg K	Resolution: 1x10E-2 deg K	
12	Station ID S	String Generic name string, short		Byte Fi	eld Size: 8 or 16 r Name of place, ro	Bit Field Size: ute, waypoint, destination, vessel	Request Parameter Yes I, 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,
		not specified in the "Comma				PGN, the response will with the ID will respond with this PGN.	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.
13	Station Na	me String Generic name string, short		Byte Fi	eld Size: 8 or 16 r	Bit Field Size: oute, waypoint, destination, vessel	Request Parameter No
		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.

Meteorological Station Data

PGN: 130323 hex: 1FD13

Destruction Colon		_	ation measurement						4 avalos per accor	ام
Mode Byte Field Size: Bit Field Size: A Request Parame DD025 Mode, Data Differential, enhanced mode, Ox = Autonomous mode, Ox = Retinated mode, Ox = Simulation mode, Ox = Simulation, Ox = Si	U				•		iseconas	Frequency:	1. cycles per secon	a
DD025 Mode, Data DF02			5 11	Оргі	ACK KYIIIII	J.			Original Reference ID #	15
Ox1 = Differential, enhanced mode, Ox2 = Estimated mode, Ox3 = Simulator mode, Ox4 = Manual mode, Ox5 to OxD = Reserved OxE = Error, OxF = Data not available Persolution: 1 Used to construct bit 2 Reserved Bits DD001 Reserved field DF52 Bit field DF53 Bit field DF53 Bit field DF53 Bit field DF54 Bit field DF54 Bit field DF55 Bit fie	1	Mode			Byte Fiel	d Size:	Bit Fie	ld Size: 4	Request Parameter	No
2 Reserved Bits DD001 Reserved field DF52 Bit field bit(n) Range: Variable number of reserved bits, all set to logic "1" 3 Measurement date DD033 Generic date DF41 Date, day count DF41 Date, day count Uint16 Range: 0 to 65,532 days DF52 Bit field Size: Request Parame DD045 Generic time of day DF64 Time of day DF65 Station location, latitude DD022 Latitude, WGS-84 DF25 Longitude DF25 Longitude DF26 DF26 Station location, longitude DD023 Longitude DD023 Longitude DD024 Generic Speed DF35 Speed DF35 Speed Uint16 Range: 0 to 655.32 m/s DF66 Station DF66 Speed DF67 Speed DF67 Speed DF68 Speed DF68 Speed DF68 Speed DF68 Speed DF69 Speed Uint16 Range: 0 to 655.32 m/s DF69 Speed DF69 Speed DF69 Speed Uint16 Range: 0 to 655.32 m/s DF69 Speed DF69 Speed DF69 Speed Uint16 Range: 0 to 655.32 m/s DF69 Speed DF69 Speed DF69 Speed DF69 Speed Uint16 Range: 0 to 655.32 m/s DF69 Resolution: Ix10E-2 m/s DF69 Speed Uint16 Range: 0 to 655.32 m/s DF69 Speed Uint16 Range: 0 to 655.32 m/s DF69 Resolution: Ix10E-2 m/s DF69 Speed Uint16 Range: 0 to 655.32 m/s DF69 Resolution: Ix10E-2 m/s DF69 Resolution: Ix10E-4 m/s DF69 Resolution		DD025	Mode, Data			0x1 = Differenti. 0x2 = Estimated 0x3 = Simulator 0x4 = Manual m 0x5 to 0xD = Re 0xE = Error,	al, enhanced m mode, mode, aode, eserved	ode,		
DD001 Reserved field DF52 Bit field DF52 Bit field DF52 Bit field DF53 Bit field DF53 Bit field DF53 Bit field DF54 Dit (n) DF54 Dit (n) DF55 Bit field DF55 Bit field DF55 Bit field DF56 DF56 DF56 DF56 DF56 DF56 DF56 DF56		DF52	Bit field	bit(n)	Range: \	Variable	Resoluti	ion: 1	Used to construct bit fields	_
DF52 Bit field 4 Bits needed to fill out the byte 3 Measurement date DD039 Generic date DD039 Generic date DD045 Generic date DD164 Date, day count Uint16 Range: 0 to 65,532 days Resolution: 1 day 0 = January 1, 1970, -179 years 4 Measurement time DD158 Generic time of day DD158 Generic time of day Uint32 Range: 0 to 86,401 s Resolution: 1x10E-4 s Pyte Field Size: Request Parame DD158 Generic time of day Uint32 Range: 0 to 86,401 s Resolution: 1x10E-7 deg "-" = South, resolution: 1x10E-7 deg "-" = South, resolution: 1x10E-7 deg DD022 Latitude, WGS-84 DF23 Latitude DD023 Longitude Byte Field Size: 4 Bit Field Size: Request Parame DD023 Longitude Byte Field Size: 4 Bit Field Size: Request Parame DD023 Longitude Byte Field Size: 4 Bit Field Size: Request Parame DD024 Generic Speed DD044 Generic Speed DD044 Generic Speed Uint16 Range: 0 to 655,32 m/s Resolution: 1x10E-2 m/s 1 Knot = 0.5144 m/s Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction DD045 Mind Direction DD046 Mind Direction DD047 Mind Range: 0 to 655,32 m/s Resolution: 1x10E-4 rad Resolution: 0.0057d.	2				Byte Fiel					Vo
4 Bits needed to fill out the byte 3 Measurement date DD039 Generic date DD41 Date, day count DF41 Date, day count DD458 Generic time of day DD58 Generic time of day DD59 Time of day DB50 Time of day DB		DD001	Reserved field			Variable number	r of reserved bi	ts, all set to logic "1	"	
Measurement date Byte Field Size: Bit Field Size: Request Parame DD039 Generic date Days since January 1, 1970, Date is relative to UTC Time.				bit(n)	Range: \	Variable	Resoluti	ion: 1	Used to construct bit fields	
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, -179 years 4 Measurement time 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, time is in UTC DF06 Time of day uint32 Range: 0 to 86,401 s Resolution: 1x10E-4 s -24 hours, 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, time is in UTC DF06 Time of day uint32 Range: 0 to 86,401 s Resolution: 1x10E-4 s -24 hours, 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, time is in UTC Byte Field Size: 4 Bit Field Size: Request Parame Latitude referenced to WGS-84 DF23 Latitude int32 Range: +/- 90 deg Resolution: 1x10E-7 deg "-" = South, resolution cm Byte Field Size: 4 Bit Field Size: Request Parame Longitude referenced to WGS-84 DF25 Longitude int32 Range: +/- 180 deg Resolution: 1x10E-7 deg "-" = West, resolution cm Figure 4 Size: 2 Bit Field Size: Request Parame DD044 Generic Speed DD044 Generic Speed DF35 Speed uint16 Range: 0 to 655.32 m/s Resolution: 1x10E-2 m/s 1 Knot = 0.5144 m/s Wind Direction DF02 Angle uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution -0.0057de			-		Ryte Fiel	d Size: 2	Rit Fig	ald Size:	Peguest Parameter	No.
4 Measurement time DD158 Generic time of day DF06 Time of day byte Field Size: Color	3				Dyte i lei					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, time is in UTC Resolution: 1x10E-4 s -24 hours, 0 = midnight, time is in UTC 1x10E-4 s -24 hours, 0 = midnight, time is in UTC Resolution: 1x10E-4 s -24 hours, 0 = midnight, time is in UTC 1x10E-4 s -24 hours, 0 = midnight, time is in UTC Resolution: 1x10E-4 s -24 hours, 0 = midnight, time is in thing in the part of the part of the part of the part of the part o		DF41	Date, day count	uint16	Range: () to 65,532 days	Resoluti	ion: <mark>1 day</mark>	0 = January 1, 1970, max = ~179 years	:
DF06 Time of day uint32 Range: 0 to 86,401 s Resolution: Ix10E-4 s -24 hours, 0 = midnic range allows for up to leap seconds per day 5 Station location, latitude DD022 Latitude, WGS-84 DF23 Latitude int32 Range: +/- 90 deg Resolution: Ix10E-7 deg "-" = South, resolution cm 6 Station location, longitude DD023 Longitude, WGS-84 DF25 Longitude int32 Range: +/- 180 deg Resolution: Ix10E-7 deg "-" = West, resolution cm 7 Wind Speed DD044 Generic Speed DF35 Speed DF35 Speed DF35 Speed uint16 Range: 0 to 655.32 m/s Resolution: Ix10E-2 m/s I Knot = 0.5144 m/s Request Parame Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parame DD045 Wind Direction DF02 Angle Wint16 Range: 0 to 2Pi rad Resolution: Ix10E-4 rad Resolution: O.0057dc	4	Measuren	ment time		Byte Fiel	d Size: 4	Bit Fie	eld Size:	Request Parameter	۷o
5 Station location, latitude DD022 Latitude, WGS-84 DF23 Latitude DD022 Latitude DD023 Latitude DD023 Latitude DD024 Latitude DD025 Longitude DD026 Longitude DD026 Longitude DD027 Longitude DD027 Longitude DD028 Longitude DD029 Longitude		DD158	Generic time of day			24 hour clock, 0	= midnight, t	ime is in UTC		
DD022 Latitude, WGS-84 DF23 Latitude int32 Range: +/- 90 deg Resolution: 1x10E-7 deg "-" = South, resolution cm Byte Field Size: 4 DD023 Longitude, WGS-84 DF25 Longitude int32 Range: +/- 180 deg Resolution: 1x10E-7 deg "-" = West, resolution cm Twind Speed DD044 Generic Speed DF35 Speed DF35 Speed Uint16 Range: 0 to 655.32 m/s Byte Field Size: 2 Bit Field Size: Request Parameters Resolution: 1x10E-7 deg "-" = West, resolution cm "-" = South, resolution cm "-" = West, resolution		DF06	Time of day	uint32	Range: () to 86,401 s	Resoluti	ion: <mark>1x10E-4 s</mark>	~24 hours, 0 = midnight, range allows for up to two leap seconds per day	
DF23 Latitude int32 Range: +/- 90 deg Resolution: 1x10E-7 deg "-" = South, resolution cm 8 Station location, longitude DD023 Longitude, WGS-84 Longitude referenced to WGS-84 DF25 Longitude int32 Range: +/- 180 deg Resolution: 1x10E-7 deg "-" = West, resolution cm 7 Wind Speed Byte Field Size: 2 Bit Field Size: Request Parameter 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 DD045 Wind Direction DF02 Angle uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057de	5	Station lo	cation, latitude		Byte Fiel	d Size: 4	Bit Fie	eld Size:	Request Parameter	Vo
6 Station location, longitude DD023 Longitude, WGS-84 DF25 Longitude int32 Range: +/- 180 deg Byte Field Size: A Bit Field Size: Request Parameter Common Para		DD022	Latitude, WGS-84			Latitude reference	ced to WGS-84			
DD023 Longitude, WGS-84 DF25 Longitude int32 Range: +/- 180 deg Resolution: 1x10E-7 deg "-" = West, resolution cm 7 Wind Speed DD044 Generic Speed DF35 Speed Uint16 Range: 0 to 655.32 m/s Byte Field Size: 2 Bit Field Size: Request Parameters Byte Field Size: 2 Bit Field Size: Request Parameters Byte Field Size: 2 Bit Field Size: Request Parameters Byte Field Size: 2 Bit Field Size: Request Parameters Byte Field Size: 2 Bit Field Size: Request Parameters Byte Field Size: 2 Bit Field Size: Request Parameters DD045 Wind Direction DF02 Angle Uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057de		DF23	Latitude	int32	Range: -	+/- 90 deg	Resoluti	ion: 1x10E-7 deg	"-" = South, resolution ~1.1	
7 Wind Speed Byte Field Size: 2 Bit Field Size: Request Parameter 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 DD045 Wind Direction DF02 Angle uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057de	6				Byte Fiel				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 DD045 Wind Direction Byte Field Size: 2 Bit Field Size: Request Parameters DF02 Angle uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057de		DF25	Longitude	int32	Range: -	+/- 180 deg	Resoluti	ion: 1x10E-7 deg		
8 Wind Direction DD045 Wind Direction DF02 Angle Byte Field Size: Bit Field Size: Request Parameter O to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057dd	7	_			Byte Fiel	d Size: 2	Bit Fie	eld Size:	Request Parameter	No
DD045 Wind Direction DF02 Angle uint16 Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057do		DF35	Speed	uint16	Range: () to 655.32 m/s	Resoluti	ion: 1x10E-2 m/s	1 Knot = 0.5144 m/s	
== - 6	8				Byte Fiel	d Size: 2	Bit Fie	eld Size:	Request Parameter	No
Ç .		DF02	Angle	uint16	Range: (to 2Pi rad	Resoluti	ion: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad	

PGN: 130323 hex: 1FD13

9	Wind Reference DD205 Wind Reference		Byte Fi	using COC 0x01 = The calculated 0x02 = Ap 0x03 = The calculated 0x04 = The	d/SOG) eoretical Wusing COC parent Win eoretical (C using COC eoretical (C using Heac served	Vind (ground referenced, refe G/SOG) and (relative to the vessel central Calculated to Centerline of the G/SOG)	
	DE52 D'. C. 11	1.4()	Danga	0x07 = Nu		Pagalutian 1	IIda
	DF52 Bit field	bit(n)		Variable		Resolution: 1	Used to construct bit fields
10	Reserve Bits DD001 Reserved field		Byte Fi	eld Size: Variable n	umber of re	Bit Field Size: resv eserved bits, all set to logic	5 Request Parameter No
	DF52 Bit field	bit(n)	Range:	Variable		Resolution: 1	Used to construct bit fields
11	Wind Gusts DD053 Wind gusts			eld Size: 2	gust speed	Bit Field Size: Sustained wind over an in	Request Parameter No terval 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 DD049 Generic Pressure		Byte Fie	eld Size: 2		Bit Field Size:	Request Parameter No
	DF47 Pressure, medium	uint16	Range:	0 to 6,553,200) Pa	Resolution: 1x10E+2 Pa	
13	Air Temperature DD043 Generic Temperature		Byte Fie	eld Size: 2		Bit Field Size:	Request Parameter No
	DF39 Temperature, low	uint16	Range:	0 to 655.32 de	eg K	Resolution: 1x10E-2 deg	_
14	Station ID String DD004 Generic name string, short		Byte Fie	eld Size: 8 or Name of p	•	Bit Field Size: waypoint, destination, vess	Request Parameter No el, vehicle, etc.
	DF50 String, variable, short 15 characters maximum.	ch8or16(n)) Range:	0 to 250 ASC 0 to 125 Unic 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.

Meteorological Station Data

PGN: 130323 hex: 1FD13

15 **Station Name String** Byte Field Size: 8 or 16 n

Bit Field Size:

Request Parameter Yes

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

DF50 String, variable, short

0 to 125 Unicode

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 = $0 \Rightarrow$ 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.

ch8or16(n) Range: 0 to 250 ASCII or

Characters

Appendix B.1 - PGN Report

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Moored Buoy Station Data

PGN: 130324 hex: 1FD14

-	ame: No	Priority Default:		Default	Update Ra		liseconds	Frequency:	1. cycles per second
<i>Destina</i> i eld #	tion: Global Field Name	Query Support:	Opt'l		ACK Rqmi	nts:			Original Reference ID # 1
1	Mode DD025 Mode	e, Data			Byte Fie	0x0 = Autonome 0x1 = Differenti 0x2 = Estimated 0x3 = Simulator 0x4 = Manual m 0x5 to 0xD = Re 0xE = Error, 0xF = Data not a	ous mode, ial, enhanced me l mode, r mode, node, eserved	dd Size: 4	Request Parameter N
	DF52 Bit	field		bit(n)	Range:	Variable	Resoluti	on: 1	Used to construct bit fields
2	Reserved Bits DD001 Reserved			1.44	Byte Fie	Variable number	r of reserved bit	Id Size: resv 4	
	DF52 Bit 4 Bits needed to fi	field II out the byte		bit(n)	Range.	Variable	Resoluti	on. 1	Used to construct bit fields
3	Measurement				Byte Fie	eld Size: 2 Days since Janu	4	<i>ld Size:</i> ate is relative to UT	Request Parameter N
	DF41 Dat	e, day count		uint16	Range:	0 to 65,532 days	Resoluti	on: <mark>1 day</mark>	0 = January 1, 1970, max = ~179 years
4	Measurement de DD158 Gene				Byte Fie	eld Size: 4 24 hour clock, 0		ld Size: ime is in UTC	Request Parameter N
	DF06 Tim	ne of day		uint32	Range:	0 to 86,401 s	Resoluti	on: <mark>1x10E-4 s</mark>	~24 hours, 0 = midnight, range allows for up to two leap seconds per day
5	Station location DD022 Latitu	•			Byte Fie	eld Size: 4 Latitude reference	1	ld Size:	Request Parameter N
	DF23 Lati	tude		int32	Range:	+/- 90 deg	Resoluti	on: 1x10E-7 deg	"-" = South, resolution ~1.1 cm
6	Station location DD023 Long	_			Byte Fie	eld Size: 4 Longitude refere	1	ld Size:	Request Parameter N
	DF25 Lor	gitude		int32	Range:	+/- 180 deg	Resoluti	on: 1x10E-7 deg	"-" = West, resolution ~1.1 cm
7	Wind Speed DD044 Gene	ric Speed			Byte Fie	eld Size: 2	Bit Fie	ld Size:	Request Parameter N
	DF35 Spe	ed		uint16	Range:	0 to 655.32 m/s	Resoluti	on: 1x10E-2 m/s	1 Knot = 0.5144 m/s
8	Wind Direction DD045 Wind		_		Byte Fie	eld Size: 2	Bit Fie	ld Size:	Request Parameter N
	DF02 Ang	gle		uint16	Range:	0 to 2Pi rad	Resoluti	on: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad

PGN: 130324 hex: 1FD14

9	Wind Reference		Byte Fi	ield Size:	Bit Field Size: 3	Request Parameter No
	DD205 Wind Reference			using COG/SOG		
		cal Wind (ground referenced, refere COG/SOG) Wind (relative to the vessel center)	line)			
				0x03 = Theoretic calculated using	cal (Calculated to Centerline of the COG/SOG)	vessel, refernced to ground;
				0x04 = Theoretic	al (Calculated to Centerline of the Heading/Speed through Water)	vessel, refernced to water;
				0x06 = Error 0x07 = Null		
	DF52 Bit field	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
10	Reserved Bits		Byte Fi	ield Size:	Bit Field Size: resv 5	Request Parameter No
	DD001 Reserved field				of reserved bits, all set to logic "1"	
	DF52 Bit field5 Bits needed to fill out the byte	bit(n)	Range:	Variable	Resolution: 1	Used to construct bit fields
11	Wind Gusts		Ryte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
••	DD053 Wind gusts		Буют		peed. Sustained wind over an inter	
	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 Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DD050 Wave Height			during a 20-minu board the buoys is buoy hull during applied to the dat the temporal don displacement me operator (RAO) is for both hull and directional spectral frequencies) are a significant wave	alculated as the highest one-third of the sampling period. Note: Acceler measure the heave acceleration or the wave acquisition time. A Fast I that by the processor on board the bunain into the frequency domain. No asurements are not transmitted short processing is then performed on the electronic noise. It is from this train wave measurements (i.e., wave enderived. Along with the spectral end height (WVHGT), average wave per a laso derived from the transform	ometers or inclinometers on the vertical displacement of the Fourier Transform (FFT) is to to transform the data from the that the raw acceleration or the reside. Response amplitude a transformed data to account the insformation that non-the regies with their associated the regies, measurements such as the roid (AVGPD), and dominant
	DF13 Distance, short	uint16	Range:	0 to 655.32 m	Resolution: 1x10E-2 m	
13	Dominate Wave Period		Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DD051 Wave Period in seconds				eriod of all waves during a 20-minu od with the maximum wave energy	
	DF66 Time interval, .01sec	uint16	Range:	0 to 655.32s	Resolution: 1x10-2sec	
14	Atmospheric Pressure		Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DD049 Generic Pressure					
-	DF47 Pressure, medium	uint16		0 to 6,553,200 Pa	Resolution: 1x10E+2 Pa	
15	Pressure Tendency Rate DD052 Pressure Rate		Byte Fi	ield Size: 2 Positive value inc	Bit Field Size: dicates Rising, Negative value indicates	Request Parameter No cates Falling.
	DF48 Pressure rate	int16	Range:	+/- 327,640 Pa/hr	Resolution: 1x10E+1 Pa/hı	+ = increasing rate
16	Air temperature		Byte Fi	ield 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 DD043 Generic Temperature		Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DF39 Temperature, low	uint16	Range:	0 to 655.32 deg K	Resolution: 1x10E-2 deg K	

Moored Buoy Station Data

PGN: 130324 hex: 1FD14

18 Station ID String

DF50

Byte Field Size: 8 or 16 n

Bit Field Size:

Request Parameter Yes

DD004 Generic name string, short

String, variable, short

ch8or16(n) Range: 0 to 250 ASCII or

0 to 250 ASCII of 0 to 125 Unicode Characters Resolution: 1 ASCII or

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

1 Unicode Character

15 characters maximum.

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

2 to 252 bytes. First byte in string (uint8) is the Count byte indicating the number of bytes in the string, including the Count and Control bytes. Second byte in string is the Control byte. The Control byte indicates if the string consists of ASCII characters (Char8) or Unicode characters (Char16). Control byte = 0 => Unicode characters

Control byte = 1 => ASCII characters

A string with no characters (total length of 2 bytes, i.e. Count = 2) is a null string.

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: cycles per second Destination: Global Query Support: Opt'l ACK Ramnts: Original Reference ID # 42 Field # Field Name Byte Field Size: 1 Bit Field Size: Port trim tab Request Parameter No **DD138** Generic percent of range Range: +/- 124% Resolution: 1% Percent, Relative measure int8 Range 0 - 100%, where 0% =Full Up and 100% = Full Down Positions Byte Field Size: 2 Starboard trim tab Bit Field Size: Request Parameter No **DD138** Generic percent of range Range: +/- 124% **DF30** Percent, Relative measure Resolution: 1% Range 0 - 100%, where 0% = Full Up and 100% = Full Down Positions **Reserved Bits** Byte Field Size: Bit Field Size: resv 48 Request Parameter No 3

Range: Variable

bit(n)

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

Resolution: 1

Used to construct bit fields

PGN: 130576

DD001 Reserved field

Needed to fill the CAN frame.

Bit field

DF52

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: cycles per second Destination: Global Query Support: Opt'l ACK Ramnts: Original Reference ID # 36 Field # Field Name Bit Field Size: 4 Byte Field Size: Request Parameter No 1 **Data Mode** DD025 Mode, Data 0x0 = Autonomous mode,0x1 = Differential, enhanced mode, 0x2 = Estimated mode,0x3 = Simulator mode,0x4 = Manual mode.0x5 to 0xD = Reserved0xE = Error.0xF = Data not available Resolution: 1 Used to construct bit fields DF52 Bit field bit(n) Range: Variable Bit Field Size: Set/COG/Heading Ref. 2 Byte Field Size: Request Parameter No 0 = True,**DD117** Direction reference 1 = Magnetic,2 = Error3 = Null**DF52** Bit field Range: Variable Resolution: 1 Used to construct bit fields bit(n) Byte Field Size: Bit Field Size: resv Request Parameter No. **Reserved Bits** 3 Variable number of reserved bits, all set to logic "1' **DD001** Reserved field Bit field Range: Variable Resolution: 1 Used to construct bit fields **DF52** bit(n) 2 Bits needed to fill out the byte SID Byte Field Size: Bit Field Size: 4 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. Range: 0 to 252 Resolution: 1 bit Unit-less number **DF53** Integer, 8 bit unsigned uint8 **Course Over Ground** Byte Field Size: 2 Bit Field Size: Request Parameter No. 5 The direction of the path over ground actually followed by a vessel. **DD165** Course-Over-Ground (COG) Range: 0 to 2Pi rad Resolution: 1x10E-4 rad Resolution ~0.0057deg, 1 **DF02** Angle uint16 deg = .01745 rad6 **Speed Over Ground** Byte Field Size: 2 Bit Field Size: Request Parameter No. **DD044** Generic Speed Resolution: 1x10E-2 m/s 1 Knot = 0.5144 m/s**DF35** Speed Range: 0 to 655.32 m/s

Direction Data PGN: 130577 hex: 1FE11

7	Heading DD167 Heading			Byte Fi	expressed in an	Bit Field Size: direction in which a ship actually pogular units from a 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 th	rough Water Generic Speed		Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	DF35	Speed	uint16	Range:	0 to 655.32 m/s	Resolution: 1x10E-2 m/s	1 Knot = 0.5144 m/s
9	Set DD048	Current flow direction		Byte Fi	ield Size: 2 Direction toward	Bit Field Size: rds which current flows. Degrees rel	Request Parameter No lative to True North.
	DF02	Angle	uint16	Range:	0 to 2Pi rad	Resolution: 1x10E-4 rad	Resolution ~0.0057deg, 1 deg = .01745 rad
10	Drift DD044	Generic Speed		Byte Fi	ield Size: 2	Bit Field Size:	Request Parameter No
	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

PGN: 130578

This PGN provides a single transmission that accurately describes the speed of a vessel by component vectors.

input to such products that require tracking of vessels using these vector components.

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.

Priority Default: 2 Default Update Rate: 250 milliseconds Single Frame: No cycles per second Frequency: Destination: Global Query Support: Opt'l ACK Ramnts: Field Name Original Reference ID # 58 Field # 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 Transverse Speed, Water-referenced Byte Field Size: 2 Bit Field Size: Request Parameter No Positive values represent ahead or starboard transverse speed and negative values **DD160** Generic speed, signed represent astern or port transverse speed. Resolution: 1x10E-3 m/s Range: +/-32.764 m/s **DF36** int16 Speed, signed 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. int16 Range: +/-32.764 m/s Resolution: 1x10E-3 m/s **DF36** Speed, signed Byte Field Size: 2 Transverse Speed, Ground-referenced Bit Field Size: Request Parameter No. 4 **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 Byte Field Size: 2 Bit Field Size: Stern Speed, Water-referenced Request Parameter No. 5 Positive values represent ahead or starboard transverse speed and negative values **DD160** Generic speed, signed represent astern or port transverse speed. Resolution: 1x10E-3 m/s Range: +/-32.764 m/s **DF36** Speed, signed int16 Byte Field Size: 2 Bit Field Size: Stern Speed, Ground-referenced Request Parameter No. 6 Positive values represent ahead or starboard transverse speed and negative values **DD160** Generic speed, signed represent astern or port transverse speed. **DF36** Speed, signed int16 Range: +/-32.764 m/sResolution: 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	Date	Description
ID	Version	
77	Jul 2006 1.200 C	Power PGNs added: 127503 AC Input Status 127506 DC Detailed Status 127507 Charger Status 127509 Inverter Status 127511 Inverter Configuration 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.