NMEA Reference Manual

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NMEA Reference Manual

About This Document

This document is intended for use only with SiRF Evaluation Kits. Some manufacturers of products containing SiRF GPS devices have the ability to add, remove, or change the structure and content of NMEA output messages and input messages within SiRF firmware. SiRF may also make such changes in specific applications or for specific customers. Such changes are not reflected in this document. Contact the manufacturer for support of those products.

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Preface

Most SiRF products support a subset of the NMEA-0183 standard for interfacing marine electronic devices as defined by the National Marine Electronics Association (NMEA).

The *NMEA Reference Manual* provides details of NMEA messages developed and defined by SiRF. It does not provide information about the complete NMEA-0183 interface standard.

Who Should Use This Guide

This manual was written assuming the user has a basic understanding of interface protocols and their use.

How This Guide Is Organized

This manual contains the following chapters:

Chapter 1, Output Messages defines NMEA standard output messages supported by SiRF and NMEA proprietary output messages developed by SiRF.

Chapter 2, Input Messages defines NMEA standard input messages supported by SiRF and NMEA proprietary input messages developed by SiRF.

Related Manuals

You can refer to the following document for more information:

- *NMEA-0183 Standard For Interfacing Marine Electronic Devices*
- *SiRF Binary Protocol Reference Manual*
- *SiRF Evaluation Kit User Guides*
- *SiRF System Development Kit User Guides*

General Format

NMEA 0183 messages use the ASCII character set and have a defined format. Each message begins with a $ (hex 0x24) and end with a carriage return and line feed (hex 0x0D 0x0A, represented as <CR><LF>). Each message consists of one or more fields of ASCII letters and numbers, separated by commas. After the last field, and before the <CR><LF> is a checksum consisting of an asterisk (*, hex 0x2A) followed by two ASCII characters representing the hexadecimal value of the checksum. The checksum is computed as the exclusive OR of all characters between the $ and * characters.

Note – In NMEA 0183 specifications earlier than version 2.3, the checksum is optional.

Note – All references to discontinued unsupported products GSW2 and SiRFXTrac are provided for historical reasons only.

Output Messages

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Table 1-1 lists each of the NMEA output messages specifically developed and defined by SiRF for use within SiRF products.

Table 1-1 NMEA Output Messages

Message	Description
GGA	Time, position and fix type data
GLL	Latitude, longitude, UTC time of position fix and status
GSA	GPS receiver operating mode, satellites used in the position solution, and DOP values
GSV	Number of GPS satellites in view satellite ID numbers, elevation, azimuth, & SNR values
MSS	Signal-to-noise ratio, signal strength, frequency, and bit rate from a radio-beacon receiver
RMC	Time, date, position, course and speed data
VTG	Course and speed information relative to the ground
ZDA	PPS timing message (synchronized to PPS)
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154	Extended Ephemeris ACK
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156,0x21	ECLM EE Get Age response
156,0x22	ECLM Get SGEE Age response
156,0x23	ECLM Download Initiate Request
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156,0x25	ECLM Update File Content
156,0x26	ECLM Request File Content
160	Watchdog Timeout and Exception Condition

A full description of the listed NMEA messages is provided in the following sections.

Table 1-2 summarizes which SiRF NMEA output messages are supported by the specific SiRF platforms.

Table 1-2 Supported NMEA Output Messages

									Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg	
Message	**GSW2[1]**	**SiRFDRive[1]**	**SiRFXTrac[1]**	**SiRFLoc[1]**	**GSW3 & GSWLT3[1]**	**SiRFDiRect**	**GSD3tw**	**GSD3fLP**	**GSD4t**	**GSD4e**	**GSD4t**	**GSD4e**	**GSD4t**	**GSD4e**
GGA	All	All	All	All	All	All	All	All	All	All	No	All	No	All
GLL	All	All	All	All	All	All	All	All	All	All	No	All	No	All
GSA	All	All	All	All	All	All	All	All	All	All	No	All	No	All
GSV	All	All	All	All	All	All	All	All	All	All	No	All	No	All
MSS	All	No	No	No	No	No	No	No	No	No	No	No	No	No
RMC	All	All	All	All	All	All	All	All	All	All	No	All	No	All
VTG	All	All	All	All	All	All	All	All	No	No	No	All	No	All
ZDA	2.3.2 and later	No	No	No	All	No	All	No	No	No	No	All	No	All
150	2.3.2 and later	No	No	No	No	No	No	No	No	No	No	No	No	No
151	2.5 and later	No	2.3 and later	No	3.2.0 and later	Yes	Yes	Yes	No	No	No	No	No	No
152	2.5 and later	No	2.3 and later	No	3.2.0 and later	Yes	Yes	Yes	No	No	No	No	No	No
154	2.5 and later	No	2.3 and later	No	3.2.0 and later	Yes	Yes	Yes	No	No	No	Yes	No	Yes
155	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No
156,0x20	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
156,0x21	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
156,0x22	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
156,0x23	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
156,0x24	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
156,0x25	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
156,0x26	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
160	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes

1. GSW2 and SiRFDRive software only output NMEA version 2.20 (and earlier). Standard binaries for SiRFXTrac, GSW3, and GSWLT3 firmware use NMEA 3.0. Users of SiRF's software developer's kit can choose through software conditional defines (UI_NMEA_VERSION_XXX) to allow a choice between NMEA 2.20 and 3.00. The file `NMEA_SIF.H` contains the NMEA version defines.

In some numeric fields representing a single data element, leading zeros before a decimal are suppressed. A single "0" character preceding the decimal point is maintained. In compound numeric structures (such as LAT or LONG), leading zeros are suppressed only on the leftmost element. Trailing zeros are not suppressed.

Message ID GGA: Global Positioning System Fixed Data

Note – Fields marked in italic *red* apply only to NMEA version 2.3 (and later) in this NMEA message description.

Table 1-3 contains the values for the following example:

$GPGGA,002153.000,3342.6618,N,11751.3858,W,1,10,1.2,27.0,M,-34.2,M,,0000*5E<CR><LF>

Table 1-3 GGA Data Format

Name	Example	Unit	Description
Message ID	$GPGGA		GGA protocol header
UTC Time	002153.000		hhmmss.sss
Latitude	3342.6618		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	11751.3858		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Position Fix Indicator	1		See Table 1-4
Satellites Used	10		Range 0 to 12
HDOP	1.2		Horizontal Dilution of Precision
MSL Altitude	27.0	meters	
Units	M	meters	
Geoid Separation	-34.2	meters	Geoid-to-ellipsoid separation. Ellipsoid altitude = MSL Altitude + Geoid Separation.
Units	M	meters	
Age of Diff. Corr.		sec	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*5E		
<CR><LF>			End of message termination

Table 1-4 Position Fix Indicator

Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3-5	Not supported
6	*Dead Reckoning Mode, fix valid*

Note – A valid status is derived from all the parameters set in the software. This includes the minimum number of satellites required, any DOP mask setting, presence of DGPS corrections, etc. If the default or current software setting requires that a factor is met, then if that factor is not met the solution will be marked as invalid.

Message ID GLL: Geographic Position - Latitude/Longitude

Note – Fields marked in italic *red* apply only to NMEA version 2.3 (and later) in this NMEA message description.

Table 1-5 contains the values for the following example:

$GPGLL,3723.2475,N,12158.3416,W,161229.487,A,A*41<CR><LF>

Table 1-5 GLL Data Format

Name	Example	Unit	Description
Message ID	$GPGLL		GLL protocol header
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
UTC Time	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Mode	*A*		*A=Autonomous, D=DGPS, E=DR* *N = Output Data Not Valid* *R = Coarse Position*[1]
Checksum	*41		
<CR><LF>			End of message termination

1. Position was calculated based on one or more of the SVs having their states derived from almanac parameters, as opposed to ephemerides.

Message ID GSA: GNSS DOP and Active Satellites

Table 1-6 contains the values for the following example:

$GPGSA,A,3,07,02,26,27,09,04,15, , , , , ,1.8,1.0,1.5*33<CR><LF>

Table 1-6 GSA Data Format

Name	Example	Unit	Description
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See Table 1-7
Mode 2	3		See Table 1-8
Satellite Used[1]	07		SV on Channel 1
Satellite Used[1]	02		SV on Channel 2
....			....
Satellite Used[1]			SV on Channel 12
PDOP[2]	1.8		Position Dilution of Precision
HDOP[2]	1.0		Horizontal Dilution of Precision
VDOP[2]	1.5		Vertical Dilution of Precision
Checksum	*33		
<CR><LF>			End of message termination

1. Satellite used in solution.

2. Maximum DOP value reported is 50. When 50 is reported, the actual DOP may be much larger.

Table 1-7 Mode 1

Value	Description
M	Manual – Forced to operate in 2D or 3D mode
A	2D Automatic – Allowed to automatically switch 2D/3D

Table 1-8 Mode 2

Value	Description
1	Fix not available
2	2D (<4 SVs used)
3	3D (>3 SVs used)

Message ID GSV: GNSS Satellites in View

Table 1-9 contains the values for the following example:

$GPGSV,2,1,07,07,79,048,42,02,51,062,43,26,36,256,42,27,27,138,42*71

$GPGSV,2,2,07,09,23,313,42,04,19,159,41,15,12,041,42*41<CR><LF>

Table 1-9 GSV Data Format

Name	Example	Unit	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages[1]	2		Total number of GSV messages to be sent in this group
Message Number[1]	1		Message number in this group of GSV messages
Satellites in View[1]	07		
Satellite ID	07		Channel 1 (Range 1 to 32)
Elevation	79	degrees	Channel 1 (Maximum 90)
Azimuth	048	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/N0)	42	dBHz	Range 0 to 99, null when not tracking
....			....
Satellite ID	27		Channel 4 (Range 1 to 32)
Elevation	27	degrees	Channel 4 (Maximum 90)
Azimuth	138	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/N0)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
<CR><LF>			End of message termination

1. Depending on the number of satellites tracked, multiple messages of GSV data may be required. In some software versions, the maximum number of satellites reported as visible is limited to 12, even though more may be visible.

Message ID MSS: MSK Receiver Signal

Note – Fields marked in italic *red* apply only to NMEA version 2.3 (and later) in this NMEA message description.

Table 1-10 contains the values for the following example:

$GPMSS,55,27,318.0,100,1,*57<CR><LF>

Table 1-10 MSS Data Format

Name	Example	Unit	Description
Message ID	$GPMSS		MSS protocol header
Signal Strength	55	dB	SS of tracked frequency
Signal-to-Noise Ratio	27	dB	SNR of tracked frequency
Beacon Frequency	318.0	kHz	Currently tracked frequency
Beacon Bit Rate	100		bits per second
Channel Number	*1*		*The channel of the beacon being used if a multi-channel beacon receiver is used*
Checksum	*57		
<CR><LF>			End of message termination

Note – The MSS NMEA message can only be polled or scheduled using the MSK NMEA input message. See “Message ID MSK: MSK Receiver Interface” on page 2-17.

Message ID RMC: Recommended Minimum Specific GNSS Data

Note – Fields marked in italic *red* apply only to NMEA version 2.3 (and later) in this NMEA message description.

Table 1-11 contains the values for the following example:

$GPRMC,161229.487,A,3723.2475,N,12158.3416,W,0.13,309.62,120598,
,*10<CR><LF>

Table 1-11 RMC Data Format

Name	Example	Unit	Description
Message ID	$GPRMC		RMC protocol header
UTC Time	161229.487		hhmmss.sss
Status[1]	A		A=data valid or V=data not valid
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
Speed Over Ground	0.13	knots	
Course Over Ground	309.62	degrees	True
Date	120598		ddmmyy
Magnetic Variation[2]		degrees	E=east or W=west
East/West Indicator[2]	E		E=east
Mode	*A*		*A=Autonomous, D=DGPS, E=DR,* *N = Output Data Not Valid* *R = Coarse Position*[3]
Checksum	*10		
<CR><LF>			End of message termination

1. A valid status is derived from all the parameters set in the software. This includes the minimum number of satellites required, any DOP mask setting, presence of DGPS corrections, etc. If the default or current software setting requires that a factor is met, then if that factor is not met the solution will be marked as invalid.
2. SiRF Technology Inc. does not support magnetic declination. All "course over ground" data are geodetic WGS84 directions relative to true North.
3. Position was calculated based on one or more of the SVs having their states derived from almanac parameters, as opposed to ephemerides.

Message ID VTG: Course Over Ground and Ground Speed

Note – Fields marked in italic *red* apply only to NMEA version 2.3 (and later) in this NMEA message description.

Table 1-12 contains the values for the following example:

$GPVTG,309.62,T, ,M,0.13,N,0.2,K,A*23<CR><LF>

Table 1-12 VTG Data Format

Name	Example	Unit	Description
Message ID	$GPVTG		VTG protocol header
Course	309.62	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic[1]
Speed	0.13	knots	Measured horizontal speed
Units	N		Knots
Speed	0.2	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Mode	*A*		*A=Autonomous, D=DGPS, E=DR,* *N = Output Data Not Valid* *R = Coarse Position*[2]
Checksum	*23		
<CR><LF>			End of message termination

1. SiRF Technology Inc. does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions.
2. Position was calculated based on one or more of the SVs having their states derived from almanac parameters, as opposed to ephemerides.

Message ID ZDA: Time & Date

This message is included only with systems which support a time-mark output pulse identified as “1PPS”. Outputs the time associated with the current 1PPS pulse. Each message is output within a few hundred ms after the 1PPS pulse is output and tells the time of the pulse that just occurred.

Table 1-13 contains the values for the following example:

$GPZDA,181813,14,10,2003,,*4F<CR><LF>

Table 1-13 ZDA Data Format

Name	Example	Unit	Description
Message ID	$GPZDA		ZDA protocol header
UTC time	181813	hhmmss	The UTC time units are: hh = UTC hours from 00 to 23 mm = UTC minutes from 00 to 59 ss = UTC seconds from 00 to 59 Either using valid IONO/UTC or estimated from default leap seconds
Day	14		Day of the month, range 1 to 31
Month	10		Month of the year, range 1 to 12
Year	2003		1980 to 2079
Local zone hour[1]		hour	Offset from UTC (set to 00)
Local zone minutes[1]		minute	Offset from UTC (set to 00)
Checksum	*4F		
<CR><LF>			End of message termination

1. Not supported by SiRF. Reported as 00.

Message ID 140: Proprietary

This message is reserved for SiRF extended ephemeris usage only. The content of this message is proprietary.

Table 1-14 contains the message parameter definitions.

Table 1-14 Proprietary

Name	Example	Unit	Description
Message ID	$PSRF140		PSRF108 protocol header
Extended Ephemeris			Proprietary message
Checksum			
<CR><LF>			End of message termination

Message ID 150: OkToSend

This message is sent out during power-saving modes such as TricklePower™ and Push-to-Fix™ to indicate when the receiver is ready to receive messages or when it is going into low-power mode. When power is restored, it is the first message sent, and when power is going to be reduced, it is the last message sent.

Table 1-15 contains the values for the following examples:

1. OkToSend

   $PSRF150,1*3F<CR><LF>

2. not OkToSend

   $PSRF150,0*3E<CR><LF>

Table 1-15 OkToSend Message Data Format

Name	Example	Unit	Description
Message ID	$PSRF150		PSRF150 protocol header
OkToSend	1		1=OK to send, 0=not OK to send
Checksum	*3F		
<CR><LF>			End of message termination

Message ID 151: GPS Data and Extended Ephemeris Mask

SiRFInstantFix uses Message ID 151 to request ephemerides for specific satellites.

$PSRF151,3,1485,147236.3,0x43002732*4A<CR><LF>

Table 1-16 contains the parameter definitions and example values.

Table 1-16 GPS Data and Ephemeris Mask

Name	Example	Unit	Description
Message ID	$PSRF151		PSRF151 protocol header
GPS_TIME_VALID_ FLAG	3	N/A	Bit 0 = 1, GPS week is valid
GPS Week	1485	week number	Extended week number
GPS Time of Week	147236.3	seconds	GPS Time Of Week
EPH_REQ_MASK	0x43002732	N/A	Mask to indicate the satellites for which new ephemeris is needed. Eight characters preceded by the following characters, “0x”, are used to show this 32-bit mask (in hex). The MSB is for satellite PRN 32, and the LSB is for satellite PRN 1.
Checksum			
<CR><LF>			End of message termination

Message ID 152: Extended Ephemeris Integrity

SiRFInstantFix uses Message ID 152 to report the validity of various aspects of satellite data in the receiver.

$PSRF152,0x43002712,0x43002712,0x00000001*44<CR><LF>

Table 1-17 contains the parameter definitions and example values.

Table 1-17 Extended Ephemeris Integrity

Name	Example	Unit	Description
Message ID	$PSRF152		PSRF152 protocol header
SAT_POS_VALIDITY _FLAG	0x00000002	N/A	Hexadecimal representation of 32-bit field, where MSB represents satellite PRN 32, LSB satellite PRN 1. A bit set to 1 indicates an invalid position has been found for that satellite.
SAT_CLK_ VALIDITY_FLAG	0x00000002	N/A	Hexadecimal representation of 32-bit field, where MSB represents satellite PRN 32, LSB satellite PRN 1. A bit set to 1 indicates that satellite has an invalid clock.
SAT_HEALTH_FLAG	0x00000001	N/A	Hexadecimal representation of 32-bit field, where MSB represents satellite PRN 32, LSB satellite PRN 1. A bit set to 1 indicates that satellite is reported to be unhealthy.
Checksum	*44		
<CR><LF>			End of message termination

Message ID 154: Extended Ephemeris ACK

The SiRFInstantFix software uses Message ID 154 to acknowledge input messages 107, 108 or 110.

$PSRF154,110*3B<CR><LF>

Table 1-18 contains the parameter definitions and example values.

Table 1-18 Extended Ephemeris ACK

Name	Example	Unit	Description
Message ID	$PSRF154		PSRF154 protocol header
ACK ID	110	N/A	Message ID of the message to ACK (107, 108, 110)
Checksum			
<CR> <LF>			End of message termination

Message ID 155: Proprietary

This message is reserved for SiRF extended ephemeris usage only. The content of this message is proprietary.

Table 1-19 contains the message parameter definitions.

Table 1-19 Proprietary

Name	Example	Unit	Description
Message ID	$PSRF155		PSRF108 protocol header
Extended Ephemeris			Proprietary message
Checksum			
<CR> <LF>			End of message termination

Message ID 156 (Sub ID 0x20): ECLM ACK/NACK

This is the ACK/NACK response to message ID 114, Sub ID 0x16, 0x17, 0x18, 0x19 or 0x1A. The Sub Message ID for this message is fixed to 0x20.

Table 1-20 contains the values for the following example:

$PSRF156,20,72,16,0,0*09<CR><LF>

Table 1-20 ECLM ACK/NACK

Name	Example	Unit	Description
Message ID	$PSRF156		ECLM ACK/NACK
Sub ID	0x20 (Decimal: 32)		0x20: Sub ID for ECLM ACK/NACK
ACK Message ID	0x72		114: Msg ID for ECLM Download
ACK Sub ID	0x16		0x16: Sub ID for ECLM Start Download This field can take values 0x16, 0x17, 0x18, 0x19, or 0x1A to ACK corresponding SIDs.
ACK/NACK	0x0		0: ACK 1: NACK
Reason	0x0		See Table 1-21
CheckSum	*09		
<CR><LF>			End of message termination

Table 1-21 Description of ACK/NACK Values

Value	Example	Code	Description
0	0x00	ECLM_SUCCESS	Success
1	0x01	ECLM_SPACE_UNAVAILABLE	Insufficient space
2	0x02	ECLM_PKT_LEN_INVALID	Packet length field out of range
3	0x03	ECLM_PKT_OUT_OF_SEQ	Packet received is out of sequence
4	0x04	ECLM_DOWNLOAD_SGEE_NONEWFILE	No new file
5	0x05	ECLM_DOWNLOAD_CORRUPTFILE_ERROR	Corrupt file
6	0x06	ECLM_DOWNLOAD_GENERIC_FAILURE	Generic failure
7	0x07	ECLM_API_GENERIC_FAILURE	Generic failure calling CLM API

Message ID 156 (Sub ID 0x21): ECLM EE Age

This is the response to message ID 114, Sub ID 0x19. The Sub Message ID for this message is fixed to 0x21.

Table 1-22 contains the values for the following example:

$PSRF156,21,1,7,2,0,0,0,0,0,0,2,0,0,0,0,0,0,0*10<CR><LF>

If NACKed, the reason for the NACK is present in the next byte (see Table 1-21). If ACKed, the following fields appear after the ACK field.

Table 1-22 ECLM EE Age Fields

Field Name	Description
numSAT ID	This field indicates the number of times the following fields are present in the message
prnNum;	PRN number of satellite for which age is indicated in other fields
ephPosFlag	Ephemeris flag to indicate the type of ephemeris available for the satellite: (Position Age): 0: Invalid ephemeris, not available 1: Broadcast Ephemeris (BE) 2: Server-generated EE (SGEE) 3: Client-generated EE (CGEE)
eePosAge	Age of EE in 0.01 days (Position Age)
cgeePosGPSWeek	GPS week of BE used in the CGEE generation. 0 if ephPosFlag is not set to 3, or set to 0 (Position Age)
cgeePosTOE	TOE of BE used in the CGEE generation. 0 if ephPosFlag is not set to 3, or set to 0 (Position Age)
ephClkFlag	Ephemeris flag to indicate the type of ephemeris available for the satellite (Clock Age)
eeClkAge	Age of EE in 0.01 days (Clock Age)
cgeeClkGPSWeek	GPS week of BE used in the CGEE generation. 0 if ephClkFlag is not set to 3, or set to 0 (Clock Age)
cgeeClkTOE	TOE of BE used in the CGEE generation; 0 if ephClkFlag is not set to 3 or set to 0 (Clock Age)

Table 1-23 contains the input values for the following example:

Table 1-23 ECLM EE Age

Name	Example	Unit	Description
Message ID	$PSRF156		ECLM output
Sub ID	0x21 (Decimal: 33)		0x21: Sub ID for ECLM EE Age
numSAT	1		This field indicates the number of times the fields repeat
prnNum;	7		PRN number = 7
ephPosFlag	2		EE age
eePosAge	00		
cgeePosGPSWeek	00		
cgeePosTOE	00		
ephClkFlag	2		
eeClkAge	00		

Table 1-23 ECLM EE Age

Name	Example	Unit	Description
cgeeClkGPSWeek	00		
cgeeClkTOE	00		
Checksum	*10		
<CR><LF>			End of message termination

Message ID 156 (Sub ID 0x22): ECLM SGEE Age

This is the response to the message ID 114, Sub ID 0x1A. The Sub Message ID for this message is fixed to 0x22.

Table 1-24 contains the input values for the following example:

Sub ID = 0x22, Get EE Age, SGEE Age = 0x7da8, Prediction Interval = 0x15180

Example:

$PSRF156,22,7da8,15180*3E<CR><LF>

Table 1-24 ECLM Get SGEE Age

Name	Example	Unit	Description
Message ID	$PSRF156		ECLM ACK/NACK
Sub ID	0x22 (Decimal: 34)		0x22: Sub ID for ECLM Get EE Age ACK/NACK
SGEE Age	0x7da8		Age of the satellite
Prediction interval	0x15180		Prediction interval
Checksum	*3E		
<CR><LF>			End of message termination

Message ID 156 (Sub ID 0x23):ECLM Download Initiate Request

This message is a Download Initiate Request. It is sent if a fresh download of the SGEE file is required.

Table 1-25 contains the input values for the following example:

Sub ID = 0x23, Start Download = 0x1, Time to Wait = 0x0

Example:

$PSRF156,23,1,0*09<CR><LF>

Table 1-25 contains the message parameter definitions.

Table 1-25 ECLM Download Initiate Request

Name	Example	Unit	Description
Message ID	$PSRF156		ECLM ACK/NACK
Sub Message ID	0x23 (Decimal: 35)		0x23: Download Initiate Request

Table 1-25 ECLM Download Initiate Request

Name	Example	Unit	Description
Start/stop	0x1		1: Start download 0: Stop download
Time to Next Start	0x0		0: Immediate start, otherwise specified number of seconds
Checksum	*09		Checksum
<CR><LF>			End of message termination

Message ID 156 (Sub ID 0x24):ECLM Erase Storage File

This message erases a storage file specified by NVMID.

Table 1-26 contains the input values for the following example:

Sub Message ID = 0x24, NVM ID = 0x3

Example:

$PSRF156,24,3*10<CR><LF>

Table 1-26 contains the input values for the following example.

Table 1-26 Erase Storage File

Name	Example	Unit	Description
Message ID	$PSRF156		ECLM ACK/NACK
Sub Message ID	0x24 (Decimal: 36)		0x24: Erase Storage File
NVM ID	0x3		1: Erase SGEE file 2: Erase CGEE file 3: BE file
Checksum	*10		
<CR><LF>			End of message termination

Message ID 156 (Sub ID 0x25): ECLM Update File Content

Send update file content to host for specified file.

Table 1-27 contains the input values for the following example:

Sub ID = 0x25, NVMID:0x2, Blocks = 0x1

Example:

$PSRF156,25,2,11,4f06,1,29,38,c2,75,4e,fb,c,b3,cc,b0,bf,b6,93,3e,84,24,90*1C
<CR><LF>

Table 1-27 contains the input values for the following example.

Table 1-27 Update File Content

Name	Example	Unit	Description
Message ID	$PSRF156		ECLM ACK/NACK
Sub Message ID	0x25 (Decimal: 37)		0x25: Sub ID for ECLM Update File Content
NVM ID	0x2		SGEE File: 1 CGEE File: 2 BE File: 3
Size	0x11		Size
Offset	0x4f06		Offset
Seq Number	0x1		Seq number
Data	29,38,c2,75,4e,fb,c,b3,cc,b0,bf,b6,93,3e,84,24,90		
Checksum	*1C		
<CR><LF>			End of message termination

Message ID 156 (Sub ID 0x26): ECLM Request File Content

Request for file content of specified NVM ID.

Table 1-28 contains the input values for the following example.

Sub ID = 0x26, NVMID:0x3, Blocks = 0x1

Example:

$PSRF156,26,3,1,1,4c,0*75<CR><LF>

Table 1-28 Request File Content

Name	Example	Unit	Description
Message ID	$PSRF156		ECLM ACK/NACK
Sub Message ID	0x26 (Decimal: 38)		0x26: Sub ID for ECLM Request for file content
NVM ID	0x3		SGEE File: 1 CGEE File: 2 BE File: 3
Seq Number	0x1		
Num Blocks	0x1		Number of blocks in packet

Table 1-28 Request File Content

Name	Example	Unit	Description
Block Size	0x4c		
Block offset	0x0		Offset in file
Checksum	*75		
<CR><LF>			End of message termination

Message ID 160: Watchdog Timeout and Exception Condition

This message notifies a PVT product host of a watchdog timeout or processor exception in the receiver. The consistent accumulation of these notification messages by the host can produce statistics for:

- Reliability measurement and analysis
- For troubleshooting purposes

For the GSD4e, it has the critical purpose of enabling the host to determine the need for reloading the patch RAM. The watchdog event, and some exception events, are indications of potential corruption in the patch RAM. This message enables the host to initiate the patch download protocol.

Typically, upon receipt of this message, the host requests to switch the receiver into binary OSP messaging mode. Already in OSP messaging mode, the host polls the software version of the receiver, and the response contains the actual patch status of the receiver. The host then compares this status with the last applied patch according to the patch maintenance value stored in the host. If the software version response does not indicate the up-to-date patch status, the host initiates the reload of the required patch according to the latest patch maintenance value stored in the host. After completing the patch procedure using the binary OSP messages, the host switches back to NMEA mode for normal operation to continue.

Example:

$PSRF160,W,1,0*5A<CR><LF>

This message is not supported in the GSD4t or earlier products.

Table 1-29 Watchdog and Exception Condition Notification

Name	Example	Unit	Description
Message ID	$PSRF160		PSRF160 protocol header
Event condition	W		W: Watchdog time-out event E: Reserved: Exception condition event
Patch RAM corruption	1		0: Intact, not corrupted 1: Corrupted, need to restore
Exception code	-		Hexadecimal value of the processor exception code register (0 if event ‘W’)
Checksum	*hh		
<CR><LF>			End of message termination

Message ID 225: Reserved

Except for Sub ID 6, the contents of this message are proprietary, reserved for use by SiRF engineers, and are not described here.

Input Messages 2

This section describes the NMEA input messages listed in Table 2-1.

Table 2-1 NMEA Input Messages

Message	Description
100	SetSerialPort: Set Port A parameters and protocols
101	NavInit: Parameters required to start using X/Y/Z[1]
102	SetDGPSPort: Set port B parameters for DGPS input
103	Query NMEA Message and/or set output rate
104	LLANavInit: Parameters to Start Using Lat/Long/Alt[2]
105	DevDataOn/Off: Development Data Messages On/Off
106	Selection of Datum for Coordinate Transformation
107	Extended ephemeris proprietary message
108	Extended ephemeris proprietary message
110	Extended ephemeris debug
114,0x16	ECLM start download
114,0x17	ECLM file size
114,0x18	ECLM packet data
114,0x19	ECLM Get EE Age
114,0x1A	ECLM Get SGEE Age
114,0x1B	ECLM Host File Content
114,0x1C	ECLM Host ACK/NACK
117	System Turn Off
120	Storage Configuration Setting
200	Marketing Software Configuration
MSK	Command message to an MSK radio-beacon receiver

1. Input coordinates must be WGS84.

Note – NMEA input messages 100 to 200 are SiRF proprietary NMEA messages. The MSK NMEA string is as defined by the NMEA 0183 standard.

Table 2-2 shows which SiRF platforms support the NMEA input messages.

Table 2-2 Supported NMEA Input Messages

									Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg	
Message	**GSW2**	**SiRFDRive**	**SiRFXTrac**	**SiRFLoc**	**GSW3 & GSWLT3**	**SiRFDiRect**	**GSD3tw**	**GSD3fLP**	**GSD4t**	**GSD4e**	**GSD4t**	**GSD4e**	**GSD4t**	**GSD4e**
100	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes
101	Yes	Yes	Yes[1]	Yes	Yes[1]	Yes[1]	Yes	Yes	No	No	No	Yes	No	Yes
102	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes
103	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes
104	Yes	Yes	Yes[1]	Yes	Yes[1]	Yes[1]	Yes	Yes	No	No	No	Yes	No	Yes
105	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes
106	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes
107	2.5 and later	No	2.3 and later	No	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes
108	2.5 and later	No	2.3 and later	No	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes
110	2.5 and later	No	2.3 and later	No	3.2.0 and later	Yes	Yes	Yes	No	No	No	Yes	No	Yes
114,0x16	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
114,0x17	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
114,0x18	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
114,0x19	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
114,0x1A	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
114,0x1B	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
114,0x1C	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes
117	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
120	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes
200	Yes[2]	No	No	No	No	No	No	No	No	No	No	No	No	No
MSK	Yes	Yes	No	No	No	No	No	No	No	No	No	No	No	No

1. In GSW firmware versions prior to GSW3.5.0, input of position and [XXXtme] time are not allowed.

2. Only with a GSC2xr chip.

Message ID 100: SetSerialPort

This command message is used to set the protocol (SiRF binary or NMEA) and/or the communication parameters (Baud rate, data bits, stop bits, and parity). Generally, this command is used to switch the module back to SiRF binary protocol mode where a more extensive command message set is available. When a valid message is received, the parameters are stored in battery-backed SRAM and the receiver resumes, after a reset, using the saved parameters.

Table 2-3 contains the input values for the following example:

Switch to SiRF binary protocol at 9600,8,N,1

$PSRF100,0,9600,8,1,0*0C<CR><LF>

Table 2-3 Set Serial Port Data Format

Name	Example	Unit	Description
Message ID	$PSRF100		PSRF100 protocol header
Protocol	0		0=SiRF binary 1=NMEA
Baud	9600		1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200
DataBits	8		8 only
StopBits	1		1 only
Parity	0		0=None only
Checksum	*0C		
<CR> <LF>			End of message termination

For the GSD4e, operation at speeds below 38400 carries risk of dropped messages when using SGEE (Server Generated Extended Ephemeris).

Message ID 101: NavigationInitialization

This command restarts the receiver, and specifies the type of restart. Optionally, it may also initialize position (in X, Y, Z ECEF coordinates), clock drift, GPS Time Of Week and GPS Week Number. This enables the receiver to search for the correct satellite signals at the correct signal parameters. Correct initialization parameters enable the receiver to quickly acquire signals.

For software that does not support initializing data (some versions of GSW3 and GSWLT3, and SiRFXTrac), attempting to include initializing data may cause unpredictable results. Do not set the initialize-data bit in the ResetCfg word.

Table 2-4 contains the input values for the following example:

Start using known position and time.

$PSRF101,-2686700,-4304200,3851624,96000,497260,921,12,3*1C<CR><LF>

Table 2-4 Navigation Initialization Data Format

Name	Example	Unit	Description
Message ID	$PSRF101		PSRF101 protocol header
ECEF X	-2686700	meters	X coordinate position
ECEF Y	-4304200	meters	Y coordinate position
ECEF Z	3851624	meters	Z coordinate position
ClkDrift	96000	Hz	Clock Drift of the Receiver[1]
TimeOfWeek	497260	sec	GPS Time Of Week
WeekNo	921		GPS Week Number
ChannelCount	12		Range 1 to 12
ResetCfg	3		See Table 2-5 and Table 2-6
Checksum	*1C		
<CR><LF>			End of message termination

1. Use 0 for last saved value if available.If this is unavailable, a default value of 96250 is used.

Table 2-5 Reset Mode Value (SiRFstarIII and Later)

Value	Description
1	Hot start
2	Warm start (no init)
3	Warm start (with init)
4	Cold start
8	Factory start

Table 2-6 Reset Configuration: SiRFLoc Specific

Decimal	Description
00	Perform a hot start using internal RAM data. No initialization data is used.
01	Use initialization data and begin in start mode. Uncertainties are 5 seconds time accuracy and 300 km position accuracy. Ephemeris data in SRAM is used.
02	No initialization data is used, ephemeris data is cleared, and warm start performed using remaining data in RAM.
03	Initialization data is used, ephemeris data is cleared, and warm start performed using remaining data in RAM.
04	No initialization data is used. Position, time, and ephemeris are cleared, and a cold start is performed.
08	No initialization data is used. Internal RAM is cleared and a factory reset is performed.

Message ID 102: SetDGPSPort

This command is used to control the serial port used to receive RTCM differential corrections. Differential receivers may output corrections using different communication parameters. If a DGPS receiver is used that has different communication parameters, use this command to allow the receiver to correctly decode the data. When a valid message is received, the parameters are stored in battery-backed SRAM and the receiver restarts using the saved parameters.

Note – In receivers that do not support RTCM 104 DGPS (e.g. SiRFStarIII), this command is not supported.

Table 2-7 contains the input values for the following example:

Set DGPS Port to 9600 baud, 8 data bits, 1 stop bit, no parity bit.

$PSRF102,9600,8,1,0*12<CR><LF>

Table 2-7 Set DGPS Port Data Format

Name	Example	Unit	Description
Message ID	$PSRF102		PSRF102 protocol header
Baud	9600		1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200
DataBits	8		8,7
StopBits	1		0,1
Parity	0		0=None 1=Odd 2=Even
Checksum	*12		
<CR><LF>			End of message termination

Message ID 103: Query/Rate Control

This command is used to control the output of only standard NMEA messages GGA, GLL, GSA, GSV, RMC, and VTG. It also controls the ZDA message in software that supports it. Using this command message, standard NMEA messages may be polled once, or setup for periodic output. Checksums may also be enabled or disabled depending on the needs of the receiving program. NMEA message settings are saved in battery-backed memory for each entry when the message is accepted.

Table 2-8 contains the input values for the following example:

Query the GGA message with checksum enabled

$PSRF103,00,01,00,01*25<CR><LF>

Table 2-8 Query/Rate Control Data Format

Name	Example	Unit	Description
Message ID	$PSRF103		PSRF103 protocol header
Msg	00		Message to control. See Table 2-9.[1]
Mode	01		0 = Set Rate 1 = Query one time 2 = ABP On 3 = ABP Off
Rate	00	sec	Output Rate, 0 = Off 1–255 = seconds between messages[2]
CksumEnable	01		0=Disable Checksum 1=Enable Checksum
Checksum	*25		
<CR><LF>			End of message termination

1. The Msg field is ignored if the Mode field has values of 2 or 3 (ABP On/Off).
2. The Rate field is ignored unless the Mode field is set to 0 (Set Rate).

Table 2-9 Messages

Value	Description
0	GGA
1	GLL
2	GSA
3	GSV
4	RMC
5	VTG
6	MSS (If internal beacon is supported)
7	Not defined
8	ZDA (if 1PPS output is supported)
9	Not defined

Note – In TricklePower mode, the update rate specifies TricklePower cycles rather than seconds. If the TP cycle is set at 5 seconds, then an update rate of 2 means to output the message every 2 cycles, or 10 seconds.

Message ID 104: LLANavigationInitialization

This command is used to cause a restart of the receiver, and to specify the type of restart. Optionally, it may also initialize position (in latitude, longitude, and altitude), clock drift, GPS Time Of Week and GPS Week Number. This enables the receiver to search for the correct satellite signals at the correct signal parameters. Correct initialization parameters enable the receiver to quickly acquire signals.

For software that does not support initializing data (GSW3, GSWLT3, SiRFXTrac), attempting to include initializing data may cause unpredictable results. Do not set the initialize-data bit in the ResetCfg word.

Table 2-10 contains the input values for the following example:

Start using known position and time.

$PSRF104,37.3875111,-121.97232,0,96000,237759,1946,12,1*07<CR><LF>

Table 2-10 LLA Navigation Initialization Data Format

Name	Example	Unit	Description
Message ID	$PSRF104		PSRF104 protocol header
Lat	37.3875111	degrees	Latitude + = North (Range 90 to -90)
Lon	-121.97232	degrees	Longitude + = East (Range 180 to -180)
Alt	0	meters	Altitude position
ClkDrift	96000	Hz	Clock Drift of the Receiver[1]
TimeOfWeek	237759	sec	GPS Time Of Week
WeekNo	1946		Extended GPS Week Number
ChannelCount	12		Range 1 to 12
ResetCfg	1		See Table 2-11
Checksum	*07		
<CR><LF>			End of message termination

1. Use 0 for last saved value if available. If this is unavailable, a default value of 96,250 Hz is used.

Table 2-11 Reset Mode Value (SiRFstarIII and Later)

Value	Description
1	Hot start
2	Warm start (no init)
3	Warm start (with init)
4	Cold start
8	Factory start

Message ID 105: Development Data On/Off

This command turns development data (debug messages) on and off. Development data can be used to help diagnose system problems since many parts of the software contain messages that are output when problems are detected.

Table 2-12 contains the input values for the following example:

$PSRF105,1*3E<CR><LF>

Table 2-12 Development Data On/Off Data Format

Name	Example	Unit	Description
Message ID	$PSRF105		PSRF105 protocol header
Debug	1		0=Off 1=On
Checksum	*3E		
<CR><LF>			End of message termination

Message ID 106: Select Datum

This message allows the selection of an alternate map datum. The receiver software may contain one or more alternate datums in addition to WGS84, the default GPS datum. The table below lists some datums that may be in a particular software build. In addition, other datums may have been added by either SiRF or by developers with SDK software access. Available datums, if different from the list below, should be documented in the system or software documentation.

Table 2-13 contains the input values for the following examples:

1. Datum select TOKYO_MEAN

   $PSRF106,178*32<CR><LF>

Table 2-13 Select Datum Data Format

Name	Example	Unit	Description
Message ID	$PSRF106		PSRF106 protocol header
Datum	178		21=WGS84 178=TOKYO_MEAN 179=TOKYO_JAPAN 180=TOKYO_KOREA 181=TOKYO_OKINAWA
Checksum	*32		
<CR><LF>			End of message termination

Message ID 107: Proprietary

This message is reserved for SiRFInstantFix usage only. The content of this message is proprietary.

Table 2-14 contains the message parameter definitions.

Table 2-14 Proprietary

Name	Example	Unit	Description
Message ID	$PSRF107		PSRF107 protocol header
Extended Ephemeris			Proprietary message
Checksum			
<CR><LF>			End of message termination

Message ID 108: Proprietary

This message is reserved for SiRFInstantFix usage only. The content of this message is proprietary.

Table 2-15 contains the message parameter definitions.

Table 2-15 Proprietary

Name	Example	Unit	Description
Message ID	$PSRF108		PSRF108 protocol header
Extended Ephemeris			Proprietary message
Checksum			
<CR><LF>			End of message termination

Message ID 110: Extended Ephemeris Debug

This message allows control of a SiRFInstantFix debug flag. Turning on the flag forces the receiver to ignore broadcast ephemeris from the satellites and only use SiRFInstantFix ephemeris for navigation.

Table 2-16 contains the message parameter definitions.

Table 2-16 Extended Ephemeris Debug

Name	Example	Unit	Description
Message ID	$PSRF110		PSRF110 protocol header
DEBUG_FLAG	0x01000000		0x01000000 = Debug flag on, ignore broadcast ephemeris 0x00000000 = Debug flag off, normal operation
Checksum			
<CR><LF>			End of message termination

Message ID 112: Set Message Rate

This message is intended only for SiRFInstantFix and must not be used otherwise.

Table 2-17 contains the message parameter definitions for the following example:

$PSRF112,140,1,1*3B<CR><LF>

Table 2-17 Table Set Message Rate

Name	Example	Unit	Description
Message ID	PSRF112		PSRF112 protocol header
Message ID to set	140		This is the only NMEA message ID supported
Message rate	1	sec	140 – valid rate is 1 (i.e. occuring once at every periodic EE event, in every 6 seconds) or 0 (to disable)
Send Now	1		Poll NMEA message ID once.

Message ID 113 (Sub ID 0x01): Set GRF3i+ IF Bandwidth Mode

This message enables the user to set the IF bandwidth mode for the GRF3i+.

Table 2-18 contains the values for the following example:

Sub ID = 0x1, GRF3i+ Bandwidth Mode Selection = 0x1,

Example:

$PSRF113,01,01*24<CR><LF>

Table 2-18 Set GRF3i+ IF Bandwidth Mode

Name	Example	Unit	Description
Message ID	$PSRF113		GRF3i+ protocol header
Sub ID	0x01 (Decimal: 01)		0x01 : Set GRF3i+ IF bandwidth mode
GRF3i+ IF Bandwidth Mode Selection	0x01		0 = Wideband Mode 1 = Narrowband Mode [default]
CheckSum	*24		
<CR><LF>			End of message termination.

Message ID 113 (Sub ID 0x02): Set GRF3i+ Normal/Low Power RF Mode

This message enables the user to set the RF power mode to normal or low.

Table 2-19 contains the values for the following example:

Sub ID = 0x2, GRF3i+ power mode =0x1

Example:

$PSRF113,02,01*27<CR><LF>

Table 2-19 Set GRF3i+ IF Bandwidth Mode

Name	Example	Unit	Description
Message ID	$PSRF113		GRF3i+ protocol header
Sub ID	0x02 (Decimal: 02)		0x02 : Set GRF3i+ power mode
GRF3i+ power mode Selection	0x01		0 = Normal power [default] 1 = Low power
CheckSum	*27		
<CR><LF>			End of message termination.

Note – GRF3i+ Power Mode would be internally saved to NVM. By default, it would be initialized to 0 (Normal power).

Message ID 114 (Sub ID 0x16): ECLM Start Download

This message indicates to the GPS receiver that Host EE Downloader wants to initiate the SGEE file download. The Sub Message ID for this message is fixed to 0x16.

Table 2-20 contains the input values for the following example:

Sub ID = 0x16

Example:

$PSRF114,16*08<CR><LF>

Table 2-20 ECLM Start Download

Name	Example	Unit	Description
Message ID	$PSRF114		ECLM Download Packet Header
Sub ID	0x16 (Decimal: 22)		0x16: Sub ID for ECLM Start Download
CheckSum	*08		
<CR><LF>			End of message termination

The receiver reports the success or failure of this message with message ID 156, Sub ID 0x20.

Message ID 114 (Sub ID 0x17): ECLM File Size

This message is sent from Host EE Downloader to the GPS receiver to indicate the size of the SGEE file to be downloaded. The Sub Message ID for this message is fixed to 0x17.

Table 2-21 contains the values for the following example:

Sub Message ID = 0x17, SGEE File Size = 0x2859

Example:

$PSRF114,17,2859*23<CR><LF>

Table 2-21 ECLM File Size

Name	Example	Unit	Description
Message ID	$PSRF114		Message ID
Sub ID	0x17 (Decimal: 23)		0x17: SGEE File Length
File length	0x2859		File length
CheckSum	*23		
<CR><LF>			End of message termination

The receiver reports the success or failure of this message with message ID 156, Sub ID 0x20.

Message ID 114 (Sub ID 0x18): ECLM Packet Data

This message is sent from Host EE Downloader to the GPS receiver to indicate the size of the SGEE file to be downloaded. The Sub Message ID for this message is fixed to 0x18.

Table 2-22 contains the values for the following example:

Sub ID = 0x18, Packet Sequence No = 1, Packet Length = 32

Example:

$PSRF114,18,1,32,62,12,31,6,3,2,7,d9,7,7,0,0,39,6d,8f,12,0,0,0,0
,0,0,1,2d,9a,e7,5,2,ff,fe,28,5*3D<CR><LF>

Table 2-22 SGEE Packet Data

Name	Example	Unit	Description
Message ID	$PSRF114		Message ID
Sub ID	0x18 (Decimal: 24)		0x18: SGEE Packet Data
Packet Sequence No	1	In decimal	File length
Packet Length	32	In decimal	Length of this packet
Packet Data	62,12,31,6,3,2,7,d9,7,7,0,0, 39,6d,8f,12,0,0,0,0,0,0,1,2d, 9a,e7,5,2,ff,fe,28,5		SGEE data in this packet of length PacketLength
CheckSum	*3D		
<CR><LF>			End of message termination

The receiver reports the success or failure of this message with message ID 156, Sub ID 0x20.

Message ID 114 (Sub ID 0x19): ECLM Get EE Age

This message is sent from Host EE Downloader to the GPS receiver to get the EE age from the GPS receiver. The Sub Message ID for this message is fixed to 0x19.

Table 2-23 contains the values for the following example:

Sub ID = 0x19, Num Sat = 1, Prn Num = 1

Example:

$PSRF114,19,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0*1B<CR><LF>

Table 2-23 ECLM Get EE Age

Name	Example	Unit	Description
Message ID	$PSRF114		Message ID
Sub ID	0x19 (Decimal: 25)		0x19: Get EE Age
Num Sat	0x1		Number of times below fields will be repeated
prnNum	0x1		PRN number = 1
ephPosFlag	0x0		
eePosAge	0x0		
cgeePosGPSWeek	0x0		
cgeePosTOE	0x0		
ephClkFlag	0x0		
eeClkAge	0x0		
cgeeClkGPSWeek	0x0		
cgeeClkTOE	0x0		
Pad	0x0		
CheckSum	*1B		
<CR><LF>			End of message termination

The receiver reports the success or failure of this message with message ID 156, Sub ID 0x21 or 0x20.

Message ID 114 (Sub ID 0x1A): ECLM Get SGEE Age

This message is sent from Host EE Downloader to the GPS receiver to get the SGEE age from the GPS receiver. The Sub Message ID for this message is fixed to 0x1A.

Table 2-24 contains the values for the following example:

Sub ID = 0x1A, Sat ID = 1

Example:

$PSRF114,1a,1*42<CR><LF>

Table 2-24 Get SGEE Age

Name	Example	Unit	Description
Message ID	$PSRF114		Message ID
Sub ID	0x1A (Decimal: 26)		0x1A: Get SGEE Age
Sat ID	0x1		Satellite ID for which SGEE Age is asked
CheckSum	*42		
<CR><LF>			End of message termination

The receiver reports the success or failure of this message with message ID 156, Sub ID 0x22 (success) or 0x20 (failure).

Message ID 114 (Sub ID 0x1B): ECLM Host File Content

This message is sent to the GPS receiver in response to a Request File Content message. The Sub Message ID for this message is fixed to 0x1B.

Table 2-25 contains the values for the following example:

Sub Message ID = 0x1B, NVM ID = 3, Num Blocks = 1

Example:

$PSRF114,1b,1,3,1,a,0,0,0,f,6,0,f0,0,0,4a,0*41<CR><LF>

Table 2-25 Host File Content

Name	Example	Unit	Description
Message ID	$PSRF114		Message ID
Sub ID	0x1B (Decimal: 27)		0x1B: Host File Content
SeqNum	0x01		
NVM ID	0x03		1: SGEE file 2: CGEE file 3: BE file
Num Blocks	0x1		Number of blocks per packet
Block Length	0xA		Block size
Offset	0x0		Offset of block in file
Data	0,0,f,6,0,f0,0,0,4a,0		Block data
CheckSum	*41		
<CR><LF>			End of message termination

Message ID 114 (Sub ID 0x1C): ECLM Host ACK/NACK

This message is the response to Output Message 156 with SubMsgID 0x23, 0x24 or 0x25.

Table 2-26 contains the values for the following example:

ACK for Downloader initiate request

$PSRF114,1c,9c,23,0,0*06<CR><LF>

Table 2-26 Host ACK/NACK

Name	Example	Unit	Description
Message ID	$PSRF114		Message ID
Sub ID	0x1C (Decimal: 28)		0x1C: Host ACK/NACK
ACK Message ID	0x9C		$PSRF156
ACK Sub ID	0x23		This can contain values 0x23, 0x24, 0x25
ACK/NACK	0x0		0x0: ACK 0x1: NACK
Reason	0x0		0x0: SUCCESS 0x1: Invalid NVMID 0x13: File access error
CheckSum	*06		
<CR><LF>			End of message termination

Message ID 117: System Turn Off

This message requests that the GPS receiver perform an orderly shutdown and switch to hibernate mode.

Table 2-27 contains the values for the following example:

$PSRF117,16*0B<CR><LF>

Table 2-27 System Turn Off

Name	Example	Unit	Description
Message ID	$PSRF117		Message ID
Sub ID	0x10 (Decimal: 16)		0x10: System turn off
CheckSum	*0B		
<CR><LF>			End of message termination

Message ID 120: Storage Config Setting

This command sets storage configuration options to determine on which storage media the different types of system data will be physically stored.

Table 2-27 contains the input values for the following example:

Store patches on I2Cserial flash and extended ephemeris data on I^2C EEROM.

$PSRF120,F,R,*<checksum><CR><LF>

Table 2-28 Storage Configuration Option Settings Format

Name	Example	Unit	Description
Message ID	$PSRF120		PSRF120 Protocol Header
Patch Storage Setting	F		"N" = Do not store to I^2C serial flash (default) "F" = Store to I^2C serial flash "0" = No change applied to patch
	R		"H" = Storage available on host "R" = I^2C EEROM provided for GSD4e access (default) "F" = Store to parallel FLASH "N" = No storage "0" = No change applied to patch storage settings
CheckSum	*...		
<CR><LF>			End of message termination

Note – This message is supported by GSD4e and later.

Message ID 200: Marketing Software Configuration

Note – This message is used to select one of the pre-programmed configurations within ROM-based devices. Refer to the appropriate product datasheet to determine message format and specific configurations supported.

Message ID MSK: MSK Receiver Interface

Table 2-29 contains the values for the following example:

$GPMSK,318.0,A,100,M,2,*45<CR><LF>

Table 2-29 MSK Data Format

Name	Example	Unit	Description
Message ID	$GPMSK		MSK protocol header
Beacon Frequency	318.0	kHz	Frequency to use
Auto/Manual Frequency[1]	A		A : Auto M : Manual
Beacon Bit Rate	100		Bits per second
Auto/Manual Bit Rate[2]	M		A : Auto M : Manual
Interval for Sending $--MSS[3]	2	sec	Sending of MSS messages for status

1. If Auto is specified, the previous field is ignored and the receiver will search for beacon frequency automatically.
2. If Auto is specified, the previous field is ignored and the receiver will search for the correct bit rate.
3. When status data is not to be transmitted this field is null.

Note – The NMEA messages supported by the receiver does not provide the ability to change the DGPS source. If you need to change the DGPS source to internal beacon, use the SiRF binary protocol and then switch to NMEA.

NMEA Reference Manual

May 2010

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