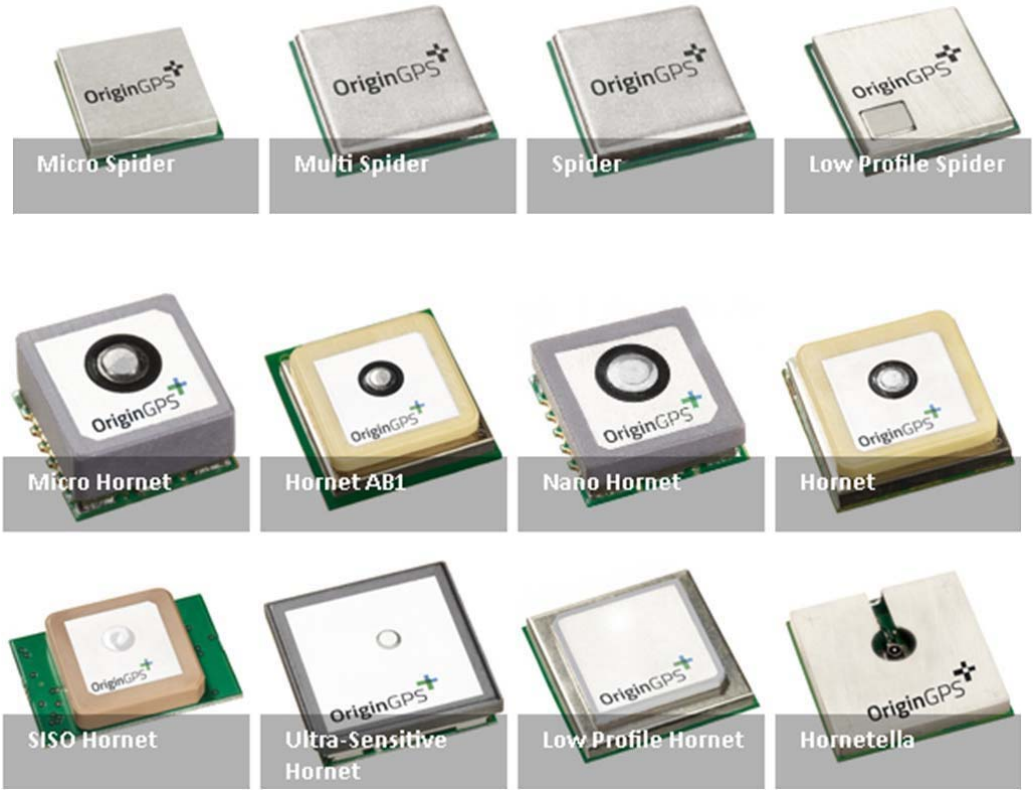
OriginGPS
mini+mighty



SPIDER AND HORNET GPS /GNSS RECEIVER MODULES

NMEA Protocol Reference Manual

OriginGPS.com

SCOPE

This document describes NMEA protocol associated with Spider and Hornet GPS / GNSS receiver modules.

DISCLAIMER

All trademarks are properties of their respective owners.
Performance characteristics listed in this document do not constitute a warranty or guarantee of product performance. OriginGPS assumes no liability or responsibility for any claims or damages arising out of the use of this document, or from the use of integrated circuits based on this document.
OriginGPS assumes no liability or responsibility for unintentional inaccuracies or omissions in this document.
OriginGPS reserves the right to make changes in its products, specifications and other information at any time without notice.
OriginGPS reserves the right to conduct, from time to time, and at its sole discretion, firmware upgrades. As long as those FW improvements have no material change on end customers, PCN may not be issued.
OriginGPS navigation products are not recommended to use in life saving or life sustaining applications.

SAFETY INFORMATION

Improper handling and use can cause permanent damage to the product.

ESD SENSITIVITY

This product is ESD sensitive device and must be handled with care.

CONTACT INFORMATION

Support - support@origingps.com or Online Form
Marketing and sales - marketing@origingps.com
Web – www.origingps.com

RELATED DOCUMENTATION

№	DOCUMENT NAME	ISSUED BY
1	NMEA Reference Guide – Issue 5 CS-129435-UGP	CSR
2	NAVSTAR GPS Interface Control Document – IS-GPS-200G	Global Positioning Systems Directorate
3	GLONASS Interface Control Document – Navigational Radiosignal In Bands L1, L2 Edition 5.1	Russian Institute of Space Device Engineering
4	Spider and Hornet - One Socket Protocol Reference Manual	OriginGPS
5	Multi Spider - ORG4572 OSP® Extensions Reference Manual	OriginGPS
6	Spider and Hornet - Software User Manual	OriginGPS
7	Spider and Hornet - NMEA Protocol Reference Manual	OriginGPS
8	Spider and Hornet - Host Interface Application Note	OriginGPS
9	Spider and Hornet - Low Power Modes Application Note	OriginGPS
10	Spider and Hornet - Jammer Detector and Remover Application Note	OriginGPS
11	Spider and Hornet - Client Generated Extended Ephemeris Application Note	OriginGPS
12	Spider and Hornet - Server Generated Extended Ephemeris Application Note	OriginGPS
13	Spider and Hornet - Ephemeris Push Application Note	OriginGPS
14	Spider and Hornet – MEMS Sensors Interface Application Note	OriginGPS

RELATED DOCUMENTATION

REVISION HISTORY

REVISION	DATE	CHANGE DESCRIPTION
B00	February 2, 2014	Updated technical content for MIDs: 103, 114, 120, 121, 122, 123, 124, 125, 141, 150, 165, 190, 191, 192. Added name in Table 3.29 Updated technical content for GLONASS support.
3.0	August 10, 2014	Updated technical content for MIDs: 56, 78, 103, 114, 124, 131, 129, 131, 156, 190,192, 232, 233. Editorial updates.
4.0	March 31, 2015	Updated technical content for MIDs: 101, 103, 106, 114 0x16, 114 0x5C, 133. Added MIDs: 126, 131, 132 and EPE. Editorial updates.

REVISION HISTORY

ABOUT SPIDER FAMILY

OriginGPS GNSS receiver modules have been designed to address markets where size, weight, stand-alone operation, highest level of integration, power consumption and design flexibility - all are very important.

OriginGPS' Spider family breaks size barrier, offering the industry's smallest fully-integrated, highly-sensitive GPS and GNSS modules.

Spider family features OriginGPS' proprietary NFZ™ technology for high sensitivity and noise immunity even under marginal signal condition, commonly found in urban canyons, under dense foliage or when the receiver's position in space rapidly changes.

Spider family enables the shortest TTM (Time-To-Market) with minimal design risks.

Just connect an antenna and power supply on a 2-layer PCB.

ABOUT HORNET FAMILY

OriginGPS' Hornet family is offering the industry's smallest fully-integrated, highly-sensitive GPS and GNSS modules with integrated antennas or on-board RF connectors.

Hornet family features OriginGPS' proprietary NFZ™ technology for high sensitivity and noise immunity even under marginal signal condition, commonly found in urban canyons, under dense foliage or when the receiver's position in space rapidly changes.

Hornet family enables the shortest TTM (Time-To-Market) with minimal design risks.

Just connect power supply on a single layer PCB.

ABOUT ORIGINGPS

OriginGPS is a world leading designer, manufacturer and supplier of miniature positioning modules, antenna modules and antenna solutions.

OriginGPS modules introduce unparalleled sensitivity and noise immunity by incorporating Noise Free Zone system (NFZ™) proprietary technology for faster position fix and navigation stability even under challenging satellite signal conditions.

Founded in 2006, OriginGPS is specializing in development of unique technologies that miniaturize RF modules, thereby addressing the market need for smaller wireless solutions

Contents

List of Tables

1 Overview

This document describes NMEA messages developed and defined for CSR products. It does not describe the complete NMEA-0183 interface standard.

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

This document applies to SiRFstarV 5xp B01, software version 5.6.3 and SiRFstarV 5xp BO2, software version 5.7.5.

1.1 Intended Audience

This document assumes that you have a basic understanding of interface protocols.

1.2 How This Document is Organized

This document contains the following chapters:

- Output Messages: Section 2 defines NMEA standard output messages supported by CSR, and NMEA proprietary output messages developed by CSR.
- Input Messages: Section 3 defines NMEA standard input messages supported by CSR, and NMEA proprietary input messages developed by CSR.

1.3 Related Manuals

For more information, see:

- NMEA-0183 Standard For Interfacing Marine Electronic Devices Version 4.0
- SiRF Evaluation Kit User Guides
- SiRF System Development Kit User Guides
- SiRFstarV One Socket Protocol Interface Control Document (OSP ICD)

1.4 Message Format

NMEA 0183 messages use the ASCII character set and have a defined format. Each message begins with a $ and ends with a carriage return and line feed, represented as <CR><LF> (hex 0x0D, 0x0A). 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 decimal and hexadecimal value of the checksum. The checksum is computed as the exclusive OR of all characters between the $ and * characters.

The subID value is most messages is in decimal. In cases where the subID values is interpreted as hexadecimal, these values must be input without an 0x prefix.

In addition to the sentences that are specifically defined by NMEA, the protocol also enables manufacturer-specific proprietary sentences. These sentences begin with $PSRF. These sentences control the receiver and output extra information beyond the NMEA-0183 standard definition.

Note:

The checksum is optional in NMEA 0183 specifications earlier than version 2.3.

CSR provides references to discontinued, unsupported products GSW2 and SiRFXTrac for historical reasons only.

Many $PSRF messages have a corresponding MID in the SiRFstarV One Socket Protocol Interface Control Document (OSP ICD). This document references some of these OSP messages.

Talker Identification (talker ID) is part of all standard NMEA sentences. It consists of two characters immediately after the $ at the start of the message. Talker ID indicates the source of the message that follows. In GNSS receivers, the talker ID also specifies which constellations are used for the data in the message.

Possible talker IDs are:

- GA: Galileo satellites
- GB: BDS satellites
- GL: GLONASS satellites
- GP: GPS satellites
- GN: Satellites from more than one constellation

Some sentences can use only one talker ID, while others can use more than one. The table below shows which talker IDs can be used with each message in the CSR receivers.

Note:

Only standard messages use talker IDs. Proprietary messages always begin $PSRF and do not use a talker ID. GSD4e supports only GP and SiRFstarV supports other talker IDs

Sentence	Possible Talker Identifications
GGA	GP
GLL	GA GB GL GP GN
GNS	GA GB GL GP GN

Sentence	Possible Talker Identifications
GSA	GA GB GL GP GN
GSV	GA GB GL GP
MSS	GP
RMC	GA GB GL GP GN
VTG	GA GB GL GP GN
ZDA	GA GB GL GP GN

Table 1.1: Talker Identifications

2 Output Messages

Table 2.1 lists the NMEA output messages specifically developed and defined within CSR products.

Message	Description
GGA	Time, position and fix type data for GPS constellations
$GLL	Latitude, longitude, UTC time of position fix and status
GNS	Time, position and fix type date for all constellations
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 and 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
$PSRF120,81	GSM measurement response
$PSRF120,84	GSM assistance data response
$PSRF120,129	WiFi measurement response
$PSRF120,132	WiFi assistance data response
$PSRF131,1	External storage map response
$PSRF131,2	External storage map response
$PSRF131,3	External storage map response
$PSRF140	Proprietary CSR extended ephemeris use only
$PSRF141	Verified 50 BPS
$PSRF150	OK to send message
$PSRF151	GPS data and extended ephemeris mask
$PSRF152	Extended ephemeris integrity
$PSRF154	Extended ephemeris ACK
$PSRF155	Extended ephemeris proprietary message
$PSRF156,20	ECLM ACK/NACK

Message	Description
$PSRF156,21	ECLM EE get age response
$PSRF156,22	ECLM SGEE age
$PSRF156,23	ECLM download initiate request
$PSRF156,24	ECLM erase storage file
$PSRF156,25	ECLM update file content
$PSRF156,26	ECLM request file content
$PSRF156,41	GNSS extended ephemeris request
$PSRF156,42	GNSS extended ephemeris integrity
$PSRF156,44	GNSS proprietary
$PSRF156,50	GNSS ACK/NACK
$PSRF156,51	GNSS EE age
$PSRF156,52	GNSS SGEE age
$PSRF156,53	GNSS download initiate request
$PSRF156,54	GNSS erase storage file
$PSRF156,55	GNSS update file content
$PSRF156,56	GNSS request file content
$PSRF156,58	GNSS get EE header request
$PSRF160	Watchdog timeout and exception condition
$PSRF165	GPIO state
$PSRF190	Data log record
$PSRF191	Data log terminator
$PSRF192	Data log status
$PSRF195	Response to poll SW version string
$PSRFEPE	Expected position error

Table 2.1: NMEA Output Messages

Table 2.2 lists the NMEA output messages supported by specific platforms. This section describes these messages.

Message	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw	GSD3fLP	Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg		SiRFStarV: 5e 5xp 5ea
									GSD4t GSD5t	GSD4e	GSD4t GSD5t	GSD4e	GSD4t GSD5t	GSD4e	
GGA	All	All	All	All	All	All	All	All	All	All	No	All	No	All	All
GLL	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
GNS	No	No	No	No	No	No	No	No	GSD5t only	No	GSd5t only	No	GSD5t only	No	Yes
GSA	All	All	All	All	All	All	All	All	All	All	No	All	No	All	All
GSV	All	All	All	All	All	All	All	All	All	All	No	All	No	All	All
MSS	All	No	No	No	No	No	No	No	No	No	No	No	No	No	No
RMC	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
VTG	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
ZDA	2.3.2 and later	No	No	No	All	No	All	No	No	No	No	All	No	All	No
$PSRF120,81	No	No	No	No	No	No	No	No	No	No	No	No	No	No	5xp only
$PSRF120,84	No	No	No	No	No	No	No	No	No	No	No	No	No	No	5xp only
$PSRF120,129	No	No	No	No	No	No	No	No	No	No	No	No	No	No	5xp only
$PSRF120,132	No	No	No	No	No	No	No	No	No	No	No	No	No	No	5xp only
$PSRF131,1	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes

Message	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw	GSD3fLP	Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg		SiRFStarV: 5e 5xp 5ea
									GSD4t GSD5t	GSD4e	GSD4t GSD5t	GSD4e	GSD4t GSD5t	GSD4e	
$PSRF131,2	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF131,3	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF141	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
$PSRF150	2.3.2 and later	No	No	No	No	No	No	No	No	No	No	No	No	No	No
$PSRF151	2.5 and later	No	2.3 and later	No	3.2.0 and later	Yes	Yes	Yes	No	No	No	No	No	No	No
$PSRF152	2.5 and later	No	2.3 and later	No	3.2.0 and later	Yes	Yes	Yes	No	No	No	No	No	No	No
$PSRF154	2.5 and later	No	2.3 and later	No	3.2.0 and later	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
$PSRF155	No	No	No	No	No	No	No	Yes	No	No	No	No	No	No	No
$PSRF156,20	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	No	Yes	No
$PSRF156,21	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
$PSRF156,22	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
$PSRF156,23	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
$PSRF156,24	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No

Message	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw	GSD3tLP	Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg		SiRFStarV: 5e 5xp 5ea
									GSD4t GSD5t	GSD4e	GSD4t GSD5t	GSD4e	GSD4t GSD5t	GSD4e	
$PSRF156,25	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
$PSRF156,26	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
$PSRF156,41	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
$PSRF156,42	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
$PSRF156,44	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
$PSRF114,49	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
$PSRF156,50	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF156,51	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF156,52	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF156,53	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF156,54	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF156,55	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF156,56	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF156,58	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
$PSRF160	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes

Message	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw	GSD3fLP	Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg		SiRFStarV: 5e 5xp 5ea
									GSD4t GSD5t	GSD4e	GSD4t GSD5t	GSD4e	GSD4t GSD5t	GSD4e	
$PSRF165	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
$PSRF190	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
$PSRF191	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
$PSRF192	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
$PSRF195	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
$PSRFEPE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Np	Yes	Yes

Note:

In 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.

2.1 GNS: GNSS Fix Data

This message provides fix data for GPS, GLONASS, possible future satellite systems and systems that combine these.

Table 2.3 lists the message information for the following example:

`$GNS,hhmmss.ss,1111.11,a,yyyy.yy,a,c--c,xx,x.x,x.x,x.x,x.x,x.x,x.x,a*hh<CR><LF>`

Note:

The values in the Latitude and Longitude columns are in ddmm.mmmm. The units are degrees, minutes and fractional minutes.

Name	Unit	Description
GNSS Fix Data	-	GPGNS: Data is from GPS only GLGNS: Data is from GLONASS only GBGNS: Data is from BDS only GNGNS: Data is from multiple constellations
UTC of Position	Hours Minutes Seconds	Timestamp hhmmss.sss
Latitude	Degrees Minutes	ddmm.mmmm
N/S Indicator	-	N: North S: South
Longitude	Degrees Minutes	ddmm.mmmm
E/W Indicator	-	E: East W: West
Mode Indicator	-	Variable length valid character field type with the first two characters currently defined. The first character indicates the use of GPS satellites and the second character indicates the use of GLONASS satellites. Characters are: A: Autonomous D: Differential E: Estimated F: Float RTK M: Manual Input N: No fix P: Precise R: Real Time Kinematic S: Simulator

Name	Unit	Description
Satellites Used	-	Number of sattelite uses in the fix. Range: 0 to 99
HDOP	-	Horizontal Dilution of Precision
MSL Altitude	Metres	-
Geoid Separation	-	Geoid-to-ellipsoid separation. Ellipsoid altitude: Geoid MSL altitude - Gepod separation
Age of Diff. Data	Seconds	Null fields when DGPS is not used.
Diff. Ref. Station ID	-	Null fields when DGPS is not used.

Table 2.3: GNS: GNSS Fix Data Data Format

2.2 Global Positioning System Fix Data: GGA

This message supports multiple constellations.

This message is supported in all SiRFstar versions. Fields in italic apply only to version 2.3 and later.

Table 2.4 lists the message information 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>
```

Name	Unit	Description
GGA	-	GGA protocol header. This message always uses GP as its talker ID.
UTC Time	Hours Minutes Seconds	Timestamp hhmmss.sss
Latitude	Degrees Minutes	ddmm.mmmm
N/S Indicator	-	N: North S: South
Longitude	Degrees Minutes	dddmm.mmmm
E/W Indicator	-	E: East W: West
Position Fix Indicator	-	See Table 2.5.
Satellites Used	-	Count of satellites used in fix. Range: 0 to 12
HDOP	-	Horizontal Dilution of Precision

Name	Unit	Description
MSL Altitude	Metres	-
Units	Metres	-
Geoid Separation	-	Geoid-to-ellipsoid separation. Ellipsoid altitude: Geoid MSL altitude - Geoid separation
Units	Metres	-
Age of Diff. Corr.	Seconds	Null fields when DGPS is not used
Diff. Ref. Station ID	-	Range: 0 to 1023 Null fields when DGPS is not used.

Table 2.4: Global Positioning System Fixed Data: GGA Data Format

Table 2.5 list the fields for the 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 to 5	Not supported
6	Dead Reckoning Mode, fix valid (NMEA version 2.3 and later only)

Table 2.5: Position Fix Indicator

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 and the presence of DGPS corrections. If a required factor is not met, the solution is marked as invalid.

2.3 Geographic Position for Latitude and Longitude: GLL

This message provides information specific to the satellite system identified by the first two characters of the message.

This message is supported in SiRFStar GSD4e and later. Fields in italic apply only to NMEA version 2.3 and later.

Table 2.6 lists the message information for the following example:

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

Name	Unit	Description
GLL	-	GPGLL: Data is from GPS only GLGLL: Data is from GLONASS only GBGLL: Data is from BDS only GNGLL: Data is from multiple constellations
Latitude	Degrees Minutes	ddmm.mmmm
N/S Indicator	-	N: North S: South
Longitude	Degrees Minutes	dddmm.mmmm
E/W Indicator	-	E: East W: West
UTC Time	Hours Minutes Seconds	Timestamp hhmmss.sss
Status	-	A: Data valid V: Data not valid
Mode	-	A: Autonomous D: DGPS E: DR N: Output Data Not Valid R: Coarse Position S: Simulator

Table 2.6: Geographic Position for Latitude and Longitude: GLL Data Format

Note:

In the Coarse Position (R) mode:

- Position is calculated based on one or more of the SVs having their states derived from almanac parameters, not ephemerides.
- This feature is supported in GSD4 version 1.1.0 and later.

2.4 GNSS DOP and Active Satellites: GSA

This message provides the current DOP values and a list of the satellites used in the fix.

This message is supported in SiRFstar GSD4e and later.

Table 2.7 lists the message information for the following example of only GPS satellites used in the position solution:

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

Name	Unit	Description
GSA	-	GPGSA: Data is from GPS only GLGSA: Data is from GLONASS only GBGSA: Data is from BDS only GNGSA: Data is from multiple constellations
Mode 1	-	M: Manual. Forced to operate in 2D or 3D mode. A: Automatic. Enabled to automatically switch 2D/3D
Mode 2	-	1: Fix not available 2: 2D (<4 SVs used) 3D (>3 SVs used)
Satellite Used [1]	-	Satellites used in the solution. Range varies by constellation: ... GPS: 1 to 32 GLONASS: 65 to 88 BDS: 121 to157
Satellite Used [2]	-	Range varies as per Navigation system: GPS: 1 to 32 GLONASS: 65 to 88 BDS: 121 to 157
....	-	....
Satellite Used [12]		Range varies as per Navigation system on channel 12: GPS: 1 to 32 GLONASS: 65 to 88 BDS: 121 to 157
PDOP	-	Position Dilution of Precision
HDOP	-	Horizontal Dilution of Precision
VDOP	-	Vertical Dilution of Precision

Table 2.7: GNSS DOP and Active Satellites: GSA Data Format

Note:

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

This is an example of only GLONASS satellites:

```
$GLGSA,A,3,73,66,88,83,81,68, , , , , ,1.8,1.0,1.5*2E<CR><LF>
```

This is an example of a solution using a mix of GPS and GLONASS satellites:

```
$GNGSA,A,3,07,66,26,83,09,68, , , , , ,1.8,1.0,1.5*22<CR><LF>
```

2.5 GNSS Satellites in View: GSV

This message is supported in SiRFstar GSD4e and later.

Table 2.8 lists the message information for the following example of GPS-only satellite messages:

```
$GPGSV,2,1,07,07,79,048,42,02,51,062,43,26,36,256,42,27,27,138,42*71<CR><LF>
$GPGSV,2,2,07,09,23,313,42,04,19,159,41,15,12,041,42*41<CR><LF>
```

This is an example of GLONASS-only satellites in view reporting messages

```
$GLGSV,2,1,07,73,14,302,39,66,33,037,39,80,13,251,38,83,16,313,38*64<CR><LF>
$GLGSV,2,2,07,81,36,083,36,68,29,185,31,82,53,003,43*53<CR><LF>
```

Name	Unit	Description
GSV	-	GPGSV: GPS SV list GLGSV: GLONASS SV list GBGSV: BDS SV list
Number of Messages	-	Total number of GSV messages to be sent in this group
Message Number	-	Message number in this group of GSV messages
Satellites in View	-	-
Satellite ID	-	Range varies as per Navigation system: GPS: 1 to 32 GLONASS: 65 to 88 BDS: 121 to 157
Elevation	Degrees	Maximum of 90
Azimuth	Degrees	True, range 0 to 359 clockwise from true North
C/N_0	dB-Hz	Range 0 to 99, null when not tracking
....	-	Satellite ID, Elevation and C/N_0 are repeated for three additional satellites

Table 2.8: GNSS Satellites in View: GSV Data Format

Note:

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, but the actual number may be larger.

2.6 MSK Receiver Signal: MSS

This message controls the settings for a radio beacon receiver.

This message is supported in SiRFstar GSD4e and later. Fields in italic apply only to NMEA version 2.3 and later.

Table 2.9 lists the message information for the following example:

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

Name	Unit	Description
MSS	-	MSS protocol header. This message always uses GP as its talker ID.
Signal Strength	dB re: 1 uV/m	SS of tracked frequency
Signal-to-Noise Ratio	dB	SNR of tracked frequency
Beacon Frequency	kHz	Range 283.5 to 325.0
Frequency Selection	-	A: Automatic frequency selection M: Manual frequency selection
Beacon Bit Rate	bps	25, 50, 100 or 200 bps
Bit rate selection	-	A: Automatic bit rate selection M: Manual bit rate selection
Interval	Seconds	Rate to send MSS message
Channel Number	-	The channel of the beacon being used if a multi-channel beacon receiver is used

Table 2.9: MSK Receiver Signal: MSS Data Format

Note:

The MSS NMEA message can only be polled or scheduled using the MSK NMEA input message. See section 3.25.

2.7 Recommended Minimum Specific GNSS Data: RMC

This message describes the current time, date, speed and heading data from GNSS observations.

This message is available in SiRFstar GSD4e and later. Fields in italic apply only to NMEA version 2.3 and later.

Table 2.10 lists the message information for the following example:

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

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 and the presence of DGPS corrections. If the default or current software setting requires that a factor be met, and that factor has not met the solution, it is marked as invalid.

Name	Unit	Description
RMC	-	GPRMC: Data is from GPS only GLRMC: Data is from GLONASS only GBRMC: Data is from BDS only GNRMC: Dats is from multiple constellations
UTC Time	Hours Minutes Seconds	Timestamp hhmmss.sss
Status	-	A: Data valid V: Data not valid
Latitude	Degrees Minutes	ddmm.mmmm
N/S Indicator	-	N: North S: South
Longitude	Degrees Minutes	ddmm.mmmm
E/W Indicator	-	E: East W: West
Speed Over Ground	Knots	-
Course Over Ground	Degrees	True
Date	Day Month Year	ddmmyy
Magnetic Variation	Degrees	CSR does not support this feature
East/West Indicator	-	E: East W: West This feature is supported in GSD4e, version 1.1.0 and later
Mode	-	A: Autonomous D: DGPS E: DR N: Output Data Not Valid R: Coarse Position S: Simulator

Table 2.10: Recommended Minimum Specific GNSS Data RMC Data Format

Note:

Coarse Position mode is supported in versions 4.1.1.0 and later. When Mode is R, the position was calculated based on one or more of the SVs having their states derived from almanac parameters, not ephemerides.

2.8 Course Over Ground and Ground Speed: VTG

This message describes the actual course and speed relative to the ground.

This message is supported in SiRFstarV. Fields in italic apply to NMEA version 2.3 and later.

Table 2.11 lists the message information for the following example:

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

Name	Unit	Description
VTG	-	GPVTG: Data is from GPS only GLVTG: Data is from GLONASS only GBVTG: Data is from BDS only GNVTG: Data is from multiple constellations
Course	Degrees	Measured heading
Reference	-	True
Course	Degrees	Measured heading (Not supported)
Reference	-	Magnetic (Not supported)
Speed	Knots	Measured horizontal speed
Units	-	Knots
Speed	km/hour	Measured horizontal speed
Units		km/hr
Mode	-	A: Autonomous D: DGPS E: DR N: Output Data Not Valid R: Coarse Position S: Simulator

Table 2.11: Course Over Ground and Grond Speed: VTG Data Format

Note:

Coarse Position mode is supported in versions 4.1.0 and later. When Mode is R, the position is calculated based on one or more of the SVs having their states derived from almanac parameters, instead of ephemerides.

2.9 Time and Date: ZDA

This message is included only with systems that support a time-mark output pulse identified as 1PPS. This outputs the time associated with the current 1PPS pulse. Each message is outputted within a few hundred m/s after the 1PPS pulse is outputted, and provides the time of the pulse that just occurred.

This message reports the UTC time and date represented by the immediately preceding 1 PPS pulse. The message is typically only supported in receivers where the position report is not aligned with the GPS second (SiRFstarII and SiRFstarIII receivers), although it can be provided in other receivers under certain circumstances.

This message is supported in SiRFstarV.

Table 2.12 lists the message information for the following example:

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

Name	Unit	Description
ZDA	-	GPZDA: Data is in GPS only GLZDA: Data is in GLONASS only GBZDA: Data is in BDS only GNZDA: Data is from multiple constellations
UTC Time	Hours Minutes Seconds	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	Number	Day of the month, range 1 to 31
Month	Number	Month of the year, range 1 to 12
Year	Year	Year
Local zone hour	Hours	Offset from UTC (Not supported, set to 00)
Local zone minutes	Minutes	Offset from UTC (Not supported, set to 00)

Table 2.12: Time and Date: ZDA Data Format

2.10 GSM Measurement Response: $PSRF78,81

This message passes a GSM measurement from the HM to the NMEA output when periodic GSM measurement reporting is enabled. See OSP Measurement Response Message ID 69, Sub ID 2.

This message is supported in SiRFstarV.

Table 2.13 lists the message information for the GSM measurement response.

Name	Unit	Description
$PSRF78,81	-	PSRF78 protocol header
UTC	Hours Minutes Seconds	Timestamp hhmmss.sss
STATUS	-	A: Data valid V: Data not valid
NUM_GSM_CELLS	Number	Number of cells for which information is included in the NMEA message
The following fields are repeated as a block NUM_GSM_CELLS times		
MCC	Ref. ITU E.212	Mobile country code of network. For example, UK
MNC	Ref. 3GPP TS 23.003	Mobile country code of network, For example, Vodaphone
LAC	Ref. 3GPP TS 23.003	Location area code
CID	Ref. 3GPP TS 23.003	Cell ID
ARFCN	Ref. 3GPP TS 45.005	ARFCN
BSIC	Ref. 3GPP TS 23.003	Base station Identity Code
Frame number	Number	Number of reference frame
RSSI	dBm	RSSI
numEotdMeas	Ref. 3GPP TS 23.003	Encoded, represents 2..55
stdofEotd	Ref. 3GPP TS 44.031	-
symbolOtd	-	TNbor: TRef OTD in 1/256 symbols. (0..39999)
burstOtd	-	TNbor: TRef OTD in increments of 156.25 symbol bursts, modulo 1 frame Frame Otd is 156.25 * BurstOtd + symbolOtd

Table 2.13: GSM Measurement Response: $PSRF120,81 Field Description

2.11 GSM Assistance Data Response: $PSRF78,84

This message passes the current GSM assistance database from the HM to the NMEA output, when periodic assistance indication is enabled via NMEA. See OSP Measurement Response Message ID 69, Sub ID 2.

This message is supported in SiRFstarV.

Table 2.14 lists the message information for GSM Assistance Data Response.

Name	Unit	Description
$PSRF78,84	-	PSRF78 protocol header
UTC	Hours Minutes Seconds	Timestamp hhmmss.sss
Number of Messages	Number	Number of these messages in group
Message Number	Number	Number of this message within group
NUM_GSM_CELLS	Number	Number of cells for which information is included in the NMEA message
The following fields repeated NUM_GSM_CELLS times as a block:		
MCC	Ref. ITU E.212	Mobile country code of network. for example, UK
MNC	Ref. 3GPP TS 23.003	Mobile country code of network, for example, Vodaphone
LAC	Ref. 3GPP TS 23.003	Location Area Code
CID	Ref. 3GPP TS 23.003	Cell ID
ARFCN	Ref. 3GPP TS 45.005	ARFCN
BSIC	Ref. 3GPP TS 23.003	Base Station Identity Code
BS Lat	Degrees Minutes	Latitude of Base Station ddmm.mmmm
N/S	-	Latitude sign: N: North S: South
BS Long	Degrees Minutes	Longitude of Base Station dddmm.mmmm
E/W	-	Longitude sign: E: East W: West
BS Alt	Metres	Altitude of Base Station

Table 2.14: GSM Assistance Data Response: $PSRF120,84 Field Description

2.12 Wi-Fi Measurement Response: $PSRF78,129

This message passes a Wi-Fi measurement from the HM to the NMEA output, when periodic Wi-Fi measurement reporting is enabled. See OSP Set Message Rate.

This message is supported in SiRFstarV.

Table 2.15 lists the message information for Wi-Fi Measurement Response.

Name	Unit	Description
$PSRF78,129	-	PSRF78 protocol header
UTC	Hours Minutes Seconds	Timestamp hhmmss.sss
NUM_APS	-	Number of Access Points
The following fields repeated as a block for each included AP NUM_APS times:		
BSSID	-	MAC Address of BSS
Serving AP indicator	-	Service state of AP: U: Uknown N: Not serving
AP Tx Power	dBm	AP Tx power
AP Tx Gain	dBi	AP Ant. Gain
Frequency	-	Wi-Fi channel (0..256)
RTD Value (1)	ns	Measured RTD
RTD Uncertainty (1)	-	SD of reported RTD
Device Type (1)	-	Wi-Fi device specification version: a b g n
SNR(1)	dB	SNR of signal received by User Equipment
RSSI(1)	dBm	RSSI or AP measured by User Equipment
STA Tx Power(1)	dBm	Tx power of Station
STA Antenna Gain(1)	dBi	Antenna gain of Station
STA SNR (1)	-	SNR of signal received from UE measured at AP
STA RSSI (1)	-	RSSI of signal from UE as measured at AP
Location (1)	-	Location reported by AP (if any), from 802.11v LCI (RFC 3825) encoded value, referenced to WGS84 datum.
Location Type	-	Location height type in RFC 3825 (1 for metres, 2 for floors. Unit: 1 or 2

Name	Unit	Description
Latitude resolution	Bits	Number of valid bits of latitude (from 34 bit representation in 2^{-25} degree units)
Latitude	Degrees Minutes	Latitude ddmm.mmmm
N/S	-	Latitude sign: N: North S: South
Longitude resolution	Bits	Number of valid bits of latitude (from 34 bit representation in 2^{-25}degree units)
Longitude	Degrees Minutes	Longitude dddmm.mmm
E/W	-	Longitude sign: E: East W: West
Altitude resolution	Bits	Number of valid bits of altitude (from 30 bit representation in 2^{-8} metre/floor units)
Altitude	Metres	Altitude

Table 2.15: Wi-Fi Measurement Response: $PSRF120,129 Field Description

(1) These fields are only present if the UE can obtain IEEE 802.11v defined data from the serving AP. They are not populated in sniffer-only implementations.

2.13 WiFi Assistance Data Response: $PSRF78,132

This message passes a Wi-Fi Assistance Data Response report from the HM to the NMEA output, when periodic Assistance Data reporting is enabled. See OSP Set Message Rate.

This message is supported in SiRFstarV.

Note:

If more applications are available than can be reported in the message for a given reference point, this table describes only the strongest applications.

Table 2.16 lists message information for WiFi Assistance Data Response.

Name	Unit	Description
$PSRF78,132	-	PSRF78 protocol header
UTC	Hours Minutes Seconds	Timestamp hhmmss.sss
Message number	Number	Number of this message wthin group
Number of messages	Number	Number of messages in group

Name	Unit	Description
Postion format type	-	Only 0 defined in this version of the protocol
RP Latitude	Degrees Minutes	ddmm.mmmm
N/S	-	Latitude sign: N: North S: South
RP Longitude	Degrees Minutes	ddmm.mmmm
E/W	-	Longitude sign: E: East W: West
RP Altitude	Metres	-32768 to 32767 metres wrt. WGS84 datum
NUM_APS	-	Number of cells for the information in the NMEA message
The following fields are repeated for each included AP NUM_APS times:		
BSSID	-	MAC Address of BSS
Rel. North	Metres relative to the reference point	Relative North altitude values
Rel. East	Metres relative to the reference point	Relative East altitude values
Uncertainty	-	Coded uncertainty
Rel. Alt.	-	Distance of AP above Reference Point
Rel. Pwr	db	Power weighting offset

Table 2.16: WiFi Assistance Data Response: $PSRF120,132 Field Description

2.14 External Storage Map Response: $PSRF131, 1

This message is the NMEA equivalent to the OSP External Storage Map Response. It indicates the external storage memory mapping, or data storage parameters. The NMEA size constraints requires this message to have 3 Sub IDs: 1, 2 and 3.

This message is supported in all versions of SiRFstarV.

Table 2.17 lists the message information for External Storage Map Response.

Name	Unit	Description
$PSRF131, 1	-	PSRF131 protocol header
Start Address	-	Code start address (in storage memory)
Code End Address	-	Code end address (in storage memory)
Storage Data End	-	Storage data memory end address (in storage memory)
Storage End	-	Storage memory end address

Table 2.17: External Storage Map Response: $PSRF131, 1 of 3 Field Description

This is an example message sequence for the first part of $PSRF131:

```
$PSRF131,1,Storage Start:40400000, Storage Code End:40520000, Storage Data
End:4059bfff, Storage End:40600000*06<CR><LF>
```

2.15 External Storage Map Response: $PSRF131, 2

This message is the NMEA equivalent to the OSP External Storage Map Response. It indicates the external storage memory mapping or data storage parameters. NMEA size constraints requires this message to have 3 SubIDs: 1, 2 and 3.

This message is supported in all versions of SiRFstarV.

Table 2.18 lists the message information for External Storage Map Response.

Name	Unit	Description
$PSRF131, 2	-	PSRF131 protocol header
Storage Data Set	-	Data1. First data set of $PSRF131 messages.
UTC Start Address	-	Starting address of UTC data
RTC Start Address	-	Starting address of RTC data
XO Start Address	-	Starting address of XO data
Almanac Start Addresses	-	Almanac starting address for GPS, GLONASS, GAL and BDS almanacs

Table 2.18: External Storage Map Response: $PSRF131, 2 of 3 Field Description

This is an example message sequence for the second part of $PSRF131:

```
$PSRF131,2,Data1 -
UTC:40520000,RTC:40522000, XO:40400000,ALM(GPS:40522000,GLO:40527000,GAL:40400000,BDS:4040000
0)*1A<CR><LF>
```

2.16 External Storage Map: $PSRF131, 3

This message is the NMEA equivalent to the OSP External Storage Map Response. It indicates the external storage memory mapping or data storage parameters. NMEA size constraints requires this message to have 3 SubIDs: 1, 2 and 3.

This message is supported by SiRFstarV.

Table 2.19 lists the message information for External Storage Map.

Name	Unit	Description
$PSRF131, 3	-	PSRF131 protocol header
Storage Data Set	-	Data2. Second data set of $PSRF131 messages.
EE Hdr Addresses	-	Starting address of EE headers (GPS and GLONASS)
CGEE Addresses	-	Starting address of CGEE data (GPS and GLONASS)
SGEE Addresses	-	Starting address of SGEE data (GPS and GLONASS)
Free Memory/Data Logger Start Address	-	Free memory (for user data)/data logger starting address

Table 2.19: External Storage Map: $PSRF131, 3 of 3 Field Description

This is an example message sequence for the third part of $PSRF131:

```
$PSRF131,3,Data2 -
EEHdr(GPS:4052c000,GLO:40533000),CGEE(GPS:4053a000,GLO:40548000),SGEE(GPS:40556
000,GLO:40579000),Free/DL:4059c000*07<CR><LF>
```

2.17 Proprietary: $PSRF140

This message is for CSR extended ephemeris use only. The content of this message is proprietary.

This message is supported in SiRFstarV.

Table 2.20 lists the message information.

Name	Unit	Description
$PSRF140	-	PSRF140 protocol header
Extended Ephemeris	-	Proprietary data

Table 2.20: Proprietary: $PSRF140 Field Description

2.18 Verified 50 BPS/SUBFRAME: $PSRF141

This message outputs the verified 50 BPS/Sub frame packets from NAV that are used by SiRF as seed data for CGEE predictions in NMEA mode.

This message is supported in GSD4t version 4.1.2. It is not supported in ROM 2.2/GSD4e_ROM 4.1.2 releases.

Table 2.21 lists the message information.

Name	Unit	Description
$PSRF141	-	PSRF141 protocol header NMEA_EE_SUBFRAME_VERIFIED_OUTPUT
Extended Ephemeris	-	CSR's proprietary data

Table 2.21: Verified 50 BPS/SUBFRAME: $PSRF141 Description

2.19 OkToSend: $PSRF150

This message is sent during power-saving mode, such as TricklePower™ and Push-to-Fix™. It indicates that the receiver can recieve messages ,or that it is going into low-power mode. $PSRF150 is the first message sent when power is restored. It is the last message sent before going into low-power mode.

Table 2.22 lists the message information for the following examples:

1. OkToSend

   `$PSRF150,1*3E<CR><LF>`
2. not OkToSend

   `$PSRF150,0*3F<CR><LF>`

Name	Unit	Description
$PSRF150MID	-	PSRF150 protocol header
OkToSend	-	1: OK to send 0: Not OK to send

Table 2.22: OkToSend: $PSRF150 Massage Field Description

2.20 GPS Data and Extended Ephemeris Mask: $PSRF151

SiRFInstantFix uses $PSRF151 to request ephemerides for specific satellites.

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

Table 2.23 lists the message information.

Name	Unit	Description
$PSRF151	-	PSRF151 protocol header
GPS_TIME_VALID_FLAG	Bits	Bit 0: 1, GPS week is valid
GPS Week	Week number	Extended week number
GPS Time of Week	10 seconds	GPS time of week
EPH_REQ_MASK	-	Mask to indicate the satellites for which new ephemeris is needed. Eight characters preceded by "0x" to show this 32-bit mask (in hex). The MSB is for satellite PRN 32 The LSB is for satellite PRN 1.

Table 2.23: GPS Data and Extended Ephemeris Mask: $PSRF151 Field Description

2.21 Extended Ephemeris Integrity: $PSRF152

SiRFInstantFix uses $PSRF152 to report the validity of various aspects of satellite data in the receiver.

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

Table 2.24 lists the message information.

Name	Unit	Description
$PSRF152	-	PSRF152 protocol header
SAT_POS_VALIDITY_FLAG	Bits	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	Bits	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	Bits	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.

Table 2.24: Extended Ephemeris Integrity: $PSRF152 Field Description

2.22 Extended Ephemeris ACK: $PSRF154

The SiRFInstantFix software uses $PSRF154 to acknowledge input $PSRF107, $PSRF108 and $PSRF110.

This message is supported in SiRFstarV.

And example of this message is:`$PSRF154,110*3B<CR><LF>`

Table 2.25 lists the message information.

Name	Unit	Description
$PSRF154	-	PSRF154 protocol header
ACK ID	-	MID of the message to ACK:$PSRF107, $PSRF108 or $PSRF110

Table 2.25: Extended Ephemeris ACK: $PSRF154 Field Description

2.23 Proprietary: $PSRF155

This message is for CSR's extended ephemeris use only. The content of this message is proprietary.

Table 2.26 lists the message information.

Name	Unit	Description
$PSRF155	-	PSRF155 protocol header
Extended Ephemeris	-	Proprietary data

Table 2.26: Proprietary: $PSRF155 Field Description

2.24 ECLM ACK/NACK: $PSRF156,20

This message is the ACK/NACK response to $PSRF114,16, 17, 18, 19, or 1A. The SID for this message is fixed to 20.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstar GSD4e.

Table 2.27 lists the message information for the following example:

SID = 20, ACK SID = 22

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

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	20
ACK MID	-	$PSRF114: ECLM download
ACK SID	-	16: ECLM Start download This field can take values 16, 17, 18, 19, or 1A to ACK corresponding SIDs
ACK/NACK	-	0: ACK 1: NACK
Reason	-	See Table 2.28

Table 2.27: ECLM ACK/NACK: $PSRF156,20 Field Description

Value	Code	Description
0	ECLM_SUCCESS	Success
1	ECLM_SPACE_UNAVAILABLE	Insufficient space
2	ECLM_PKT_LEN_INVALID	Packet length field out of range
3	ECLM_PKT_OUT_OF_SEQ	Packet received is out of sequence
4	ECLM_DOWNLOAD_SGEE_NONEWFILE	No new file

Value	Code	Description
5	ECLM_DOWNLOAD_CORRUPTFILE_ERROR	Corrupt file
6	ECLM_DOWNLOAD_GENERIC_FAILURE	Generic failure
7	ECLM_API_GENERIC_FAILURE	Generic failure calling CLM API
8	ECLM_AID_IN_PROGRESS	Aiding in progress
9	ECLM_NOT_INITIALIZED	The module has not been started
10	ECLM_DOWNLOAD_SGEE_NONEWFILE_BUT_MOREDATA	Data is being sent but the previous file has already been filled

Table 2.28: Description of ACK/NACK: $PSRF156,20 Values

2.25 ECLM EE Age: $PSRF156, 21

This is the response to $PSRF114,19. The SID for this message is fixed to 21.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstar GSD4e.

Table 2.29 lists the message information for the following example:

SID = 21, prnNum = 7

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

If NACKed, the reason for the NACK is present in the next byte. If ACKed, the fields in Table 2.29 display after the ACK field.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	21
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: 7
ephPosFlag	-	Ephemeris flag that indicates 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)

Name	Unit	Description
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 2.29: ECLM EE Age: $PSRF156,21 Field Description

2.26 ECLM SGEE Age: $PSRF156,22

This is the response to the $PSRF114, Sub ID1A. The SID for this message is fixed to 22.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstar GSD4e.

Table 2.30 lists the message information for the following example:

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

SID = 22, SGEE Age = 7da8, Prediction Interval = 15180

Name	Unit	Description
$PSRF156	-	PSRF protocol header
SID	-	22:ECLM Get EE Age ACK/NACK
SGEE Age	Seconds	Age of the SGEE age in the receiver
Prediction Interval	Seconds	Prediction interval

Table 2.30: ECLM Get SGEE Age: $PSRF156,22 Field Description

2.27 ECLM Download Initiate Request: $PSRF156,23

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

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix

This message is supported in SiRFstar GSD4e.

Table 2.31 lists the message information for the following example:

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

SID = 23, Start Download = 1, Time to Wait = 0

Name	Unit	Description
$PSRF156	-	PSRD156 protocol heder
SID	-	23: Download initiate request
Start/Stop	-	1: Start download 0: Stop download
Time to Next Start	Seconds	0: Immediate start, otherwise specified number of seconds

Table 2.31: ECLM Download Initiate Request: $PSRF,23 Field Description

2.28 ECLM Erase Storage File: $PSRF156,24

This message erases a storage file specified by NVMID.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstar GSD4e.

Table 2.32 lists the message information for the following example:

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

SID = 24, NVM ID = 3

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	24: Erase storage file
NVM ID	-	1: Erase SGEE file 2: Erase CGEE file 3: BE file

Table 2.32: Erase Storage File: $PSRF156,24 Field Description

2.29 ECLM Update File Content: $PSRF156,25

This message sends updated file contents from the receiver to the host, and tells the host to store the included information of a specified file.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

Table 2.33 lists the message information for the following 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>
```

SID = 25, NVMID = 2, Blocks = 0x1

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	25: SID for ECLM update file content
NVM ID		SGEE file: 1 CGEE file: 2 BE file: 3
Size	-	Size
Offset	-	Offset
Seq Number	-	Seq number
Data	Bytes	-

Table 2.33: Update File Content: $PSRF156,25 Field Description

2.30 ECLM Request File Content: $PSRF156,26

This message requests the file content of a specified NVM ID. '

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstar GSD4e.

Table 2.34 lists the message information for the following example:

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

SID = 26, NVMID = 3, Blocks = 1

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	26
NVM I-	-	SGEE file: 1 CGEE file: 2 BE file: 3
Seq Number	-	-
Num Blocks	Number	Number of blocks in packet
Block Size	-	-
Block offset	-	Offset in file

Table 2.34: Request File Content: $PSRF156,26 Field Description

2.31 GNSS Extended Ephemeris Request: $PSRF156,41

This message requests ephemeris for specific satellites from external SIF. The SID for this message is fixed to 41 and sent only when SIF and NAV are not integrated together.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

An example of this message is: `$PSRF156,41,0,3,1485,147236.3,0x43002732,0*4A<CR><LF>`

Table 2.35 lists message information for GNSS Extended Ephemeris Request.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	41
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
GPS_TIME_VALID_FLAG	Bits	Bit 1:1, GPS week is valid Bit 1:1, GPS time is valid
GPS Week	-	Extended week number
GPS Time of Week	-	GPS time of week
EPH_REQ_MASK	-	Mask indicates the satellites that need new ephemeris. Eight characters show this 32-bit mask in hexadecimal. The MSB is for satellite PRN 32, and the LSB is for satellite PRN 1.
reserved	-	Reserved field

Table 2.35: GNSS Data and Extended Ephemeris Mask: $PSRF156,41 Field Description

2.32 GNSS Proprietary: $PSRF156,44

This message is for CSR's extended ephemeris usage only. The content of this message is proprietary. The SID for this message is fixed to 44. This is sent only when SIF and NAV are not integrated together.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

Table 2.36 lists the message information for GNSS proprietary.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	44
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
Extended Ephemeris	-	Proprietary message
Reserved	-	Reserved field

Table 2.36: GNSS Proprietary: $PSRF156,44 Field Data

2.33 GNSS ACK/NACK: $PSRF156,50

This is the ACK/NACK response to $PSRF114, SID 49, 4A, 4B, 4C, or 4D. The SID for this message is fixed to 50.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

An example of this message is:
`$PSRF156,50,0,72,49,0,0,0*09<CR><LF>`.

Table 2.37 lists message information for GNSS ACK/NACK: MID 156, 50.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	50
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
ACK MID	-	114: GNSS download
ACK SID	-	16: GNSS start download This field can take values 49, 4A, 4B, 4C or 4D to ACK corresponding SIDs
ACK/NACK	-	0: ACK 1: NACK
Reason	-	0: Success 1: Insufficient space available 2: Invalid packet length 3: Received packet out of sequence 4: SGEE download file not found 5: Corrupt download File 6: Generic download failure 7: Generic API failure 8: SIF aiding is in progress 9: SIF has not started
Reserved	-	Reserved field

Table 2.37: GNSS ACK/NACK: $PSRF156, 50 Field Description

2.34 GNSS EE Age: $PSRF156,51

This message is the response to MID 114,4C. The SID for this message is fixed to 51. Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix. This message is supported in SiRFstarV.

An example of this message is: `$PSRF156,51,0,1,7,2,0,0,0,0,0,0,2,0,0,0,0,0,0,0*10<CR><LF>`

Table 2.38 lists the message information for GNSS EE Age.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	51: GNSS EE age
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
numSAT	-	This field indicates the number of times the fields repeat. The following fields repeat: ▪ prnNum ▪ ephPosFlag ▪ eePosAge ▪ cgeePosGPSWeek ▪ cgeePosTOE ▪ ephClkFlag ▪ eeClkAge ▪ cgeeClkGPSWeek
prnNum	-	PRN number of satellites for which age is indicated in other fields: GPS: 1 to 32 GLONASS: 65 to 88
ephPosFlag	-	Ephemeris flag that indicates the type of ephemeris available for the satellite (Position Age): 0: Invalid ephemeris, not available 1: BE 2: SGEE 3: CGEE
eePosAge	0.01 days	Age of EE (Position Age)
cgeePosGPSWeek	-	GPS week of BE used in the CGEE generation. If ephPosFlag is not set to 3 it is set to 0 (Position Age)

Name	Unit	Description
cgeePosTOE	GPS: 16 Seconds GLONASS: 15 Seconds	TOE of BE used in the CGEE generation. If ephPosFlag is not set to 3 it is set to 0 (Position Age)
ephClkFlag	-	Ephemeris flag to indicate the type of ephemeris available for the satellite (Clock Age): 0: Invalid ephemeris, not available 1: BE 2: SGEE 3: CGEE
eeClkAge	1.01 days	Age of EE (Clock Age)
cgeeClkGPSWeek	-	GPS week of BE used in the CGEE generation. If ephClkFlag is not set to 3 it is set to 0 (Clock Age)
cgeeClkTOESec	GPS: 16 Seconds GLONASS: 15 Seconds	TOE of BE used in the CGEE generation. If ephClkFlag is not set to 3 this value is set to 0 (Clock Age) Unit:
reserved	-	Reserved field. This field is not repeated.

Table 2.38: GNSS EE Age: $PSRF156,51 Field Description

2.35 GNSS SGEE Age: $PSRF156,52

This message is the response to $PSRF114, SID 4D. The SID for this message is fixed to 52.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

An example of this message is: `$PSRF156,52,0,7da8,15180*3E<CR><LF>`

Table 2.39 lists the message information for GNSS SGEE Age.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	52
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
SGEE Age	Seconds	Age of the SGEE age in the receiver
Prediction Interval	Seconds	This field indicates total validity of downloaded SGEE file
reserved	-	Reserved field

Table 2.39: GNSS SGEE Age: $PSRF156,52 Field Description

2.36 GNSS Download Initiate Request: $PSRF156,53

This message is a Download Initiate Request and is sent if a fresh download of the SGEE file is required. The SID for this message is fixed to 53.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

An example of this message is: `$PSRF156,53,0,1,0,0*09<CR><LF>`

Table 2.40 lists the message information for GNSS Download Initiate Request.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	53
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
start/stop	Seconds	1: Start download 0: Stop download
Wait time before start	Seconds	0: Immediate start, otherwise specified number of seconds
reserved	-	Reserved field

Table 2.40: GNSS Download Initiate Request: $PSRF156,53 Field Description

2.37 GNSS Erase Storage File: $PSRF156,54

This message erases the storage file specified by NVM ID. The SID for this message is fixed to 54.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

An example of this message is: `$PSRF156,54,0,3,0*10<CR><LF>`

Table 2.41 lists the message information for GNSS Erase Storage File.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	54
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
NVM ID	-	NVM ID of the storage: 01: GPS SGEE 02: GPS CGEE 03: GPS BE 05: GPS header 06: GLONASS SGEE 07: GLONASS CGEE 08: GLONASS BE 0a: GLONASS header
reserved	-	Reserved field

Table 2.41: GNSS Erase Storage File: $PSRF156,54 Field Description

2.38 GNSS Update File Content: $PSRF156,55

This message requests an update of the file content of an EE file stored on the host identified by NVM ID. The SID for this message is fixed to 55.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

An example of this message is:
`$PSRF156,55,0,2,11,4f06,1,29,38,c2,75,4e,fb,c,b3,cc,b0,bf,b6,93,3e,84,24,90,0*1C<CR><LF>`

Table 2.42 lists the message information for GNSS Update File Content.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	55
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS

Name	Unit	Description
NVM ID	-	NVM ID of the storage: 01: GPS SGEE 02: GPS CGEE 03: GPS BE 05: GPS header 06: GLONASS SGEE 07: GLONASS CGEE 08: GLONASS BE 0a: GLONASS header
Size	-	Size of content
Offset	-	Offset of content in given storage file
Seq Number	-	Packet sequence number
Data	Bytes	File content
reserved	-	Reserved field

Table 2.42: GNSS Update File Content: $PSRF156,55 Field Description

2.39 GNSS Request File Content: $PSRF156,56

This message requests the file content for a specified NVM ID. The SID for this message is fixed to 56.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

An example of this message is: `$PSRF156,56,0,3,1,1,4c,0,0*75<CR><LF>`

Table 2.43 lists the message information for GNSS Request File Content.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	56
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS

Name	Unit	Description
NVM ID	-	NVM ID of the storage: 01: GPS SGEE 02: GPS CGEE 03: GPS BE 05: GPS header 06: GLONASS SGEE 07: GLONASS CGEE 08: GLONASS BE 0a: GLONASS header
Seq Number	Number	Packet sequence number
Num Blocks	Number	Number of blocks in each packet. The following fields are repeated Num Blocks times: ▪ block size ▪ block offset
Block Size	Bytes	Size of each block
Block offset	Bytes	Offset in file
reserved	-	Reserved field

Table 2.43: GNSS Request File Content: $PSRF156,56 Field Description

2.40 GNSS Get EE Header Request: $PSRF156,58

This message requests the host to retrieve the entire EE header information from storage. The receiver sends this request at start-up if and only if the default selection of EE aiding data storage is set to host storage. In response to this request the host sends EE header contents to the firmware. The SID for this message is fixed to 58.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

An example of this message is: `$PSRF156,58,0,0,0*75<CR><LF>`

Table 2.44 lists the message information for GNSS Get EE Header Request.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	58
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
Reserved1	-	Reserved field
Reserved2	-	Reserved field

Table 2.44: GNSS Get EE Header request: $PSRF156,58 Field Description

2.41 Watchdog Timeout and Exception Condition: $PSRF160

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
- Troubleshooting

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

When the host receives this message, it switches 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.

This message is supported in SiRFstarV.

An example of this message is: `$PSRF160,W,1,0*5A<CR><LF>`

Table 2.45 lists the message information for the Watchdog Timeout and Exception Condition message.

Note:

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

Name	Unit	Description
$PSRF160	-	PSRF160 protocol header
Event Condition	-	W: Watchdog time-out event E: Reserved: Exception condition event
Patch RAM corruption	-	0: Intact, not corrupted 1: Corrupted, must restore
Exception code	-	Hexadecimal value of the processor exception code register (0 if event W)

Table 2.45: Watchdog and Exception Condition Notification: $PSRF160 Field Description

2.42 GPIO State Output: $PSRF165

This message is sent in response to a request for this message:

An example of this message is: `$PSRF165,1ff*38<CR><LF>`

Table 2.46 lists the message information for GPIO State Output.

Note:

This message supports GSD4e version 4.1.2 and later.

Name	Unit	Description
$PSRF165	-	PSRF165 protocol header
gpio_state	Bitmap	State of each GPIO. For example: bit 0: GPIO 0 bit 1: GPIO 1

Table 2.46: GPIO State Output: $PSRF165 Field Description

2.43 Data Log Record Output: $PSRF190

This message consists of data read from the data log store using a single record type of 0 through 5. It is a subset of fields from OSP MID 41 (or OSP MID 67, 1 for Record Type 5) and uses the same units, precision, and ranges for all values. Not all fields are populated for all record types. Applicable fields that are empty are indicated by adjacent commas, and empty fields are not included in the CRC. Record Type 1 is the smallest, and each subsequent type includes the previous with additional fields. All fields within the message remain in the same position. Record Type 0 is for previous compatibility. Longer record types, such as Record Types 0, 4 and 5, are split into multi-sentence messages to maintain length limits.

Total sentences and unique sequence number fields in each sentence facilitate multi-part management. Requesting this message while the data logger is active stops data logging before output begins. No other NMEA messages are outputted while retrieving logged data.

This message is supported in SiRFstarV.

Table 2.47 lists the message information for Data Log Record Output.

Note:

This message supports version 4.1.2 and later.

Name	Unit	Description
$PSRF190	-	PSRF190 protocol header
Total Sentences	-	Number of sentences for full data. Range: 1 to 255
Sentence Number	-	Sentence sequence number out of total sentences. Range: 1 to 255
Record Type	-	Record type (rec type 0 to 5)
UTC Date	Year Month Day	YYMMDD date (rec type 0 to 5)

Name	Unit	Description
UTC Time	Hours Minutes Seconds	HHMMSS time (rec type 0 to 5)
Latitude	Degrees Minutes	DDMM.mmm (rec type 0 to 5) Range: 0.0 to 8959.9999
Latitude Direction	-	(rec type 0 to 5) N: North S: South
Longitude	Degrees Minutes	DDDMM.mmm (rec type 0 to 5) Range: 0.0 to17959.9999
Longitude Direction		(rec type 0 to 5) E: East W: West
Altitude (MSL)	Metres	Altitude from mean sea level (rec type 0, 2 to 5)
Altitude Units	-	(rec type 0, 2 to 5)
Speed Over Ground	m/s	(rec type 3 to 5)
CRC-32	-	CRC-32 value of non-zero -padded payload (rec type 1 to 3). Not populated for multi-part rec type 0, 4 or 5.
SV Count	-	Count of SVs in fix (rec type 0, 4 or 5) Range: 1 to 255
HDOP	-	Horizontal Dilution of Precision (rec type 0, 4 or 5)
EHPE	Metres	Estimated Horizontal Position Error (rec type 4 or 5)
EHPE Units	-	Metres
TOW	Seconds	Time of Week (rec type 4 or 5)
CRC	-	CRC-32 value of non-zero-padded payload for rec type 4 CRC-16 for rec type 0

Table 2.47: Message Field Description: Second Sentence, Record Type 0, 4 or 5 Field Description

Name	Unit	Description
MID	-	PSRF190 protocol header (rec type 5)
Total Sentences	-	Number of sentences for full data (rec type 5) Range: 1 to 255
Sentence Number	-	Sentence sequence number out of total sentences (rec type 5)
Nav Valid	-	See OSP MID 67 SID 1 (rec type 5)
Nav Type	-	See OSP MID 67 SID 1 (rec type 5)
Altitude (Ellipsoid)	Metres	Altitude from ellipsoid (rec type 5)
GPS SVs	-	bit 0: PRN 1 bit 1: PRN 2, ... (rec type 5)
GLONASS SVs	Bits	bit 0: 70 bit 1: 71, ... (70: channel -7, 71: channel -6, ...) (rec type 5)
SBAS SVs	Bits	bit 0: PRN 120 bit 1: PRN 121, ... (rec type 5)
QZSS SVs	-	bit 0: PRN 193 bit 1: PRN 194, ... (rec type 5)

Table 2.48: Message Field Description: Third Sentence, Record Type 5 Only

Name	Unit	Description
MID	-	PSRF190 protocol header (rec type 5)
Total Sentence	-	Number of sentences for full data (rec type 5) Range: 1 to 255
Sentence Number	-	Sentence sequence number out of total sentences (rec type 5) Range: 1 to 255
PDOP	-	Position (3D) Dilution of Precision (rec type 5)
VDOP	-	Vertical Dilution of Precision (rec type 5)
Heading	Degrees	Clockwise from North (North = 0) (rec type 5)
CRC-32	-	CRC-32 value of nonzero-padded payload (rec type 5)

Table 2.49: Message Field Description: Fourth Sentence, Record Type 5

2.44 Data Log Terminator Output: $PSRF191

This message indicates that data log output is complete and outputs after all valid data records have been read from the data log store and sent out. When the log output is complete, regular NMEA messaging resumes. This message contains no payload data. To start data logging again, issue a new Start Log command.

This message is supported in SiRFstarV.

Table 2.50 lists the message information for Data Log Terminator Output.

Note:

This message supports NMEA version 4.1.2 and later.

Name	Unit	Description
$PSRF191	-	PSRF191 protocol header

Table 2.50: Data Log Terminator Output: $PSRF191 Field Description

2.45 Data Log Status Output: $PSRF192

This message provides the current data logger status including; threshold settings, memory usage, record type, and activity. It can be requested at anytime even while the data logger is active. The memory used indicates the amount of memory written to that has not yet been read back. It is valid only for stop-on-memory-full management and zero.

When all data has been read or the data logger is restarted after a memory full condition, memory used returns to zero. The memory available indicates memory available for writing. It is used for stop-on-memory-full management and shows the full store size. When all data has been read or the data logger is restarted, after a memory full condition, memory available returns to the full store size.

This message is supported in SiRFstarV.

Table 2.51 lists the message information for Data Log Status Output: $PSRF 192.

Note:

This message supports version 4.1.2 and later.

Name	Unit	Description
$PSRF192	-	PSRF192 protocol header NMEA_192
Active	-	0: Not active 1: Logging active
Record Type	-	Record Type. Range: 0 to 4 (GSD4e) 0 to 5 (SiRFstarV 5xp)
Logging Interval	Seconds	Minimum seconds between logging each record Range: 1 to 65535
Distance Threshold	Metres	Current distance threshold setting. Range: 0 to 65535

Name	Unit	Description
Speed Threshold	Metres/ Seconds	Current speed threshold setting. Range: 0 to 65535
Memory Available	Bytes	Size of the data store, or if stopping on full, unused memory
Memory Used	Bytes	If stopping on full, indicates memory used, zero otherwise
Stop On Memory Full	-	0: Circular buffering 1: Stop logging at end of first pass through store
Memory Full	-	0: Not full. If stopping on full 1: Memory is full (logging stopped)
Reserved	-	Always zero

Table 2.51: Data Log Status Output: $PSRF192 Message Field Description

2.46 Response to Poll SW Version String: $PSRF195

This message is the response to the Poll SW version message ($PSRF125).

This message is supported in SiRFstarV.

An example of this message is: $PSRF195
GSD4e_4.1.2-E51 F+ 06/06/2011 157-Jul 5 2011-15:27:59*3A<CR><LF>

Table 2.52 lists the message information for Response to Poll SW Version String: $PSRF195.

Note:

This message supports GSD4e version 4.1.2 and later.

Name	Unit	Description
MID$PSRF195	-	PSRF195 protocol header NMEA_195
Version String	-	-

Table 2.52: Response to Poll SW Version String: $PSRF195 Message Field Description

2.47 Reserved: $PSRF225

Except for SID 6, the contents of this message are proprietary and for CSR internal use only.

This message is supported in SiRFstarV.

2.48 $PSRFEPE

This message provides expected position error.

Table 2.53 lists the message information.

Name	Unit	Description
$PSRFEPE	-	PSRFEPE protocol header
UTC	Hours Minutes Seconds	hhmmss.sss
Status	-	A: Valid fix V: Invalid fix
HDOP	-	Horizontal Dilution of Precision. Scaled to 0.1
EHPE	0.01 Metres	Estimated Horizontal Position Error
EVPE	0.1 Metres	Estimated Vertical Position Error
EHVE	Metres/Seconds	Estimated Vertical Velocity Error
EHE	0.1 Degrees	Estimated Heading Error

Table 2.53: $PSRFEPE Field Description

3 Input Messages

This section describes the NMEA input messages in Table 3.1.

Message	Description
100	SetSerialPort: Set Port A parameters and protocols
101	NavInit: Parameters 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
112	Set message rate
113,01	Set GRF3i+ IF Bandwidth Mode
113,02	Set GRF3i+ Normal/Low Power RF Mode
117,01	Set GRF3i+ IF bandwidth mode
114,16	ECLM start download
114,17	ECLM file size
114,18	ECLM packet data
114,19	ECLM get EE age
114,1A	ECLM get SGEE age
114,1B	ECLM host file content
114,1C	ECLM host ACK/NACK
114,22	ECLM start download
114,23	ECLM file size
114,24	ECLM packet data
114,25	ECLM get EE age
114,26	ECLM get SGEE Age
114,49	GNSS start download

Message	Description
114,4A	GNSS file size information
114,4B	GNSS packet data
114,4C	GNSS get EE age
114,4D	GNSS get SGEE age
114,4E	GNSS host file content
114,4F	GNSS file size information
114,5C	GNSS get EE age
117,16	System turn off
117,32	Switch to boot mode
120[4]	Storage configuration setting
121[3]	Data logging command
122[3]	Data logging interval command
123[3]	Data logging threshold command
124[3]	Data logging memory management command
125[3]	Poll SW version string
126	SPI flash device parameters
131	External storage map request
132	Factory reset
133	Enable/disable DTM
200	Marketing software configuration
MSK	Command message to an MSK radio-beacon receiver

Table 3.1: NMEA Input Messages

[1] Input coordinates in WGS-84 ECEF format.

[2] Input coordinates in WGS-84 Latitude, Longitude and MSL Altitude format.

[3] This feature is supported starting at version 4.1.2 and later.

[4] This feature is supported starting from GSD4e and later.

Note:

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

Table 3.2 shows which CSR platforms support the NMEA input messages.

Message	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw	GSD3fLP	Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg		SiRFstarV: 5e 5xp 5ea
									GSD4t	GSD4e	GSD4t	GSD4e	GSD4t	GSD4e	
100	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
101	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
102	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
103	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
104	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
105	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
106	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
107	2.5 and later	No	2.3 and later	No	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
108	2.5 and later	No	2.3 and later	No	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	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	Yes
114,1A	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes
114,1B	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes
114,1C	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes
114,4A	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes

Message	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw	GSD3fLP	Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg		SiRFstarV: 5e 5xp 5ea
									GSD4t	GSD4e	GSD4t	GSD4e	GSD4t	GSD4e	
114,4B	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
114,4C	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
114,4D	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
114,4E	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
114,4F	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
114,5C	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
114,16	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes
114,17	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes
114,18	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes
114,19	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	Yes
114,22	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
114,23	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
114,24	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
114,25	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No
114,26	No	No	No	No	No	No	No	Yes	Yes	Yes	No	Yes	No	Yes	No

Message	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw	GSD3fLP	Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg		SiRFstarV: 5e 5xp 5ea
									GSD4t	GSD4e	GSD4t	GSD4e	GSD4t	GSD4e	
114,49	No	No	No	No	No	No	No	No	No	No	No	No	No	No	Yes
117,16	No	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
117,32	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
120	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
121	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
122	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
123	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
124	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes
125	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	Yes

Message	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw	GSD3fLP	Code Linked Host		GPIO Strapped Chip		OSP NMEA Switch Msg		SiRFstarV: 5e 5xp 5ea
									GSD4t	GSD4e	GSD4t	GSD4e	GSD4t	GSD4e	
126	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	Yes	No
131	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	No	Yes
132	No	No	No	No	No	No	No	No	No	Yes	No	Yes	No	No	Yes
133	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	No	Yes	Yes
200	Yes	No	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	No

3.1 Set Serial Port: $PSRF100

This command message sets the protocol (SiRF binary or NMEA) and/or the communication parameters, such as Baud rate, data bits, stop bits and parity. The command switches 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. After a reset, the receiver resumes using the saved parameters.

This message is supported in SiRFstarV.

Table 3.3 lists the message information for the following example:

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

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

Name	Unit	Description
$PSRF100	-	PSRF100 protocol header
Protocol	-	0: SiRF binary 1: NMEA
Baud	-	Supported data rates: 1200 (SiRFstarV 5xp B01 only) 2400 (SiRFstarV 5xp B01 only) 4800 9600 19200 38400 57600 115200
DataBits	Bits	8 only
StopBits	Bits	1 only
Parity	-	0: None only

Table 3.3: Set Serial Port: $PSRF100 Field Description

Note:

Operating the GSD4e at speeds below 38400 may cause dropped messages when using SGEE.

CSR does not recommend data rates of 1200 or 2400 (SiRFstarV 5xp B01 only) unless you disable all but one or two NMEA messages

3.2 Navigation Initialization: $PSRF101

This command message 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.

This message is supported in SiRFstarV.

Note:

Including initializing data, such as versions of GSW3 and GSWLT3 and SiRFXTrac, in software that does not support it can cause unpredictable results. Do not set the initialize-data bit in the `ResetCfg` word.

Table 3.4 lists 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>
```

Name	Unit	Description
$PSRF101	-	PSRF101 protocol header
ECEF X	Metres	X coordinate position
ECEF Y	Metres	Y coordinate position
ECEF Z	Metre	Z coordinate position
ClkDrift	Hz	Clock drift of the receiver(1)
TimeOfWeek	Seconds	GPS time Of week
WeekNo	-	GPS week number
ChannelCount	-	Range 1 to 12
ResetCfg	-	See Table 3.5.

Table 3.4: Navigation Initialization: $PSRF101Data Format

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

Value	Description
0	Perform a hot start using internal RAM data. No initialization data is used.
1	Hot start. Use initialization data and begin in start mode. The uncertainties are 5 seconds time accuracy and 300 km position accuracy. Ephemeris data in SRAM is used.
2	Warm start (no init). No initialization data is used, ephemeris data is cleared and warm start performed using remaining data in RAM.
3	Warm start (with init). Initialization data is used, ephemeris data is cleared and warm start performed using remaining data in RAM.
4	Cold start. No initialization data is used. Position, time and ephemeris are cleared, and a cold start is performed.
8	Factory start. No initialization data is used. Internal RAM is cleared and a factory reset is performed.
72	Factory XO start. No initialization data is used. XO Model data is cleared and CW Controller setting switched to default (off). Internal RAM is cleared and a factory reset is performed.

Table 3.5: Reset Mode Value (SiRFstarIII and Later)

3.3 SetDGPSPort: $PSRF102

This message controls the serial port that receives RTCM differential corrections. Differential receivers can output corrections using different communication parameters. If a DGPS receiver has different communication parameters, this command enables the receiver to correctly decode the data. When a valid message is received, the parameters are stored in the battery-backed SRAM and the receiver resumes using the saved parameters.

This message is supported in SiRFstarV.

Note:

Receivers that do not support RTCM 104 DGPS, such as SiRFStarIII, do not support this command.

Table 3.6 lists 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>
```

Name	Unit	Description
$PSRF102	-	PSRF102 protocol header
Baud	-	Supported data rates: 1200 (SiRFstarV 5xp B01 only) 2400 (SiRFstarV 5xp B01 only) 4800 9600 19200 38400 57600 115200
DataBits	Bits	8 7
StopBits	Bits	0 1
Parity	-	0: None 1: Odd 2: Even

Table 3.6: Set DGPS Port: $PSRF102 Data Format

3.4 Query/Rate Control: $PSRF103

This message controls 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.

This message is supported in SiRFstarIV B03 and and partially supported in SiRFstarV. See Table 3.7 for details.

Table 3.7 lists the input values for the following example:

Query the GGA message with checksum enabled.

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

Name	Unit	Description
$PSRF103	-	PSRF103 protocol header
Msg	-	Message to control. See Table 3.8 (1)
Mode	-	0: Set rate 1: Query one time 2: ABP on 3: ABP off 4: Reverse EE on 5: Reverse EE off 6: 5Hz Navigation on 7: 5Hz Navigation off 8: SBAS Ranging on 9: SBAS Ranging off 10: FTS (Fast Time Sync) Mode on 11: FTS Mode off 12: SW Tracking Loop on (SiRFstarIV B03 only) 13: SW Tracking Loop off (SiRFstarIV B03 only) 18: SSB Debug (SiRFstarIV B03 only)

Rate	Seconds	Output Rate, 0: off
		1 to 255: Seconds between messages(2)
		If the Mode field is set to 18 (SSB Debug), this field means message level control. Bit mask of Rate wcontrol output of each message.
		Bit 0 (SiRFstarIV B03 only):
		`SIRF_MSG_SSB_MEASURED_NAVIGATION (MID 2)`
		`SIRF_MSG_SSB_MEASURED_TRACKER (MID 4)`
		`SIRF_MSG_SSB_OK_TO_SEND (MID 18)`
		Bit 1 (SiRFstarIV B03 only): `SIRF_MSG_SSB_NL_MEAS_DATA (MID 28)`
		`SIRF_MSG_SSB_NL_DGPS_DATA (MID 29)`
		`SIRF_MSG_SSB_NL_SV_STATE_DATA (MID 30)`
		`SIRF_MSG_SSB_NL_INIT_DATA (MID 31)`
		`SIRF_MSG_SSB_NL_AUX_INIT_DATA (MID 64, SID 1)`
		`SIRF_MSG_SSB_NL_AUX_MEAS_DATA (MID 64, SID 2)`
		`SIRF_MSG_SSB_NL_AUX_AID_DATA (MID 64, SID 3)`
		`SIRF_MSG_SSB_NL_DEBUG_GNSS (MID 64, SID 4)`
		`SIRF_MSG_SSB_BEP_SET_TIME_INFO (MID 64,SID 10)`
		Bit 2 (SiRFstarIV B03 only):
		`SIRF_MSG_SSB_GEODETIC_NAVIGATION (MID 41)`
		Bit 3 (SiRFstarIV B03 only):
		`SIRF_MSG_SSB_AGC_GAIN_OUTPUT (MID 91,3)`
		`SIRF_MSG_SSB_CW_DATA (MID 92, SID 1)`
		`SIRF_MSG_SSB_CW_FILTER (MID 92, SID 2)`

CksumEnable	-	0: Disable checksum 1: Enable checksum

Table 3.7: Query/Rate Control Data Format: $PSRF103 Message Field Description

(1) The Msg field is ignored if the Mode field has values other than 1 (query) in SiRFstarIV B03 only.

(2) The Rate field is ignored unless the Mode field is set to 0 (Set Rate) in SiRFstarIV B03 only.

Value	Description
0	GGA
1	GLL
2	GSA
3	GSV
4	RMC
5	VTG
6	MSS (If internal beacon is supported)
7	EPE
8	ZDA (if 1PPS output is supported)
9	GNS

Table 3.8: Query/Rate Control Messages

Note:

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

3.5 LLA Navigation Initialization: $PSRF104

This command restarts the receiver and specifies 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.

This message is supported in SiRFstarV.

Note:

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

Table 3.9 lists 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>
```

Name	Unit	Description
$PSRF104	-	PSRF104 protocol header
Lat	Degrees	Latitude +: North (Range: 90 to -90)
Lon	Degrees	Longitude +: East (Range: 180 to to180)

Name	Unit	Description
Alt	Metres	Ellipsoid Altitude in latitude, longitude and altitude (WGS84)
ClkDrift	Hz	Clock drift of the receiver(1)
TimeOfWeek	Seconds	GPS time of week
WeekNo	-	Extended GPS week number
ChannelCount	-	Range: 1 to 12
ResetCfg	-	SeeTable 3.10

Table 3.9: LLA Navigation Initialization: $PSRF104 Field Description

(1) If clock drift is known, enter it here. If not known, enter 0. The receiver uses either the last saved value. If none is available, it uses the default and opens the uncertainty window.

Value	Description
0	Perform a hot start using internal RAM data. No initialization data is used.
1	Hot start. Use initialization data and begin in start mode. The uncertainties are 5 seconds time accuracy and 300 km position accuracy. Ephemeris data in SRAM is used.
2	Warm start (no init). No initialization data is used, ephemeris data is cleared and warm start performed using remaining data in RAM.
3	Warm start (with init). Initialization data is used, ephemeris data is cleared and warm start performed using remaining data in RAM.
4	Cold start. No initialization data is used. Position, time and ephemeris are cleared, and a cold start is performed.
8	Factory start. No initialization data is used. Internal RAM is cleared and a factory reset is performed.

Table 3.10: Reset Mode Value (SiRFstarIII and Later)

3.6 GNSS Extended Ephemeris Integrity: $PSRF156,42

This message reports the validity of various aspects of satellite data in the receiver to the external SIF. The SID for this message is fixed to 42. This is sent only when SIF and NAV are not integrated together.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

An example of this message is: `$PSRF156,42,0, 0x00000002, 0x00000002,0x00000001,0*44<CR><LF>`

Table 3.11 lists message information for GNSS extended ephemeris integrity.

Name	Unit	Description
$PSRF156	-	PSRF156 protocol header
SID	-	42: GNSS Extended Ephemeris Integrity
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
SAT_POS_VALIDITY_FLAG	Bits	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	Bits	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	Bits	Hexadecimal representation of 32-bit field, where Mmsb represents satellite PRN 32, LSB satellite PRN 1. A bit set to 1 indicates that satellite is reported to be unhealthy.
Reserved	-	Reserved field

Table 3.11: GNSS Extended Ephemeris Integrity: $PSRF 156,42

3.7 Development Data On/Off: $PSRF105

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

This message is supported in SiRFstarV.

Table 3.12 lists the input values for the following example:

Debug = 1

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

Name	Unit	Description
$PSRF105	-	PSRF105 protocol header
Debug	-	0: Off 1: On

Table 3.12: Development Data On/Off Data Format: $PSPRF105 Field Description

3.8 Select Datum: $PSRF106

This message enables 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. CSR or developers with SDK software access may have added other datums. Document available datums, if different from this list, in the system or software documentation.

This message is supported in SiRFstarV.

Table 3.13 lists the input values for the following example:

Datum = TOKYO_MEAN

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

Name	Unit	Description
$PSRF106	-	PSRF106 protocol header
Datum	-	21: WGS84 178: TOKYO_MEAN 179: TOKYO_JAPAN 180: TOKYO_KOREA 181: TOKYO_OKINAWA 182: PZ90.11

Table 3.13: Select Datum Data Format: $PSRF106 Field Description

3.9 $PSRF107

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

This message is supported in SiRFstarV.

Table 3.14 lists the message parameter definitions.

Name	Unit	Description
$PSRF107	-	PSRF107 protocol header
Extended Ephemeris	-	Proprietary data

Table 3.14: Proprietary: MID 107 Field Description

3.10 Proprietary: $PSRF108

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

This message is supported in SiRFstarV.

Table 3.15 lists the message parameter definitions.

Name	Unit	Description
$PSRF108	-	PSRF108 protocol header
Extended Ephemeris	-	Proprietary data

Table 3.15: Proprietary: MID 108 Field Description

3.11 Extended Ephemeris Debug: $PSRF110

This message enables 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 to navigate.

This message is supported in SiRFstarV.

Table 3.16 lists the input values for this message.

Name	Unit	Description
$PSRF110	-	PSRF110 protocol header
DEBUG_FLAG	-	0x01000000: Debug flag on, ignore broadcast ephemeris 0x00000000: Debug flag off, normal operation

Table 3.16: Extended Ephemeris Debug: $PSRF110 Field Description

3.12 Set Message Rate: $PSRF112

This message is only for SiRFInstantFix.

This message is supported in SiRFstarV.

Table 3.17 lists the message parameter definitions for the following example:

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

Name	Unit	Description
$PSRF112	-	PSRF112 protocol header
MID to set	-	140. This is the only NMEA MID supported. Message rates can be 1 or 0.
Message rate	Seconds	Valid rates are: 1: Occur once at every periodic EE event, in every 6 seconds 0: Disable
Send Now	-	1: Poll NMEA MID once

Table 3.17: Set Message Rate: $PSRF112 Field Description

3.13 Set GRF3i+ IF Bandwidth Mode: $PSRF113,01

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

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

Table 3.18 lists the values for the following example:

SID = 1, GRF3i+ Bandwidth Mode Selection = 1

Example: `$PSRF113,01,01*24<CR><LF>`

Name	Unit	Description
$PSRF113	-	GRF3i+ protocol header
SID	-	01: Set GRF3i + IF bandwidth mode
GRF3i+ If Bandwidth Mode Selection	-	0: Wideband mode 1: Narrowband mode (default)

Table 3.18: Set GRF3i+ IF Bandwidth Mode: $PSRF113,01 Field Description

3.14 Set GRF3i+ Normal/Low Power RF Mode: $PSRF113,02

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

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

Table 3.19 lists the input values for the following example:

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

SID = 2, GRF3i+ power mode = 1

Name	Unit	Description
$PSRF113	-	GRF3i+ protocol header
SID	-	02: Set GRF3i+ power mode
GRF3i+ power mode selection	-	0: Normal power (default) 1: Low power

Table 3.19: Set GRF3i+ Normal/Low Power RF Mode: $PSRF113,02 Field Description

Note:

GRF3i+ Power Mode would be internally saved to NVM. By default, it is initialized to 0.

3.15 ECLM Start Download: $PSRF114,16

This message contains a packet of the SGEE file data being downloaded from the Host to the GPS receiver. The SID for this message is fixed to 16.

Payload in this message is in hexadecimal format.

This messages is supported in all releases of GSD4e and GSD4t. Table 3.20 lists the message information for the following example:

SID = 16

Example: `$PSRF114,16,0*2C<CR><LF>`

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	16: ECLM start download
Reserved	-	Reserved for future use. Always set to 0.

Table 3.20: ECLM Start Download: $PSRF114,16

Note:

The Reserved field must always be set to 0 otherwise start download does not execute.

3.16 ECLM File Size: $PSRF114,17

This message is sent from Host EE Downloader to the GPS receiver to indicate the size of the SGEE file to be downloaded. The SID for this message is fixed to 17.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

Table 3.21 lists the message information for the following example:

SID = 17, SGEE File Size = 2859

An example of this message is: `$PSRF114,17,2859*23<CR><LF>`

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	17: SGEE file length
File Length	-	File length

Table 3.21: ECLM File Size: $PSRF114,17 Field Description

Note:

The receiver reports the success or failure of this message with $PSRF156,20 in SiRFStarIV only.

This message is not forward-compatible and does not work on SiRFStarV.

3.17 ECLM Packet Data: $PSRF114,18

The Host EE Downloader sends this message to the GPS receiver to indicate the size of the SGEE file to be downloaded. The SID for this message is fixed to 18.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

Table 3.22 lists the message information for the following example:

SID = 18, Packet Sequence No = 1, Packet Length = 32

An example of this message is:

```
$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>
```

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	18: SGEE packet data
Packet Sequence Number of this packet	Decimal	Sequence
Packet Length	Bytes	Length of this packet
Packet Data	Bytes	SGEE data in this packet of length packet length

Table 3.22: ECLM Packet Data: $PSRF114,18 Field Description

Note:

The receiver reports the success or failure of this message with $PSRF156,20.

3.18 ECLM Get EE Age: $PSRF114,19

The Host EE Downloader sends this message to the GPS receiver to get the EE age from the GPS receiver. The SID for this message is fixed to 19.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

Table 3.23 lists the message information for the following example:

SID = 19, Num Sat = 1, Prn Num = 1

An example of this message is: `$PSRF114,19,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0*1B<CR><LF>`

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	19: Get EE Age
Num Sat	-	Number of times below fields are repeated
prnNum	-	PRN number: 1
ephPosFlag	-	Not used, send as a null field (field with no contents)
eePosAge	-	Not used, send as a null field (field with no contents)
cgeePosGPSWeek	-	Not used, send as a null field (field with no contents)
cgeePosTOE	-	Not used, send as a null field (field with no contents)
ephClkFlag	-	Not used, send as a null field (field with no contents)
eeClkAge	-	Not used, send as a null field (field with no contents)
cgeeClkGPSWeek	-	Not used, send as a null field (field with no contents)
cgeeClkTOE	-	Not used, send as a null field (field with no contents)
Pad	-	Not used, send as a null field (field with no contents)

Table 3.23: EECLM Get EE Age: $PSRF114,19 Field Description

Note:

The receiver reports the success or failure of this message with $PSRF156,21 or 20.

3.19 ECLM Get SGEE Age: $PSRF114,1A

The Host EE Downloader sends this message to the GPS receiver to get the SGEE age from the GPS receiver. The SID for this message is fixed to 1A.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

Table 3.24 lists the input values for the following example:

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

SID = 1A, Sat ID = 1

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	1A: Get SGEE age
Sat ID	-	Satellite ID for which SGEE age is asked

Table 3.24: ECLM Get SGEE Age: $PSRF114,1A Field Description

Note:

The receiver reports the success or failure of this message with $PSRF156, 22 (success) or 20 (failure).

3.20 ECLM Host File Content: $PSRF114,1B

This message is sent to the GPS receiver in response to a Request File Content message. The SID for this message is fixed to 1B.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

Table 3.25 lists the message information for the following example:

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

SID = 0x1B, NVM ID = 3, Num Blocks = 1

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	1B: Host file content
SeqNum	-	-
NVM ID	Number	1: SGEE file 2: CGEE file 3: BE file
Num Blocks	Number	Number of blocks per packet
Block Length	-	Block size
Offset	-	Offset of block in file
Data	Bytes	Block data

Table 3.25: EECLM Host File Content: $PSRF114,1B Field Description

3.21 ECLM Host ACK/NACK: $PSRF114,1C

This message is the response to Output MID 156 with SID 23, 24 or 25.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

Table 3.26 lists the input values for the following example:

ACK for Downloader initiate request.

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

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	1C: Host ACK/NACK
ACK MID	-	$PSRF156
ACK SID	-	Possible values: 23 24 25
ACK/NACK	-	0: ACK 1: NACK
Reason	-	0: SUCCESS 1: Invalid NVMID 13: File access error

Table 3.26: ECLM Host ACK/NACK: $PSRF114,1C Field Description

3.22 ECLM Start Download: $PSRF114,22

This message tells the GPS receiver to initiate the SGEE file download to the the host EE downloader. The SID for this message is fixed to 22.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in all releases of SiRFstar GSD4e and GSD4t.

Table 3.27 lists the message information for the following example: SID = 22.

An example of this message is :$PSRF114,16*08<CR><LF>

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	22: ECLM start download

Table 3.27: ECLM Start Download: $PSRF114,22

Note:

This message indicates:

- SUCCESS: Ack: $PSRF156 using Command Acknowledgment $PSRF156,20
- FAILURE: Nack: $PSRF156 using Command Negative Acknowledgment $PSRF156,20.

3.23 ECLM File Size: $PSRF114,23

The Host EE Downloader sends this message to the GPS receiver to indicate the size of the SGEE file to be downloaded. The SID for this message is fixed to 23.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstar GSD4e.

Table 3.28 lists the message information for the following example: SID = 23, SGEE File Size = 10329

An example of this message is:$PSRF114, 17, 2859*23<CR><LF>

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	23: SGEE file size
File Length	Bytes	File length

Table 3.28: ECLM File Size: $PSRF114, 23 Field Description

Note:

This message indicates:

- SUCCESS: Ack: $PSRF156 using Command Acknowledgment $PSRF156,20.
- FAILURE: Nack: $PSRF156 using Command Negative Acknowledgment $PSRF156,20.

3.24 ECLM Packet Data: $PSRF114,24

The Host EE Downloader sends this message to GPS Receiver to indicate the size of the SGEE file to be downloaded. The SID for this message is fixed to 24.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstar GSD4e.

Table 3.29 lists the message information for the following example: SID = 24, Packet Sequence No = 0x1, Packet Length = 32

An example of this message is:
`$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`

Name	Unit	Descripion
$PSRF114	-	PSRF114 protocol header
SID	-	24: SGEE packet data
Packet Sequence No	-	File length
Packet Length	Bytes	Length of this packet
Packet Data	Bytes	SGEE data in this packet

Table 3.29: ECLM Packet Data: $PSRF114, 24 Field Description

Note:

This message indicates:

- SUCCESS: Ack: $PSRF156 using Command Acknowledgment $PSRF156,20.
- FAILURE: Nack: $PSRF156 using Command Negative Acknowledgment $PSRF156,20.

3.25 ECLM Get EE Age: $PSRF114,25

The Host EE Downloader sends this message to the GPS receiver to get the EE Age from GPS Receiver. The SID for this message is fixed to 25.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstar GSD4e.

Table 3.30 lists the message information for the following example: SID = 25, Num Sat = 1, Prn Num = 1

An example of this message is: `$PSRF114,19,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0*1B<CR><LF>`

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	25: Get EE age
Num Sat	-	Number of satellite: 1
prnNum;	-	Not used, send as a null field (field with no contents)
ephPosFlag	-	Not used, send as a null field (field with no contents)
eePosAge	-	Not used, send as a null field (field with no contents)
cgeePosGPSWeek	-	Not used, send as a null field (field with no contents)

Name	Unit	Description
cgeePosTO E	-	Not used, send as a null field (field with no contents)
ephClkFlag	-	Not used, send as a null field (field with no contents)
eeClkAge	-	Not used, send as a null field (field with no contents)
cgeeClkGP SWeek	-	Not used, send as a null field (field with no contents)
cgeeClkTO E	-	Not used, send as a null field (field with no contents)
Pad	-	Not used, send as a null field (field with no contents)

Table 3.30: CLM Get EE Age: $PSRF114, 25

Note:

This message indicates:

- SUCCESS: Ack: $PSRF156 using Command Acknowledgment $PSRF156,21 with EE Age.
- FAILURE: Nack: $PSRF156 using Command Negative Acknowledgment $PSRF156,21.

3.26 ECLM Get SGEE Age: $PSRF114,26

This message is sent from the Host EE Downloader to the GPS receiver to get the SGEE Age from GPS Receiver. The SID for this message is fixed to 26.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstar GSD4e.

Table 3.31 lists the values for the following example: SID = 26, Sat ID = 1

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

Table 3.31 lists the message information for ECLM Get SGEE Age.

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	26: Get SGEE age
Sat ID	-	Satellite ID for SGEE age

Table 3.31: ECLM Get SGEE Age: $PSRF114,26 Field Description

Note:

This message indicates:

- SUCCESS: Ack: $PSRF156 using Command Acknowledgment $PSRF156,22 with SGEE Age.
- FAILURE: Nack: $PSRF156 using Command Negative Acknowledgment $PSRF156,22.

3.27 GNSS Start Download: $PSRF114,49

The Host EE Downloader sends this message to the GNSS receiver to indicate that the host EE downloader initiates the SGEE download procedure. Two modes of the SGEE download are supported:

1. Set the mode field to 0 to indicate either an initial SGEE file download when no previously downloaded SGEE file is available in the receiver, or when the previously downloaded SGEE file expired and a periodical, new download is requested.
2. Set the mode field to 80 to force a new SGEE file to download, even if an unexpired and previously downloaded SGEE file is available in the receiver.

The receiver reports the success or failure of this message with $PSRF156,50.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message is supported in SiRFstarV.

Example:

```
$PSRF114,49,0,0,0*2C<CR><LF>
```

Table 3.32 lists the message information for GNSS Start Download.

Name	Unit	Description
MID	-	PSRF114 protocol header
SID	-	49: GNSS start download
NavSystem	-	Navagation system. Possible values are: 0: GPS 1: GLONASS
Mode	-	Indicates an initial, periodical or forced SGEE download: 0: Initial or periodical download 0x80: Forced download
Reserved	-	Reserved field

Table 3.32: GNSS Start Download: $PSRF114,49 Field Description

3.28 GNSS File Size: $PSRF114,4A

The Host EE Downloader sends this message to the GNSS receiver to indicate the size of the SGEE file to be downloaded. The SID for this message is fixed to 4A.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message applies to SiRFstarV. It is the equivalent of $PSRF114,17.

An example of this message is: `$PSRF114,4A,0,2859,0*2C<CR><LF>`

Table 3.33 lists the input values for GNSS File Size.

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	4A: SGEE file length
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
File Length	-	SGEE file length
reserved	-	Reserved field

Table 3.33: GNSS File Size: $PSRF114,4A Field Description

Note:

The receiver reports the success or failure of this message with $PSRF156,50.

3.29 GNSS Packet Data: $PSRF114,4B

This message sends the SGEE data from the host downloader to the GNSS receiver to be processed by SIF modules and saved in NVM. The SID for this message is fixed to 4B.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message applies to SiRFstarV.

Example: `$PSRF114,4B,0,1,32,62,12,31,6,3,2,7,d9,7,7,0,0,39,6d,8f,12,0,0,0,0,0,0,1,2d,9a,e7,5,2,ff,fe,28,5,0*3D<CR><LF>`

Table 3.34 lists the input values for GNSS Packet Data.

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	4B: SGEE packet data
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
Packet Sequence Number of this packet	-	Packet Sequence number of the current packet starting from 1. This value is transmitted in decimal format
Packet Length	Bytes	Length of this packet. This value is transmitted in decimal format.
Packet Data	Bytes	SGEE data in this packet of length packet length
reserved	-	Reserved field

Table 3.34: GNSS Packet Data: $PSRF114,4B Field Description

Note:

The receiver reports the success or failure of this message with $PSRF156,50.

3.30 GNSS Get EE Age: $PSRF114,4C

This message is sent from Host EE Downloader to the GNSS receiver to get the EE age from the GNSS receiver. The SID for this message is fixed to 4C.

Payload in this message is in hexadecimal format unless stated otherwise.

This message applies to SiRFstarV from ROM2.2.

An example of this message is: `$PSRF114,4C,0,00000001,0*1B<CR><LF>`

Table 3.35 lists the message information for GNSS Get EE Age.

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	4C: Get EE age
Navsystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
satBitMask	Bits	32-bit bitmask of satellites for which EE age is requested. 1 to 32: GPS satellite ID 1 to 24: GLO slot ID
Reserved	-	Reserved field

Table 3.35: GNSS Get EE Age: $PSRF114,4C Field Description

Note:

The receiver reports the success or failure of this message with $PSRF156,51 (success) or 50 (failure).

3.31 GNSS Get SGEE Age: $PSRF114,4D

The Host EE Downloader sends this message to the GNSS receiver to get the EE age from the GNSS receiver. The SID for this message is fixed to 4D.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message applies to SiRFstarV.

An example of this message is: `$PSRF114,4D,0,1,0*42<CR><LF>`

Table 3.36 lists the message information for GNSS Get SGEE Age.

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	4D: Get SGEE age
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
Sat ID	-	Satellite ID for SGEE age: GPS: 1 to 32 GLONASS: 65 to 88
reserved	-	Reserved field

Table 3.36: GNSS Get SGEE Age: $PSRF114,4D Field Description

Note:

The receiver reports the success or failure of this message with $PSRF156,52 for success or 50 for failure.

3.32 GNSS Host File Content: $PSRF114,4E

This message is sent to the GNSS receiver in response to a Request File Content message. The SID for this message is 4E.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message applies to SiRFstarV.

An example of this message is: `$PSRF114,4E,0,1,3,1,a,0,0,0,f,6,0,f0,0,0,4a,0,0*41<CR><LF>`

Table 3.37 lists the message information for GNSS Host File Content.

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	4E: Host file content
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
Seq Num	-	Sequence number of message
NVM ID	-	NVM ID of the storage: 01: GPS SGEE 02: GPS CGEE 03: GPS BE 05: GPS header 06: GLONASS SGEE 07: GLONASS CGEE 08: GLONASS BE 0a: GLONASS header

Name	Unit	Description
Num Blocks	-	Number of blocks per packet
Block Length and offset are repeated Num Block times		
Block Length	Bytes	Block size bytes
offset	Bytes	Offset of block in file bytes
Repetition ends for above 2 fields and data field is repeated Num Block times		
Data	Bytes	Block data
Repetition ends for Data field		
reserved	-	Reserved field

Table 3.37: GNSS Host File Content: $PSRF114,4E Field Description

3.33 GNSS Host ACK/NACK: $PSRF114,4F

This message is the response to $PSRF156 with SID 53, 54 or 55. The SID for this message is 4F.

Payload in this message is in hexadecimal format. Do not input this message with a 0x prefix.

This message applies to SiRFstarV.

An example of this message is: `$PSRF114,4F,0,9c,23,0,0,0*06<CR><LF>`

Table 3.38 lists the message information for GNSS Host ACK/NACK.

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	4F: Get SGEE age
NavSystem	-	Navigation system. Possible values are: 0: GPS 1: GLONASS
ACK MID	-	MID of the message Acked/Nacked
ACK SID	-	SID of the message Acked/Nacked
ACK/NACK	-	0: ACK 1: NACK
Reason	-	Ack/Nack reason
reserved	-	Reserved field

Table 3.38: GNSS Host ACK/NACK: $PSRF114,4F Field Description

3.34 GNSS Sync New SGEE File: $PSRF114,5C

This message supports the Offline SGEE module, which is available in host storage mode, and is available only in SiRFstarV Engine products.

The Host EE Downloader sends this message to the GNSS receiver to indicate that the host EE downloader has downloaded a new SGEE file, and Offline SGEE has converted it to the format that the GNSS receiver understands.

The GNSS receiver must update its header file with the SGEE information it receives from the server. After receiving this message, the receiver updates its internal header with the new header that is provided as a message parameter.

This message only applies to SiRFstarV.

The response packet is ACK / NACK (MID $PSRF156,50) depending on the action performed and the failure conditions defined.

An example of this message is:

```
$PSRF114,5C,0,0,38,1,1,2,0,3,1,F3,6,4,0,DE,7,2,D,0,0,AE,71,0,0,DE,B3,0,0,0,0,0,0,A4,0,
14,25,20,0,0,0,F3,6,2A
5D,19,0,FE,2,42,FB,1,F9,FD,FF,FF,DF,
2,0,0,20,0*56
```

Table 3.39 lists the message information for GNSS Sync New SGEE Gile.

Name	Unit	Description
$PSRF114	-	PSRF114 protocol header
SID	-	5C
NavSystem	-	0: GPS 1: GLONASS
Retry count	-	If the packet is lost, the retry mechanism increments the retry count and re-sends the packet
Size	Bytes	Size of header data Range: 0 to 0x258
Header data	Bytes	Contains header data generated from the SGEE file conversion. Maximum size is 600 bytes.
Reserved	-	Reserved field

Table 3.39: GNSS Sync New SGEE File: $PSR114,5C Field Description

3.35 System Turn Off: $PSRF117,16

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

This message is supported in SiRFstar GSD4e and later.

Table 3.40 lists the message information for the following example:

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

Name	Unit	Description
$PSRF117	-	PSRF117 protocol header
SID	-	16: System turn off

Table 3.40: System Turn Off: $PSRF117,16 Field Description

3.36 Switch to Boot Mode: $PSRF117,32

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

This message is supported in SiRFstar GSD4e and later.

Table 3.41 lists the message information for the following example:

`$PSRF117,32*0D<CR><LF>`

Name	Unit	Description
$PSRF117	-	PSRF117 protocol header
SID	-	32: SID_SwitchToBootMode

Table 3.41: Switch to Boot Mode: $PSRF117,32 Field Description

3.37 Storage Configuration Setting: $PSRF120

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

Table 3.42 lists the input values for the following example:

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

Example:`$PSRF120,F,R,*<checksum><CR><LF>`

Note:

This message is supported by GSD4e and later.

Name	Unit	Description
$PSRF120		PSRF120 protocol header
Patch Storage Setting	-	N: Do not store to external memory(1) F: Store to external memory (default)(1) 0: No change applied to patch
EE Storage Setting	-	H: Storage available on host R: I2C EEROM provided for GSD4e access (default) F: Store to FLASH(2) N: No storage 0: No change to EE storage settings

Table 3.42: Storage Configuration Option Setting: $PSRF120 Field Description

(1) External memory can be either I^2C serial flash (EEPROM) or SPI Flash as determined by the Auto-detect feature in GSD4E ROM. For GSD4e, ROM versions prior to 4.1.2, 0 means do not store to I^2C Serial flash and 1 means store to I^2C serial flash.

(2) Storage is set to either parallel or SPI flash. SPI flash only applies to GSD4E ROM. If a SPI flash part is detected on GSD4E ROM, then 0x02 means store to SPI flash. Otherwise, 0x02 is interpreted to mean parallel flash. For GSD4e, versions prior to 4.1.2 and all 4t versions, 0x02 means store to parallel flash.

3.38 Data Logging Command: $PSRF121

This message controls the state of the data logger allowing it to be started, stopped, cleared, retrieve logged data, and retrieve general status. The minimum logging interval is specified as a parameter of the start command. The current position data is logged if the interval and other threshold criteria are met.

This message supports SiRFstarV.

Table 3.43 lists this message information.

Name	Unit	Desciption
$PSRF121	-	PSRF121 protocol header
Command	-	0: Start 1: Stop 2: Clear 3: Retrieve data 4: Retrieve status
Logging Interval	Seconds	Minimum seconds between logging each record. Only applicable to the `Start` command. Range: 1 to 6535

Table 3.43: Data Logging Command: $PSRF121 Field Description

Note:

If Command 3 is used the receiver responds with PSRF190 and PSRF191. If 4 is used the response is PSRF192.

3.39 Data Logging Interval Command: $PSRF122

This message sets the minimum data logging interval and overrides the 'minimum logging interval' value set in the Data Logger Command Message. When this time is exceeded, data records are logged if other threshold criteria are also met. This interval can be changed at any time even while data logging is active.

This message is supported in SiRFstar GSD4e version 4.1.2 and later.

Table 3.44 lists this message information.

Name	Unit	Description
$PSRF122	-	PSRF122 protocol header
Logging Interval	Seconds	Minimum seconds between logging each record. Range: 0 to 65535

Table 3.44: Data Logging Interval Command: $PSRF122 Field Description

3.40 Data Logging Threshold Command: $PSRF123

This message sets the minimum distance and speed thresholds that must be met before logging a record.

The data record are logged when either:

- The distance change from the last logged record exceeds the distance threshold
- The current record's speed over ground exceeds the speed threshold and the minimum time interval has been exceeded

This message is supported in SiRFstar GSD4e version 4.1.2 and later.

These thresholds can be changed at any time even while data logging is active. Zero threshold values are always exceeded. Threshold results are OR'ed with each other. When any threshold is exceeded, logging occurs at the interval controlled rate. Default Distance Threshold is 0 metres. Default Speed threshold is 0 m/s.

Table 3.45 lists the message information.

Name	Unit	Description
$PSRF123	-	PSRF123 protocol header `NMEA_123`
Distance Threshold	Metres	Distance between current record and the previously logged record that must be exceeded to log the current record. Range: 0 to 65535
Speed Threshold	Metres/Seconds	The speed the current record must exceed to be logged. Range: 0 to 65535

Table 3.45: Data Logging Threshold Command: $PSRF123 Field Description

3.41 Data Logging Memory Management Command: $PSRF124

This message sets the type of memory management and format of the data record to be stored. To take effect it must be issued when the data logger is not active.

The memory management types include:

- Stop-on-memory-full
- Circular data buffering, where oldest data is over written by new data for continuous logging

Logged data is stored and read back using the specified record type. Changing the record type invalidates all stored data and logging starts from the beginning of the allocated area. Default management type is circular buffering for the GSD4e and when SPI Flash is attached to the SiRFstarV 5xp. If no SPI Flash is attached to the SiRFstarV 5xp, the default management type is stop-on-memory-full.

Default record type is Record Type 0 for the GSD4e and for the SiRFstarV 5xp when a SPI Flash is attached. If no SPI Flash is attached to the SiRFstarV 5xp the default record type is Record Type 5, and the records will be saved to internal Applications RAM rather than external SPI Flash.

SiRFstarV 5xp V2.1 ROM:

For the SiRFstarV 5xp, when internal Applications RAM is used, if either GPIO2, GPIO3, GPIO4 or GPIO5 has been configured to trigger on non-message conditions from the I/O Pin Configuration field in the Tracker Configuration message ($PSRF178, 70) and the I/O Pin Control and Host Wake Event Control fields in the Host Wake Configuration message ($PSRF 178, 50) the SiRFstarV 5xp asserts the GPIO when the management type is stop-on-memory-full and the memory is full. After the records are read, the SiRFstarV 5xp de-asserts the GPIO.

If the GPIO has not been configured to trigger during non-message conditions from the I/O Pin Configuration field in the Tracker Configuration message ($PSRF178, 70) and the I/O Pin Control and Host Wake Event Control fields in the Host Wake Configuration message ($PSRF178, 50), then any GPIO functionality will be unrelated to the Data Logger.

Table 3.45 lists the Data Logging Memory Management Command: $PSRF124 message description.

Note:

This message supports version 4.1.2 and later.

Name	Unit	Description
$PSRF124	-	PSRF124 protocol header `NMEA_124`
Stop On Memory Full	-	0: Circular buffering 1: Stop on full (one pass)
Data Record Type	-	0: Compatibility format 1: Position 2: Position + Altitude 3: Position + Altitude + Speed 4: Position + Altitude + Speed + Accuracy 5: Extended position (SiRFstarV 5xp)

Table 3.46: Data Logging Memory Management Command: $PSRF124 Field Description

3.42 Poll SW Version String: $PSRF125

This message polls the version string when in NMEA mode. The response is $PSRF195. If a customer version string is defined, this request generates two $PSRF195, one with the SW Version String, and one with the customer-specific version string.

This message supports GSD4e version 4.1.2 and later.

Table 3.47 lists the message description for the example: `$PSRF125*21<CR><LF>`

Name	Unit	Description
$PSRF125	-	PSRF125 protocol header `NMEA_125`

Table 3.47: Poll SW Version String: $PSRF125 Field Description

3.43 SPI Flash Device Parameters: $PSRF126

This message enables users to set SPI flash memory parameters, which are unknown to the firmware in the ROM chip. All parameters should be extracted from the target SPI flash memory data sheet.

This message applies to SiRFstarIV 4e ROM B03.

Table 3.48 lists the message information for the example:
`$PSRF126,0,98,22,19,524288,4096,256,0,0,1,3,6,32,2,0,4,5,1,0,0*<CKSUM>`.

Name	Unit	Description
$PSRF126	-	Proprietary
index	Number	Two SPI flashes can be saved Range: 0 to 1
manufacturerID	-	JEDEC manufacturer ID Range: 0 to 255
memType	-	JDEC memory type Range: 0 to 255
capacityCode	-	JDEC capacity code for size Range: 0 to 255
capacity	Bytes	Overall memory capacity Range: 0 to 4294967295
sectorSize	Bytes	Sector size Range: 0 to 4294967295
pageSize	Bytes	Page size for devices that operate by page sections Range: Range: 0 to 4294967295
burstSize	Bytes	Number of bytes that can be sent for each burst Range: 0 to 255

Name	Unit	Description
mode	-	0: SPI mode 0 3: SPI mode 3
busyBitMask	-	Bitmask in status register for BUSY status Range: 0 to 255
readCmd	-	Command to read data from device Range: 0 to 255
writeEnableCmd	-	Command to write/erase data from device Range: 0 to 255
sectorEraseCmd	-	Command to erase a sector Range: 0 to 255
multiWriteCmd	-	Command to write data to device Range: 0 to 255
oneByteWriteCmd	-	Command to execute a single-byte write operation (not available on all devices) Range: 0 to 255
writeDisableCmd	-	Command for devices that use write disable command at the end of a write
readStatusReg	-	Command to read from the status register Range: 0 to 255
writeStatusReg	-	Command to write from the status register Range: 0 to 255
writeSetupCmd	-	Command for devices that have WriteSetup as FALSE, this can be set to 0 Range: 0 to 255
writeUnSetupCmd	-	For devices that have WriteSetup as FALSE, this can be set to 0 Range: 0 to 255

Table 3.48: $PSRF126 Field Description

3.44 External Storage Map Request: $PSRF131

$PSRF131 is a query for the external storage memory mapping of the receiver. The receiver responds with messages indicating how the external storage memory is used. It is the NMEA equivalent to the OSP External Storage Map Request.

This message applies to all SiRFstarV 5xp/5ea versions.

Table 3.49 lists the message information for External Storage Map Request.

Name	Unit	Description
$PSRF131	-	PSRF131 protocol header

Table 3.49: External Storage Map Request: $PSRF131 Field Description

3.45 Factory Reset Message: $PSRF132

This message can selectively clear storage to perform a factory reset. This message also supports the legacy factory reset.

This message applies to SiRFstarV B02.

An example of this message is: `$PSRF132,33,0,0*0B`. Table 3.50 lists the message information for Factory Reset Message: $PSRF132.

Name	Unit	Description
$PSRF132	-	PSRF132 protocol header
Options	Bits	1-byte range (bitmapped): Bits 2:0: Clear options 1: Clear all 2: Preserve all 4: Clear selected Bit 3: Reserved Bits 5:4: Protocol 1: NMEA 4800 2: OSP 115200 3: Default Bits 7:6: Reserved
EraseDataType	Bits	2-byte range (bitmapped): Deletes data tupe is bit is set to 1 Bit 0: Almanac Bit 1: CGEE Bit 2: SGEE Bit 3: UTC Bit 4: XO data Bit 5: User data Bit 6: RTC learning, only used if Clear Selected is selected in the options field Bits 15:7: Reserved
Reserved	Bytes	4-byte range, reserved field

Table 3.50: Factory Reset Message: $PSRF132 Field Description

3.46 Enable/Disable DTM: $PSRF133

This message enables and disables Digital Terrain Model (DTM) sentences in NMEA.

Table 3.51 lists the message information for Enable/Disable DTM.

Name	Unit	Description
$PSRF133	-	PSRF 133 protocol header
DTM control	-	0: Disable DTM output 1: Enable DTM output

Table 3.51: Enable/Disable DTM: $PSRF133 Field Description

3.47 Marketing Software Configuration: $PSRF200

Use this message to select one of the pre-programmed configurations within ROM-based devices. See the appropriate product data sheet to determine message format and specific supported configurations.

3.48 MSK Receiver Interface: MSK

This message defines a MSK radio-beacon receiver.

Table 3.52 lists the message information for the following example:

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

Name	Unit	Description
MSK	-	MSK protocol header
Beacon Frequency	kHz	Frequency to use
Auto/Manual Frequency	-	A: Auto M: Manual
Beacon Bit Rate	Bits	Bits per second
Auto/Manual Bit Rate	Bits	A: Auto M: Manual
Interval for Sending $--MSS	Seconds	Sending of MSS message for status

Table 3.52: MSK Data Format

Note:

If Auto is specified as the Frequency, the previous field is ignored and the receiver searches for beacon frequency automatically.

If Auto is specified as the Bit Rate, the previous field is ignored and the receiver searches for the correct bit rate.

When Interval for Sending $MSS status data is not to be transmitted this field is null

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.

Terms and Definitions

Term	Definition
ASCII	American Standard Code for Information Interchange
BE	Broadcast Ephemeris
CGEE	Client Generated Extended Ephemeris
CR	Carriage Return
CSR	Cambridge Silicon Radio
DGPS	Differential Global Positioning System
DoP	Dilution of Precision
GGA	NMEA Term: Global Positioning System Fix Data
GPS	Global Positioning System
GSA	NMEA string: GNSS DOP and Active Satellites
GSV	NMEA string: GNSS Satellites in View
LF	Line Feed
LSB	Least-Significant Bit (or Byte)
MSB	Most Significant Bit (or Byte)
MSK	NMEA string: MSK Receiver Interface
MSS	NMEA string: MSK Receiver Signal
NMEA	National Marine Electronics Association
NVM	Non-Volatile Memory
OSP	One Socket Protocol
PRN	Pseudo-Random Noise
PVT	Position, Velocity and Time
RAM	Random Access Memory
RMC	Recommended Minimum Specific GNSS Data
RTCM	Radio Technical Commission for Maritime Services
SDK	Software Development Kit
SID	Sub ID
SRAM	Static Random Access Memory
UTC	Co-ordinated Universal Time
VTG	NMEA string: Course Over Ground and Ground Speed
ZDA	NMEA string: Time & Date