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Info@Atrinelec.com

@ATRINELEC

NMEA Reference Manual

SiRF Technology, Inc.
217 Devcon Drive
San Jose, CA 95112 U.S.A.
Phone: +1 (408) 467-0410
Fax: +1 (408) 467-0420
www.SiRF.com

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NMEA Reference Manual

About This Document

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If you have any problems contact your SiRF representative or call or send an e-mail to the SiRF Technology support group:

phone	+1 (408) 467-0410
e-mail	support@sirf.com

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Preface

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

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

Who Should Use This Guide

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

How This Guide Is Organized

This manual contains the following chapters:

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

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

Related Manuals

You can refer to the following document for more information:

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

Contacting SiRF Technical Support

Address:

SiRF Technology Inc.
217 Devcon Drive
San Jose, CA 95112 U.S.A.

SiRF Technical Support:

Phone: +1 (408) 467-0410 (9 am to 5 pm Pacific Standard Time)
E-mail: support@sirf.com

General enquiries:

Phone: +1 (408) 467-0410 (9 am to 5 pm Pacific Standard Time)
E-mail: gps@sirf.com

Output Messages 1

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

Table 1-1 NMEA Output Messages

Message	Description
GGA	Time, position and fix type data
GLL	Latitude, longitude, UTC time of position fix and status
GSA	GPS receiver operating mode, satellites used in the position solution, and DOP values
GSV	Number of GPS satellites in view satellite ID numbers, elevation, azimuth, & SNR values
MSS	Signal-to-noise ratio, signal strength, frequency, and bit rate from a radio-beacon receiver
RMC	Time, date, position, course and speed data
VTG	Course and speed information relative to the ground
ZDA	PPS timing message (synchronized to PPS)
150	OK to send message
151	GPS Data and Extended Ephemeris Mask
152	Extended Ephemeris Integrity
154	Extended Ephemeris ACK

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

Table 1-2 provides a summary of SiRF NMEA output messages supported by the specific SiRF platforms.

Table 1-2 Supported NMEA Output Messages

Message	SiRF Software Options					
	GSW2[1]	SiRFDRive[1]	SiRFXTrac[1]	SiRFLoc[1]	GSW3 & GSWLT3[1]	SiRFDiRect
GGA	All	All	All	All	All	All
GLL	All	All	All	All	All	All
GSA	All	All	All	All	All	All
GSV	All	All	All	All	All	All
MSS	All	No	No	No	All[2]	All
RMC	All	All	All	All	All	All
VTG	All	All	All	All	All	All
ZDA	2.3.2 & above	No	No	No	No	No
150	2.3.2 & above	No	No	No	No	No
151	2.5 & above	No	2.3 & above	No	3.2.0 & above	Yes

Table 1-2 Supported NMEA Output Messages *(Continued)*

Message	SiRF Software Options					
	GSW2[1]	SiRFDRive[1]	SiRFXTrac[1]	SiRFLoc[1]	GSW3 & GSWLT3[1]	SiRFDiRect
152	2.5 & above	No	2.3 & above	No	3.2.0 & above	Yes
154	2.5 & above	No	2.3 & above	No	3.2.0 & above	Yes

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

2. MSS message for GSW3 and GSWLT3 is empty since they do not support BEACON.

GGA —Global Positioning System Fixed Data

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

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

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

Table 1-3 GGA Data Format

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

Table 1-4 Position Fix Indicator

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

Note – A valid position fix indicator is derived from the SiRF Binary M.I.D. 2 position mode 1. See the *SiRF Binary Protocol Reference Manual*.

GLL—Geographic Position - Latitude/Longitude

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

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

$GPGLL,3723.2475,N,12158.3416,W,161229.487,A,A*41

Table 1-5 GLL Data Format

Name	Example	Unit	Description
Message ID	$GPGLL		GLL protocol header
Latitude	3723.2475		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12158.3416		dddmm.mmmm
E/W Indicator	W		E=east or W=west
UTC Time	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Mode	*A*		*A=Autonomous, D=DGPS, E=DR (Only present in NMEA v3.00)*
Checksum	*41		
<CR> <LF>			End of message termination

GSA—GNSS DOP and Active Satellites

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

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

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

Table 1-6 GSA Data Format

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

1. Satellite used in solution.

Table 1-7 Mode 1

Value	Description
M	Manual—forced to operate in 2D or 3D mode
A	2D Automatic—allowed to automatically switch 2D/3D

Table 1-8 Mode 2

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

GSV—GNSS Satellites in View

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

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

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

Table 1-9 GSV Data Format

Name	Example	Unit	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages[1]	2		Range 1 to 3
Message Number[1]	1		Range 1 to 3
Satellites in View	07		
Satellite ID	07		Channel 1 (Range 1 to 32)
Elevation	79	degrees	Channel 1 (Maximum 90)
Azimuth	048	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/N0)	42	dBHz	Range 0 to 99, null when not tracking
....			....
Satellite ID	27		Channel 4 (Range 1 to 32)
Elevation	27	degrees	Channel 4 (Maximum 90)
Azimuth	138	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/N0)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
<CR> <LF>			End of message termination

1. Depending on the number of satellites tracked, multiple messages of GSV data may be required.

MSS—MSK Receiver Signal

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

This message for GSW3 and GSWLT3 is empty because they do not support BEACON.

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

$GPMSS,55,27,318.0,100,1,*57

Table 1-10 MSS Data Format

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

Note – The MSS NMEA message can only be polled or scheduled using the MSK NMEA input message. See “MSK—MSK Receiver Interface” on page 2-9.

RMC—Recommended Minimum Specific GNSS Data

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

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

$GPRMC,161229.487,A,3723.2475,N,12158.3416,W,0.13,309.62,120598, ,*10

Table 1-11 RMC Data Format

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

1. A valid status is derived from the SiRF Binary M.I.D 2 position mode 1. See the *SiRF Binary Protocol Reference Manual*.
2. SiRF Technology Inc. does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions.

VTG—Course Over Ground and Ground Speed

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

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

$GPVTG,309.62,T, ,M,0.13,N,0.2,K,A*23

Table 1-12 VTG Data Format

Name	Example	Unit	Description
Message ID	$GPVTG		VTG protocol header
Course	309.62	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic[1]
Speed	0.13	knots	Measured horizontal speed
Units	N		Knots
Speed	0.2	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Mode	*A*		*A=Autonomous, D=DGPS, E=DR*
Checksum	*23		
<CR> <LF>			End of message termination

1. SiRF Technology Inc. does not support magnetic declination. All "course over ground" data are geodetic WGS84 directions.

ZDA—SiRF Timing Message

Outputs the time associated with the current 1 PPS pulse. Each message is output within a few hundred ms after the 1 PPS pulse is output and tells the time of the pulse that just occurred.

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

$GPZDA,181813,14,10,2003,00,00*4F

Table 1-13 ZDA Data Format

Name	Example	Unit	Description
Message ID	$GPZDA		ZDA protocol header
UTC time	181813	hhmmss	The UTC time units are as follows: hh = UTC hours from 00 to 23 mm = UTC minutes from 00 to 59 ss = UTC seconds from 00 to 59 Either using valid IONO/UTC or estimated from default leap seconds
Day	14		01 TO 31
Month	10		01 TO 12
Year	2003		1980 to 2079
Local zone hour	00	hour	Offset from UTC (set to 00)
Local zone minutes	00	minute	Offset from UTC (set to 00)
Checksum	*4F		
<CR> <LF>			End of message termination

140— Proprietary

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

Table 1-14 contains the message parameter definitions.

Table 1-14 Proprietary

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

150—OkToSend

This message is being sent out during the trickle power mode to communicate with an outside program such as SiRFDemo to indicate whether the receiver is awake or not.

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

1. OkToSend

   $PSRF150,1*3F

2. not OkToSend

   $PSRF150,0*3E

Table 1-15 OkToSend Message Data Format

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

151—GPS Data and Extended Ephemeris Mask

Message ID 151 is used by GSW2 (2.5 or above), SiRFXTrac (2.3 or above), and GSW3 (3.2.0 or above), and GSWLT3 software. An example of the message is provided below. Note that the parentheses "(" and ")" are NOT part of the message; they are used to delimit description of a field. The field of checksum consists of two hex digits representing the exclusive or of all characters between, but not including, the $ and *.

$PSRF151,(GPS_TIME_VALID_FLAG),(GPS Week),(GPS TOW),
(EPH_REQ_MASK_HEX)*(checksum)<CR><LF>

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

Table 1-16 GPS Data and Ephemeris Mask - Message 151

Name	Example	Unit	Description
Message ID	$PSRF151		PSRF151 protocol header
GPS_TIME_VALID_FLAG	0, 1, 2, or 3	N/A	LSB bit 0 = 1, GPS week is valid LSB bit 0 = 0, GPS week is not valid LSB bit 1 = 1, GPS TOW is valid LSB bit 1 = 0, GPS TOW is not valid
GPS Week	1324	week number	Extended week number (variable length field)
GPS TOW		0.1 sec	GPS Time Of Week (variable length field)
EPH_REQ_MASK	0x40000001	N/A	Mask to indicate the satellites for which new ephemeris is needed. Eight characters preceded by the following characters, “0x”, are used to show this 32-bit mask (in hex). The leading bit is for satellite PRN 32, and the last bit is for satellite PRN 1.
<CR> <LF>			End of message termination

152—Extended Ephemeris Integrity

Message ID 152 is used by GSW2 (2.5 or above), SiRFXTrac (2.3 or above), and GSW3 (3.2.0 or above), and GSWLT3 software. An example of the message is provided below. Note that the parentheses “(“ and ”)” are NOT part of the message; they are used to delimit description of a field. The field of checksum consists of two hex digits representing the exclusive or of all characters between, but not including, the $ and *.

$PSRF152, (SAT_POS_VALIDITY_FLAG), (SAT_CLK_VALIDITY_FLAG), (SAT_HEALTH_FLAG)*(checksum) <CR><LF>

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

Table 1-17 Extended Ephemeris Integrity - Message 152

Name	Example	Unit	Description
Message ID	$PSRF152		PSRF152 protocol header
SAT_POS_VALIDITY_FLAG	0x10000041	N/A	This is a 10 character field representing the debug flag in hex with lead-in “0x”. (e.g., 0x00F00000). 1 = invalid position found, 0 = valid position. SVID 1 validity flag will be in LSB, and subsequent bits have validity flags for SVIDs in increasing order up to SVID 32 whose validity flag will be in MSB.
SAT_CLK_VALIDITY_FLAG	0x10000041	N/A	This is a 10 character field representing the debug flag in hex with lead-in “0x”. (e.g., 0x00F00000). 1 = invalid clock found, 0 = valid clock. SVID 1 validity flag is in LSB and subsequent bits will have validity flags for SVIDs in increasing order up to SVID 32 whose validity flag will be in MSB.
SAT_HEALTH_FLAG	0x10000041	N/A	This is a 10 character field representing the debug flag in hex with lead-in “0x”. (e.g., 0x00F00000). 1 = unhealthy satellite, 0 = healthy satellite. SVID 1 health flag is in the LSB and subsequent bits will have health flags for SVIDs in increasing order up to SVID 32 whose validity flag will be in MSB.
<CR> <LF>			End of message termination

154—Extended Ephemeris ACK

Message ID 154 is used by GSW2 (2.5 or above), SiRFXTrac (2.3 or above), and GSW3 (3.2.0 or above), and GSWLT3 software. This message is returned when Messages ID 107, 108, or 110 (input messages) is received. Refer to Chapter 2, “Input Messages” for more information about Messages ID 107, 108, and 110.

An example of the message is provided below. Note that the parentheses “(“ and ”)” are NOT part of the message; they are used to delimit description of a field. The field of checksum consists of two hex digits representing the exclusive or of all characters between, but not including, the $ and *.

$PSRF154, (ACK Message ID)*(checksum) <CR><LF>

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

Table 1-18 Extended Ephemeris ACK - Message 154

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

155—Proprietary

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

Table 1-19 contains the message parameter definitions.

Table 1-19 Proprietary

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

Reserved—Message ID 225

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

Input Messages 2

NMEA input messages enable you to control the Evaluation Receiver while in NMEA protocol mode. The Evaluation Receiver may be put into NMEA mode by sending the SiRF binary protocol message "Switch to NMEA Protocol--Message I.D. 129" (see the *SiRF Binary Protocol Reference Manual*). This is done by using a user program or by using the SiRFDemo software and selecting Switch to NMEA Protocol from the Action menu (see the *SiRFDemo User Guide*). If the receiver is in SiRF binary mode, all NMEA input messages are ignored. After the receiver is put in NMEA mode, the following messages may be used to command it.

Transport Message

Table 2-1 describes the transport message parameters.

Table 2-1 Transport Message Parameters

Start Sequence	Payload	Checksum	End Sequence
$PSRF<MID>[1]	Data[2]	*CKSUM[3]	<CR> <LF>[4]

1. Message Identifier consisting of three numeric characters. Input messages begin at MID 100.
2. Message specific data. Refer to a specific message section for <data>...<data> definition.
3. CKSUM is a two-hex character checksum as defined in the NMEA specification, *NMEA-0183 Standard For Interfacing Marine Electronic Devices*. Checksum consists of a binary exclusive OR the lower 7 bits of each character after the "$" and before the "*" symbols. The resulting 7-bit binary number is displayed as the ASCII equivalent of two hexadecimal characters representing the contents of the checksum. Use of checksums is required on all input messages.
4. Each message is terminated using Carriage Return (CR) Line Feed (LF) which is \r\n which is hex 0D 0A. Because \r\n are not printable ASCII characters, they are omitted from the example strings, but must be sent to terminate the message and cause the receiver to process that input message.

Note – All fields in all proprietary NMEA messages are required, none are optional. All NMEA messages are comma delimited.

NMEA Input Messages

Table 2-2 describes the NMEA input messages.

Table 2-2 NMEA Input Messages

Message	Name	Description
100	SetSerialPort	Set PORT A parameters and protocol
101	NavigationInitialization	Parameters required for start using X/Y/Z[1]
102	SetDGPSPort	Set PORT B parameters for DGPS input
103	Query/Rate Control	Query standard NMEA message and/or set output rate
104	LLANavigationInitialization	Parameters required for start using Lat/Lon/Alt[2]
105	Development Data On/Off	Development Data messages On/Off
106	Select Datum	Selection of datum used for coordinate transformations
107	Proprietary	Extended Ephemeris Proprietary message
108	Proprietary	Extended Ephemeris Proprietary message
110	Extended Ephemeris Debug	Extended Ephemeris Debug
200	Marketing Software Configuration	Selection of Marketing Software Configurations
MSK	MSK Receiver Interface	Command message to a MSK radio-beacon receiver

1. Input coordinates must be WGS84.

Note – NMEA input messages 100 to 106 are SiRF proprietary NMEA messages. The MSK NMEA string is as defined by the NMEA 0183 standard.

Table 2-3 provides a summary of supported SiRF NMEA input messages by the specific SiRF platforms.

Table 2-3 Supported NMEA Input Messages

Message ID	SiRF Software Options					
	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect
100	Yes	Yes	Yes	Yes	Yes	Yes
101	Yes	Yes	Yes[1]	Yes	Yes[1]	Yes[1]
102	Yes	Yes	No	No	Yes	Yes
103	Yes	Yes	Yes	Yes	Yes	Yes
104	Yes	Yes	Yes[1]	Yes	Yes[1]	Yes[1]
105	Yes	Yes	Yes	Yes	Yes	Yes
106	Yes	Yes	Yes	Yes	Yes	Yes
107	2.5 & above	No	2.3 & above	No	Yes	Yes
108	2.5 & above	No	2.3 & above	No	Yes	Yes
110	2.5 & above	No	2.3 & above	No	3.2.0 & above	Yes
200[2]	No	No	No	No	No	No
MSK	Yes	Yes	No	No	Yes[3]	Yes[3]

1. Position and time are not available, consequently warm start init is ignored.
2. Only with GSC2xr chip.
3. MSK message for GSW3 and GSWLT3 are empty since they do not support BEACON

100—SetSerialPort

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

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

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

$PSRF100,0,9600,8,1,0*0C

Table 2-4 Set Serial Port Data Format

Name	Example	Unit	Description
Message ID	$PSRF100		PSRF100 protocol header
Protocol	0		0=SiRF binary, 1=NMEA
Baud	9600		1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200
DataBits	8		8,7[1]
StopBits	1		0,1
Parity	0		0=None, 1=Odd, 2=Even
Checksum	*0C		
<CR> <LF>			End of message termination

1. SiRF protocol is only valid for 8 data bits, 1stop bit, and no parity.

101—NavigationInitialization

This command is used to initialize the Evaluation Receiver by providing current position (in X, Y, Z coordinates), clock offset, and time. This enables the Evaluation Receiver to search for the correct satellite signals at the correct signal parameters. Correct initialization parameters enable the Evaluation Receiver to quickly acquire signals.

For GSW3, GSWLT3, and SiRFXTrac software, position and time inputs are not possible and consequently warm start init is ignored.

Table 2-5 contains the input values for the following example:

Start using known position and time.

$PSRF101,-2686700,-4304200,3851624,96000,497260,921,12,3*1C

Table 2-5 Navigation Initialization Data Format

Name	Example	Unit	Description
Message ID	$PSRF101		PSRF101 protocol header
ECEF X	-2686700	meters	X coordinate position
ECEF Y	-4304200	meters	Y coordinate position
ECEF Z	3851624	meters	Z coordinate position
ClkOffset	96000	Hz	Clock Offset of the Receiver[1]
TimeOfWeek	497260	sec	GPS Time Of Week
WeekNo	921		GPS Week Number
ChannelCount	12		Range 1 to 12
ResetCfg	3		See Table 2-6 and Table 2-7
Checksum	*1C		
<CR> <LF>			End of message termination

1. Use 0 for last saved value if available.If this is unavailable, a default value of 96,000 is used.

Table 2-6 Reset Configuration - Non SiRFLoc Platforms

Decimal	Description
01	Hot Start— All data valid
02	Warm Start—Ephemeris cleared
03	Warm Start (with Init)—Ephemeris cleared, initialization data loaded
04	Cold Start—Clears all data in memory
08	Clear Memory—Clears all data in memory and resets the receiver back to factory defaults

Table 2-7 Reset Configuration - SiRFLoc Specific

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

102—SetDGPSPort

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

For GSW3 and GSWLT3 software, this message does not provide DGPS parameter.

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

Set DGPS Port to be 9600,8,N,1.

$PSRF102,9600,8,1,0*12

Table 2-8 Set DGPS Port Data Format

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

103—Query/Rate Control

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

Table 2-9 contains the input values for the following example:

Query the GGA message with checksum enabled

$PSRF103,00,01,00,01*25

Table 2-9 Query/Rate Control Data Format

Name	Example	Unit	Description
Message ID	$PSRF103		PSRF103 protocol header
Msg	00		See Table 2-10
Mode	01		0=SetRate, 1=Query
Rate	00	sec	Output—off=0, max=255
CksumEnable	01		0=Disable Checksum, 1=Enable Checksum
Checksum	*25		
<CR> <LF>			End of message termination

Table 2-10 Messages

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

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

104—LLANavigationInitialization

This command is used to initialize the Evaluation Receiver by providing current position (in latitude, longitude, and altitude coordinates), clock offset, and time. This enables the receiver to search for the correct satellite signals at the correct signal parameters. Correct initialization parameters enable the receiver to quickly acquire signals.

For GSW3, GSWLT3, and SiRFXTrac software, position and time inputs are not possible and consequently warm start init is ignored.

Table 2-11 contains the input values for the following example:

Start using known position and time.

$PSRF104,37.3875111,-121.97232,0,96000,237759,1946,12,1*07

Table 2-11 LLA Navigation Initialization Data Format

Name	Example	Unit	Description
Message ID	$PSRF104		PSRF104 protocol header
Lat	37.3875111	degrees	Latitude position (Range 90 to -90)
Lon	-121.97232	degrees	Longitude position (Range 180 to -180)
Alt	0	meters	Altitude position
ClkOffset	96000	Hz	Clock Offset of the Evaluation Receiver[1]
TimeOfWeek	237759	sec	GPS Time Of Week
WeekNo	1946		Extended GPS Week Number (1024 added)
ChannelCount	12		Range 1 to 12
ResetCfg	1		See Table 2-12
Checksum	*07		
<CR> <LF>			End of message termination

1. Use 0 for last saved value if available. If this is unavailable, a default value of 96,000 is used.

Table 2-12 Reset Configuration

Decimal	Description
01	Hot Start—All data valid
02	Warm Start—Ephemeris cleared
03	Warm Start (with Init)—Ephemeris cleared, initialization data loaded
04	Cold Start—Clears all data in memory
08	Clear Memory—Clears all data in memory and resets receiver back to factory defaults

105—Development Data On/Off

Use this command to enable development data information if you are having trouble getting commands accepted. Invalid commands generate debug information that enables the you to determine the source of the command rejection. Common reasons for input command rejection are invalid checksum or parameter out of specified range.

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

1. Debug On

   $PSRF105,1*3E

2. Debug Off

   $PSRF105,0*3F

Table 2-13 Development Data On/Off Data Format

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

106—Select Datum

GPS receivers perform initial position and velocity calculations using an earth-centered earth-fixed (ECEF) coordinate system. Results may be converted to an earth model (geoid) defined by the selected datum. The default datum is WGS 84 (World Geodetic System 1984) which provides a worldwide common grid system that may be translated into local coordinate systems or map datums. (Local map datums are a best fit to the local shape of the earth and not valid worldwide.)

Table 2-14 contains the input values for the following examples:

1. Datum select TOKYO_MEAN

   $PSRF106,178*32

Table 2-14 Select Datum Data Format

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

107—Proprietary

This message is reserved for SiRF extended ephemeris usage only. The content of this message is proprietary. See also Chapter 1, “Output Messages” Message ID 154.

Table 2-15 contains the message parameter definitions.

Table 2-15 Proprietary

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

108—Proprietary

This message is reserved for SiRF extended ephemeris usage only. The content of this message is proprietary. See also Chapter 1, “Output Messages” Message ID 154.

Table 2-16 contains the message parameter definitions.

Table 2-16 Proprietary

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

110—Extended Ephemeris Debug

This message contains a debug flag. See also Chapter 1, “Output Messages” Message ID 154.

Table 2-17 contains the message parameter definitions.

Table 2-17 Extended Ephemeris Debug

Name	Example	Unit	Description
Message ID	$PSRF110		PSRF110 protocol header
DEBUG_FLAG	0x01000000		This is a 10 character field representing the debug flag in hex with leading “0x” If the first byte is set to 0x01 (i.e., Debug_Flag = 0x01000000), the GPS sensor ignores all internal broadcast ephemeris
Checksum			
<CR> <LF>			End of message termination

112 – Set Message Rate

This message is not for general usage and is used for SiRF extended ephemeris usage only at this time.

Table 2-18 contains the message parameter definitions for the following example:

$PSRF112,140,6,1*3B

Table 2-18 Table Set Message Rate

Name	Example	Unit	Description
Message ID	PSRF112		PSRF112 protocol header
Message ID to set	140		This is the only NMEA message ID supported
Message rate	6	sec	Valid rate is either 6 or 0 (to disable)
Send Now	1		Poll NMEA message ID once.

200—Marketing Software Configuration

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

MSK—MSK Receiver Interface

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

$GPMSK,318.0,A,100,M,2,*45

Table 2-19 RMC Data Format

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

1. If Auto is specified the previous field value is ignored.
2. When status data is not to be transmitted this field is null.

Note – The NMEA messages supported by the Evaluation 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.

ADDITIONAL AVAILABLE PRODUCT INFORMATION

Part Number	Description
1050-0041	SiRF Binary Protocol Reference Manual

North America
Corporate HQ
(1) (408) 467-0410
Sales@sirf.com

Europe
United Kingdom
(44) (1344) 668390
SalesUK@sirf.com

Germany
(49) (81) 529932-90
SalesGermany@sirf.com

Belgium
(32) (496) 152969
SalesBelgium@sirf.com

Asia Pacific
China
(86) (21) 5854-7153
SalesChina@sirf.com

Taiwan
(886) (2) 8174-8966
SalesTaiwan@sirf.com

Japan
(81) (44) 829-2186
SalesJapan@sirf.com

India
(91) (80) 41966000
SalesIndia@sirf.com

South Korea
(82) (2) 3424-3150
SalesKorea@sirf.com

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