SiRF

NMEA Reference Manual

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NMEA Reference Manual

About This Document

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

Related Manuals

You can refer to the following document for more information:

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

General Format

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

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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

	SiRF Software Options						
Message	**GSW2[1]**	**SiRFDRive[1]**	**SiRFXTrac[1]**	**SiRFLoc[1]**	**GSW3 & GSWLT3[1]**	**SiRFDiRect**	**GSD3tw**
GGA	All	All	All	All	All	All	All
GLL	All	All	All	All	All	All	All
GSA	All	All	All	All	All	All	All
GSV	All	All	All	All	All	All	All
MSS	All	No	No	No	All[2]	All	All
RMC	All	All	All	All	All	All	All
VTG	All	All	All	All	All	All	All
ZDA	2.3.2 & above	No	No	No	All	No	All

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

Message	SiRF Software Options						
	GSW2[1]	SiRFDRive[1]	SiRFXTrac[1]	SiRFLoc[1]	GSW3 & GSWLT3[1]	SiRFDiRect	GSD3tw
150	2.3.2 & above	No	No	No	No	No	No
151	2.5 & above	No	2.3 & above	No	3.2.0 & above	Yes	Yes
152	2.5 & above	No	2.3 & above	No	3.2.0 & above	Yes	Yes
154	2.5 & above	No	2.3 & above	No	3.2.0 & above	Yes	Yes
155							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 status is derived from all the parameters set in the software. This includes the minimum number of satellites required, any DOP mask setting, presence of DGPS corrections, etc. If the default or current software setting requires that a factor is met, then if that factor is not met the solution will be marked as invalid.

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* *N = Output Data Not Valid*
Checksum	*41		
<CR> <LF>			End of message termination

GSA—GNSS DOP and Active Satellites

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

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

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
....			....

Table 1-6 GSA Data Format

Name	Example	Unit	Description
Satellite Used[1]			SV on Channel 12
PDOP[2]	1.8		Position Dilution of Precision
HDOP[2]	1.0		Horizontal Dilution of Precision
VDOP[2]	1.5		Vertical Dilution of Precision
Checksum	*33		
<CR> <LF>			End of message termination

1. Satellite used in solution.

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

Table 1-7 Mode 1

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

Table 1-8 Mode 2

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

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

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

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

Table 1-11 RMC Data Format

Name	Example	Unit	Description
East/West Indicator[2]	E		E=east
Mode	*A*		*A=Autonomous, D=DGPS, E=DR,* *N = Output Data Not Valid*
Checksum	*10		
<CR> <LF>			End of message termination

1. A valid status is derived from all the parameters set in the software. This includes the minimum number of satellites required, any DOP mask setting, presence of DGPS corrections, etc. If the default or current software setting requires that a factor is met, then if that factor is not met the solution will be marked as invalid.
2. SiRF Technology Inc. does not support magnetic declination. All “course over ground” data are geodetic WGS84 directions relative to true North.

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, N = Output Data Not Valid*
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—Time & Date

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,,*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		Day of the month, range 1to 31
Month	10		Month of the year, range 1 to 12
Year	2003		1980 to 2079
Local zone hour[1]		hour	Offset from UTC (set to 00)
Local zone minutes[1]		minute	Offset from UTC (set to 00)
Checksum	*4F		
<CR> <LF>			End of message termination

1. Not supported by SiRF. Reported as 00.

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

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

1. OkToSend

   $PSRF150,1*3F

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 SiRFInstantFix to request ephemerides for specific satellites.

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

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

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

Name	Example	Unit	Description
Message ID	$PSRF151		PSRF151 protocol header
GPS_TIME_VALID_FLAG	3	N/A	Bit 0 = 1, GPS week is valid
GPS Week	1485	week number	Extended week number
GPS Time of Week	147236.3	0.1 sec	GPS Time Of Week
EPH_REQ_MASK	0x43002732	N/A	Mask to indicate the satellites for which new ephemeris is needed. Eight characters preceded by the following characters, “0x”, are used to show this 32-bit mask (in hex). The leading bit is for satellite PRN 32, and the last bit is for satellite PRN 1.
Checksum			
<CR> <LF>			End of message termination

152—Extended Ephemeris Integrity

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

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

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

Table 1-17 Extended Ephemeris Integrity - Message 152

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

154—Extended Ephemeris ACK

Message ID 154 is used by SiRFInstantFix software to acknowledge input messages 107, 108 or 110.

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

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

Table 1-18 Extended Ephemeris ACK - 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)
Checksum			
<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

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

Table 2-1 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 200 are SiRF proprietary NMEA messages. The MSK NMEA string is as defined by the NMEA 0183 standard.

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

Table 2-2 Supported NMEA Input Messages

Message ID	SiRF Software Options						
	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw
100	Yes	Yes	Yes	Yes	Yes	Yes	Yes
101	Yes	Yes	Yes[1]	Yes	Yes[1]	Yes[1]	Yes
102	Yes	Yes	No	No	Yes	Yes	Yes
103	Yes	Yes	Yes	Yes	Yes	Yes	Yes
104	Yes	Yes	Yes[1]	Yes	Yes[1]	Yes[1]	Yes
105	Yes	Yes	Yes	Yes	Yes	Yes	Yes
106	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 2-2 Supported NMEA Input Messages *(Continued)*

Message ID	SiRF Software Options						
	GSW2	SiRFDRive	SiRFXTrac	SiRFLoc	GSW3 & GSWLT3	SiRFDiRect	GSD3tw
107	2.5 & above	No	2.3 & above	No	Yes	Yes	Yes
108	2.5 & above	No	2.3 & above	No	Yes	Yes	Yes
110	2.5 & above	No	2.3 & above	No	3.2.0 & above	Yes	Yes
200[2]	No	No	No	No	No	No	No
MSK	Yes	Yes	No	No	Yes[3]	Yes[3]	No

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

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

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

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

Table 2-3 Set Serial Port Data Format

Name	Example	Unit	Description
Message ID	$PSRF100		PSRF100 protocol header
Protocol	0		0=SiRF binary, 1=NMEA
Baud	9600		1200, 2400, 4800, 9600, 19200, 38400, 57600, 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 cause a restart of the receiver, and to specify the type of restart. Optionally, it may also initialize position (in X, Y, Z ECEF coordinates), clock drift, GPS Time Of Week and GPS Week Number. This enables the receiver to search for the correct satellite signals at the correct signal parameters. Correct initialization parameters enable the receiver to quickly acquire signals.

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

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

Start using known position and time.

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

Table 2-4 Navigation Initialization Data Format

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

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

Table 2-5 Reset Configuration Bit Map

Bit	Description
0[1]	Data valid flag: 1 = Use data in ECEF X, Y, Z, Clock Offset, Time of Week and Week number to initialize the receiver; 0 = Ignore data fields
1	Clear ephemeris from memory: blocks Snap or Hot Start from occurring
2	Clear all history (except clock drift) from memory: blocks Snap, Hot, and Warm Starts
3	Factory Reset: clears all GPS memory including clock drift. Also clears almanac stored in flash memory
4	Enable Nav Lib data (YES = 1, NO = 0)[2]

1. For software that does not support initialized data (GSW3, GSWLT3, SiRFXTrac) setting this bit may cause unpredictable results. Do not attempt to use initializing data.

2. If Nav Lib data are enabled, the resulting messages are enabled: Clock Status (Message ID 7), 50BPS (Message ID 8), Raw DGPS (Message ID 17), NL Measurement Data (Message ID 28), DGPS Data (Message ID 29), SV State Data (Message ID 30), and NL Initialized Data (Message ID 31). All messages sent at 1 Hz. If SiRFDemo is used to enable Nav Lib data, the bit rate is automatically set to 57600 by SiRFDemo.

Table 2-6 Reset Configuration - SiRFLoc Specific

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

Table 2-6 Reset Configuration - SiRFLoc Specific *(Continued)*

Decimal	Description
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.

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

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

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

Table 2-7 Set DGPS Port Data Format

Name	Example	Unit	Description
Message ID	$PSRF102		PSRF102 protocol header
Baud	9600		1200, 2400, 4800, 9600, 19200, 38400, 57600, 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 2-8 contains the input values for the following example:

Query the GGA message with checksum enabled

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

Table 2-8 Query/Rate Control Data Format

Name	Example	Unit	Description
Message ID	$PSRF103		PSRF103 protocol header
Msg	00		Message to control. See Table 2-9
Mode	01		0 = Set Rate, 1 = Query one time

Table 2-8 Query/Rate Control Data Format *(Continued)*

Name	Example	Unit	Description
Rate	00	sec	Output Rate, 0 = Off, 1-255 = seconds between messages[1]
CksumEnable	01		0=Disable Checksum, 1=Enable Checksum
Checksum	*25		
<CR> <LF>			End of message termination

1. This field is ignored if Mode field is set to Query one time.

Table 2-9 Messages

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

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

104—LLANavigationInitialization

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

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

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

Start using known position and time.

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

Table 2-10 LLA Navigation Initialization Data Format

Name	Example	Unit	Description
Message ID	$PSRF104		PSRF104 protocol header
Lat	37.3875111	degrees	Latitude + = North (Range 90 to -90)
Lon	-121.97232	degrees	Longitude + = East (Range 180 to -180)
Alt	0	meters	Altitude position
ClkDrift	96000	Hz	Clock Drift of the Receiver[1]

Table 2-10 LLA Navigation Initialization Data Format *(Continued)*

Name	Example	Unit	Description
TimeOfWeek	237759	sec	GPS Time Of Week
WeekNo	1946		Extended GPS Week Number
ChannelCount	12		Range 1 to 12
ResetCfg	1		See Table 2-11
Checksum	*07		
<CR> <LF>			End of message termination

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

Table 2-11 Reset Configuration Bit Map

Bit	Description
0[1]	Data valid flag: 1 = Use data in ECEF X, Y, Z, Clock Offset, Time of Week and Week number to initialize the receiver; 0 = Ignore data fields
1	Clear ephemeris from memory: blocks Snap or Hot Start from occurring
2	Clear all history (except clock drift) from memory: blocks Snap, Hot, and Warm Starts
3	Factory Reset: clears all GPS memory including clock drift. Also clears almanac stored in flash memory
4	Enable Nav Lib data (YES = 1, NO = 0)[2]

1. For software that does not support initialized data (GSW3, GSWLT3, SiRFXTrac) setting this bit may cause unpredictable results. Do not attempt to use initializing data.
2. If Nav Lib data are enabled, the resulting messages are enabled: Clock Status (Message ID 7), 50BPS (Message ID 8), Raw DGPS (Message ID 17), NL Measurement Data (Message ID 28), DGPS Data (Message ID 29), SV State Data (Message ID 30), and NL Initialized Data (Message ID 31). All messages sent at 1 Hz. If SiRFDemo is used to enable Nav Lib data, the bit rate is automatically set to 57600 by SiRFDemo.

105—Development Data On/Off

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

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

$PSRF105,1*3E

Table 2-12 Development Data On/Off Data Format

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

106—Select Datum

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

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

1. Datum select TOKYO_MEAN

   $PSRF106,178*32

Table 2-13 Select Datum Data Format

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

107—Proprietary

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

Table 2-14 contains the message parameter definitions.

Table 2-14 Proprietary

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

108—Proprietary

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

Table 2-15 contains the message parameter definitions.

Table 2-15 Proprietary

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

110—Extended Ephemeris Debug

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

Table 2-16 contains the message parameter definitions.

Table 2-16 Extended Ephemeris Debug

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

112 – Set Message Rate

This message is not for general usage and is used for SiRFInstantFix usage only at this time.

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

$PSRF112,140,6,1*3B

Table 2-17 Table Set Message Rate

Name	Example	Unit	Description
Message ID	PSRF112		PSRF112 protocol header
Message ID to set	140		This is the only NMEA message ID supported
Message rate	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 prouduct datasheet to determine message format and specific configurations supported.

MSK—MSK Receiver Interface

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

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

Table 2-18 MSK Data Format

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

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

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

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