Getting Started 1

This chapter describes the PC requirements and step-by-step instructions to install the GM-80/81/200 using Windows 3.1 and Windows 95/98. In addition, it also explains how to connect the GM-80/81/200 to your PC.

Requirements

PC, 486 or better, with at least 8 MB RAM with DOS (3.x) and Windows 3.x or Windows 95/98 with one available serial comm port (1, 2, 3 or 4).

Installing the Tool CD Application Software

This section describes installing the GM-80/81/200 software using:

- Microsoft Windows 95/98
- Microsoft Windows 3.1
- MS-DOS (SiRFdemo requires Windows 3.x or 95 for operation)

Note – The enclosed disk contains several large files. You may wish to only copy over the `\holux` directory which contains the necessary tools and utilities for data collection and analysis.

Using Microsoft Windows 95/98

1. Insert the CD into the CD-ROM.
2. Select the disk drive from My Computer.
3. Copy over the directories of interest to your hard drive.

Using Microsoft Windows 3.1

1. Using File manager, select the disk drive.
2. Copy over the directories of interest to your hard drive.

Using Microsoft DOS

1. At the DOS prompt, change to the disk drive
2. Copy over the directories of interest to your hard drive.

Table 2-1 Directory Structure of GM-80/81/200 disk

Sub Directory	File Name	Description
GM200\English\utility\	GM200.pdf	This user's manual.
	\ Sirfdemo.exe	SiRFdemo utility
	\Ring100D.SMP	SiRF map Protocol file

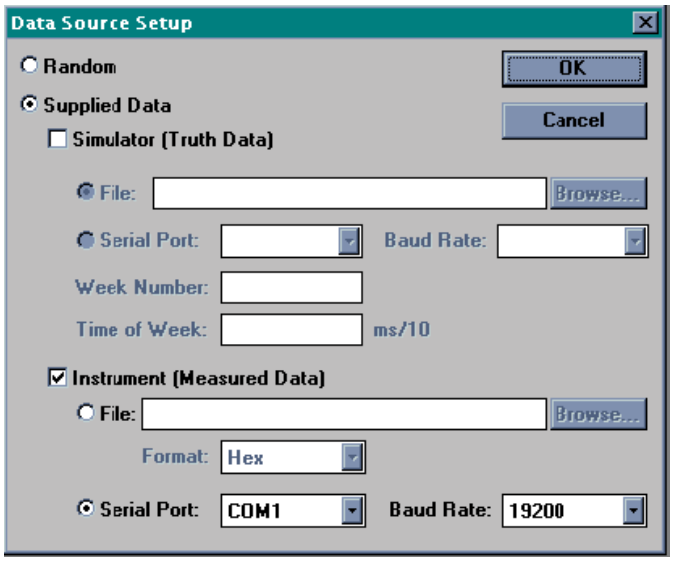
Quickstart 2

This chapter describes how to run the SiRFdemo software.

Note – If you want to run the SiRFdemo, you only need to install the software. You do not need to connect the GM-200. If you want a more detailed explanation on how to run the software, go to **Chapter 3, "Setup**."

1. Double-click on the `SiRFdemo` icon. located in `\holux`

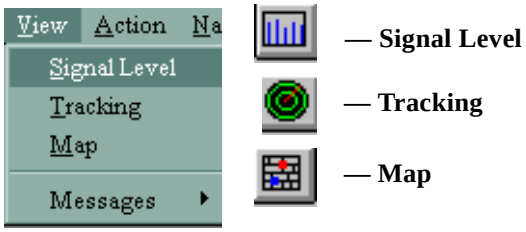
The Data Source Setup screen is displayed.



Note – The Serial Port and Baud Rate apply to the host PC (The GM-200 is set at a baud rate of 4800 ,user can use)ACtion\Synchronize Protocol and BaudRate to change Baudrate)

2 . Click OK.

3. Click on the Signal Level View button or choose Signal Level from the View menu.



The 12-Channel Signal Level View screen displays the satellite number, status, azimuth, elevation, C/No, and last five seconds of measured signal levels.

4. Click on the Tracking View button or choose Tracking from the View menu.

The Tracking View screen is displayed. This displays the satellites in a polar plot.

- Outer circle represents the horizon (Elevation=0 degrees)
- Inner circle represents 45 degrees
- Center point is directly overhead (Elevation=90 degrees)

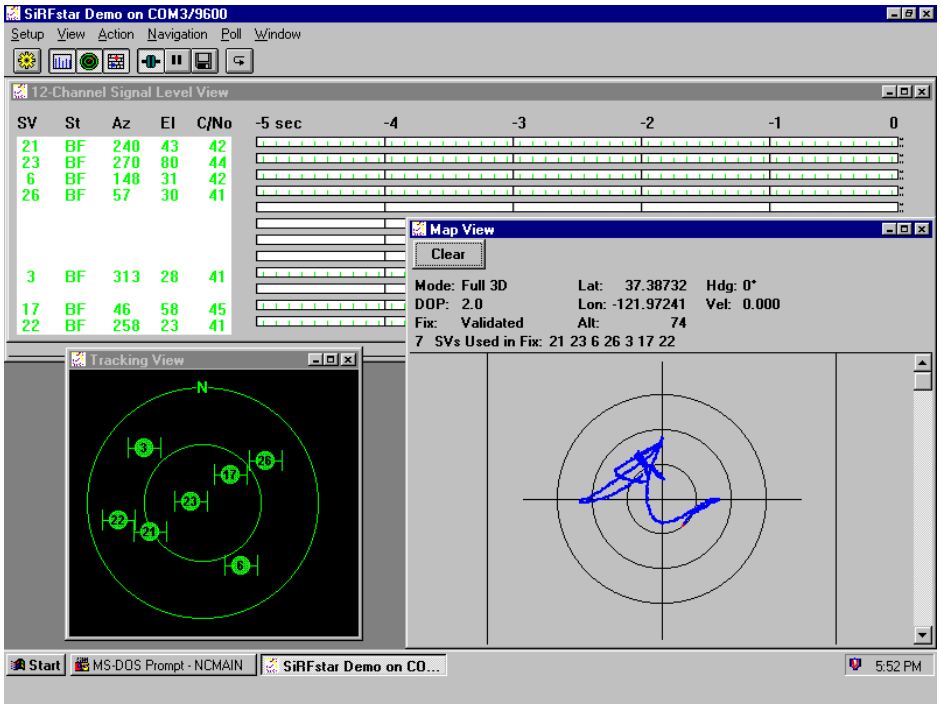
5. Click on the Map View button.

The Map View screen displays the position of the ground tracking.

The red dot shows the last position solution. If you run Map View with a moving setup, the ground track is displayed in the Map View screen.

If no dot is shown, you must update the `ring90.smp` file for your location.

.



Note – To use the Map View track history portion of the screen, you must set up an appropriate SiRF Map Protocol file with a `*.smp` extension.

6. Click the Connect/Disconnect button.

   A prompt is displayed asking if you want to open a log file.

7. Click No.
   If your receiver is properly connected (with antenna), the location and tracking status of the satellites are displayed on the Tracking View screen as follows:

   - The Tracking View screen displays the location of the satellites, their relative location in azimuth and elevation.
   - The 12-Channel Signal Level View screen displays the SV PRN, status, azimuth, elevation, and C/No for each satellite.
   - The colors for the satellites are as follows:

     Green: Satellite with signal lock, used in navigation solution.

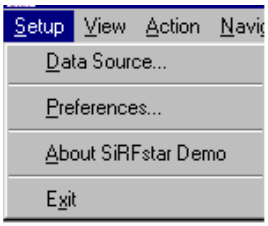
     Blue: Satellite with signal lock, not used navigation solution.

     Red: Satellite without signal lock.

Setup 3

This chapter describes the SiRFdemo functions under the Setup menu:

- “To Define the Data Source”
- “To Change Preferences”
- “To Display Information About the SiRFstar Demo”
- “To Exit the SiRFstar Demo”

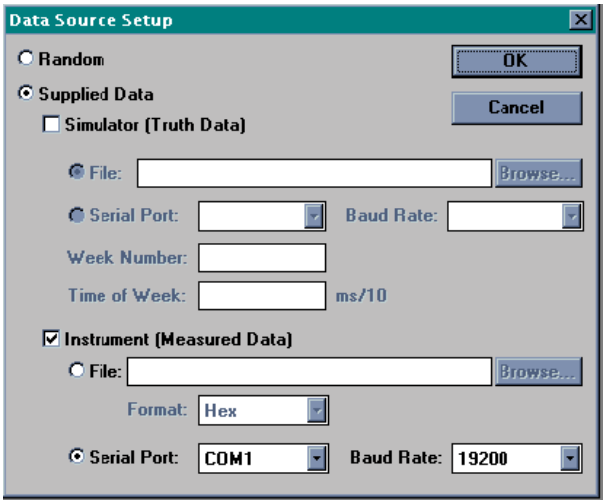


 **— Data Source**

To Define the Data Source

1. Click the Data Source button or choose Data Source from the Setup menu.

   The Data Source Setup screen is displayed.



Note – The Simulator (Truth Data) option is not yet implemented.

The Serial Port and Baud Rate apply to the host PC (The GM-200 is set to a baud rate of 4800 during factory testing). To capture any information regarding your positions, the GM-200 must be connected to the selected serial port on your PC.

Do not use the File radio button. This option is not implemented at this time.

2. Click on Supplied Data if you want to run the SiRFdemo.

Option	Description
Random	Only uses randomly generated data. Use this option to verify that the SiRFdemo is running without the GM-200 connected.
Supplied Data	Collects data on your positions.

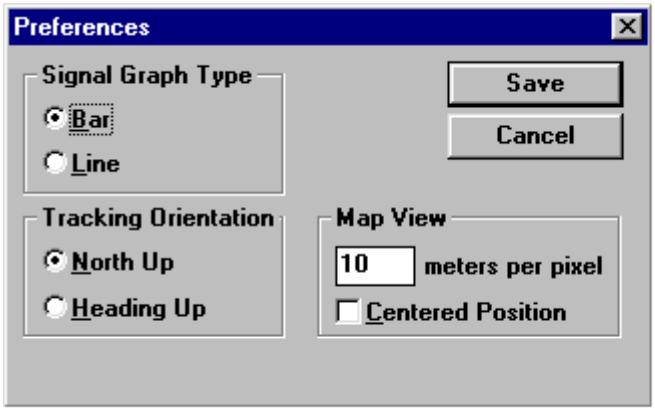
4. Click on Instrument (Measured Data) if it is not already clicked on.
5. Select the comm port from the Serial Port pulldown menu to which the serial cable has been connected on your PC.
6. Select 4800 from the Baud Rate pulldown menu (default baud rate).
7. Click the OK button to continue.

To Change Preferences

Note – These are basic settings that apply to the 12-Channel Signal Level View Screen, Tracking View Screen, and Map View Screen.

1. Choose Preferences from the Setup pulldown menu.

   The Preferences screen is displayed.



2. Select the type of signal graph that you want to view on the 12-Channel Signal Level View screen.

Option	Description
Bar	Displays the data with vertical bars.
Line	Displays the data in a horizontal line.

3. Select the direction of the tracking orientation that you want to use in the Tracking View screen.

Option	Description
North Up	True north points to the top of the circle.
Heading Up	Used when driving. Current heading points to the top of the circle.

4. Type the meters per pixel that you want to display when viewing the map in Map View, this controls the scale of the map.
5. Click the check box if you want the Map View to be displayed with the current position at the map center.
6. Click the Save button to save the changes or the Cancel button to exit.

To Display Information About the SiRFstar Demo

1. Select About SiRFstar Demo from the Setup pulldown menu.

   This displays SiRFdemo software information.

To Exit the SiRFstar Demo

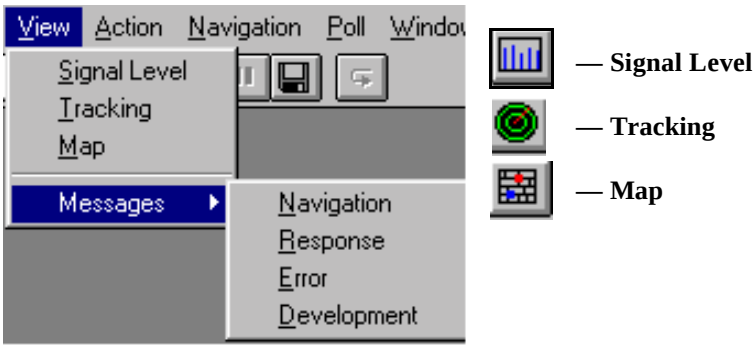
1. Select Exit from the Setup pulldown menu.

   This closes SiRFdemo software.

View 4

This chapter describes the SiRFdemo functions under the View menu:

- “To Display the 12-Channel Signal Level View Screen”
- “To Display the Tracking View Screen”
- “To Display the Tracking View Configuration Screen”
- “To Display the Map View Screen”
- “To Change Preferences from the Map View”
- “To Display the Measured Navigation Message View Screen”
- “To Display the Response View Screen”
- “To Display the Error Message View Screen”
- “To Display the Development Data View Screen”

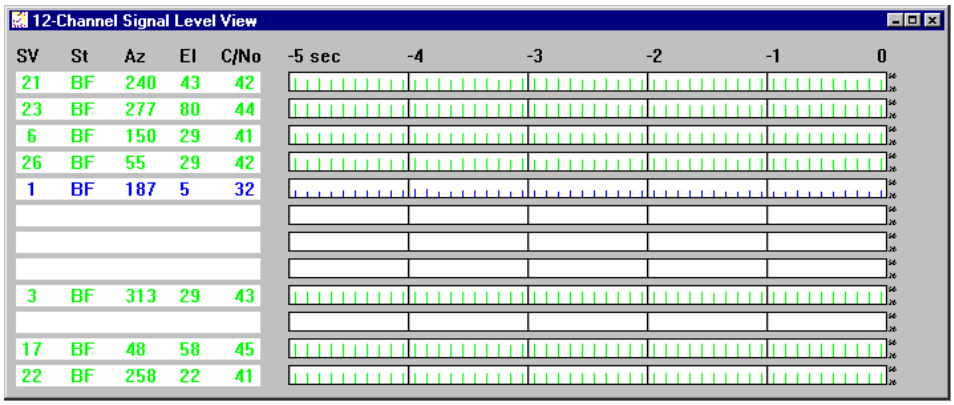


To Display the 12-Channel Signal Level View Screen

1. Click on the Signal Level View button or choose Signal Level from the View menu.

   The 12-Channel Signal Level View screen displays the satellite number, status, azimuth, elevation, C/No, and last five seconds of signal measured strength.

Note – If you double-click on the 12-Channel Signal Level View screen, the Preferences screen is displayed, as described in “To Change Preferences” on page 14. The Preferences screen enables you to modify the way information is displayed on the screen.

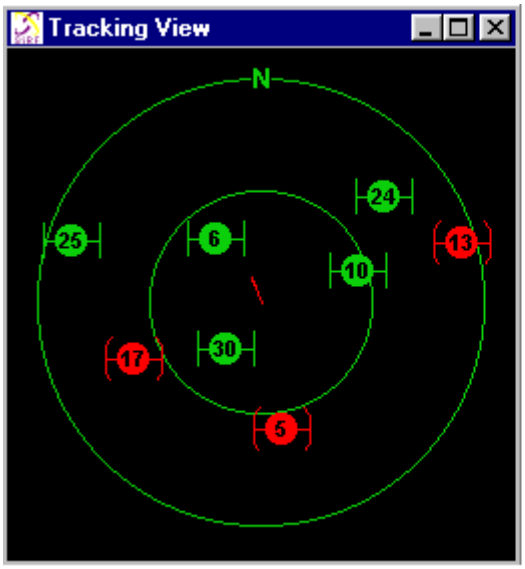


Information Displayed	Description
Satellite Number (SV)	GPS satellite PRN number
Status (St)	Satellite status (see Table C-31 for more information)
Azimuth (Az)	Satellite azimuth (in degrees)
Elevation (El)	Satellite elevation (in degrees)
C/No	Signal level (in dB-Hz)
Signal Level (-5 sec)	5-second history

To Display the Tracking View Screen

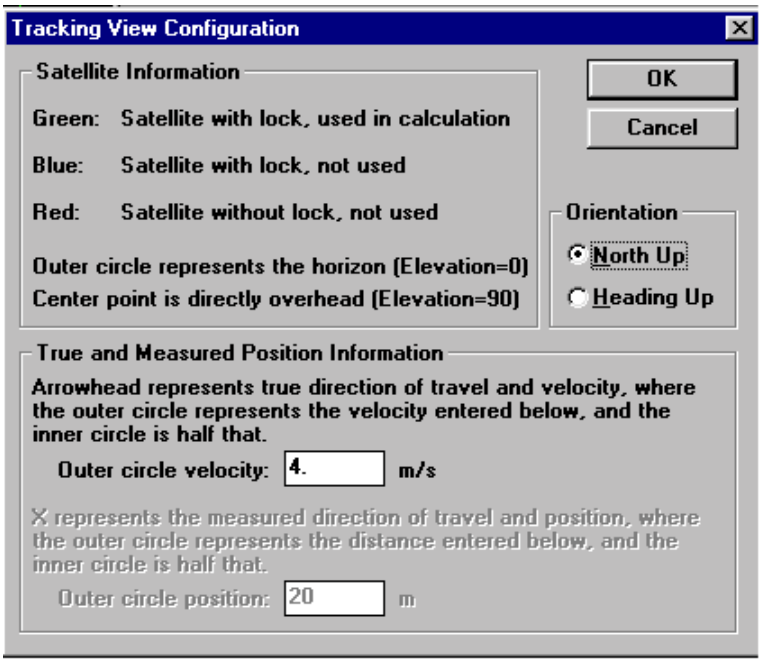
1. Click on the Tracking View button or choose Tracking from the View menu.

   The Tracking View screen displays the satellites in a polar plot orientation.



To Display the Tracking View Configuration Screen

1. Double-click on the Tracking View screen to display the Tracking View Configuration screen.



2. Select the direction of the tracking orientation that you want to use.

Option	Description
North Up	True north points to the top of the circle.
Heading Up	This option can be used when driving. Current heading points to the top of the circle.

3. Type the Outer circle velocity (in m/sec).

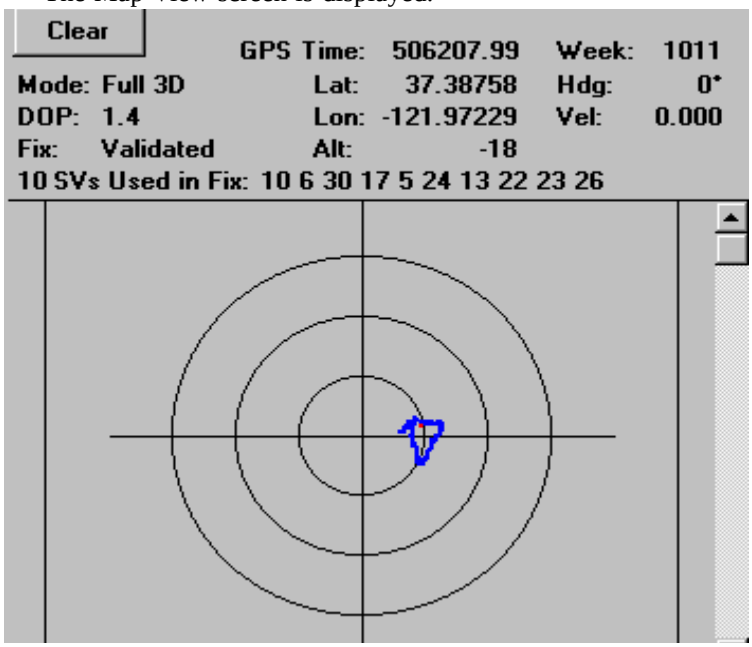
4. Click the OK button to save the changes or the Cancel button to exit.

To Display the Map View Screen

Note – To use the Map View track history screen, you must create a SiRF Map Protocol file (with a `*.smp` extension). Provided with your software is a sample `ring90.smp` file that includes data for SiRF Technology, Inc.'s location. You can modify this file for your location. Go to "Modifying the Sample ring90.smp File" on page 83 in this manual for more information.

1. Click on the Map View button or choose Map from the View menu.

   The Map View screen is displayed.

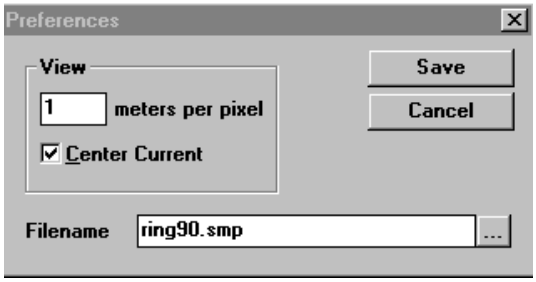


Note – The red dot shows the current position while the blue dots show the previous position.

Note – If you double-click on the Map View screen, the Preferences screen is displayed.

To Change Preferences from the Map View

1. Double-click on the Map View screen to set specific preferences on the Map View screen.



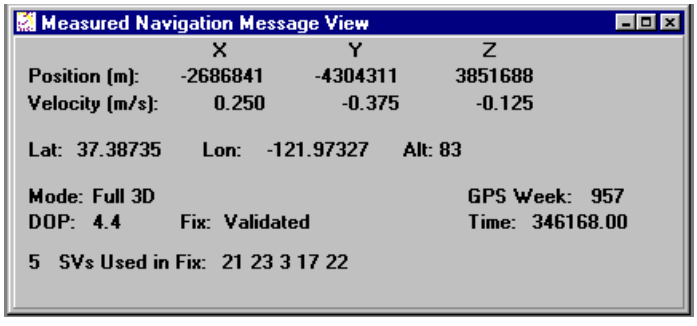
2. Type the meters per pixel that you want to display when viewing the map in Map View. This value controls the map scale.
3. Click the Center Current check box if you want the Map View to be displayed in the centered position.
4. Type the Filename or browse.
5. Click the Save button to save the changes or the Cancel button to exit.

Note – The Navigation, Response, Error, Development, and Messages options, are for viewing only. If you want to log data, choose Open a Log File from the Action menu. See “To Open a Log File” on page 17.

To Display the Measured Navigation Message View Screen

1. Choose Messages Navigation from the View menu.

   The Measured Navigation Message View screen is displayed.



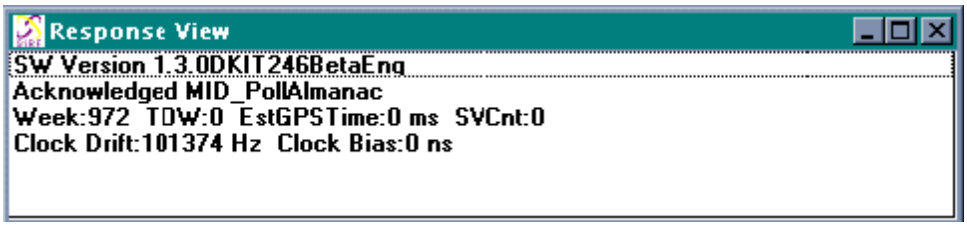
Information Displayed	Description
X, Y, Z positions	Coordinates of user's position in ECEF (meters)
Velocity	User's velocity in ECEF (m/s)
Latitude	User's latitude (decimal of degrees)
Longitude	User's longitude (decimal of degrees)
Altitude	User's altitude (meters)
Mode	Navigation solution type (see Table C-28 and Table C-29)
GPS Week	GPS week number
DOP	Dilution of Precision
Fix	Validated/unvalidated (see Table C-28 and Table C-29)
Time	Current GPS time (seconds)
Svs Used in Fix	Sv PRN used in solution

Note – ECEF XYZ is converted geodetic latitude, longitude, and altitude based on the WGS84 ellipsoid parameters.

To Display the Response View Screen

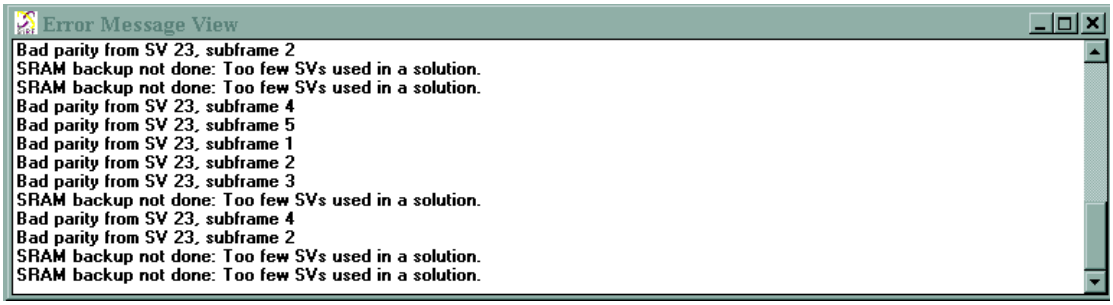
Note – This option is used with the Poll menu. All responses to poll messages are displayed in the Response screen.

1. Choose Messages Response from the View menu.



To Display the Error Message View Screen

1. Choose Messages Error from the View menu.

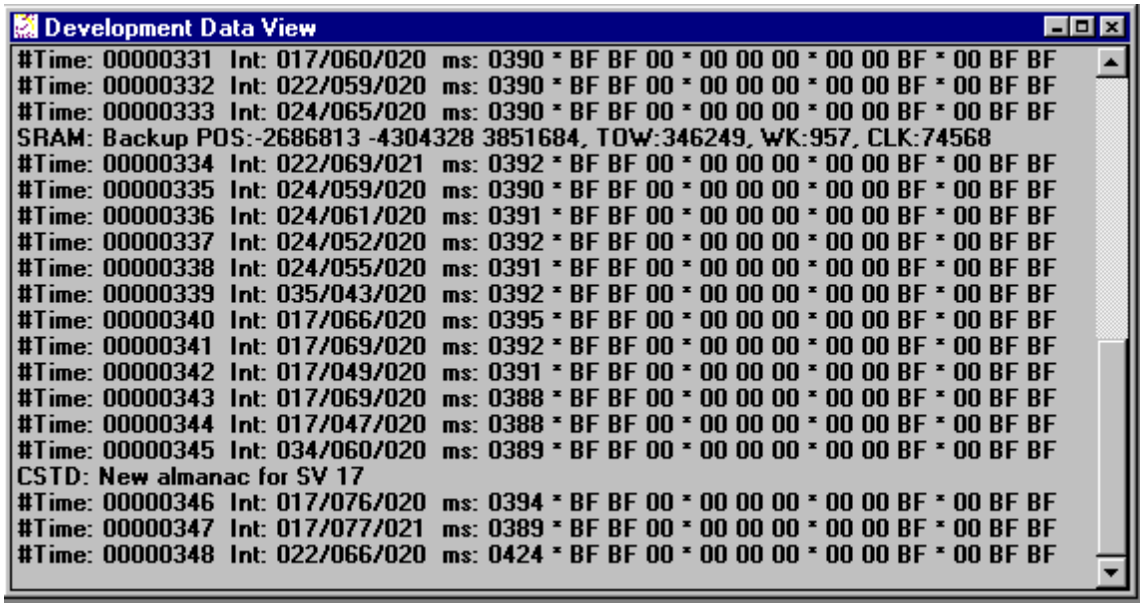


Note – Error messages are generated automatically by the receiver under certain conditions. Many are caused by normal GPS operations (i.e., acquiring a low elevation satellite could result in a bad parity).

To Display the Development Data View Screen

The Development Data View screen displays additional information about the receiver operation. The data is generated automatically by the GM-200.

1. Choose Messages Development from the View menu.



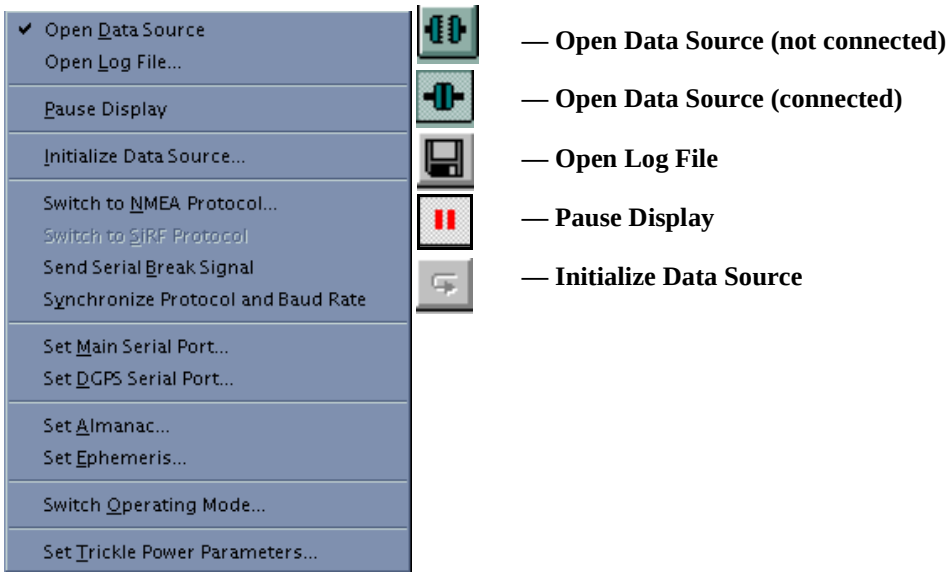
Note – To view incoming development data the Enable Development Data checkbox must be enabled on the Receiver Initialization screen.

Action 5

This chapter describes the SiRFdemo functions under the Action menu:

- “To Open Data Source”
- “To Open a Log File”
- “To Pause the Display”
- “To Initialize Data Source”
- “To Switch to NMEA Protocol”
- “To Switch to SiRF Protocol (from NMEA Protocol)”
- “To Send Serial Break”
- “To Synchronize Protocol and Baud Rate”
- “To Set the Main Serial Port”
- “To Set the DGPS Serial Port Parameters”
- “To Upload an Almanac to the GM-200”
- “To Upload an Ephemeris to the GM-200”
- “To Switch Operating Modes”
- “To Set Trickle Power Parameters”

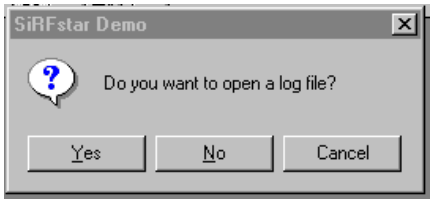
Note – All values that appear in the dialogue boxes under this menu are “**RECEIVER DEFAULT VALUES.”** To determine the current settings of all Navigation.



To Open Data Source

1. Click the Connect/Disconnect button or select Open Data Source from the Action menu.

   A prompt is displayed asking if you want to open a log file.



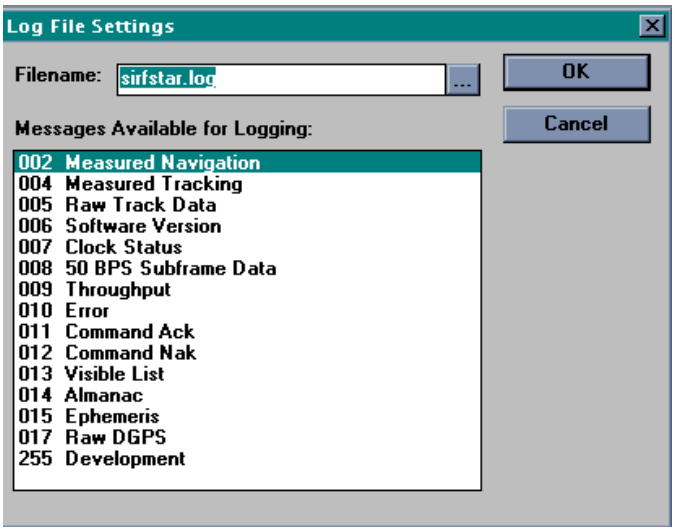
   - Clicking the Yes button displays the Log File Settings screen (see “To Open a Log File” on page 26 for more information).
   - Clicking the No button will not open a log file.
   - Clicking the Cancel button aborts the connection.

2. Click the Connect/Disconnect button again or select Open Data Source from the Action menu to disconnect communication to the GM-200.

To Open a Log File

1. Click the Log File Settings button or choose Open Log File from the Action menu.

Note – `sirfstar.log` is the default filename. Click the button on the right side of the filename field to browse for a file.



Messages	Description
002 Measured Navigation	Time, position, velocity,...
004 Measured Tracking	Satellite status and C/No
005 Raw Track Data	Satellite raw data measurements
006 SW Version	Software version of the GM-200
007 Clock Status	Receiver clock performance
008 50 BPS Subframe Data	Satellite ephemeris and almanac data
009 Throughput	CPU throughput usage
010 Error	Various error messages
011 Cmd Ack	Acknowledgment of received commands
012 Cmd Nak	Input message failures
013 Visible List	Satellite visibility list (based on current almanac)
014 Almanac	Satellite almanac data
015 Ephemeris	Satellite ephemeris data
017 Raw DGPS Data	Differential GPS corrections in RTCM format
255 Development	Various development information

2. Type or select the file name in which you want to save the settings.

Note – Only records that are selected are saved to file.

3. Click the OK button to begin logging the selected messages or the Cancel button to abort opening a file.

To Pause the Display

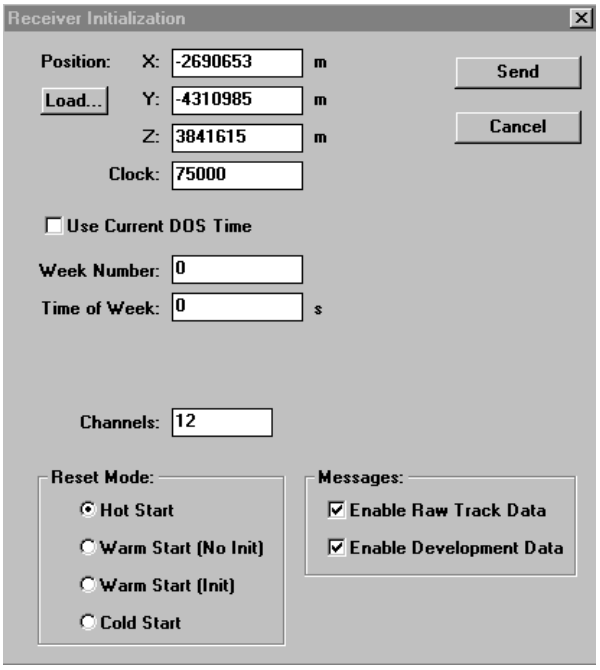
1. Click the Pause button or choose Pause Display from the Action menu.

Note – No data is logged while the display is paused.

To Initialize Data Source

1. Click the reset button or choose Initialize Data Source from the Action menu.

   The Receiver Initialization Setup screen is displayed.



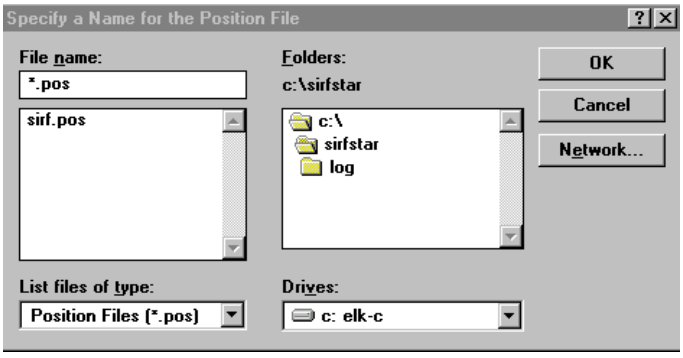
2. Select type of Reset Mode by clicking on the radio button.

Option	Description
Hot Start	The GM-200 restarts by using the values stored in the internal memory of the GM-200.
Warm Start (No Init)	This option has the same functionality as Hot Start except that it clears the ephemeris data and retains all other data.
Warm Start (Init)	This option clears all initialization data in the GM-200 and subsequently reloads the data that is currently displayed in the Receiver Initialization Setup screen. Almanac is retained but ephemeris is cleared. You can load a predefined file by selecting a *.pos file (see “Modifying the Sample Sirf.pos File” for more information on loading positions X, Y, and Z).
Cold Start	This option clears all data that is currently stored in the internal memory of the GM-200 including position, almanac, ephemeris, time, and clock drift.

Note – If Warm Start (Init) is selected the user must supply the X, Y, and Z coordinates and the clock data. (Refer to Step 3 through Step 10.) Otherwise go to Step 11.

Note – If Cold start is selected, all receiver settings will be reset to **FACTORY DEFAULTS**.

3. Type or Load the X, Y, and Z coordinates by clicking the Load button to display the Specify a Name for the Position File screen to browse for a position file.



4. Select the sample `Sirf.pos` configuration file.

Note – See “Modifying the Sample Sirf.pos File” for more information on loading positions X, Y, and Z.

5. Click the OK button to accept or the Cancel button to exit.
   The Receiver Initialization Setup screen is displayed again.
6. Type 96,000 in the Clock field (typical clock drift value of the crystal in the GM-200).

Note – If you type 0 in the Clock field, the GM-200 uses its last stored value, or a default of 96,000 if no prior stored value is available.

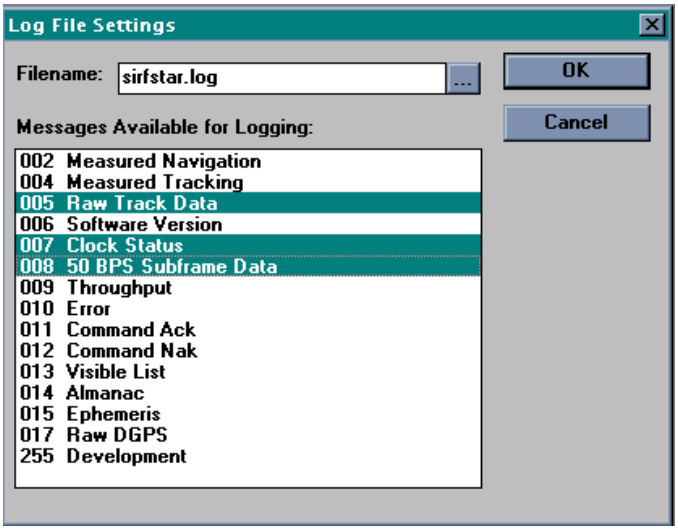
7. Click on or off the Use current DOS time check box.
   The default value is set to the current time.

Note – It is recommended to use DOS time (it is assumed that the date and time on your computer are set correctly).

8. Type the number of the week in the Week Number field.
9. Type the time of the week in the Time of Week field.
10. Type number of channels in the Channel field.
    Not more than 12 and not less than 1.
11. Click on Enable Raw Track Data to Log Raw Track Data.

Note – To log the Raw Track Data (005) or the Development Data (255) the records must be enabled by clicking in the respective boxes.

Note – 005 [Raw Track] Data must also be high-lighted on the Log File Settings Screen.



It is recommended to log records 007 [Clock Status] and 008 [50 BPS Subframe Data] with 005 [Raw Track Data] because they are enabled/disabled as a set of measurements.

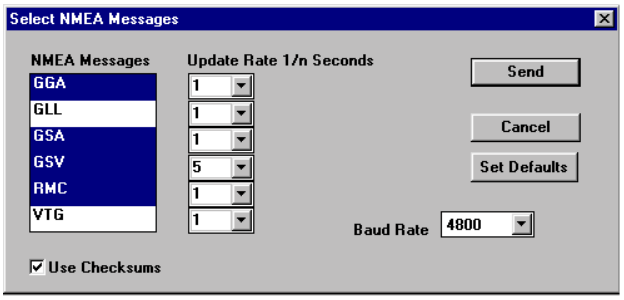
12. Click on Enable Development Data to turn on message 255 for Development Data View.
13. Click the Send button to initialize or the Cancel button to exit.

To Switch to NMEA Protocol

Note – Switching to NMEA Protocol causes the GM-200 to reset and send NMEA Messages.

1. Choose Switch to NMEA Protocol from the Action menu.

   The Select NMEA Messages screen is displayed.



2. Select the NMEA Messages that you want to use:

Option	Description
GGA	Standard output message for detailed position information.
GLL	Older message for simple position information only.
GSA	List of satellites used in solution.
GSV	Detailed satellite information including signal strengths.
RMC	Combination message of position and velocity.
VTG	Standard output message for velocity.

3. Select the update rate for each NMEA message that you want to use from the Update Rate pulldown menu (1 record per second minimum to 1 record per 255 seconds maximum).
4. Select the baud rate that you want to use from the Baud Rate pulldown menu.
5. Click the OK button to save or the Cancel button to exit.

Note – NMEA is regarded as a message 255 and can be viewed in the Development Data screen. It can also be logged by using the same technique as a SiRF binary file. Select 255-Development in the Log File Settings screen and Enable Development Data must be checked on in the Messages field of the Receiver Initialization screen.

To Switch to SiRF Protocol (from NMEA Protocol)

1. Choose Switch to SiRF Protocol from the Action menu to return to SiRF binary protocol.

Note – For more detailed information see Appendix , “NMEA Input/Output Messages.”

To Send Serial Break

Note – Applies to previous software versions only (maintained for backwards compatibility).

To Synchronize Protocol and Baud Rate

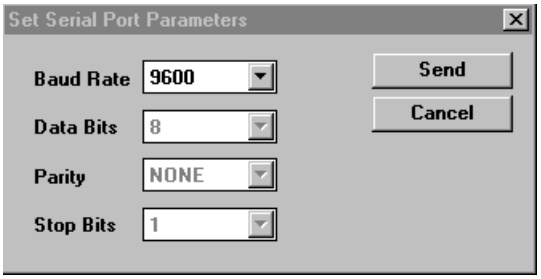
All receiver settings are preserved over power cycles in a battery backed SRAM. It can occur that the computer in use may change or communication parameters may change. Other users of the GM-200 may not be aware of the last settings. This option will attempt to communicate with the GM-200 using all possible baud rates and both NMEA and SiRF binary protocols. When communication is established with the unit It will be set to SiRF binary protocol at a baud rate of 9600.

Note – The RS232 settings (i.e. parity, stop bits....) are left at current settings

To Set the Main Serial Port

1. Choose Set Main Serial Port from the Action menu.

   The Set Serial Port Parameters screen is displayed.



2. Select the baud rate, data bits, parity, and stop bits that you want to use for the serial port parameters from each pulldown menu.

Note – Only Baud Rate is changeable.

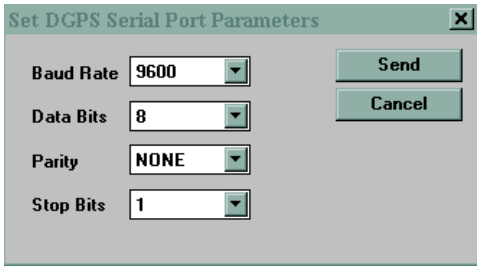
3. Click the Send button to accept or the Cancel button to exit.

   Clicking the Send button resets the GM-200 and computer’s serial port to start communicating with the new parameters.

To Set the DGPS Serial Port Parameters

1. Choose Set DGPS Serial Port from the Action menu.

   The Set DGPS Serial Port Parameters screen is displayed.



2. Select the baud rate, data bits, parity, and stop bits that you want to use for the DGPS serial port parameters from each pulldown menu.

3. Click the Send button to accept or the Cancel button to exit.

   Clicking the Send button resets the GM-200 and attempts to accept DGPS information from serial port B (RTCM input).

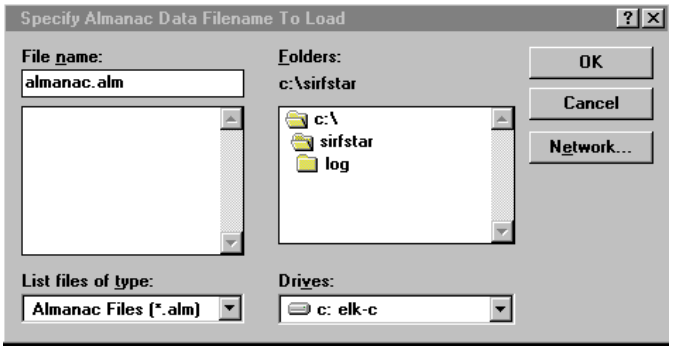
Note – Differential correction data source must be configured separately.

To Upload an Almanac to the GM-200

The Almanac file must be in the same format as polled from the GM-200.

1. Choose Set Almanac from the Action menu.

   The Specify Almanac Data Filename To Load screen is displayed.



2. Specify the file you want to use.

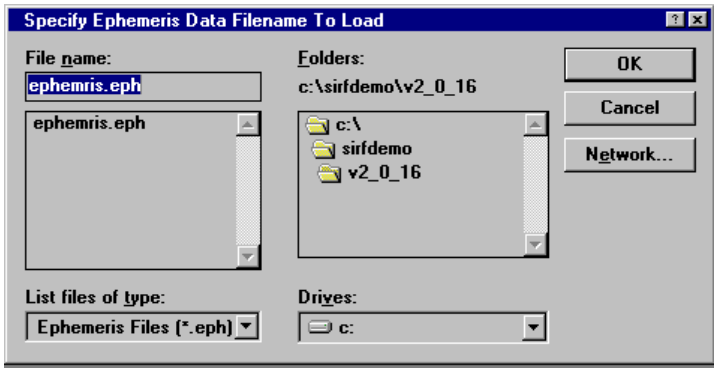
3. Click the OK button to accept or the Cancel button to exit.

To Upload an Ephemeris to the GM-200

The Ephemeris file must be in the same format as polled from the GM-200.

1. Choose Set Ephemeris from the Action menu.

   The Specify Ephemeris Data Filename To Load screen is displayed.

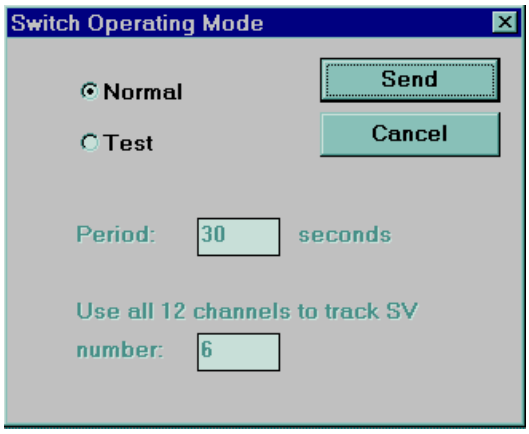


2. Specify the file you want to use.
3. Click the OK button to accept or the Cancel button to exit.

To Switch Operating Mode

1. Choose Switch Operating Mode the Action menu.

The Switch Operating Mode screen is displayed.



2. Select “Test” if you wish to track a specific satellite on all channels.Satellite and tracking period must be specified.
3. Select Normal (default) to track all available satellites.
4. Send the command to the GM-200.

To Switch Trickle Power Parameters

In release 1.3, functionality is added for low-power receiver operation. There are two modes of low-power operation:

- TricklePower — In TricklePower mode, the power to the SiRF chipset is cycled periodically, so that it operates only a fraction of the time.
- Push-to-Fix — In Push-to-Fix mode, the receiver is generally off, but turns on frequently enough to collect ephemeris maintain GSP1 real time clock calibration so that, upon user request, a position fix can be provided quickly after power-up.

TricklePower

In this mode, the power to the GRF1/LX chip is cycled regularly, according to two user-specified parameters: Update Rate and OnTime. During TricklePower operation, the GRF1/LX chip is powered on for OnTime (in milliseconds), then powered off for a specified number of milliseconds as determined by the update rate.This cycle repeats indefinitely.

The GSP1/LX chip is not explicitly powered down, but its primary operation is driven by the GPS clock generated by the GRF1/LX, so it draws very little power while the GRF1/LX is powered down. The real time clock (RTC) portion of the GSP1/LX continues operation at all times, and is used to generate the interrupt that turns everything back on.

The microprocessor on which the SiRF code executes is not explicitly powered down. After the OnPeriod has elapsed, the processor continues operating long enough to complete its navigation tasks, then puts itself in sleep mode until it is reawakened by the RTC-generated interrupt.

The default parameters values are:

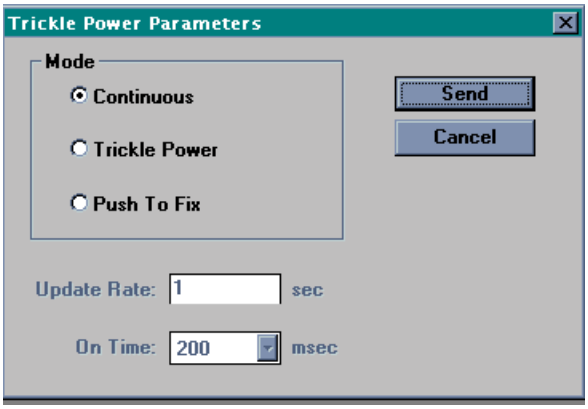
- OnPeriod = 200ms, Update Rate = 1 second

Push-to-Fix

For applications where a position fix is required on demand (i.e., not continuous) then the Push-to-Fix mode is the most appropriate mode of operation for power sensitive situations. In this mode, the receiver turns on periodically (approximately every 30 minutes) to update ephemeris records and calibrate the clocks. When all internal updating tasks are complete, the unit powers itself off (except for RTC) and schedules the next wake up period. When the receiver is power cycled externally, a navigation solution will be available to the user in 3 seconds.

1. Select Set Trickle Power Parameters from the Action Menu

   The Trickle Power Parameters screen is displayed



2. Select low power mode.

Note – If you select Trickle Power you must also input the update rate (number of seconds between fixes, minimum is 1 second) and On Time (range 200-900 ms).

---

3. Click Send to activate selection.

Navigation 6

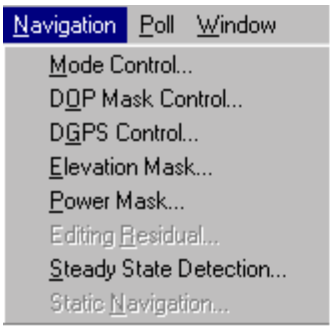
This chapter describes how to modify the operational parameters of the GM-200. The GM-200 is shipped with a set of defaults that provide optimized operation over a variety of applications. However, your application may have specific requirements that need modification of the operation of the GM-200 to provide improved performance. The navigation control parameters which can be adjusted via the serial port from the SiRFdemo and their effects are explained in this chapter.

This chapter describes the SiRFdemo functions under the Navigation menu:

- "To Set Navigation Mode Control"
- "To Set the DOP Mask Control"
- "To Set the DGPS Control"
- "To Set the Elevation Mask"
- "To Set the Power Mask"
- "To Enable/Disable the Steady State Detection"

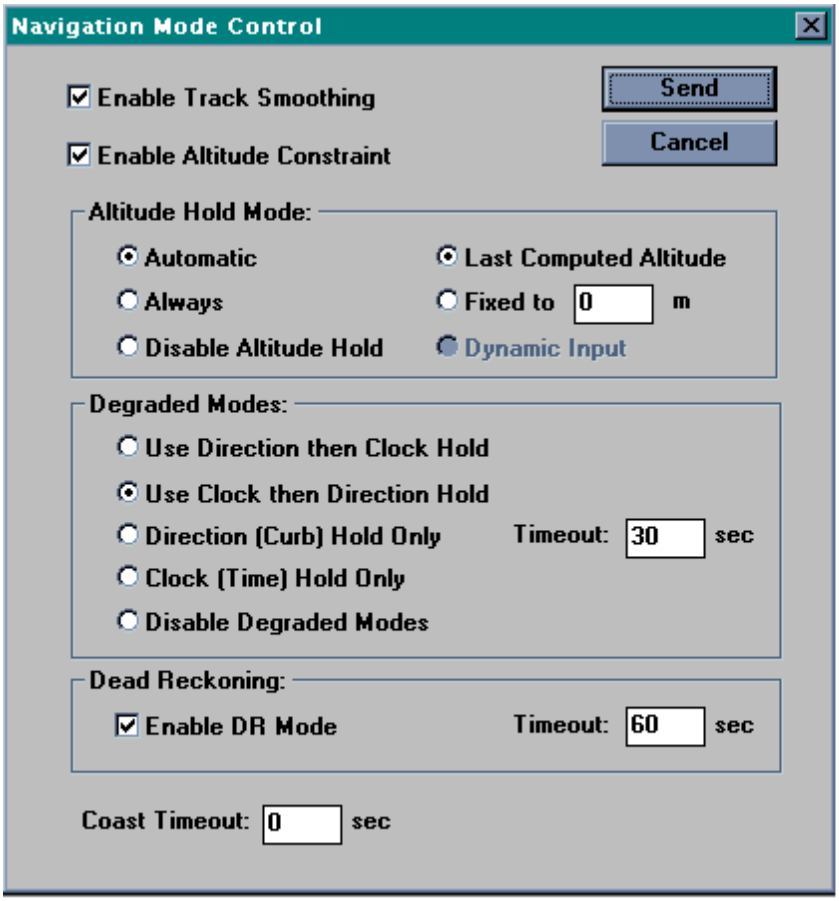
Note – All values that appear in the dialogue boxes under this menu are "**RECEIVER DEFAULT VALUES".**

To Set Navigation Mode Control



1. Choose Mode Control from the Navigation menu.

   The Navigation Mode Control screen is displayed.



Note – 3D mode is always enabled and cannot be changed.

2. Select the option(s) that you want to use.

Option	Description	Default
Enable Track Smoothing	Enables data smoothing	On
Enable Altitude Constraint	Clamp altitude variation to 10% of horizontal to create a smoother ground track.	On
Altitude Hold Mode:		
Automatic	Switch automatically to 2D if only three satellites are used, 3D if four satellites or more are used.	On
Always	Stay in 2D regardless of number of satellites in solution.	Off
Disable Altitude Hold	Only do 3D, if less than four satellites, no navigation.	Off
Last Computed Altitude	In hold mode, use last computed altitude.	Off
Fixed to	In hold mode, use entered value (meters)	Off
Dynamic Input	User can input new value vie serial port. Not currently implemented.	Off
Degraded Modes:		
Use Direction then Clock Hold	In two satellite mode use direction hold, one satellite is in clock hold.	Off
Use Clock then Direction Hold	In two satellite mode use clock hold, one satellite is in direction hold.	On
Direction (Curb) Hold Only	Never use clock hold, must have two satellites in direction hold.	Off
Clock (Time) Hold Only	Never use direction hold, must have two satellites in clock hold.	Off
Disable Degraded Modes	No output if less than three satellites.	Off
Timeout	Mode is disabled at timeout value.	
Dead Reckoning:		
Enable Dead Reckoning Mode	Outputs position updated with last velocity for specified time period.	On
Timeout	Mode is disabled at timeout value.	
Coast Timeout	Delay mode switch by specified time.	0 sec

8. Type the Timeout(s) that you want to use.
9. Click the Send button to accept or the Cancel button to exit.

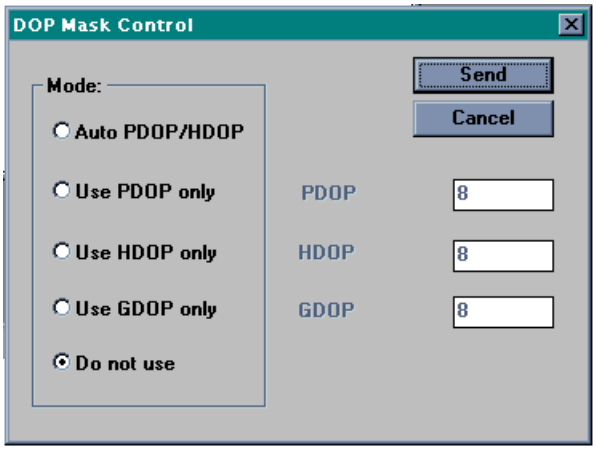
To Set the DOP Mask Control

This mask enables you to control the output of the receiver such that positions computed with a high DOP (dilution of precision) are not updated. When the DOP mask is exceeded, the position message status changes to “DOP mask exceeded” and the position does not update. You can select the modes and the associated values can be entered in the fields adjacent to the radio button for each mode.

Note – At this time, the mask is implemented based only on PDOP. The other options are not currently implemented.

1. Choose DOP Mask Control from the Navigation menu.

   The DOP Mask Control screen is displayed.



2. Select the Mode that you want to use.

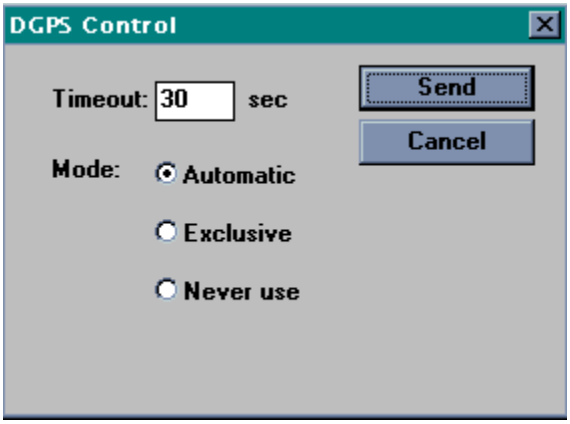
Option	Description	Default
Auto PDOP/HDOP	PDOP in use if more than four satellites, HDOP if three satellites.	On
Use PDOP only	PDOP mask always in use.	Off (10)
Use HDOP only	HDOP mask always in use.	Off (8)
Use GDOP only	GDOP mask always in use.	Off (8)
Do not use	No mask in use, update regardless of DOP (default).	Off

3. Click the Send button to accept or the Cancel button to exit.

To Set the DGPS Control

1. Choose DGPS Control from the Navigation menu.

   The DGPS Control screen is displayed.



2. Select the Mode that you want to use.

Option	Description	Default
Automatic	Use differential corrections when they are available, otherwise compute a non differential solution. (see note below)	On
Exclusive	Only compute a differential solution. If no corrections are available no solution is output.	Off
Never use	Only compute a nondifferential solution (even if corrections are valid).	Off

3. Type the Timeout that you want to use.

4. Click the Send button to accept or the Cancel button to exit.

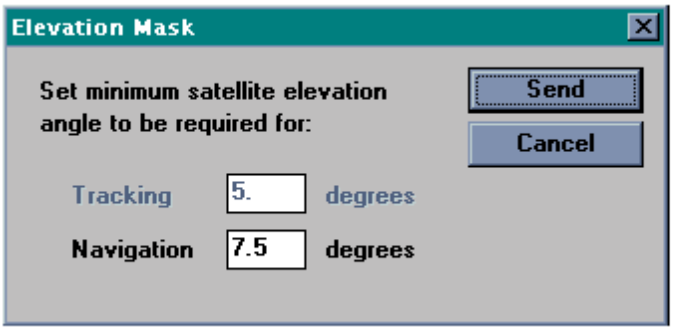
Note – Automatic Mode: The Automatic Mode of operation reports a valid position that is either deferentially corrected (all valid DGPS corrections applied) or a non-deferentially corrected solution with all valid satellites used in the solution. Conditions leading to a solution are described in the table below.

Valid SVs	Valid DGPS Correction	Reported Position Mode
>= 4 Svs	>= 4 valid corrections	DGPS
>=4	.<=3	>=4 SV (NON DGPS)
<=3	<=3 valid corrections	DGPS

To Set the Elevation Mask

1. Choose Elevation Mask from the Navigation menu.

   The Elevation Mask screen is displayed.



Note – Minimum satellite elevation angle for satellites to be tracked is not currently implemented (default is 5 degrees).

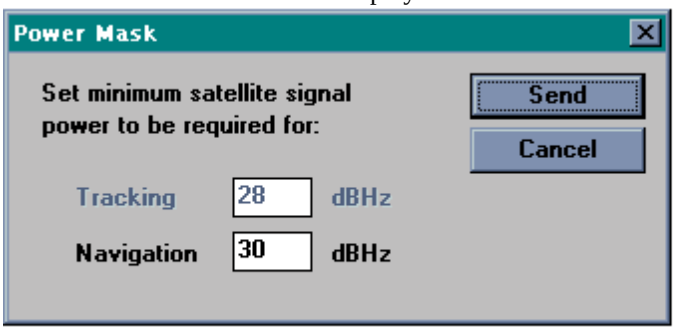
2. Type the minimum satellite elevation angle for satellites to be used in navigation solution. (The default is 7.5 degrees.)

3. Click the Send button to accept or the Cancel button to exit.

To Set the Power Mask

1. Choose Power Mask from the Navigation menu.

   The Power Mask screen is displayed.



Note – Minimum satellite signal power for satellites to be tracked is not currently implemented (default is 28 dBHz).

2. Type minimum satellite signal power for satellites to be used in navigation solution.

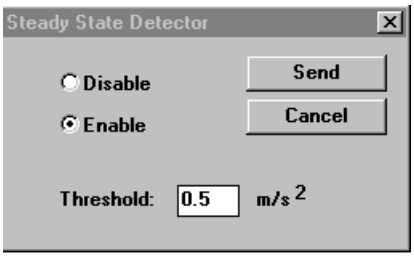
3. Click the Send button to accept or the Cancel button to exit.

To Enable/Disable the Steady State Detection

The steady state detection allows the navigating algorithms to decrease the noise in the in the position output when the acceleration is below the threshold. This reduces the position wander caused by Selective Availability (SA) and improved positions especially in stationary applications.

1. Choose Steady State Detection from the Navigation menu.

   The Steady State Detector screen is displayed.



2. Select the option that you want to use.
3. Type the Threshold if applicable.
4. Click the Send button to accept or the Cancel button to exit.

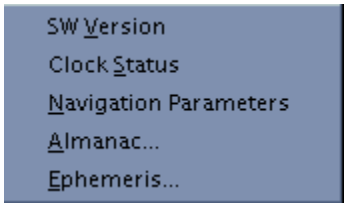
Poll

7

This chapter describes how to request the following information. All responses are displayed in the Response View screen or saved in a file.

This chapter describes the SiRFdemo functions under the Poll menu:

- “To Poll The Software Version”
- “To Poll the Clock Status”
- “To Poll Navigation Parameters”
- “To Download an Almanac”
- “To Download Ephemeris Data”

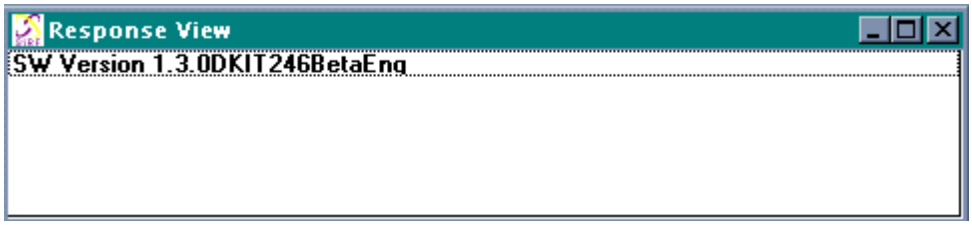


To Poll The Software Version

Note – The software version is composed of the software version number, a four-letter kit identifier, and a build number. This software version refers to the GM-200. Use this information when calling SiRF Technology technical support.

1. Choose SW Version from the Poll menu.

   The Response View screen is displayed with the software version.

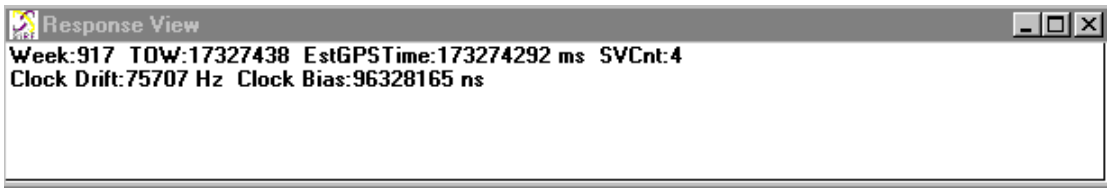


To Poll the Clock Status

The Clock Status displays the receiver clock performance.

1. Choose Clock Status from the Poll menu.

   The Response View screen is displayed with the clock status.

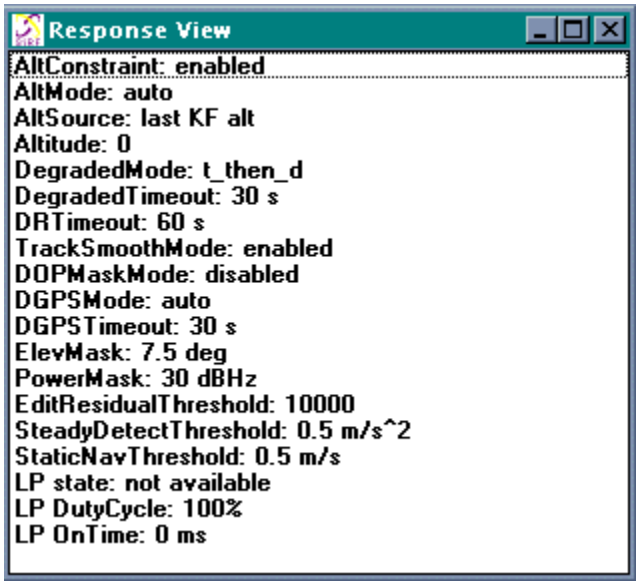


To Poll Navigation Parameters

All of the user settings under the Action and Navigation menus can be polled for their current status and settings.

1. Select Navigation Parameters from the Poll menu.

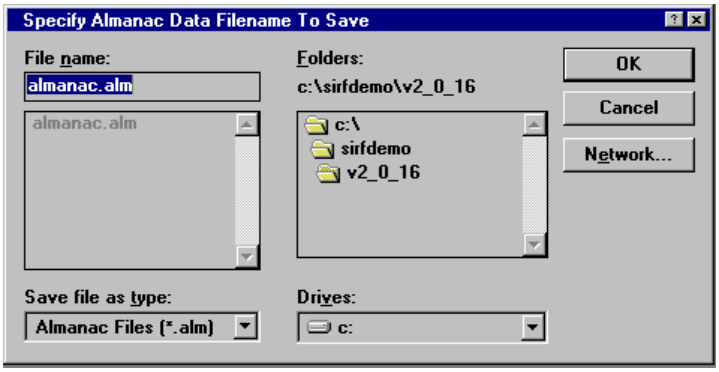
   The current settings will be displayed in the response view window.



To Download an Almanac

1. Choose Almanac from the Poll menu.

   The Specify Almanac Data Filename To Load screen is displayed.



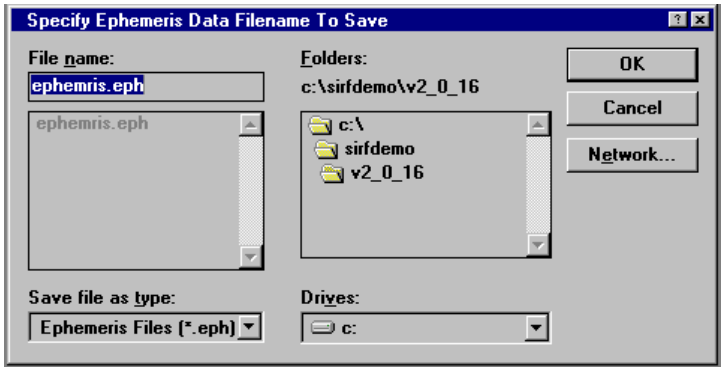
2. Specify the file name in which to save the almanac information.
3. Click the OK button to save or the Cancel button to exit.

Note – Clicking the OK button saves the data to file when received. A message box is displayed to confirm completion.

To Download Ephemeris Data

1. Choose Ephemeris from the Poll menu.

   The Specify Ephemeris Data Filename To Load screen is displayed.



2. Specify the file name that you want to save the ephemeris information to.
3. Click the OK button to save or the Cancel button to exit.

Note – Clicking the OK button saves the data to file when received. A message box is displayed to confirm completion.

NMEA Input/Output Messages 8

The GM-200 provided by SiRF Technology Inc. may also output data in NMEA-0183 format as defined by the National Marine Electronics Association (NMEA), Standard For Interfacing Marine Electronic Devices, Version 2.20, January 1, 1997. Refer to Chapter 5 for detailed instructions.

NMEA Output Messages

The GM-200 outputs the following messages as shown in Table D-1:

Table D-1 NMEA-0183 Output Messages

NMEA Record	Description
GGA	Global positioning system fixed data
GLL	Geographic position - latitude/longitude
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data
VTG	Course over ground and ground speed

GGA —Global Positioning System Fixed Data

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

$GPGGA,161229.487,3723.2475,N,12158.3416,W,1,07,1.0,9.0,M, , , ,0000*18

Table D-2 GGA Data Format

Name	Example	Units	Description
Message ID	$GPGGA		GGA protocol header
UTC Time	161229.487		hhmmss.sss
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
Position Fix Indicator	1		See Table D-3
Satellites Used	07		Range 0 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude[1]	9.0	meters	
Units	M	meters	
Geoid Separation[1]		meters	
Units	M	meters	
Age of Diff. Corr.		second	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*18		
<CR> <LF>			End of message termination

1. SiRF Technology Inc. does not support geoid corrections. Values are WGS84 ellipsoid heights.

Table D-3 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	GPS PPS Mode, fix valid

GLL—Geographic Position - Latitude/Longitude

Table D-4 contains the values for the following example:

$GPGLL,3723.2475,N,12158.3416,W,161229.487,A*2C

Table D-4 GLL Data Format

Name	Example	Units	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 Position	161229.487		hhmmss.sss
Status	A		A=data valid or V=data not valid
Checksum	*2C		
<CR> <LF>			End of message termination

GSA—GNSS DOP and Active Satellites

Table D-5 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 D-5 GSA Data Format

Name	Example	Units	Description
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See Table D-6
Mode 2	3		See Table D-7
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 D-6 Mode 1

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

Table D-7 Mode 2

Value	Description
1	Fix Not Available
2	2D
3	3D

GSV—GNSS Satellites in View

Table D-8 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 D-8 GGA Data Format

Name	Example	Units	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/No)	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/No)	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.

RMC—Recommended Minimum Specific GNSS Data

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

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

Table D-9 RMC Data Format

Name	Example	Units	Description
Message ID	$GPRMC		RMC protocol header
UTC Time	161229.487		hhmmss.sss
Status	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[1]		degrees	E=east or W=west
Checksum	*10		
<CR> <LF>			End of message termination

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

VTG—Course Over Ground and Ground Speed

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

$GPVTG,309.62,T, ,M,0.13,N,0.2,K*6E

Table D-10 VTG Data Format

Name	Example	Units	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
Checksum	*6E		
<CR> <LF>			End of message termination

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

SiRF Proprietary NMEA Input Messages

NMEA input messages are provided to allow you to control the GM-200 while in NMEA protocol mode. The GM-200 may be put into NMEA mode by sending the SiRF Binary protocol message “Switch To NMEA Protocol - Message I.D. 129" on page xx using a user program or using `Sirfdemo.exe` and selecting Switch to NMEA Protocol from the Action menu. If the receiver is in SiRF Binary mode, all NMEA input messages are ignored. Once the receiver is put into NMEA mode, the following messages may be used to command the module.

Transport Message

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. 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.

SiRF NMEA Input Messages

Message	MID[1]	Description
SetSerialPort	100	Set PORT A parameters and protocol
NavigationInitialization	101	Parameters required for start using X/Y/Z
SetDGPSPort	102	Set PORT B parameters for DGPS input
Query/Rate Control	103	Query standard NMEA message and/or set output rate
LLANavigationInitialization	104	Parameters required for start using Lat/Lon/Alt[2]
Development Data On/Off	105	Development Data messages On/Off

1. Message Identification (MID).

2. Input coordinates must be WGS84.

SetSerialPort

This command message is used to set the protocol (SiRF Binary or NMEA) and/or the communication parameters (baud, data bits, stop bits, 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 then the GM-200 restarts using the saved parameters.

Table D-11 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 D-11 Set Serial Port Data Format

Name	Example	Units	Description
Message ID	$PSRF100		PSRF100 protocol header
Protocol	0		0=SiRF Binary, 1=NMEA
Baud	9600		4800, 9600, 19200, 38400
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.

NaviagtionInitialization

This command is used to initialize the module for a warm start, by providing current position (in X, Y, Z coordinates), clock offset, and time. This enables the GM-200 to search for the correct satellite signals at the correct signal parameters. Correct initialization parameters enable the GM-200 to acquire signals quickly.

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

Start using known position and time.

$PSRF101,-2686700,-4304200,3851624,96000,497260,921,12,3*7F

Table D-12 Navigation Initialization Data Format

Name	Example	Units	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 GM-200[1]
TimeOfWeek	497260	seconds	GPS Time Of Week
WeekNo	921		GPS Week Number
ChannelCount	12		Range 1 to 12
ResetCfg	3		See Table D-13
Checksum	*7F		
<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 will be used.

Table D-13 Reset Configuration

Hex	Description
0x01	Data Valid—Warm/Hot Starts=1
0x02	Clear Ephemeris—Warm Start=1
0x04	Clear Memory—Cold Start=1

SetDGPSPort

This command is used to control Serial Port B which is an input-only serial port used to receive RTCM differential corrections. Differential receivers may output corrections using different communication parameters. The default communication parameters for PORT B are 9600 baud, 8 data bits, stop bit, and no parity. If a DGPS receiver is used which 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 then the receiver restarts using the saved parameters.

Table D-14 contains the input values for the following example:

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

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

Table D-14 Set DGPS Port Data Format

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

Query/Rate Control

This command is used to control the output of standard NMEA messages GGA, GLL, GSA, GSV, RMC, and VTG. 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 D-15 contains the input values for the following examples:

1. Query the GGA message with checksum enabled

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

2. Enable VTG message for a 1 Hz constant output with checksum enabled

   $PSRF103,05,00,01,01*20

3. Disable VTG message

   $PSRF103,05,00,00,01*21

Table D-15 Query/Rate Control Data Format (See example 1.)

Name	Example	Units	Description
Message ID	$PSRF103		PSRF103 protocol header
Msg	00		See Table D-16
Mode	01		0=SetRate, 1=Query
Rate	00	seconds	Output—off=0, max=255
CksumEnable	01		0=Disable Checksum, 1=Enable Checksum
Checksum	*25		
<CR> <LF>			End of message termination

Table D-16 Messages

Value	Description
0	GGA
1	GLL
2	GSA
3	GSV
4	RMC
5	VTG

Note – In Trickle Power mode, update rate is specified by the user. When you switch to NMEA protocol, message update rate is also required. The resulting update rate is the product of the Trickle Power Update rate AND the NMEA update rate (i.e. Trickle Power update rate = 2 seconds, NMEA update rate = 5 seconds, resulting update rate is every 10 seconds, (2 X 5 = 10)).

LLANaviagtionInitialization

This command is used to initialize the module for a warm start, 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 acquire signals quickly.

Table D-17 contains the input values for the following example:

Start using known position and time.

$PSRF104,37.3875111,-121.97232,0,96000,237759,922,12,3*37

Table D-17 LLA Navigation Initialization Data Format

Name	Example	Units	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	95000	Hz	Clock Offset of the GM-200[1]
TimeOfWeek	237759	seconds	GPS Time Of Week
WeekNo	922		GPS Week Number
ChannelCount	12		Range 1 to 12
ResetCfg	3		See Table D-18
Checksum	*37		
<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 will be used.

Table D-18 Reset Configuration

Hex	Description
0x01	Data Valid—Warm/Hot Starts=1
0x02	Clear Ephemeris—Warm Start=1
0x04	Clear Memory—Cold Start=1

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 user to determine the source of the command rejection. Common reasons for input command rejection are invalid checksum or parameter out of specified range.

Table D-19 contains the input values for the following examples:

1. Debug On

   $PSRF105,1*3E

2. Debug Off

   $PSRF105,0*3F

Table D-19 Development Data On/Off Data Format

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

Calculating Checksums for NMEA Input