



OrbitGPS User Guide

G3090 Snap On Receiver for Motorola® MC90XX Mobile Computers



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Revision History

May 2008	Initial product release
October 2009	Updated for test software changes

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Introduction

This User Guide provides information about the G3090 GPS receiver for MC90XX mobile computers from Motorola.

The G3090 GPS receiver is designed to snap on to the mobile computer to provide GPS position information to applications running on the device. The GPS receiver features a rugged plastic housing that attaches to the MC90XX mobile computer using the device's serial connector for communication and power.



The G3090 GPS receiver has been tested for compatibility with the following operating systems:

- Windows® Mobile 2003
- Windows® Mobile 2003 Phone Edition
- Windows® Mobile 5.0
- Windows® Mobile 5.0 Phone Edition
- Windows® CE 5.0

The G3090 GPS receiver outputs GPS information as industry standard NMEA sentences which are compatible with most GPS software applications. It can also be configured to output GPS information in the SiRF Binary format.

G3090 GPS receivers offer typical accuracies of 3-5 meters uncorrected, and 3 meters or better with Wide Area Augmentation System (WAAS) correction.¹ They are tested to comply with FCC and CE standards.

For detailed information on the Motorola MC90XX mobile computer, see the Quick Reference Guide or Product Reference Guide for the mobile computer, available at www.symbol.com/manuals.

¹ *Accuracy is subject to degradation based on environmental and positional conditions. Rated accuracy provides 95% Circle Error Probability (CEP) position accuracies of <5 meters with WAAS correction and <10 meters uncorrected.

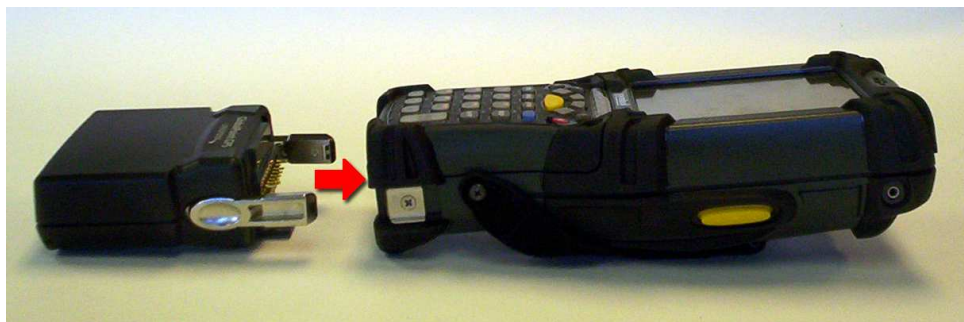
Note: Screens and windows pictured in this User Guide are samples and may vary.

Connecting the G3090 GPS Receiver to the MC90XX computer

When attached to the mobile computer, the G3090 GPS receiver has the following attributes:

- Allows the mobile computer to capture GPS data.
- Charges the mobile computer's battery, when used with the appropriate power supply.
- Provides power for operating the mobile computer, with the appropriate power connection.

To attach, snap the G3090 GPS receiver onto the bottom of the mobile computer. The latch grips on the G3090 GPS receiver will engage the mobile computer for a secure fit.



To remove, squeeze the latch grips and pull the G3090 GPS receiver from the mobile computer.



Remove the G3090 GPS receiver from the bottom of the mobile computer before using a cradle for charging and communication.

Getting Started

Using the G3090 GPS receiver with an existing GPS application

The G3090 GPS receiver is designed to work “out-of-the-box” with GPS applications that accept data in the NMEA protocol format.

The National Marine Electronics Association regulates the NMEA 0183 specifications standard which defines a set of ASCII strings, called sentences, which relay GPS navigation information. This is the most commonly used standard for GPS communications.

To configure the G3090 GPS receiver for use with a GPS application that supports the NMEA protocol, set the following parameters in the GPS application:

- GPS Com Port or Com Port: COM1
- Baud Rate: 4800
- Protocol: NMEA (Depending on the GPS application, you may not be asked to enter the protocol.)

Once these parameters have been set, the GPS application should begin automatically receiving GPS data from the G3090 GPS receiver. Please consult the GPS application documentation for further information on how to communicate with an attached GPS receiver.

Using the G3090 GPS receiver with the G3090 GPS application

The G3090 GPS application provides a means to confirm proper operation of the G3090 GPS receiver and configure the mode of operation (NMEA or SiRF). Detailed instructions on how to use the G3090 GPS application are included below.

The G3090 GPS application can be downloaded at www.OrbitGPS.com/GPSMC9000

WAAS & EGNOS Support

WAAS and EGNOS is a form of differential GPS correction that provide data that is used to improve quality of the GPS data provided by GPS receivers. The G3090 GPS Receiver will automatically acquire and utilize the correction data of WAAS or EGNOS satellites available in the area of use. When WAAS or EGNOS data is in use, the GPS fix “Quality” will show as “Corrected” in the G3090 GPS application.

For more information on WAAS visit:

<http://gps.faa.gov/programs/waas/currentnews-text.htm>

Charging the MC90XX through the G3090 GPS receiver

To charge the mobile computer's battery through the G3090 GPS receiver, connect the power supply to the G3090 GPS receiver, and then attach the G3090 GPS receiver to the mobile computer. The mobile computer begins charging automatically.

The G3090 GPS receiver supports the Motorola 12 volt DC Power Supply (Part Number VCA9000-12) and AC Power Supply (Part Number HP-O2040D43).



- 12V DC Power Supply (P/N VCA9000-12)



- AC Power Supply (P/N HP-O2040D43)

Batteries must be charged within the 32° to 104° F (0° to +40° C) ambient temperature range.

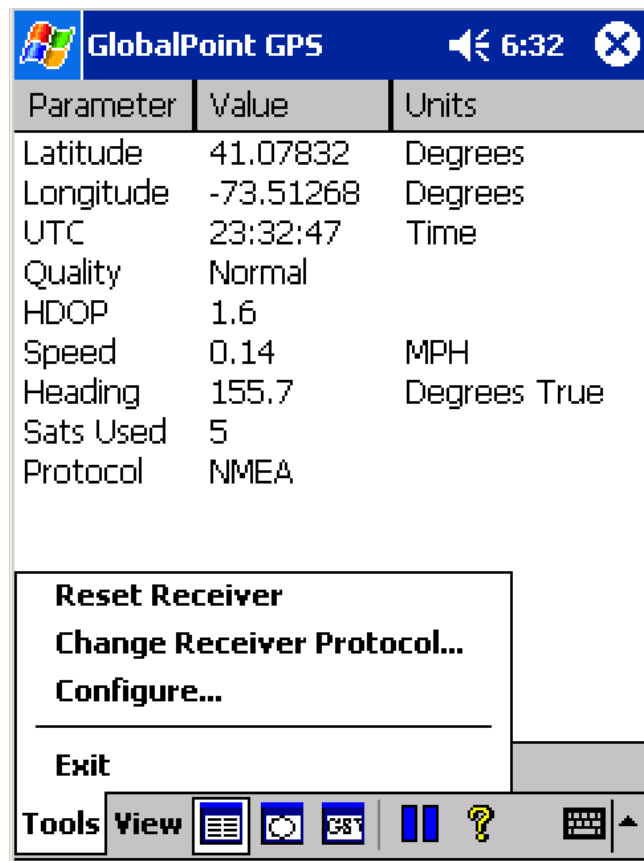
GPS Evaluation Software

The GPS Evaluation Software provides a means to configure and confirm operation of the G3090 GPS receiver. In the GPS Evaluation Software you will be able to choose the mode of operation of the receiver and display positioning and performance information.

GPS Evaluation Software can be downloaded at <http://www.orbitgps.com/support.htm>

Tools Menu Options

Use the **Tools** menu to access configuration options or to exit the program.



The tools menu contains the following options:

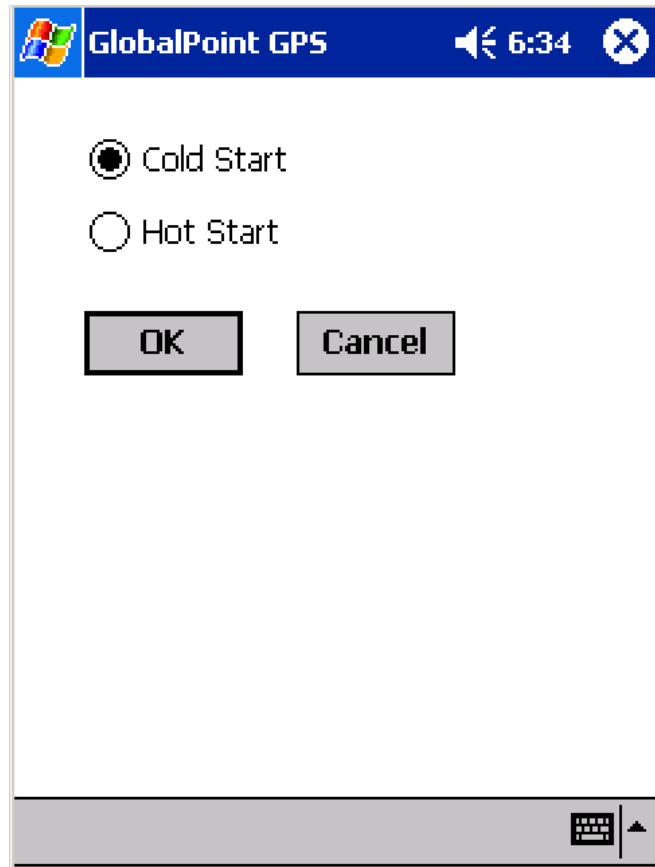
- Reset Receiver
- Change Receiver Protocol
- Configure

- Exit

Important Note: When first using the G3090 GPS application, go to the **Configure...** option first to set up communication between the G3090 GPS Receiver and Motorola MC9000 mobile computer.

Reset Receiver

Use the *Reset Receiver* option to select the Start Mode and begin a new initialization of the receiver.



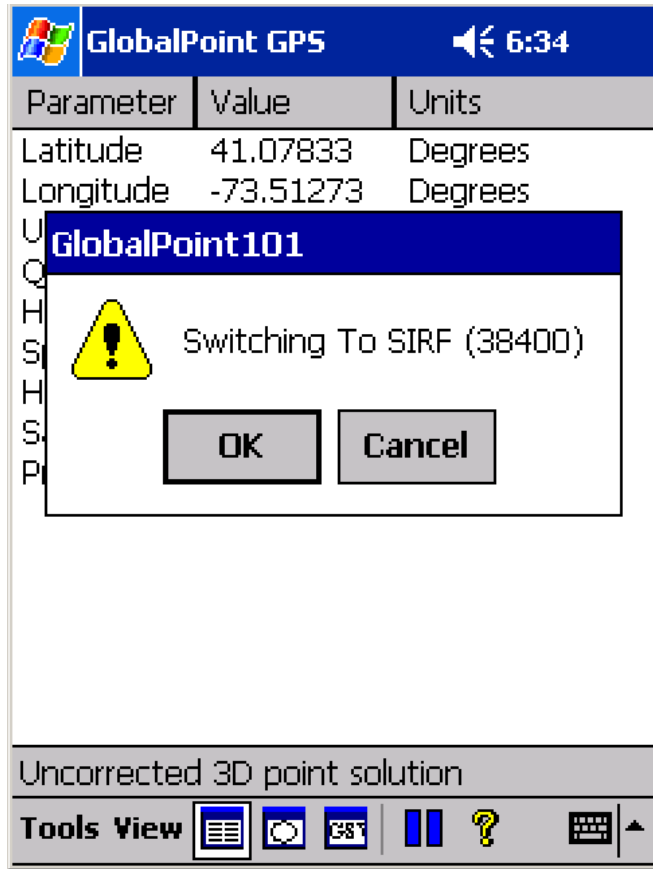
Cold Start causes the receiver to release any fix information and completely re-initialize navigation data (almanac, ephemeris, and clock). Typical "Time to First Fix" (TTFF) is 45 seconds or less.

Hot Start causes the receiver to keep existing navigation data and refresh the fix. Typical TTFF is 8 seconds or less.

Change Receiver Protocol

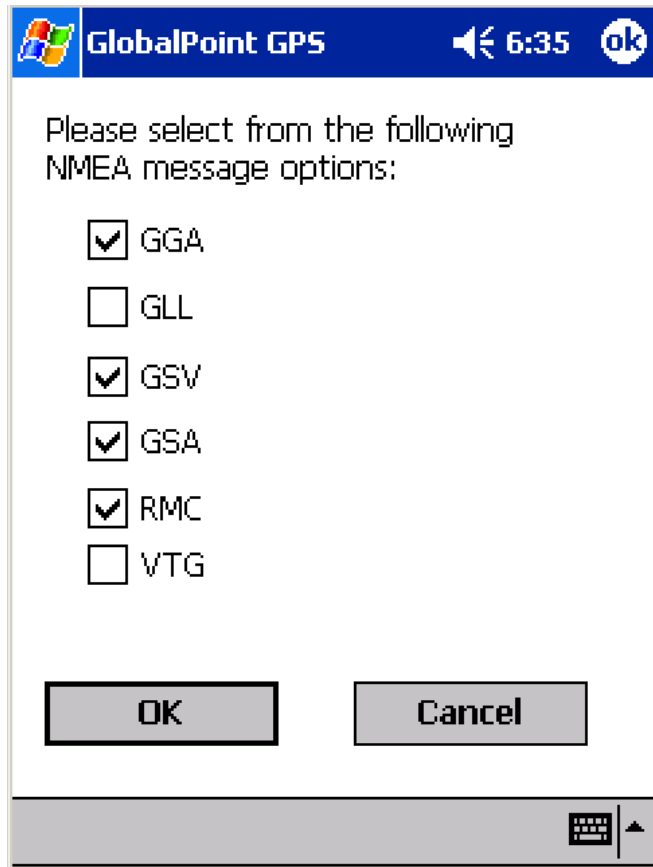
Change Receiver Protocol causes the receiver to switch between the two available modes of operation: NMEA or SiRF. NMEA is the default mode of operation for the G3090 GPS Receiver for the Motorola MC90XX mobile computers.

When in NMEA mode, choose this option to switch to SiRF mode.



The G3090 GPS application requires the user to confirm switching the mode of operation from NMEA to SiRF. To cancel the ***Change Receiver Protocol*** command, tap on "Cancel."

When in SiRF mode, choose this option to switch to NMEA mode.



The G3090 GPS application requires the user to confirm switching the mode of operation from SiRF to NMEA. To cancel the ***Change Receiver Protocol*** command, tap on "Cancel."

The ***Change Receiver Protocol*** also allows the user to choose which NMEA sentences are to be communicated from the G3090 GPS receiver to the mobile computer. The following NMEA sentences are supported by the G3090 GPS receiver:

GSV

Set this NMEA sentence to the update interval for the GNSS Satellites in view.

GLL

Set this NMEA sentence to the update interval for the Geographic Position: Latitude and Longitude.

RMC

Set this NMEA sentence to the update interval for the Recommended Minimum Specific GNSS Data.

GSA

Set this NMEA sentence to the update interval for the GNSS DOP and Active Satellites.

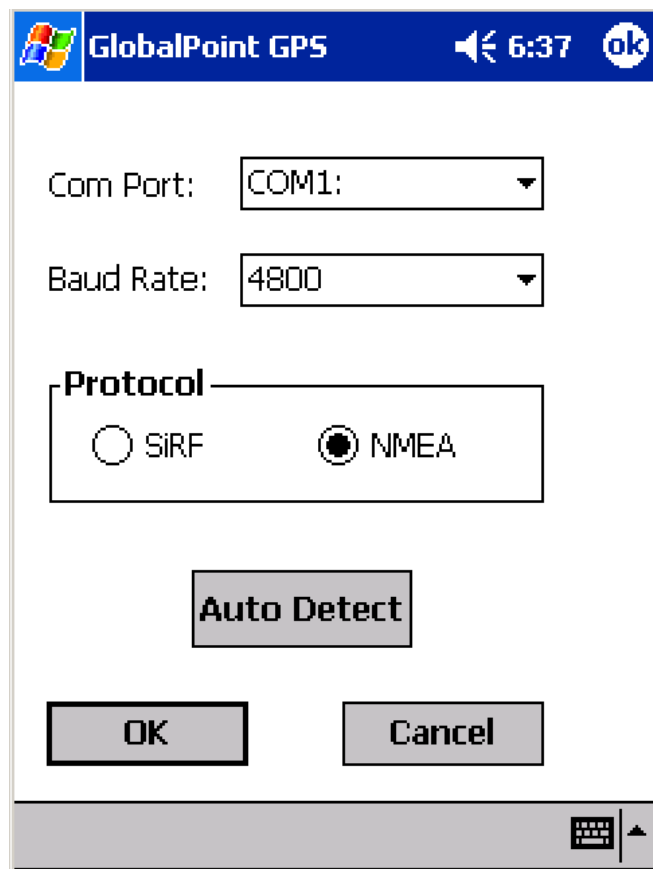
VTG

Set this NMEA sentence to the update interval for the Course Over Ground and Ground Speed.

The default NMEA sentences for the G3090 GPS receiver are GGA, GSV, GSA and RMC.

Configure

Use this option to configure the connection between the G3090 GPS receiver and the Motorola MC9000 mobile computer.



Com Port

This value determines the PC communications port the GPS receiver is connected to. **The default for the G3090 GPS receiver for the MC90XX is: COM1.**

Baud Rate

This value determines the Baud Rate (or data transfer rate) at which the GPS receiver communicates with the mobile computer. **The default for the G3090 GPS receiver for the MC90XX is: 4800.**

Protocol

This value determines the mode of operation to be used by the G3090 GPS receiver. **The default for the G3090 GPS receiver for the MC90XX is: NMEA.**

Auto Detect

Use this option to have the G3090 GPS application automatically detect the Com Port, Baud Rate and Protocol in use by the GPS receiver attached to the mobile computer.

OK and Cancel

Select "OK" to save the settings selected or "Cancel" to disregard any changes.

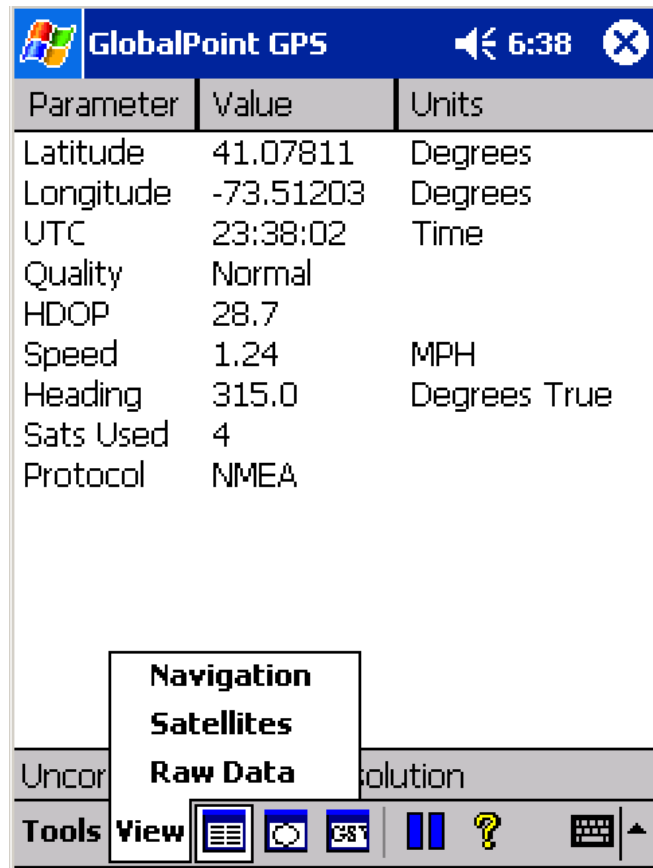
Exit

Use the **Exit** option to quit the G3090 GPS application return to the Windows Mobile "Today" screen.

Important Note: To fully exit the G3090 GPS application, the *Exit* option must be used. "Closing" the application by tapping on the "X" in the upper-right-hand portion of the screen will not exit the program, but cause it to be minimized where it will continue running in memory. If the G3090 GPS application is running in memory, it will block other GPS applications from running properly on the mobile computer.

View Options

Use the **View** menu to choose how tracking information is displayed within the G3090 GPS application.



The tools menu contains the following options:

- Navigation
- Satellites
- Raw Data

These options can also be selected by tapping on the following icons:



Navigation



Satellites



Raw Data

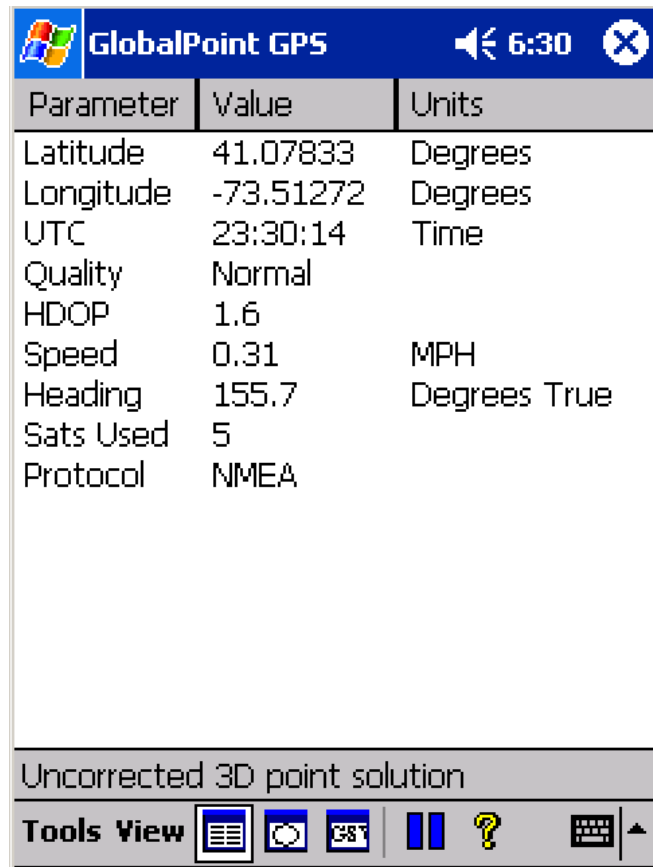
Fix Description

At the lower portion of the screen, just above the **Tools** menu, the G3090 GPS application displays the type of fix currently acquired by the GPS receiver. This value can change over time as the receiver's viewable sky changes, or if the receiver is re-initialized. The types of fixes are:

- Invalid unavailable solution – This signifies that not enough satellite data is available to provide a fix. This occurs as the receiver is initialized or when an insufficient number of satellites are in the viewable sky.
- Corrected 3D point solution – This signifies that a three-dimensional GPS fix is available and that it is corrected using WAAS.
- Uncorrected 3D point solution - This signifies that a standard three-dimensional GPS fix is available.
- Uncorrected 2D point solution – This signifies that a two-dimensional GPS fix is acquired.

Navigation View

Use the "Navigation" view to display summary data for GPS fix information communicated from the GPS receiver.



The screenshot shows the GlobalPoint GPS application interface. At the top, there is a blue header bar with the Windows logo, the text "GlobalPoint GPS", a speaker icon, the time "6:30", and a close button. Below the header is a table with three columns: "Parameter", "Value", and "Units". The table contains the following data:

Parameter	Value	Units
Latitude	41.07833	Degrees
Longitude	-73.51272	Degrees
UTC	23:30:14	Time
Quality	Normal	
HDOP	1.6	
Speed	0.31	MPH
Heading	155.7	Degrees True
Sats Used	5	
Protocol	NMEA	

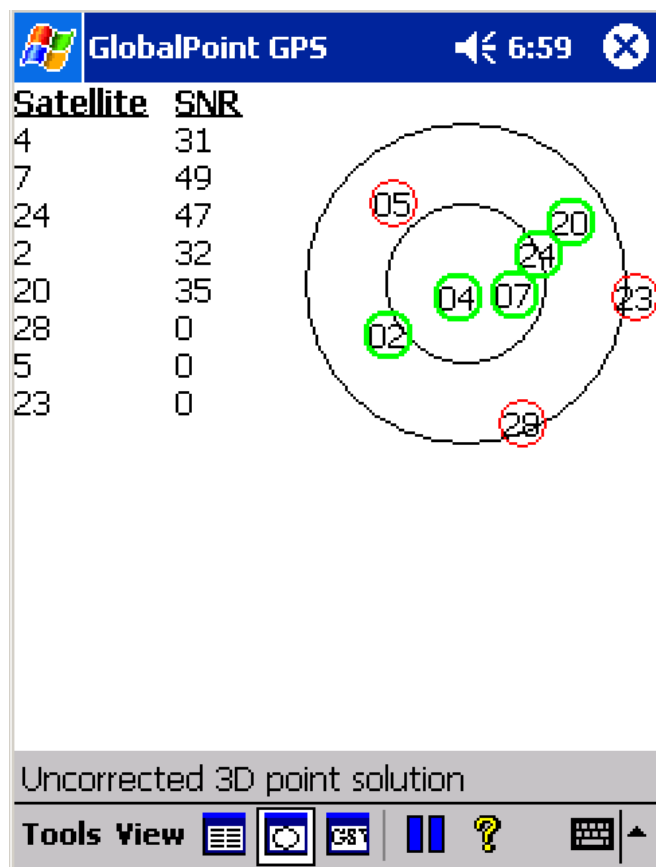
Below the table, there is a status bar with the text "Uncorrected 3D point solution". At the bottom of the screen, there is a "Tools View" menu with several icons: a list icon, a camera icon, a "BT" icon, a pause icon, a question mark icon, a keyboard icon, and an up arrow icon.

Parameters displayed in the Navigation view are:

- **Latitude** – Displays the current location on the face of the Earth north or south of the Equator. Latitude is an angular measurement ranging from 0° at the Equator to 90° at the poles (90° N or 90° S). In the G3090 GPS application, **North** is shown as a positive value and **South** is shown as a negative value.
- **Longitude** – Displays the current location on the face of the Earth east or west of a north-south line called the Prime Meridian. Longitude is an angular measurement ranging from 0° at the Prime Meridian to +180° eastward and –180° westward. In the G3090 GPS application, **East** is shown as a positive value and **West** is shown as a negative value.
- **UTC** – “Coordinated Universal Time or UTC,” is the equivalent of Greenwich Mean Time, the astronomical basis for civil time.
- **Quality** – Displays whether current fix is a “Normal” uncorrected fix or a WAAS “Corrected” fix.
- **HDOP** – “Horizontal Dilution Of Precision” is a measure of how the satellite geometry influences the latitude and longitude data accuracy. A good satellite geometry and hence a good accuracy is obtained if the satellites being tracked are located as far away from each other as possible, while the geometry is poor if the satellites are located close to each other. If the HDOP value is higher than about 10 the latitude and longitude data likely to be inaccurate.
- **Speed** – Displays the current velocity in miles per hour.
- **Heading** – Displays the current direction of travel in degrees with North being 0°.
- **Sats Used** – The number of satellites used in the current fix.
- **Protocol** – The current mode of operation. This can be SiRF or NMEA.

Satellites View

Use the “Satellite” view to display summary data about the available satellites in the viewable sky.

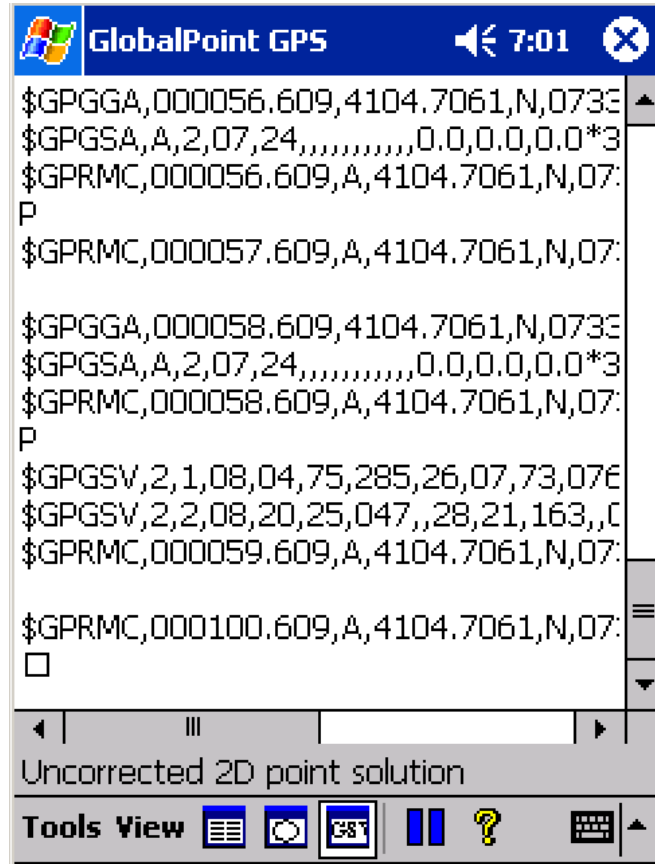


Parameters displayed in the Navigation view are:

- **Satellites** – This column displays all satellites available in the viewable sky by the identifying number of each satellite as determined by the GPS authorities.
- **SNR** - This value indicates the carrier signal to noise ratio for the signal received by the individual satellite. Typically, satellites with SNR values below 28 are not used in GPS fixes.
- **Satellite Sky Map** – This graphic image displays the relative position of the viewable satellites overhead.

Raw Data View

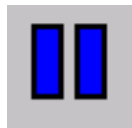
Use the “Raw Data” view to display raw GPS signal data being received by the GPS receiver.



Additional Options

Pause

Tapping the “Pause” icon temporarily pauses the GPS data stream being received by the GPS receiver. To resume the GPS data stream, tap on the pause icon. When active, the pause icon will have a gray background. When paused, the icon will have a white background.



Pause Icon (unpaused)



Pause Icon (paused)

Specifications

Supported Operating Systems

- Windows® Mobile 2003
- Windows® Mobile 2003 Phone Edition
- Windows® Mobile 5.0
- Windows® Mobile 5.0 Phone Edition (Pending)
- Windows® CE 5.0 (Pending)

Chipset

GPS Chipset:	SiRFstar III
Chipset Processor:	ARM7/TDMI – 49MHZ

Receiver

Frequency:	L1, CA code
Signal Acquisition:	200,000 effective correlators.
Channels:	20 Channels; all-in-view tracking
Max. Update Rate:	10Hz
Sensitivity:	-159dBm
DGPS Source:	WAAS/EGNOS
System Back Up:	Built-in Lithium-Ion rechargeable battery
Antenna Type:	Built-in Antenna (external antenna optional)

Position/Time Accuracy (without SA)

Autonomous:	<10 m
WAAS	<5m
Velocity:	0.1 meters/second
Time:	1 microsecond synchronized to GPS time
Datum:	WGS-84

Acquisition Rate

Reacquisition:	100msec
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Hot Start:	<1 second
Warm Start:	<38 seconds
Cold Start:	<42 sec

Protocol

Default:	NMEA-0183 (V2.20)- GGA(1), GSA(1), GSV(5), RMC(1)
Programmable:	Additional NMEA- VTG, GLL / SiRF Binary

Power

Draw:	65mA at 4.5-5.5v
Internal Battery:	3v (for GPS module only)
Pass through:	Charging pass-through for mobile computer with barrel jack connector

Dynamic Conditions

Altitude:	<18,000 meter
Velocity:	< 515 meter/second
Acceleration:	<4g

Environmental

Operating Temperature:	-20°C to +50°C
Storage Temperature:	-40°C to 70°C
Humidity:	5% to 95%, non-condensing
Thermal Shock:	-40°C to +70°C over 2 hours, 15 cyc les, non-operating
Impact (Drop):	6 ft. drop to concrete, 6 drops per 6 sides at 0°C, ambient temperature (23°C) and +50°C (Note: Low end drop te st temperature deviates from MC90XX PRD which is -20°C
Ruggedness:	Tumble; 250 cycles; 500 impacts
Vibration:	Sine 20-2000Hz, 4G peak

Physical Interface to Mobile Computer

Connector:	MC90XX standard 17-pin
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Dimensions

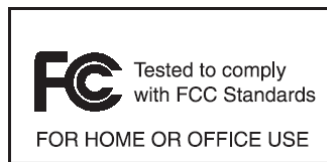
Depth:	38mm
Width:	80mm
Height:	101mm
Weight:	155g

Part Number

OrbitGPS part number:	LP11773R
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Regulatory Information

Radio Frequency Interference Requirements



NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio

frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

CAUTION: Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Statement of compliance

OrbitGPS hereby declares that this device is in compliance with the essential requirements and other relevant provisions of Directives 1999/5/EC, 89/336/EEC and 73/23/EEC. Declaration of Conformities may be obtained from OrbitGPS on request.

The G3090 GPS has been tested to and found to comply with the following standards for use within the Economic Union:

EMC Directive 89/336/EEC:

EN 55022:1998

EN 55024:1998 + A1:2001

R&TTE Directive 99/5/EC:

EN 301 489-3 V1.4.1 (2002-08)

Low Voltage Directive 73/23/EEC:

IEC 60950-1 1st Edition 2001 (National and group differences in accordance with CB Bulletin No. 109A December 2005)

The G3090 GPS has also been tested and found to comply with:

Title 47 of the CFR:2004, Part 15, Subpart (b)

Class B Radiated Electric Field Emissions and Power Line Conducted Emissions

The G3090 GPS complies with:

RoHS Directive 2002/95/EC

Warranty

OrbitGPS's hardware Products are warranted against defects in workmanship and materials for a period of twelve (12) months from the date of shipment by OrbitGPS's reseller to its customer, but in no event more than fifteen (15) months from shipment of the Products by OrbitGPS, unless otherwise provided by OrbitGPS in writing, provided the Product remains unmodified and is operated under normal and proper conditions. Warranty provisions and durations on software, integrated installed systems, Product modified or designed to meet specific customer specifications ("Custom products"), remanufactured products, and reconditioned or upgraded products, shall be as provided in the applicable Product specification in effect at the time of purchase or in the accompanying software license; (b) Spare parts (i.e. Parts, components, or subassemblies sold by OrbitGPS for use in the service and maintenance of Products) are warranted against defects in workmanship and materials for a period of thirty (30) days from the date of shipment. Spare parts may be new or originate from returned units under the conditions set forth in subsection (d) below; (c) For repairs on OrbitGPS-branded hardware Products under this Agreement, including repairs covered by warranty, the repair services provided are warranted against defects in workmanship and materials on the repaired component of the Product for a period of thirty (30) days from the shipment date of the repaired Product, or until the end of the original warranty period, whichever is longer; and (d) Products may be serviced or manufactured with parts, components, or subassemblies that originate from returned products and that have been tested as meeting applicable specifications for equivalent new material and Products. The sole obligation of OrbitGPS for defective hardware Products is limited to repair or replacement (at OrbitGPS's option) on a "return to service depot" basis with prior OrbitGPS authorization. Solution Provider is responsible for shipment to OrbitGPS and assumes all costs and risks associated with this transportation; return shipment to the Solution Provider will be at OrbitGPS's expense. Solution Provider shall be responsible for return shipment charges for product returned where OrbitGPS determines there is no defect ("No Defect Found"), or for Product returned that OrbitGPS determines is not eligible for warranty repair. No charge will be made to Solution Provider for replacement parts for warranty repairs. OrbitGPS is not responsible for any damage to or loss of any software programs, data or removable data storage media, or the restoration or reinstallation of any software programs or data other than the software, if any, installed by OrbitGPS during the manufacture of the Product; (e) Except for the warranty applying solely to the repaired component arising from a repair service as provided in (c) above, the aforementioned provisions do not extend the original warranty period of any Product that had either been repaired or replaced by OrbitGPS; (f) The above warranty shall not apply to any Product (I) which has been repaired, tampered with, altered or modified, except by OrbitGPS's authorized service personnel; or (II) in which the defects or damage to the Product result from normal wear and tear, misuse, negligence, improper storage, water or other liquids, battery leakage, use of parts or accessories not approved or supplied by OrbitGPS, or failure to perform operator handling and scheduled maintenance instructions supplied by OrbitGPS; (III) which has been subjected to unusual physical or electrical stress, abuse, or

accident, or forces or exposure beyond normal use within the specified operational and environmental parameters set forth in the applicable Product specification; nor shall the above warranty provisions apply to any expendable or consumable items, such as batteries, supplied with Product. EXCEPT FOR THE WARRANTY OF TITLE AND THE EXPRESS WARRANTIES STATED ABOVE, ORBITGPS DISCLAIMS ALL WARRANTIES ON PRODUCTS FURNISHED HEREUNDER INCLUDING ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE. ANY IMPLIED WARRANTIES THAT MAY BE IMPOSED BY LAW ARE LIMITED IN DURATION TO THE LIMITED WARRANTY PERIOD. SOME STATES OR COUNTRIES DO NOT ALLOW A LIMITATION ON HOW LONG AN IMPLIED WARRANTY LASTS OR THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS. IN SUCH STATES OR COUNTRIES, FOR SUCH PRODUCTS, SOME EXCLUSIONS OR LIMITATIONS OF THIS LIMITED WARRANTY MAY NOT APPLY. The stated express warranties are in lieu of all obligations or liabilities on the part of OrbitGPS for damages, including but not limited to, special, indirect or consequential damages arising out of or in connection with the use or performance of the Product or service. OrbitGPS's liability for damages to Solution Provider or others resulting from the use of any Product or service furnished here under shall in no way exceed the purchase price of said Product or the fair market value of said service, except in instances of injury to persons or property.

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Service Information

Before you use the G3090 GPS receiver, it must be configured to operate with our mobile computer and applications.

If you have a problem using the G3090 GPS receiver, contact your facility's Technical or Systems Support. If there is a problem with the equipment, they will contact the OrbitGPS Support Center:

Email: support@OrbitGPS.com

Telephone: +1 203.654.7720