



# GISmore

Operator's Manual

Version 1.0

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# PREFACE

Thank you for purchasing this product. The materials available in this Manual (the “Manual”) have been prepared by JAVAD GNSS, Inc. (“JAVAD GNSS”) for owners of JAVAD GNSS products. It is designed to assist owners with the use of the GISmore and its use is subject to these terms and conditions (the “Terms and Conditions”).

**Note:** Please read these Terms and Conditions carefully.

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**USE** – JAVAD GNSS receivers are designed to be used by a professional. The user is expected to have a good knowledge and understanding of the user and safety instructions before operating, inspecting or adjusting. Always wear the required protectors (safety shoes, helmet, etc.) when operating the receiver.

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**SAFETY** – Improper use of the GISmore can lead to injury to persons or property and/or malfunction of the product. The GISmore should only be repaired by authorized JAVAD GNSS warranty service centers. Users should review and heed the safety warnings in Appendix B on page 75.

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## Regulatory Information

The following sections provide information on this product's compliance with government regulations.

### FCC Class B Compliance

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

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 residential installations. 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 interference to radio or television equipment 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.
- Move the equipment away from the receiver.
- Plug the equipment into an outlet on a circuit different from that to which the receiver is powered.
- Consult the dealer or an experienced radio/television technician for additional suggestions.

**Note:** Any changes or modifications to the equipment not expressly approved by the party responsible for compliance could void your authority to operate such equipment.

## Canadian Emissions Labeling Requirements

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

## WEEE Directive

The following information is for EU-member states only:

The use of the symbol indicates that this product may not be treated as household waste. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. For more detailed information about the take-back and recycling of this product, please contact your supplier where you purchased the product or consult.



## Manual Conventions

This manual uses the following conventions:

Example	Description
<i>File ▶ Exit</i>	Click the <i>File</i> menu and click <i>Exit</i>
<i>MinPad</i>	This format represents titles of dialog windows/boxes, names of menu options, identifies program interface objects, such as checkboxes, edit boxes, radio buttons, etc.
Temp	This format is used to enter various string information (e.g., file and directory names) as well as operator commands.

**Note:** Supplementary information that can have an affect on system operation, system performance, measurements, or personal safety.

**CAUTION:** *Notification that an action has the potential to adversely affect system operation, system performance, data integrity, or personal health.*

**Warning:** *Notification that an action will result in system damage, loss of data, loss of warranty, or personal injury.*

**DANGER:** UNDER NO CIRCUMSTANCES SHOULD THIS ACTION BE PERFORMED.

## Screen Captures

This manual includes sample screen captures. Your actual screen can look slightly different from the sample screen due to the receiver you have connected, operating system used and settings you have specified. This is normal and not a cause for concern.

## Related Information

### Technical Assistance

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer. Alternatively, request technical support using the JAVAD GNSS World Wide Web site at: [www.javad.com](http://www.javad.com)

To contact JAVAD GNSS Customer Support use the QUESTIONS button available on the [www.javad.com](http://www.javad.com).



**Preface**

Related Information  
Technical Assistance

# INTRODUCTION

GISmore receiver is based on our TRIUMPH Technology implemented in our TRIUMPH Chip. For the first time in the GNSS history we offer very powerful GIS field mapping receiver with up to 100 Hz RTK, 216 channels of single frequency GPS, Galileo and GLONASS in a small attractive, sturdy, and watertight box.

Using its internal Bluetooth and GSM/GPRS connection the receiver can access local GNSS Reference Station Network. As standard future the GISmore receiver provides access to the SBAS correction services. In addition to post-processed DGPS capabilities, the GISmore utilizes external correction services for real-time DGPS mapping and navigation applications.

All GNSS, GSM, and Bluetooth® antennas are conveniently hidden and protected (Figure 1-1).



**Figure 1-1. GISmore Receiver**

The GISmore can receive and processes multiple signal types improving the accuracy and reliability of your survey points and positions, especially under difficult jobsite conditions.

GISmore receiver can access the GPS (Global Positioning System) satellites of the United States, the Galileo (an upcoming global positioning system maintained and operated by Galileo Industries), increasing the number of satellites your receiver can detect, thus improving the accuracy of your measuring points, increasing productivity, and reducing cost.

Several other features, including multipath mitigation and common tracking, provide under-canopy and low signal strength reception. The GISmore receiver provides the functionality, accuracy, availability, and integrity needed for fast and easy data collection.

The GISmore is a multi-function, multi-purpose receiver intended for precision markets. Precision markets means markets for equipment, subsystems, components and software for

surveying, construction, commercial mapping, civil engineering, precision agriculture and land-based construction and agriculture machine control, photogrammetry mapping, hydrographic and any use reasonably related to the foregoing.

## 1.1. Principles of Operation

Measurements, including survey with the right GNSS receiver can provide users accurate and precise positioning, a requirement for any project. This section gives an overview of existing and proposed Global Navigation Satellite Systems (GNSS) and receiver functions to help you understand and apply basic operating principles, allowing you to get the most out of your receiver.

### 1.1.1. GNSS Overview

Currently, the following three global navigation satellite systems (GNSS) offer line-of-site radio navigation and positioning, velocity, and time services on a global, all-weather scale to any user equipped with a GNSS tracking receiver on or near the Earth's surface:

- GPS – the Global Positioning System maintained and operated by the United States Department of Defense. For information on the status of this system, visit the US Naval Observatory website (<http://tycho.usno.navy.mil/>) or the US Coast Guard website (<http://www.navcen.uscg.gov/>).
- GLONASS – the Global Navigation Satellite System maintained and operated by the Russian Federation Ministry of Defense. For information on the status of this system, visit the Coordinational Scientific Information Center website ([http://www.glonasscenter.ru/frame\\_e.html](http://www.glonasscenter.ru/frame_e.html)).
- Galileo – an upcoming global positioning system maintained and operated by Galileo Industries, a joint venture of several European space agencies/companies working closely with the European Space Agency. Unlike GPS and GLONASS, this is a civil endeavor and is currently in the development and validation stage. For information on the status of this system, visit the Galileo Industries website (<http://www.galileo-industries.net>).

Despite numerous technical differences in the implementation of these systems, satellite positioning systems have three essential components:

- Space – GPS, GLONASS, and Galileo satellites orbit approximately 12,000 nautical miles above Earth and are equipped with a clock and radio. These satellites broadcast ranging signals and various digital information (ephemerides, almanacs, time&frequency corrections, etc.).

- Control – Ground stations located around the Earth that monitor the satellites and upload data, including clock corrections and new ephemerides (satellite positions as a function of time), to ensure the satellites transmit data properly.
- User – The community and military that use GNSS receivers to calculate positions.

## 1.1.2. Calculating Absolute Positions

When calculating an absolute position, a stationary or moving receiver determines its three-dimensional position with respect to the origin of an Earth-Center Earth-Fixed coordinate system. To calculate this position, the receiver measures the distance (called pseudoranges) between it and at least four satellites. The measured pseudoranges are corrected for clock differences (receiver and satellites) and signal propagation delays due to atmospheric effects. The positions of the satellites are computed from the ephemeris data transmitted to the receiver in navigation messages. When using a single satellite system, the minimum number of satellites needed to compute a position is four. In a mixed satellite scenario (GPS, GLONASS, Galileo), the receiver must lock onto five or more satellites to account for the different time scales used in these systems and to obtain an absolute position.

## 1.1.3. Calculating Differential Positions

DGPS, or Differential GPS, is a relative positioning technique where the measurements from two or more remote receivers are combined and processed using sophisticated algorithms to calculate the receivers' relative coordinates with high accuracy.

DGPS accommodates various implementation techniques that can be classified according to the following criteria:

- The type of GNSS measurements used, either code-phase differential measurements or carrier-phase differential measurements
- If real-time or post-mission results required Real-time applications can be further divided according to the source of differential data and communication link used.

With DGPS in its most traditional approach, one receiver is placed at a known, surveyed location and is referred to as the reference receiver or base station. Another receiver is placed at an unknown location and is referred to as the remote receiver or rover. The reference station collects the code-phase and carrier-phase measurements from each GNSS satellite in view.

- For real-time applications, these measurements and the reference station coordinates are then built up to the industry standard RTCM – or various proprietary standards established for transmitting differential data – and broadcast to the remote receiver(s) using a data

communication link. The remote receiver applies the transmitted measurement information to its observed measurements of the same satellites.

- For post-mission applications, the simultaneous measurements from reference and rover stations are normally recorded to the receiver's internal memory (not sent over communication link). Later, the data are downloaded to computer, combined, and processed.

Using this technique, the spatially correlated errors – such as satellite orbital errors, ionospheric errors, and tropospheric errors – can be significantly reduced, thus improving the position solution accuracy.

A number of differential positioning implementations exist, including post-processing measuring, real-time kinematic measuring, maritime radio beacons, geostationary satellites, and satellite based augmentation systems (WAAS, EGNOS, MSAS). The real-time kinematic (RTK) method is the most precise method of real-time measuring. RTK requires at least two receivers collecting navigation data and communication data link between the receivers. One of the receivers is usually at a known location (Base) and the other is at an unknown location (Rover). The Base receiver collects carrier phase measurements, generates RTK corrections, and sends this data to the Rover receiver. The Rover processes this transmitted data with its own carrier phase observations to compute its relative position with high accuracy, achieving an RTK accuracy of up to 1 cm horizontal and 1.5 cm vertical.

### **1.1.4. Essential Components for Quality Surveying**

Achieving quality position results requires the following elements:

- Accuracy – The accuracy of a position primarily depends upon the satellite geometry (Geometric Dilution of Precision, or GDOP) and the measurement (ranging) errors.
  - Differential positioning (DGPS and RTK) strongly mitigates atmospheric and orbital errors, and counteracts Selective Availability (SA) signals the US Department of Defense transmits with GPS signals.
  - The more satellites in view, the stronger the signal, the lower the DOP number, the higher positioning accuracy.
- Availability – The availability of satellites affects the calculation of valid positions. The more visible satellites available, the more valid and accurate the position. Natural and man-made objects can block, interrupt, and distort signals, lowering the number of available satellites and adversely affecting signal reception.
- Integrity – Fault tolerance allows a position to have greater integrity, increasing accuracy. Several factors combine to provide fault tolerance, including:

- Receiver Autonomous Integrity Monitoring (RAIM) detects faulty GNSS satellites and removes them from the position calculation.
- Five or more visible satellites for only GPS or only GLONASS; six or more satellites for mixed scenarios.
- Satellite Based Augmentation Systems (WAAS, EGNOS, etc.) creates and transmit, along with DGPS corrections, data integrity information (for example, satellite health warnings).
- Current ephemerides and almanacs.

## 1.2. Getting Acquainted

The GISmore is a 216-channel GNSS receiver with internal batteries, an internal GSM modem, and a Bluetooth® wireless technology module.

The GISmore is a receiver that has been configured for surveying. The GISmore is built with internal memory for recording survey data, and recorded data can be downloaded using the Bluetooth® wireless technology.

### 1.2.1. GISmore Receiver

The GISmore receiver’s advanced design reduces the number of cable required for operation, allowing you to survey more reliably and efficiently. The casing allocates space for a rechargeable battery, a Bluetooth® wireless technology module, a multi-system receiver board, and a GSM/GPRS modem.

### 1.2.2. Internal Components

#### GISmore GNSS Receiver

Table below lists the options available for this card model.

**Table 1-1. GISmore GNSS Receiver**

Receiver Type	Available Options
GISmore-G2	GPS L1 Galileo E1
GISmore-G3	GPS L1 Galileo E1 GLONASS L1

## Bluetooth® Module

A combination of software and hardware technology that makes the GISmore mobile, wireless, GNSS receiver that supports a point-to-point serial profile. As such, the GISmore can transfer and synchronize files between the receiver and any other Bluetooth® wireless technology device that supports serial profile, including portable handheld devices and external controllers, Bluetooth® adapters for PC-USB/RS ports, mobile computers and phones, IPAQs, PCMCAs-to-Bluetooth adapters, etc.

With Bluetooth® wireless technology, the receiver's reception and transmission distance is 10 meters (32 feet) for interior projects and 30–50 meters (98–164 feet) for exterior projects.

The Bluetooth® module's processor and firmware are independent of the receiver card and power board.

## Modem

The GISmore receiver incorporates an internal Cellular GSM/GPRS Modem with Telit® Module (GE864 - QUAD) - GSM/GPRS single quad-band cell phone frequency modem (Europe: 900/1800 MHz; USA and Canada: 850/1900 MHz).

**Note:** To comply with RF exposure requirements, maintain at least 20 cm between the user and the transceiver.

The Base station operator is responsible for complying with local regulations for radio operation. In the US, the FCC regulates the use of radio transmitters, requiring a license. Broadcasting without a license can result in severe penalties including the confiscation of your radio and GNSS equipment.

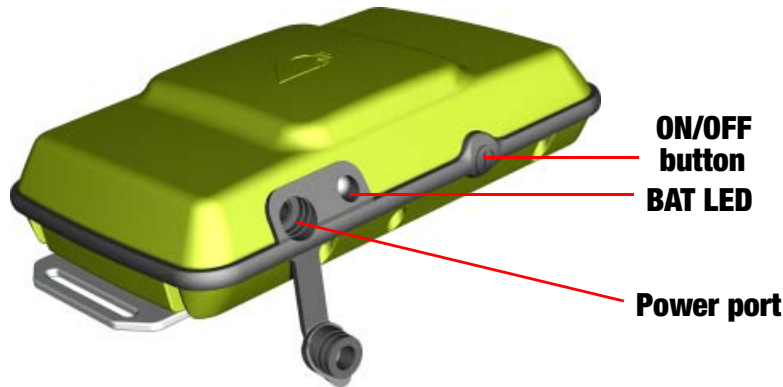
## Battery

**CAUTION:** *Risk of explosion if battery is replaced by an incorrect type. Dispose of used battery according to the instructions.*

The GISmore receiver is equipped with one non-removable, on-board, rechargeable Lithium-Ion battery connected to the receiver's board. This Lithium-Ion battery is 3.7 V, 1.05Ah.

### 1.2.3. External Components

The GISmore casing includes a user interface, and a power port.



- The *On/Off (power) button* turns the receiver on and off.
- *BAT LED* - the battery status indicator. See “Powering the Receiver” on page 33 for detailed description of the BAT LED.
- The *Power Supply unit* charges the internal battery when connected to a grounded outlet. This unit converts the alternating current (AC) normally supplied from an electrical outlet to a direct current (DC) used to charge the batteries and/or power the receiver.

### 1.2.4. Literature

GISmore literature, including manuals and other product information are available on the JAVAD GNSS website (<http://www.javad.com>):

- GISmore Quick Guide
- *GISmore Operator’s Manual*
- Functional specifications

### 1.2.5. Storage Precautions

1. Always clean the instrument after use. Wipe off dust with a cleaning brush, then wipe off dirt with a soft cloth.
2. Store in a location with a temperature of  $-20^{\circ}$   $+35^{\circ}$ C, and no exposure to direct sunlight.
3. Use a clean cloth, moistened with a neutral detergent or water, to clean the receiver. Never use an abrasive cleaner, ether, thinner benzene, or other solvents.

## Introduction

Option Authorization File (OAF)  
Storage Precautions

4. Always make sure the instrument is completely dry before storing. Dry the receiver with a soft, clean cloth.

## 1.3. Option Authorization File (OAF)

JAVAD GNSS issues an Option Authorization File (OAF) to enable the specific options that customers purchase. An Option Authorization File allows customers to customize and configure the GISmore according to particular needs, thus only purchasing those options needed.

Typically, all GISmore receivers ship with a temporary OAF that allows the receiver to be used for a predetermined period of time. When the receiver is purchased, a new OAF activates desired, purchased options permanently. Receiver options remain intact when clearing the NVRAM or resetting the receiver.

The OAF enables the following kinds of functions. For a complete list of available options and details, visit the JAVAD GNSS website (<http://www.javad.com>) or consult your dealer.

### Standard Configuration

- Memory 0 MB
- GPS L1
- GLONASS L1 (G3 only)
- RAIM
- Internal GNSS Antenna
- Internal GSM/GPRS Module
- Bluetooth® Interface
- Internal Bluetooth/GSM Antenna
- Internal Rechargeable Li-Ion Battery

### Optional Feature

- Galileo E1
- Update Rate 1 Hz, 5Hz, 10Hz, 20Hz, 50Hz & 100Hz
- RTK Rate 1 Hz, 5Hz, 10Hz, 20Hz, 50Hz & 100Hz
- Data Recording up to 256 MB
- Multi-Base Code Differential Rover
- Code Differential Base
- Advanced Multipath Reduction
- KFK WAAS/EGNOS (SBAS)

# SETUP AND CONNECTIONS

This chapter describes powering the GISmore, and setting up and connecting the various components in preparation for observations.

Before beginning to survey with the GISmore receiver, the following software needs to be installed and configurations need to be applied:

- Install receiver configuration JAVAD GNSS software. See “Installing JAVAD GNSS Software” on page 21.
- Charge the batteries. See “Charging the Battery” on page 24.
- Install SIM Card. See “Installing the Optional SIM Card” on page 23
- Configure the Bluetooth® wireless technology module. See “Bluetooth® Module Configuration” on page 27.
- Collect almanacs and ephemerides. See “Collecting Almanacs and Ephemerides” on page 28.

## 2.1. Installing JAVAD GNSS Software

Use the following software programs for configuring and maintaining the receiver:

- TriVU
- ModemVU

This software is available on the JAVAD GNSS website. If downloading the program(s) from the website, extract the program’s files into a folder on your hard drive. The following sections describe installing this software, and other sections throughout the manual describe using this software with the receiver.

### 2.1.1. Installing TriVU

TriVU™ is a comprehensive Windows® software product designed for controlling GNSS receivers developed by JAVAD GNSS.

**Note:** Refer to the *TriVU Software Manual* for full details on installing and using TriVU Software.

1. If downloading the program from the website, extract the program files into a folder on your hard drive.
2. Navigate to the location of the TriVU program and double-click the Setup.exe icon.
3. Follow the on-screen installation instructions. Click *Next* to continue, *Back* to get back to previous step, or *Cancel* to quit the installation.
4. Keep the default installation location or select a new location.
5. Click *Finish* to complete the installation.
6. If desired, create a shortcut on the computer's desktop for quick access to TriVU.

To uninstall TriVU use the *Start* menu on your computer:

1. Navigate to the location of the TriVU program and double-click the Setup.exe icon.
2. Follow the on-screen uninstallation instructions.

## 2.1.2. Installing ModemVU

ModemVU™ is a Windows® application is a configuration program for the radio modem inside the receiver. ModemVU is available from the JAVAD GNSS website.

**Note:** Refer to the *ModemVU Software Manual* for full details on installing and using ModemVU Software.

1. If downloading the program from the website, extract the program files into a folder on your hard drive.
2. Navigate to the location of the ModemVU program and double-click the Setup.exe icon.
3. Follow the on-screen installation instructions. Click *Next* to continue, *Back* to get back to previous step, or *Cancel* to quit the installation.
4. Keep the default installation location or select a new location.
5. Click *Finish* to complete the installation.
6. If desired, create a shortcut on the computer's desktop for quick access to ModemVU.

To uninstall ModemVU use the *Start* menu on your computer:

1. Navigate to the location of the ModemVU program and double-click the Setup.exe icon.
2. Follow the on-screen uninstallation instructions.

## 2.2. Installing the Optional SIM Card

The SIM card provides telephony communication for data transfer between two GSM-capable receivers. The SIM card can be purchased at your local cellular phone supply store. Once installed, the card generally remains installed.

The SIM card must support Circuit Switched Data to communicate directly between receivers. The SIM card must have GPRS support to communicate with a GPS Network IP address.

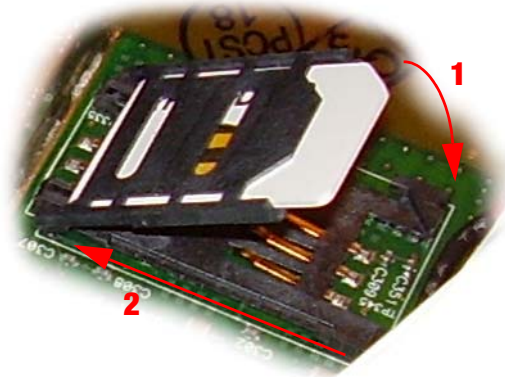
To install SIM card:

1. Ensure the receiver is turned off.
2. Open the bottom of the case screwing off 9 self tapping screw (Figure 2-1).



**Figure 2-1. SIM Card installation**

3. Remove battery and open SIM holder.
4. Carefully insert the SIM into the SIM card holder and push them to LOCK to close it tightly.



5. Close the case.

## 2.3. Charging the Battery

**CAUTION:** *Risk of explosion if battery is replaced by an incorrect type. Dispose of used battery according to the instructions.*

Before beginning to work, fully charge the battery for maximum operating time. An approximately 6-hour charge cycle will fully charge the battery. The battery can not be overcharged.

The Li-Ion batteries used in the battery should run at no less than 80% capacity after 500 charging cycles. These batteries do not need to be drained before recharging.

**Note:** The batteries are shipped from the factory with 40% of power. Fully charge the batteries before measuring and surveying.

**DANGER: NEVER ATTEMPT TO OPEN THE CASING OF THE DETACHABLE BATTERIES! LITHIUM-ION BATTERIES CAN BE DANGEROUS IF MISHANDLED!**

**DANGER: DO NOT INCINERATE OR HEAT BATTERY PACK ABOVE 212 DEGREES FAHRENHEIT (100 DEGREES CELSIUS). EXCESSIVE HEAT CAN CAUSE SERIOUS DAMAGE AND POSSIBLE EXPLOSION.**

**DANGER: THE BATTERIES (OR BATTERIES INSTALLED) SHALL NOT BE EXPOSED TO EXCESSIVE HEAT SUCH AS SUNSHINE, FIRE OR THE LIKE.**

**Warning:** *Do not attempt to open the battery pack.*

**Warning:** *Do not disassemble the battery pack.*

**Warning:** *Do not charge in conditions different than specified.*

**Warning:** *Do not use other than the specified battery charger.*

**Warning:** *Do not short circuit the battery pack.*

**Warning:** *Do not crush or modify the battery pack.*

### 2.3.1. Power supply requirements

The socket-outlet shall be installed near the equipment and shall be easily accessible.

The external power supply needs to be Listed for US and Certified for EU countries, it needs also to be a Limited Power Source and rated for Outdoor Use and have an output rated for +4.5 to +6.5

volts DC, 3A. This may not be the same range as other JAVAD GNSS products with which you are familiar.

**CAUTION:** *To avoid the introduction of hazards when operating and installing, before connecting of the equipment to the supply, make sure that the supply meets local and national safety ordinances and matches the equipment's voltage and current requirements.*

**CAUTION:** *Never attempt any maintenance or cleaning of the supply while plugged in. Always remove supply from AC power before attempting service or cleaning.*

**Warning:** *If the voltage supplied is below the minimum specification, the receiver will suspend operation. If the voltage supplied is above the maximum specification, the receiver may be permanently damaged, voiding your warranty.*

Make sure cords are located so that will not be stepped on, tripped over, or otherwise subjected to damage or stress. Do not operate equipment with a damaged cord or plug – replace immediately. To reduce the risk of damage to the equipment, pull by the plug body rather than the output cord when disconnecting the equipment.

Do not operate the supply if it has received a sharp blow, been dropped, or otherwise damaged. Do not disassemble the supply.

**Warning:** *Before connecting the external power source and the receiver, make sure that the power source matches the receiver's voltage and current requirements.*

## 2.4. Powering the Receiver

To charge the receiver internal battery, take the following steps:

- Plug the connector into the power port of the receiver.
- Plug the other end of this cable into an AC outlet.
- Turn off the receiver by pressing and holding the *power* key for more than one and less than four seconds.
- Leave overnight.

### 2.4.1. Turning On/Off the Receiver

To turn ON the receiver, press and hold the power button. To turn OFF the receiver, press and hold the power key for more than one and less than four seconds (until LED is off). This delay (about 1 second) will prevent the receiver from being turned off by mistake.

## 2.5. Connecting the Receiver and a Computer

JAVAD GNSS TriVU software provides an interface for various configuration, monitoring, and management functions for the receiver.

To configure, manage files, or maintain the receiver, connect the receiver and a computer/controller using a Bluetooth® wireless technology.

Once you have established a connection between the receiver and the computer/controller, you will be able to configure the receiver and its components, send commands to the receiver, download files from the receiver's memory; as well as, upload new firmware, upload an OAF, and upload configuration files to a receiver, using TriVU.

### 2.5.1. Establishing a Wireless Connection

The GISmore receiver contains Bluetooth® wireless technology that allows file transfer and synchronization between the receiver and any other external device that supports Bluetooth® wireless technology; for example, JAVAD GNSS Victor, an IPAQ, or a computer with USB-to-Bluetooth® adapter or PCMCA-to-Bluetooth® adapter installed.

The GISmore and external device connection procedure varies slightly depending on the type of external device used. In general, the connection procedure is as follows:

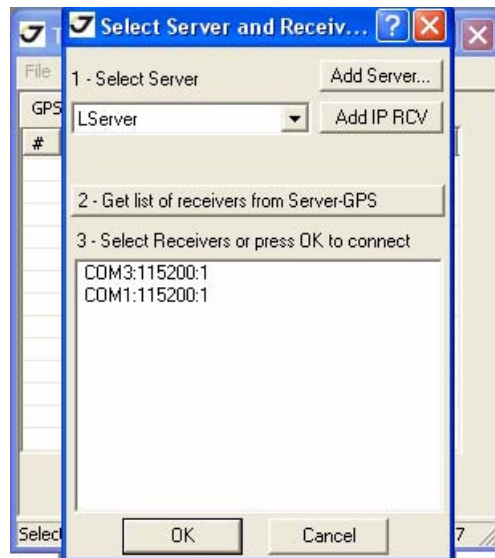
**Note:** Refer to your Bluetooth®-enabled external device documentation for more detailed connection information.

1. Turn on a Bluetooth®-enabled external device and your receiver. The default external device mode is Master; the receiver's Bluetooth® module mode is Slave.
2. Instruct the external device (Master) to search for the receiver (Slave).
3. Once the Master device detects the receiver, use the procedure described in the external device's documentation to connect it with the receiver.
4. Connect to the desired configuration software (TriVU).

## 2.6. Bluetooth® Module Configuration

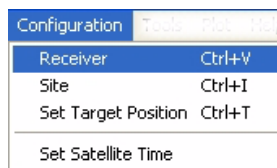
To access the Bluetooth® wireless technology module:

1. Connect computer and the receiver, as described in “Connecting the Receiver and a Computer” on page 26.
2. Start TriVU. Select the COM port and click Ok (Figure 2-2).



**Figure 2-2. Connection Parameters**

3. Click *Configuration* ▶ *Receiver* (Figure 2-3).



**Figure 2-3. Configuration->Receiver**

4. In the *Ports* tab select the *BLT* subtab (Figure 2-4).
  - *Name* - The name of the receiver’s Bluetooth® module. Here the user can enter an arbitrary string comprising up to 14 characters.

## Setup and Connections

Collecting Almanacs and Ephemerides  
Establishing a Wireless Connection

- *PIN* - Personal Identification Number (PIN) of the Bluetooth® module. The user can enter up to 16 characters.



**Figure 2-4. BLT subtab**

5. Click *Apply*, and then *Exit*.
6. Click *File* ▶ *Disconnect*, and then *File* ▶ *Exit* to quit TriVU. Disconnecting before exiting ensures proper port management.

## 2.7. Collecting Almanacs and Ephemerides

Each satellite broadcasts a navigation message that includes the ephemeris parameters of the satellite, the almanac, and various other information. The ephemeris parameters describe the orbital motion of the satellite and are used to predict its location/trajectory. The almanac gives the approximate orbit for the transmitting satellite and all other satellites in the same system only.

- GPS and GLONASS satellites broadcast ephemeris data cyclically, with a period of 30 seconds.
- GPS satellites broadcast almanac data cyclically with a period of 12.5 minutes; GLONASS satellites broadcast almanac data cyclically with a period of 2.5 minutes.

If the receiver has an almanac, you can considerably reduce the time needed to search for and lock on to satellite signals. The receiver regularly updates the almanac and ephemerides and stores the most recent versions in its Non-Volatile Random Access Memory (NVRAM).

1. Set up the receiver in a location with a clear view of the sky. Turn on the receiver.
2. Wait for about 15 minutes while the receiver collects complete almanac and ephemeris data from the satellites.

You will need to collect or update the almanac and ephemerides under the following circumstances:

- If the receiver has been off for a long time.
- If the last known receiver position, stored in the NVRAM, is different from the present position by several hundred kilometers.
- After loading a new OAF.
- After loading new firmware.
- After clearing the NVRAM.
- Before surveying.

# CONFIGURATION

Both Base and Rover receivers must be configured according to the desired survey method.

- In applications where real-time positioning results are required, the Base receiver provides the correction information needed to properly calculate the location of the Rover receiver. A Base station is normally set up over a known point and collects GPS/GLONASS data from satellites. As the receiver picks up satellite data, it measures the carrier and code phases to accurately compute and verify its location. Then, the receiver transmits this information via radio (GSM) to the Rover receiver.
- The Rover receiver applies correction information from the Base station to its current location to accurately calculate one or more points. Rovers are mobile GNSS receivers on a survey pole or bipod that compares the information from the Base station to the data it logs from satellites and applies correction algorithms to accurately calculate a new point.
- In applications intended for post-processing, the receivers typically log code phase and/or carrier phase measurements separately from common satellites and during the same time interval. This data is then processed using post-processing software (for example, Justin).

When configuring receivers for RTK surveying, use the following list to ensure the receivers are properly set up:

- Perform pre-survey preparation as described in Chapter 2.
- Configure one receiver as an RTK Base station and the other receiver as an RTK Rover. See “Configuring the Receiver” on page 38.
- Configure the communication data link for transmitting and receiving corrections. See “Configuring the GSM module for Point-to-Point radio link” on page 31 and “Configuring the GSM module for Internet access” on page 33.
- Set up the Base receiver over a known point to begin collecting static observation data and transmitting corrections. Set up the Rover receiver to begin collecting RTK data. See “Receiver Setup” on page 47 for more information.

When configuring receivers for post-processing surveying, use the following list to ensure the receivers are properly set up:

- Perform pre-survey functions as described in Chapter 2.
- Configure one receiver as a Base station and the other receiver as a Rover. See “Configuring the Receiver” on page 38.

- Set up the Base receiver over a known point to begin collecting static observation data. Set up the Rover receiver to begin collecting static or kinematic observation data. See “Receiver Setup” on page 47 for more information.

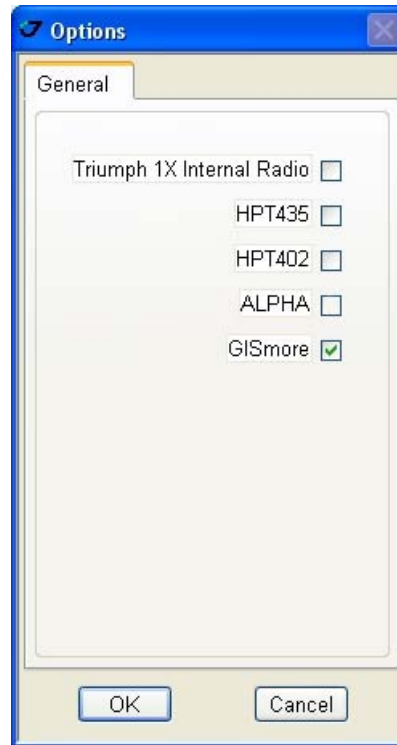
## 3.1. Configuring the GSM/GPRS Module

ModemVU is JAVAD GNSS’s configuration utility for modems embedded in JAVAD GNSS receivers. ModemVU provides the following functions:

- Connecting a computer to an integrated GSM/GPRS module via a serial port or Bluetooth® wireless technology.
- Displaying information about the radio modem installed in the receiver.
- Programming the radio modem’s settings.

See the *ModemVU Software Manual* available on the JAVAD GNSS website for details on configuring the receiver with an GSM radio modem. To configure an GSM module, have the following ready:

- Computer running Windows®;
  - ModemVU Software installed on the computer;
1. Connect the computer and receiver. Turn on the receiver.
  2. Start ModemVU.
  3. Select the GISmore (Figure 3-1 on page 31), and click *OK*:



**Figure 3-1. Options window**

4. Select the COM port the receiver is connected to (Figure 3-2). Click *Connect*.



**Figure 3-2. Connect to ModemVU**

### 3.1.1. Configuring the GSM module for Point-to-Point radio link

**Note:** To comply with RF exposure requirements, maintain at least 20 cm between the user and the GSM modem.

1. On the *General* tab, set the following parameters (Table 3-1) and click *Apply* (Figure 3-3 on page 32). In this tab modem and service status and possible errors are displayed.

## Configuration

Configuring the GSM/GPRS Module

Configuring the GSM module for Point-to-Point radio link

**Table 3-1. Receiver Parameters for the General Tab**

Parameter	Base Receiver	Rover Receiver
Mode	Slave	Master
PIN	Enter a Personal Identification Number (PIN) if required.	



**Figure 3-3. General tab**

2. On the *Master/Slave* tab, set the following parameters (Table 3-2) and click *Apply* (Figure 3-3 on page 32).

**Table 3-2. Receiver Parameters for the Master/Slave Tab**

Parameter	Base Receiver	Rover Receiver
Dial number	Leave blank.	Enter the phone number of the base GSM modem.
Send time out	Enter a period of time in seconds in which the base/rover GSM modem will send a service word to the rover/base GSM modem. <ul style="list-style-type: none"> <li>• This parameter is used to maintain reliable communication between a pair of modems and avoid unnecessary modem reinitialization.</li> <li>• To ensure reliable and secure modem communication, this parameter must be larger then the period for transmitting differential corrections.</li> </ul>	



**Figure 3-4. Master/Slave tab**

3. Click *Apply*, and then click *File ▶ Disconnect*.
4. If needed, launch TriVU and set up the receiver to run as an RTK Base station.

### 3.1.2. Configuring the GSM module for Internet access

**Note:** To comply with RF exposure requirements, maintain at least 20 cm between the user and the GSM modem.

1. On the *General* tab, set the following parameters (Table 3-3) and click *Apply* (Figure 3-5). In this tab modem and service status and possible errors are displayed.

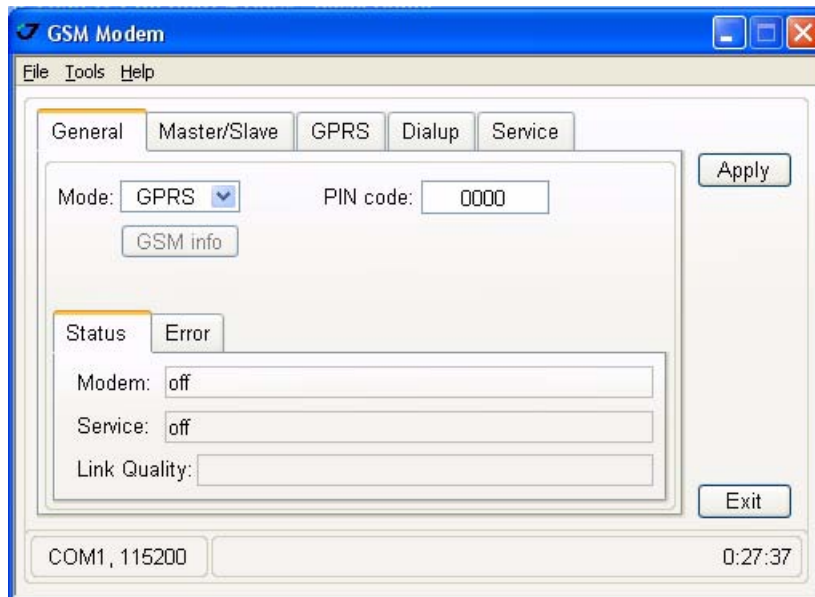
**Table 3-3. Receiver Parameters for the General Tab**

Parameter	Base Receiver	Rover Receiver
Mode	GPRS	
PIN	Enter a Personal Identification Number (PIN) if required.	

## Configuration

Configuring the GSM/GPRS Module

Configuring the GSM module for Internet access

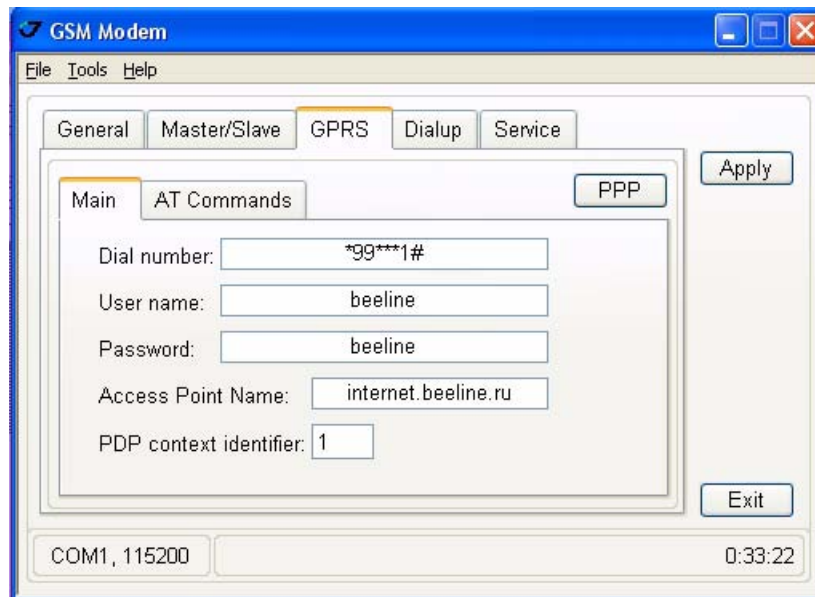


**Figure 3-5. General tab**

2. In the *GPRS* tab it is necessary to set the dial number, user name and password, access point name and PDP context identifier to establish a GPRS connection. As usually, this information is given by cell provider (Figure 3-6 on page 35).

PPP button opens the PPP parameters window, that allows user to set up the Point-to-Point protocol parameters. The Point-to-Point Protocol, or PPP, is commonly used to establish a direct connection between two nodes.

As usually, information of PPP parameters is given by Internet service provider.



**Figure 3-6. GPRS tab**

3. In the *Service* tab *Main* subtab specify the following parameters (Table 3-4) and click *Apply* (Figure 3-7 on page 36).

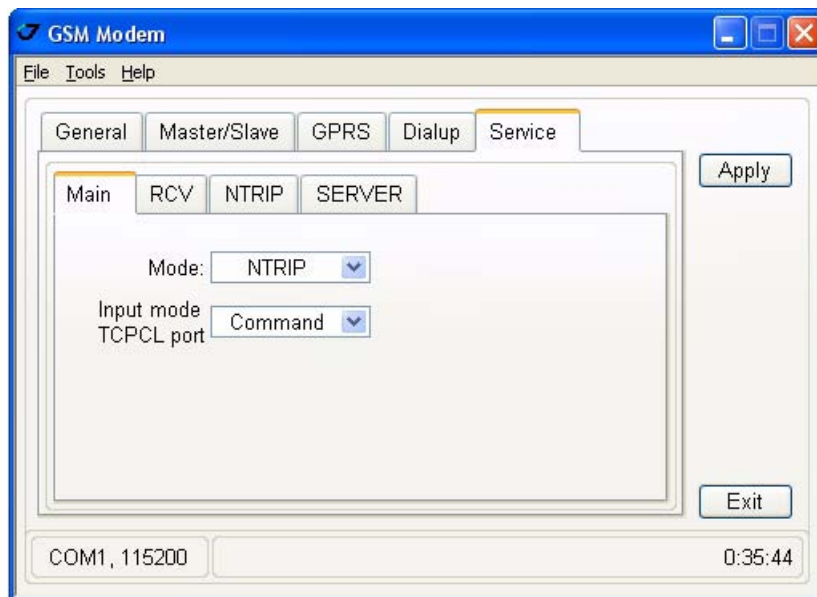
**Table 3-4. Receiver Parameters for the Service Tab Main Subtab**

Parameter	Value
Mode	<ul style="list-style-type: none"> <li>•OFF means service is disabled.</li> <li>•RCV means that modem will receive data from another (remote) JAVAD GNSS receiver configured as a base station.</li> <li>•This base station have to be connected with Internet via Ethernet or GPRS and have static IP address.</li> <li>•NTRIP are useful to provide a method to establish connection to an NTRIP caster, request data from particular mount point, and then receive and use the data as RTK/DGPS corrections.</li> <li>•SERVER - this mode allows working with JAVAD server.</li> </ul>
TCPCL port	<p>Specify the type of incoming data to accept on the TCPCL receiver port:</p> <ul style="list-style-type: none"> <li>•None means that the port will ignore any incoming data.</li> <li>•Command - port is in command mode. Being in this mode, the receiver's port recognizes commands sent by the user.</li> <li>•Echo - echo mode.</li> <li>•RTCM 2.x - RTCM 2.x input mode.</li> <li>•RTCM 3.x - RTCM 3.x input mode.</li> <li>•CMR - CMR/CMR+ input mode. For more information on CMR format, please refer to <a href="ftp://ftp.trimble.com/pub/survey/cmr">ftp://ftp.trimble.com/pub/survey/cmr</a>.</li> <li>•JPS - JPS input mode. In this mode receiver is capable to recognize both standard and non-standard JPS messages.</li> </ul>

## Configuration

Configuring the GSM/GPRS Module

Configuring the GSM module for Internet access

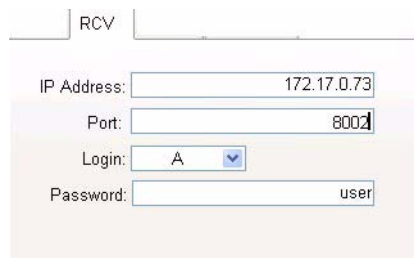


**Figure 3-7. Service tab**

4. Set up the GSM module making settings in the appropriate subtabs according selected mode.
5. After all settings click *Apply*, then click *File* ► *Disconnect*.
6. If needed, launch TriVU and set up the receiver to run as an RTK Base station.

## Settings for the RCV subtab

The *RCV* subtab is depicted in Figure 3-8.



**Figure 3-8. RCV subtab**

- *IP address* - IP address of base station.
- *Port* - base station's port
- *Login* - designation of base station's TCP port (A, B, C, D, E or empty).

- *Password* - password of base station.

IP address, Port, Login, and Password are the parameters of other receiver, configured as a base station and connected with Internet via Ethernet or GPRS.

The description of these parameters exceeds the scope of this document, see *TriVU Software Manual*, available from <http://www.javad.com>, for detailed information of base station's configuration and Ethernet and TCP port settings.

## Settings for the NTRIP subtab

The *NTRIP* subtab is depicted in Figure 3-9:

**Figure 3-9. NTRIP subtab**

- *IP address* - The value of this field should match the IP address of the NTRIP caster to use.
- *Port* - The value of this field should match the IP port the NTRIP caster is listening on for connections.
- *User* - This parameter specifies user ID for the protected space of the requested mount point. Only basic authentication scheme is supported. If empty, no user or password values will be sent to the NTRIP caster.
- *Password* - This field specifies the password for the protected space of the requested mount point. Only basic authentication scheme is supported.

As usually, this information is given by NTRIP service provider.

- *NMEA* - this box allows using appropriate parameter to receive/no receive the GGA messages for NTRIP caster:
  - -1 – receiver will not send NMEA GGA messages to NTRIP caster.
  - 0 – receiver will send NMEA GGA message to NTRIP caster only once after connection to the caster is established.
  - [1...86400] – receiver will send NMEA GGA messages to the NTRIP caster periodically, every specified number of seconds.

Mountpoint drop-down list box allows to select the necessary mount point from the list. This drop-down list box specifies the mount point of the NTRIP caster to get data from. The detailed

## Configuration

Configuring the Receiver


Configuring the GSM module for Internet access

information about each mount point it is possible to obtain and view clicking the *Source Table* button.

The description of these parameters exceeds the scope of this document, see *ModemVU Software Manual*, available from <http://www.javad.com> for detailed information.

## Settings for the SERVER subtab

The *Server* subtab allows user to setup parameters to establish connection with JAVAD server (Figure 3-10).



The image shows a screenshot of a software window titled "SERVER". Inside the window, there are two input fields. The first field is labeled "IP Address:" and contains the text "192.17.0.55". The second field is labeled "Port:" and contains the text "8003".

**Figure 3-10. SERVER subtab**

- *IP address* - The value of this field should match the IP address of the Javad Server to use.
- *Port* - The value of this field should match the IP port the Javad Server is listening on for connections.

## 3.2. Configuring the Receiver

The GISmore can be configured in several ways for collecting data for RTK or post-processing.

- A static Base station collects measurement information and saves this data to its internal memory.
- An RTK Base station collects measurement information, determines differential corrections, and transmits them to the RTK Rover(s).
- A static Rover collects observation data from the same satellites during the same time interval as the static Base station.
- An RTK Rover collects measurement information and accepts corrections from the RTK Base station to compute its relative position.
- A Rover acting as a repeater to re-transmit RTK Base station measurements to other rover receivers, extending the range of a GPS system.

To configure, manage files, or maintain the receiver, connect the receiver and a computer using Bluetooth® wireless technology, and start TriVU:

TriVU is a software used to manage the various functions of your receiver. The full range of TriVU configuration and function is outside the scope of this manual. For more information on

any of the procedures in this section or on TriVU, refer to the *TriVU Software Manual* available on the JAVAD GNSS website.

TriVU configures the various parts of the receiver, saving the settings in the receiver’s memory. These settings will be reflected when you use the MinPad.

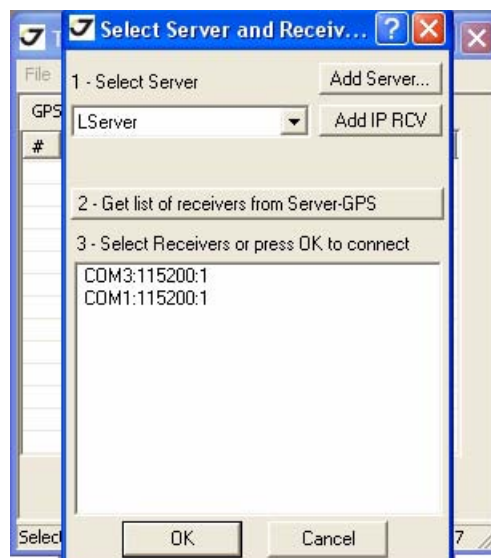
Once you have established a connection between the receiver and the computer, you will be able to:

- configure the receiver and its components
- send commands to the receiver
- download files from the receiver’s memory
- load a new OAF and other configuration files to a receiver
- load new firmware

The following Base and Rover configurations are recommended for the most common applications. However, you can select configuration parameters as needed for your particular jobsite.

**Note:** Do not make other changes without consulting the *TriVU Software Manual*.

1. Connect the receiver and computer as described in “Connecting the Receiver and a Computer” on page 26.
2. Start TriVU. Select the COM port and click Ok (Figure 3-11).



**Figure 3-11. Connection Parameters**

3. Click *Configuration* ▶ *Receiver*.

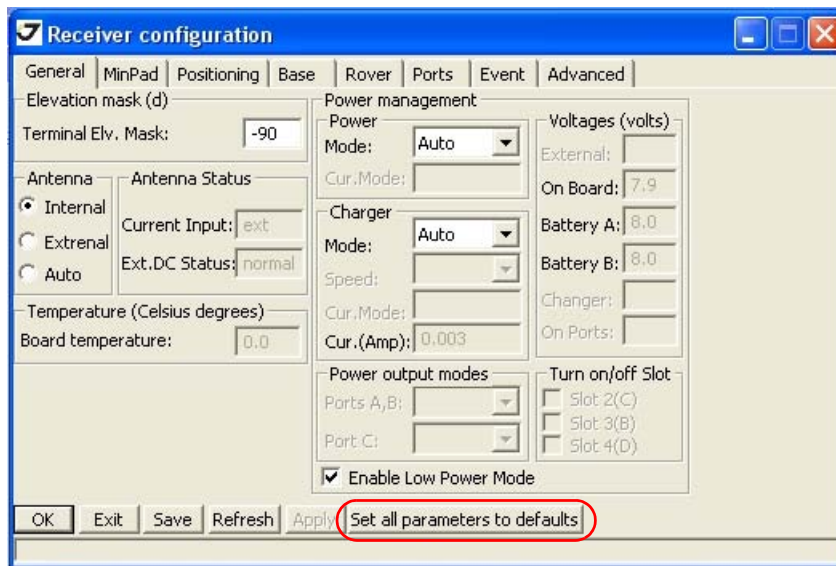
## Configuration

Configuring the Receiver

Configuring the GSM module for Internet access

**Note:** Click *Apply* after making any configuration change; otherwise, the receiver will not register the change.

- In the *General* tab click *Set all parameters to defaults* (Figure 3-12).

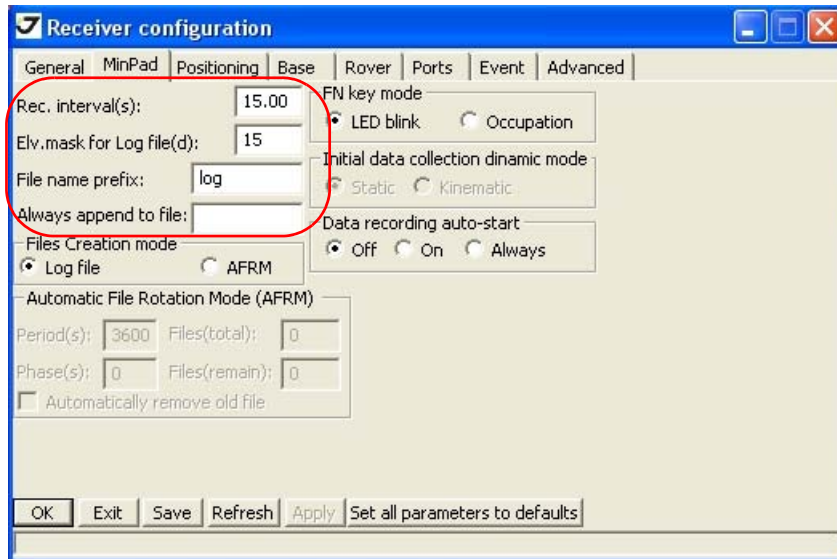


**Figure 3-12. Set all parameters to defaults**

- Click the *MinPad* tab and configure the following settings (Table 3-5), then click *Apply* (Figure 3-13 on page 41).

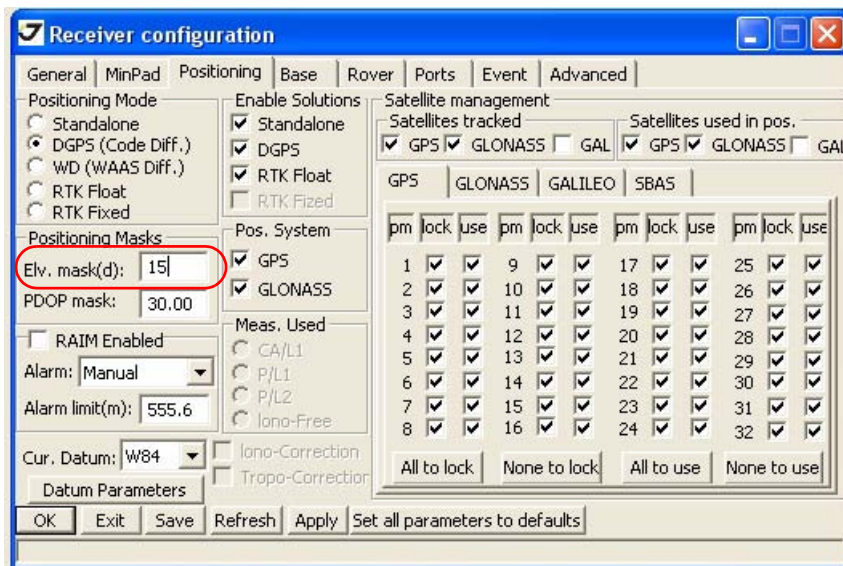
**Table 3-5. Receiver Parameters for the MinPad Tab**

Parameter	Base Receiver	Rover Receiver
Recording interval	Enter 15 seconds.	
Elevation mask angle	Enter 15 degrees.	
File name prefix	Enter a unique ID, such as the last 3 digits of receiver's serial number.	



**Figure 3-13. Configure Receiver Positioning – MinPad for data recording**

6. Click the *Positioning* tab and set the Elevation mask to 15 (Figure 3-14), then click *Apply*.



**Figure 3-14. Configure Receiver Positioning – Elevation Mask**

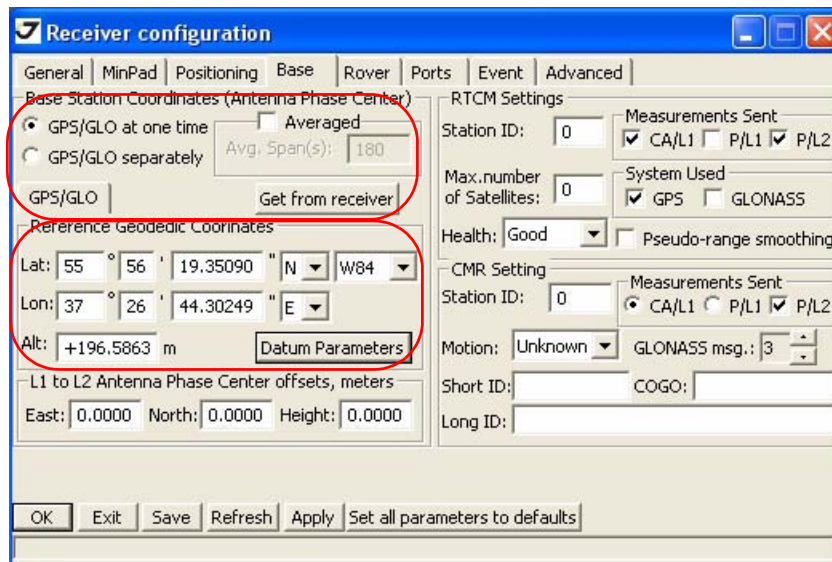
7. For the Base receiver, click the *Base* tab and set the following parameters (Figure 3-15 on page 42), then click *Apply*.
  - *GPS/GLO at one time* – enable

## Configuration

Configuring the Receiver

Configuring the GSM module for Internet access

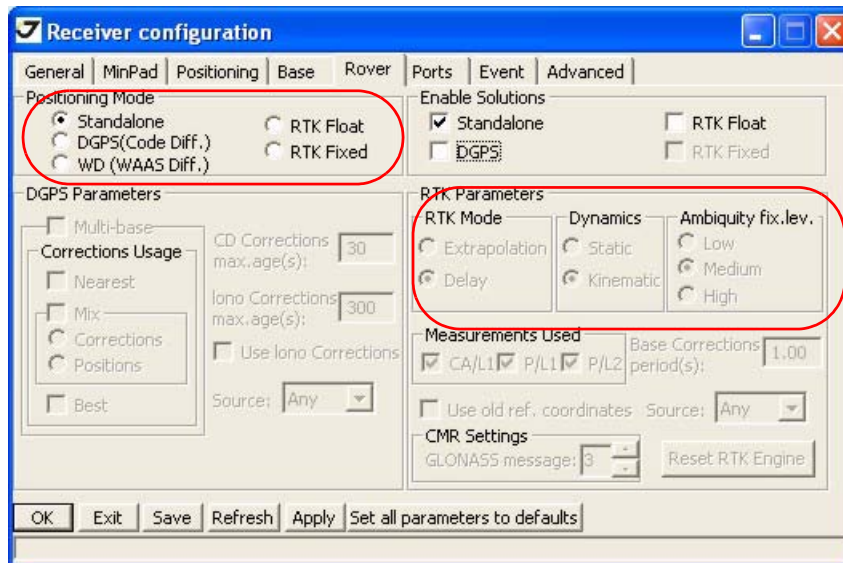
- Antenna position – enter Lat, Lon, and Alt values using one of the following methods:
  - If known, type in the values.
  - Enable *Averaged* and enter the Averaged Span in seconds, then click *Apply*. Click *Tools* ▶ *Reset receiver* and wait until the specified interval (span) completes. Examine the Base coordinates on the *Base* tab, they should correspond to the coordinates obtained from the average. Click *Refresh* if the coordinates are zeros.
  - Click *Get from receiver*.



**Figure 3-15. Base Configuration**

8. For the Rover receiver, click the *Rover* tab and set the following parameters, then click *Apply* (Figure 3-16 on page 43).
  - *Positioning Mode* – For post-processed surveys, select *Standalone*; for RTK surveys, select *RTK float* or *RTK fixed*.
  - *RTK Parameters, RTK mode* – select either *Extrapolation* for RTK float (kinematic) or *Delay* for RTK fixed (static).
    - Extrapolation is for low-latency, high frequency output ( $\geq 5$  Hz) RTK applications. The Rover will extrapolate the Base station's carrier phase measurement corrections when computing the Rover's current RTK position. This setting (extrapolation) is recommended.
    - Delay is for 1 Hz high precision RTK applications. The Rover RTK engine will compute either a delayed RTK position (for the epoch to which the newly received RTCM/CMR message corresponds) or the current standalone position (while waiting for new RTCM/CMR messages coming from the base).

- *RTK Parameters, Dynamics* – select *Static* or *Kinematic*.
- *RTK Parameters, Ambiguity fixing level* – (not applicable to RTK Float) select either *Low*, *Medium*, or *High* for indicator states of 95%, 99.5%, or 99.9%, respectively. The RTK engine uses the ambiguity fix indicator when making decisions whether or not to fix ambiguities. The higher the specified confidence level, the longer the integer ambiguity search time.



**Figure 3-16. Rover Configuration**

9. For RTK surveys, click the *Ports* tab and set the following port parameters for the serial port (Table 3-6), then click *Apply* (Figure 3-17 on page 44).

**Note:** For post-processed surveys, keep the default values for these parameters.

**Table 3-6. Receiver Parameters for the Ports Tab**

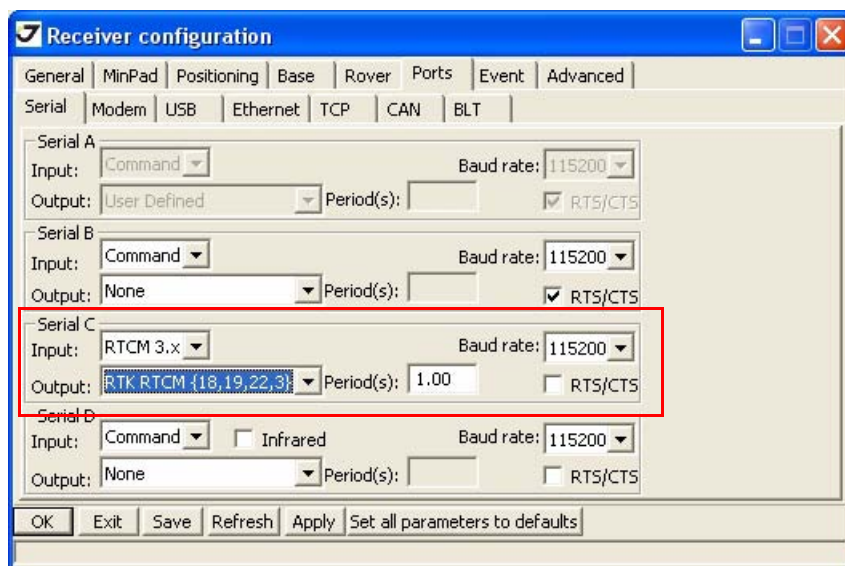
Parameter	Base Receiver	Rover Receiver
Input	n/a (Leave the default.)	Select the same differential correction format selected for the Base.
Output	Select the type and format of differential corrections.	Select “None”.
Period (sec)	Enter the interval at which the receiver will transmit differential corrections.	n/a (Leave the default.)

## Configuration

Configuring the Receiver

Configuring the GSM module for Internet access

Parameter	Base Receiver	Rover Receiver
Baud rate	Select a baud rate to use for transmitting differential messages from the receiver board to the modem module. The baud rate must match the modem's serial port speed.	
RTS/CTS	Select to enable handshaking.	

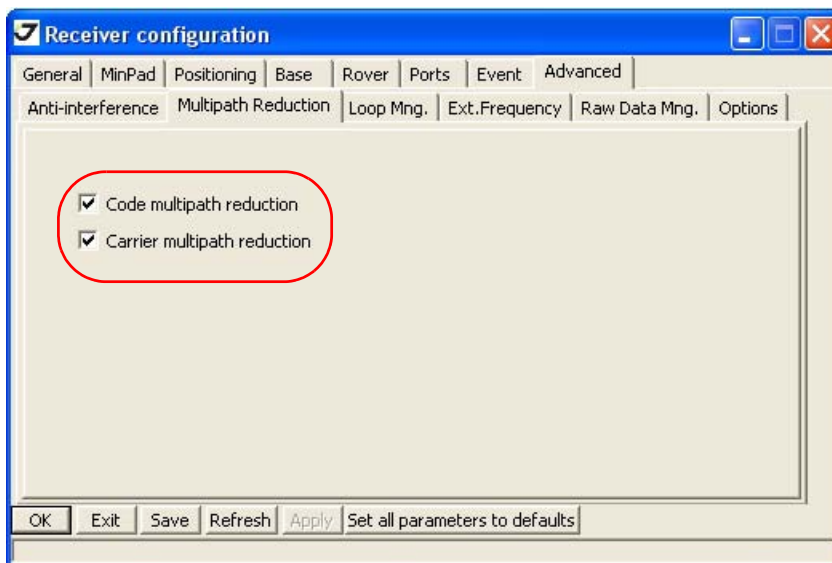


**Figure 3-17. Base and Rover Configuration for RTK Surveys – Ports**

10. Click the *Advanced* tab and then the *Multipath* tab. Set the following parameters and click *Apply* (Figure 3-18 on page 45).

- *Code multipath reduction* – enable

- *Carrier multipath reduction* – enable



**Figure 3-18. Configure Multipath Parameters**

11. Click OK to save the settings and close the dialog box. Once the receiver is configured, the configuration will remain until you change it using TriVU or clearing the NVRAM. For more details on the settings available for configuring the Base and Rover receivers, refer to the *TriVU Software Manual*.
12. Continue with other configuration activities or click *File* ▶ *Disconnect*, then *File* ▶ *Exit* to quit TriVU. Disconnecting before exiting ensures proper port management.

**Note:** Disconnect the receiver from TriVU before exiting to eliminate possible conflicts with the management of the computer’s serial ports.

## **Configuration**

Configuring the Receiver

Configuring the GSM module for Internet access

# SETUP AND SURVEY

After configuring the receivers for surveying, each receiver needs to be setup up and the receiver's height measured and the survey can begin.

## 4.1. Receiver Setup

A typical GPS survey system consists of a Base station set up over a known point and a Rover receiver set up to be a mobile data collector. After setting up the Base and Rover receivers, the antenna height must be measured.

Before collecting data, make sure the Base and Rover receivers contain a current almanac and current ephemeris data (see “Collecting Almanacs and Ephemerides” on page 28).

### 4.1.1. Set up Receiver

The Base station must be set up, logging data, and transmitting data before setting up the Rover receiver. Receiver setup for either post-process or RTK surveys is the same.

*To set up the Base receiver:*

1. Install a tripod or RTK Caddy over a known control point.
2. Attach the GISmore receiver to the tripod or RTK Caddy.
3. Carefully level the tripod and tighten the screws.
4. Attach any other accessories as needed.

*To set up the Rover receiver:*

1. Attach the GISmore receiver to the to the bipod/range pole. Make sure the receiver locks into place.

## 4.2. Static Surveying for Base Stations

Static surveying is the classic survey method, well suited for all kinds of baselines (short, medium, long). At least two receiver antennas, plumbed over survey marks, simultaneously collect raw data at each end of a baseline during a certain period of time. These two receivers track four or more common satellites, have a common data logging rate (5–30 seconds), and the same elevation mask angles. The length of the observation sessions can vary from a few minutes to several hours. The optimal observation session length depends on the surveyor's experience as well as the following factors:

- The length of the baseline measured
- The number of satellites in view
- The satellite geometry (DOP)
- The antenna's location
- The ionospheric activity level
- The types of receivers used
- The accuracy requirements
- The necessity of resolving carrier phase ambiguities

Generally, single-frequency receivers are used for baselines whose lengths do not exceed 15 kilometers (9.32 miles). For baselines of 15 kilometers or greater, use dual-frequency receivers.

Dual-frequency receivers have two major benefits. First, dual frequency receivers can estimate and remove almost all ionospheric effect from the code and carrier phase measurements, providing much greater accuracy than single-frequency receivers over long baselines or during ionospheric storms. Secondly, dual-frequency receivers need far less observation time to reach the desired accuracy requirement.

After the survey completes, data the receivers collect can be downloaded onto a computer and processed using post-processing software (for example, JAVAD GNSS Justin).

## 4.3. Kinematic (Stop & Go) Surveying for Rover Stations

In a kinematic, stop and go survey, the stationary receiver (Base station) is set up at a known point such as a survey monument, or an unknown point. The receiver continually tracks satellites and logs raw data into its memory. The Rover receiver is set up at an unknown point and collects data in static mode for 2 to 10 minutes. When finished, assign the Rover to kinematic status and move to the next survey point. At this point, and each subsequent point, the receiver is changed to static mode to collect data. So, while moving, the Rover is in kinematic mode, and while collecting data, the Rover is in static mode.

1. Set up the Rover at an unknown point and press power. Allow the Rover to collect static data for two to ten minutes.
2. When finished, assign the Rover to kinematic.
3. Move the Rover to the next location (survey point), and collect the data in static mode for two to ten minutes.
4. Repeat steps 3 and 4 until all points have been surveyed. The occupation time for the points depends on the same factors as for the static survey method.
5. When finished, stop logging data. Turn off the Rover if needed. This method of GNSS survey allows the operator to reduce the point occupation time, thus permitting field crews to survey many more points compared to the other methods available.

## 4.4. Real Time Kinematic Surveying

With RTK surveying, as with kinematic surveying described above, one receiver serves as the reference station and conducts observations with its antenna affixed to a stationary tripod or some other device. The other receiver functions as a rover and conducts observations (using an antenna) affixed to a mobile pole and moved to observation points.

Unlike post-processed kinematic surveys, RTK surveys utilize a communications link between the Base and Rover. Using a radio modem link, the Base receiver transmits its measurement and location data to the Rover receiver. The Rover, based on the transmitted data and its own observation data, immediately conducts a baseline analysis and outputs the results. For specific settings used in RTK surveys, see “Configuring the GSM/GPRS Module” on page 30 and “Configuring the Receiver” on page 38.

Usually, the receiver will start to output the coordinates of the antenna’s phase center along with the solution type within 10–30 seconds. However, GSM phones may take as long as 60 seconds to synchronize.

The geodetic coordinates displayed on the *Location* tab are always computed in WGS84 and have four solution types.

- Standalone – where the receiver computes 3D coordinates in autonomous mode without using differential corrections.
- Code differential – where the Rover receiver computes the current relative coordinate in differential mode using only pseudo ranges.
- RTK float – where the Rover receiver computes the current relative coordinates in differential mode using both pseudo ranges and phases; however, with a float solution, the phase ambiguity is not a fixed integer number and the “float” estimate is used instead.

## Setup and Survey

Real Time Kinematic Surveying

Set up Receiver

- RTK fixed – where the Rover receiver computes current relative coordinates, with ambiguity fixing, in differential mode. The LQ field reflects the status of the received differential messages and contains the following information:
  - Data link quality in percentage
  - Time (in seconds) elapsed since the last received message
  - Total number of received correct messages (dependent on the message type received)
  - Total number of received corrupt messages (dependent on the message type received)

If the receiver is not (for some reason) receiving differential corrections, or if none of the ports has been configured to receive differential corrections, the LQ field will either be empty or it will look like this: 100%(999,0000,0000).

# RECEIVER AND FILE MAINTENANCE

The GISmore stores observation data in its internal memory. The following sections discuss accessing and managing these files.

If post-processing the data after completing a survey, the data in the receiver's memory will need to be downloaded to a computer.

Downloading and deleting files will also prepare the receiver's memory for the next survey. Occasionally, the receiver's NVRAM may need to be cleared to eliminate communication or tracking problems.

As project expectations expand, the receiver's OAF may need to be updated to provide expanded operation and functionality. The receiver requires firmware to properly operate and provide appropriate functionality. As JAVAD GNSS releases firmware updates, loading these updates into the receiver will ensure that the receiver operates at its full potential.

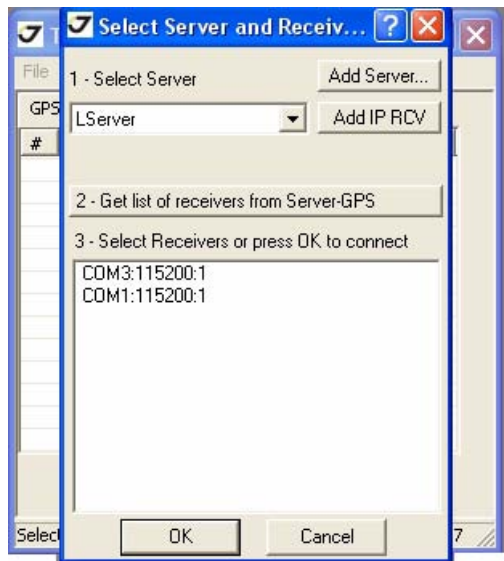
## 5.1. Downloading Files to a Computer

When your measuring finishes, you can download your measuring files to a computer for storage, post-processing, or backup. Also, the GISmore memory holds a finite amount of files and information, so downloading the files to a computer ensures that no files are lost.

You should download files as soon as possible after collecting data at the jobsite. TriVU provides a File Manager to download files to your computer and delete files from the receiver GISmore.

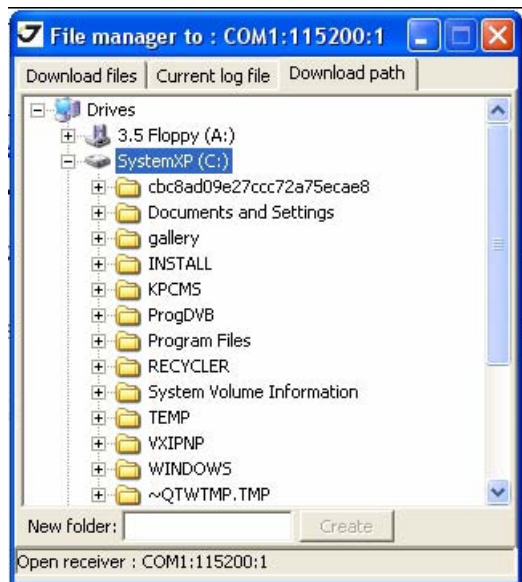
1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 26 for this procedure.

2. Start TriVU. Select the COM port and click Ok (Figure 5-1).



**Figure 5-1. Connection Parameters**

3. Click *File* ► *File Manager*, then click the *Download path* tab on the *File Manager* dialog box.
4. Navigate to or create (using the *Create* button) the folder in which to download and store files (Figure 5-2).



**Figure 5-2. Download path tab**

- 5. Click the *Download files* tab and select the file(s) to download (Figure 5-3).
- 6. To select multiple files, hold down the shift key and click on nonsequential files to select several files at once; or hold down the Ctrl key and click on individual files.

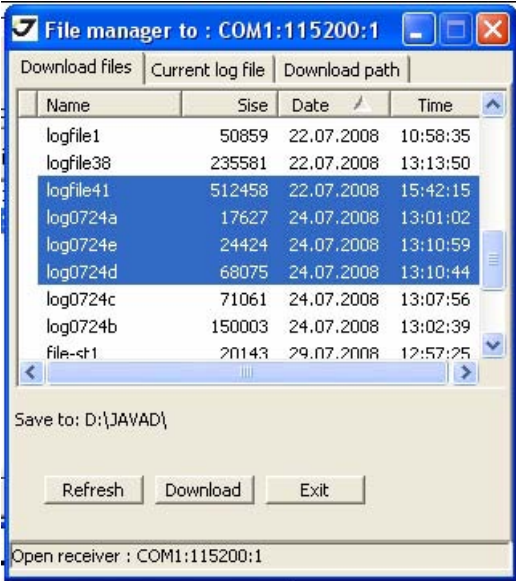
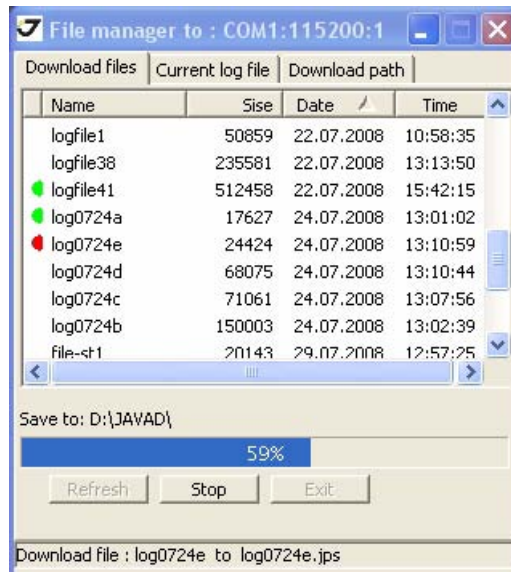


Figure 5-3. Download Files

- 7. Click the *Download* button. During the download, status indicators display next to each file (Figure 5-4 on page 54).
  - Red indicator – file currently downloading.
  - Green indicator – file has successfully downloaded.



**Figure 5-4. Download Files – Status Indicators**

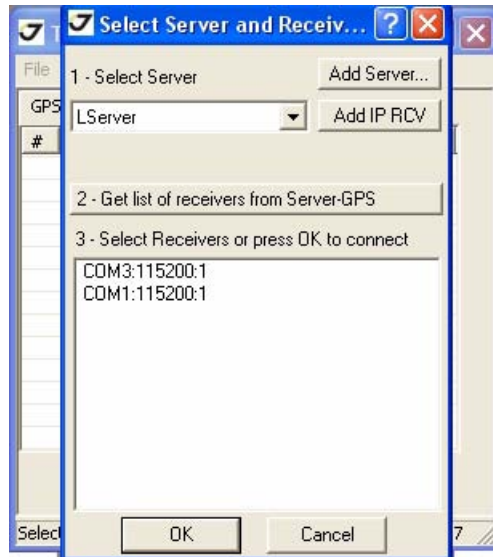
8. When done, click *Exit* on the *File Manager* dialog box.
9. Continue with other operations. Or, click *File* ▶ *Disconnect*, then *File* ▶ *Exit* to quit TriVU.

## 5.2. Deleting Files

Use the following steps to delete files from your receiver.

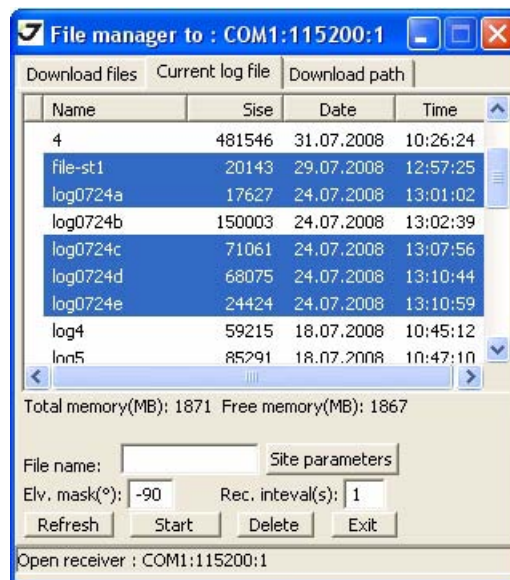
1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 26 for this procedure.

2. Start TriVU. Select the COM port and click Ok (Figure 5-5).



**Figure 5-5. Connection Parameters**

3. Click *File* ► *File Manager* and select the file(s) to delete on the *Current log files* tab (Figure 5-6).



**Figure 5-6. Current log files tab**

4. To select multiple files, hold down the shift key and click on nonsequential files to select several files at once; or hold down the Ctrl key and click on individual files.

5. Click *Delete* (Figure 5-6 on page 55).
6. Click *Yes* at the delete files confirmation dialog box. TriVU deletes the selected files.
7. Click *Exit* on the *File Manager* screen.
8. Continue with other operations. Or click *File* ▶ *Disconnect*, then *File* ▶ *Exit* to quit TriVU.

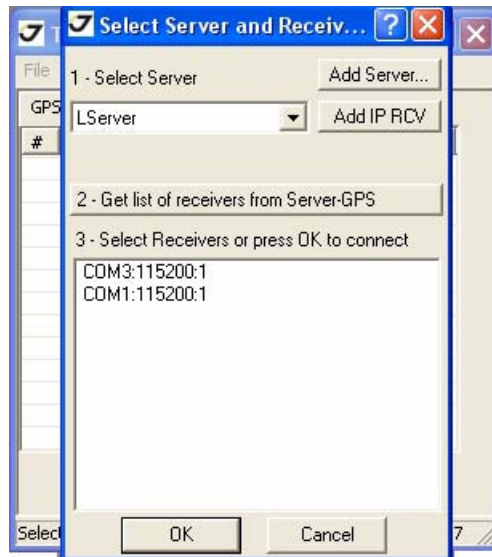
## 5.3. Managing Receiver Options

### 5.3.1. Checking an OAF

**Note:** For a complete list of options and their details, visit the JAVAD GNSS website.

You can check the status of your receiver's options, and load any new OAFs, using the RS232 cable, a computer, and TriVU. Refer to the *TriVU Software Manual* for a more complete description of the TriVU software.

1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 26 for this procedure.
2. Start TriVU. Select the COM port and click Ok (Figure 5-7).



**Figure 5-7. Connection Parameters**

3. Click *Tools* ▶ *Receiver Options*. The Options Manager dialog box (Figure 5-8) contains the following information:
  - *Option name* – a name/description of the option
  - *Current* – the current status of the option

- *Purchased* – if the option is purchased or not
- *Leased* – if the option is leased or not
- *Expiration date* – the date the option will be disabled, if applicable

Since Options can be both purchased and leased, the “Current” status of the option displays the currently effective value. Option values can be one of the following:

- -1 or “----” – the firmware version does not support this option
- 0 – the receiver option is disabled
- positive integer – the option is enabled
- yes or no – the option is either enabled or disabled.

The screenshot shows a window titled "Option manager to : COM14:115200:1". It contains a table with the following columns: Code, Option name, Current, Purchased, Leased, and Exp.Dat. The table lists various options such as GPS, GLONASS, L1, Position update rate, Raw data update rate, Memory, 1-PPS Timing Signal, Event Markers, Multipath Reduction, Frequency Input, Freq. Lock and Output, Serial Ports A, B, C, and D, GSM, UHF, RAIM, Datums support, Magnetic azimuth, Geoid height, WAAS, DGPS mode, RTK mode, RTCM Output and Input, CMR Output and Input, Reserved, Carrier Phase, ADU, Authorization, JPS Output and Input, Bluetooth, RTK distance, Corrections inputs, and Latitude/Longitude settings.

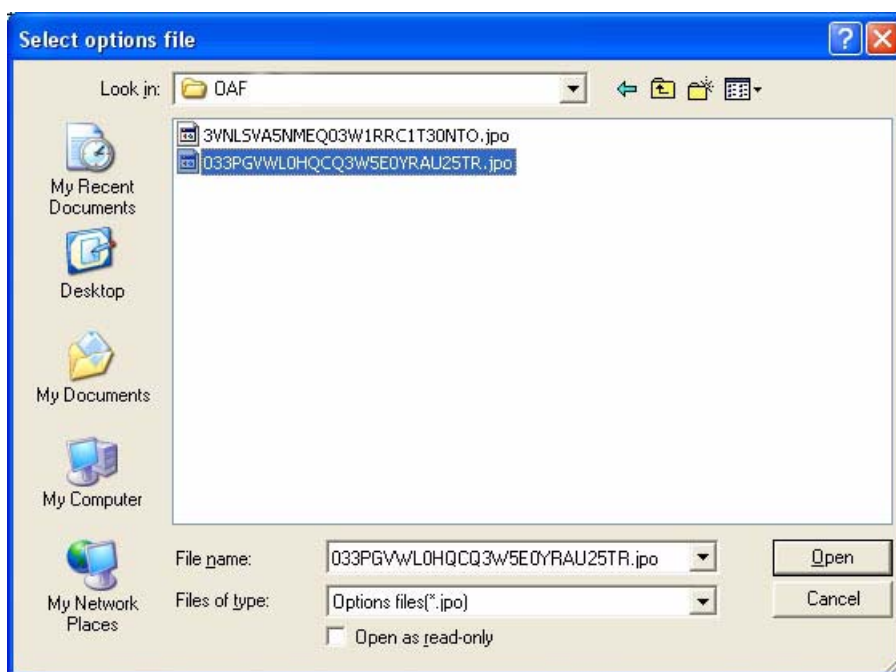
Code	Option name	Current	Purchased	Leased	Exp.Dat
_GPS	GPS	yes	511	511	25.11.2
_GLO	GLONASS	yes	511	511	25.11.2
_L1	L1	yes	511	511	25.11.2
_POS	Position update rate(Hz)	100	511	511	25.11.2
_RAW	Raw data update rate(Hz)	100	511	511	25.11.2
_MEM	Memory (Mb)	6256	6256	6256	25.11.2
_PPS	1-PPS Timing Signal	2	511	511	25.11.2
EVNT	Event Markers	2	511	511	25.11.2
_MPR	Multipath Reduction	yes	511	511	25.11.2
_FRI	Frequency Input	yes	511	511	25.11.2
_FRO	Freq. Lock and Output	yes	511	511	25.11.2
RS_A	Serial Port A (Kbps)	460	511	511	25.11.2
RS_B	Serial Port B (Kbps)	460	511	511	25.11.2
RS_C	Serial Port C (Kbps)	460	511	511	25.11.2
RS_D	Serial Port D (Kbps)	460	511	511	25.11.2
_GSM	GSM	511	0	511	25.11.2
_UHF	UHF	511	0	511	25.11.2
RAIM	RAIM	yes	511	511	25.11.2
_DTM	Datums support	yes	511	511	25.11.2
MAGN	Magnetic azimuth	yes	511	511	25.11.2
_GEO	Geoid height	yes	511	511	25.11.2
WAAS	WAAS	yes	511	511	25.11.2
CDIF	DGPS mode	yes	511	511	25.11.2
PDIF	RTK mode (Hz)	100	511	511	25.11.2
RTMO	RTCM Output	3	511	511	25.11.2
RTMI	RTCM Input	5	511	511	25.11.2
CMRO	CMR Output	1	511	511	25.11.2
CMRI	CMR Input	1	511	511	25.11.2
_LIM	Reserved	1	511	511	25.11.2
_CPH	Carrier Phase	yes	511	511	25.11.2
OCTO	ADU	Heading	511	511	25.11.2
AUTH	Authorization	255	511	511	25.11.2
JPSO	JPS Output	1	511	511	25.11.2
JPSI	JPS Input	5	511	511	25.11.2
_BLT	Bluetooth	yes	511	511	25.11.2
DIST	RTK distance [x100m]	Unlimited	Unlimited	Unlimited	25.11.2
CORI	Corrections inputs	11111111	11111111	11111111	25.11.2
LAT1	Latitude 1	90	-411	-411	25.11.2
LON1	Longitude 1	0	511	511	25.11.2
LAT2	Latitude 2	-90	-411	-411	25.11.2

Figure 5-8. View Option manager

## 5.3.2. Loading OAFs

JAVAD GNSS dealers provide customers with OAF files. For any OAF related questions, E-mail at [support@javad.com](mailto:support@javad.com). Please have your receiver ID number available (see “Checking Firmware Version” on page 61).

1. To load a new OAF, follow steps 1-3 in “Checking an OAF” on page 56.
2. Click *Load* (Figure 5-8 on page 57) to load a new OAF file, or *Update* to update the OAF file. The new receiver option loads onto the receiver and the *Option Manager* table updates.
3. Navigate to the location of the new Option Authorization File. OAFs have .jpo extension and are unique to each receiver (Figure 5-9).



**Figure 5-9. Load OAF**

4. Select the appropriate file and click *Open*. The new receiver option loads onto the receiver and the *Option Manager* table updates.
5. When finished, click *File* ▶ *Disconnect*, then *File* ▶ *Exit* to quit TriVU.

## 5.4. Managing Receiver Memory

When using the GISmore in static or dynamic applications, you may need to know the amount of memory the receiver's log file occupies. The specific memory size depends on the type of data being recorded. Use the formulas below to compute the approximate size of the receiver's log files.

- $SS$  – the estimated size of one epoch of raw data in the receiver's log file (expressed in bytes).
- $N$  – the number of observed satellites per epoch.

When recording only L1 data:  $SS = 183 + 22*N$

## 5.5. Clearing the NVRAM

The receiver's Non-Volatile Random Access Memory (NVRAM) holds data required for satellite tracking, such as almanac and ephemeris data, and receiver position. The NVRAM also keeps the current receiver's settings, such as active antenna input, elevation masks and recording interval, and information about the receiver's internal file system.

Even though clearing the NVRAM is not a common (nor normally a recommended) operation, there are times when clearing the NVRAM can eliminate communication or tracking problems. Clearing the NVRAM in your GISmore can be interpreted as a “soft boot” in your computer.

After clearing the NVRAM, your receiver will require some time to collect new ephemerides and almanacs (around 15 minutes).

Clearing the NVRAM of your receiver will not delete any files already recorded in your GISmore's memory. However, it will reset your receiver settings to factory default values.

In addition, the NVRAM keeps information about the receiver file system.

### 5.5.1. Using TriVU to Clear NVRAM

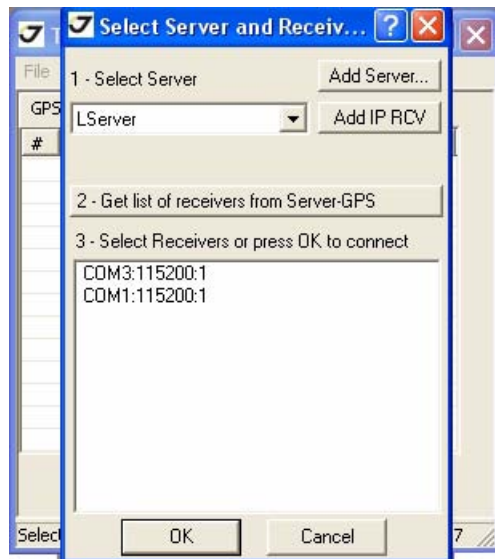
1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 26 for this procedure.

## Receiver and File Maintenance

Clearing the NVRAM

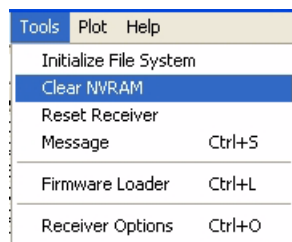
Using TriVU to Clear NVRAM

2. Start TriVU. Select the COM port and click Ok (Figure 5-7).



**Figure 5-10. Connection Parameters**

3. Click the *Tools* ► *Clear NVRAM* (Figure 5-11).



**Figure 5-11. Clear NVRAM**

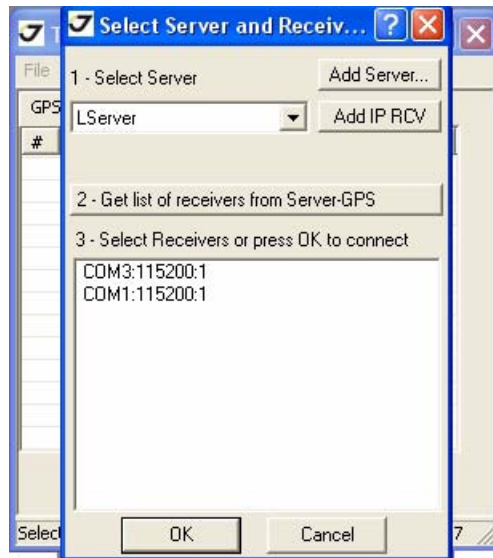
4. Click *OK* at the clear NVRAM confirmation dialog box.

The receiver will automatically disconnect once the NVRAM is cleared.

## 5.6. Checking Firmware Version

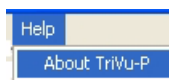
Use TriVU to check the firmware version of your receiver.

1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 26 for this procedure.
2. Start TriVU. Select the COM port and click Ok (Figure 5-7).



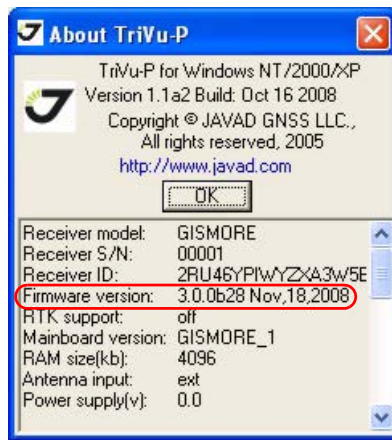
**Figure 5-12. Connection Parameters**

3. Click on *Help* ▶ *About TriVU* (Figure 5-13).



**Figure 5-13. Help->About**

The *About TriVU* dialog box opens (Figure 5-14).



**Figure 5-14. About TriVU**

*About TriVU* lists important information about the different hardware accessories and software properties. This list includes the following, which you will need if you contact JAVAD GNSS or your dealer:

- Receiver model
- Receiver IDs
- Firmware version

4. When finished, click *OK*, then click *File* ▶ *Disconnect*, then *File* ▶ *Exit* to quit TriVU.

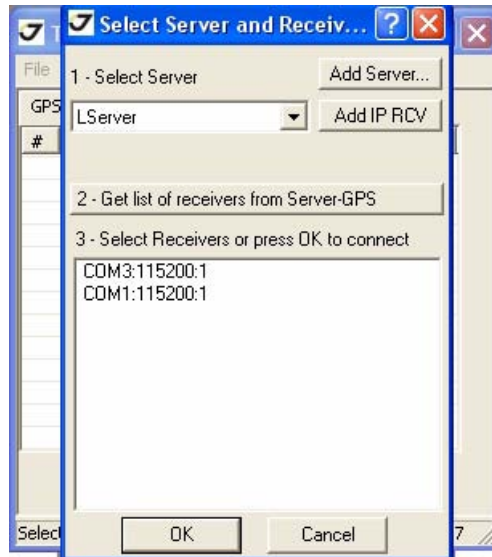
## 5.7. Loading New Firmware

Base and Rover receivers must be loaded with the same firmware version. Use the latest firmware version, available for download from the JAVAD GNSS website, to ensure your receiver has the most recent updates.

The receiver uses TriVU to load firmware onto the receiver. For more information, refer to the *TriVU Software Manual*, available on the JAVAD GNSS website.

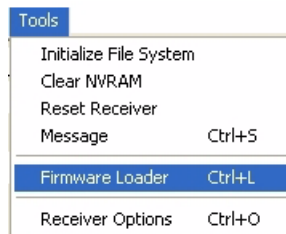
1. Download the new firmware package to your computer.
2. Connect your receiver and computer, as described in “Connecting the Receiver and a Computer” on page 26.

3. Start TriVU. Select the COM port and click Ok (Figure 5-7).



**Figure 5-15. Connection Parameters**

4. Click the *Tools* ► *Firmware loader* (Figure 5-16).



**Figure 5-16. Tools->Firmware Loader**

5. Open the required firmware folder. Select the *main.ldp* file.
6. Click the *Firmware Update* button to load new firmware.
7. Clear the receiver's NVRAM (see "Clearing the NVRAM" on page 59) and update the almanac ("Collecting Almanacs and Ephemerides" on page 28) after loading new firmware.
8. Click *File* ► *Disconnect*, then *File* ► *Exit* to quit TriVU.

## **Receiver and File Maintenance**

Loading New Firmware

Using TrIVU to Clear NVRAM

# TROUBLESHOOTING

This chapter will help you diagnose and solve some common problems you may encounter with your receiver.

**Warning:** *Do not attempt to repair equipment yourself. Doing so will void your warranty and may damage the hardware.*

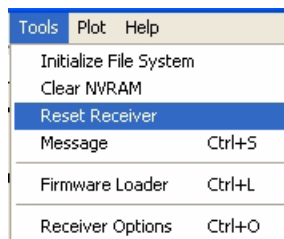
## 6.1. Check This First!

Before contacting JAVAD GNSS support, check the following:

- Check all power sources for drained batteries or incorrectly connected batteries/cables.
- Check that the most current software is downloaded onto the computer and that the most current firmware is loaded into the receiver. Check the JAVAD GNSS website for the latest updates.
- If connecting via Bluetooth®, check that the port used for connection is in Command mode.

Then, try the following:

- Reset the receiver using TriVU: *Tools* ▶ *Reset Receiver* (Figure 6-1):



**Figure 6-1. Tools->Reset Receiver**

- Restore default settings using TriVU (*Configuration* ▶ *Receiver*, then click *Set all parameters to defaults*).
- Clear the NVRAM (see “Clearing the NVRAM” on page 59).

If the problem persists, see the following sections for other solutions.

## The receiver does not power up

- ⊙ The battery may be discharged.
  - Charge the batteries overnight. See “Powering the Receiver” on page 25.
- ⊙ The receiver may have a defective charger.

If, after connecting an external power source, the receiver still does not power up, contact JAVAD GNSS Customer Support for advice.

## 6.2. Receiver Problems

The following are some of the most commonly encountered receiver problems.

### Generic problems

- ⊙ The receiver does not lock on to satellites for a long period of time.
  - The receiver stores an old almanac.  
Update the almanac. See “Collecting Almanacs and Ephemerides” on page 28 for details.
- ⊙ The corresponding receiver options may be disabled or expired (L1, GPS/GLONASS must be on to track satellites).
  - See “Managing Receiver Options” on page 56 for details on how to check current options.
  - Order a new OAF with the desired options activated to enable or extend validity of the corresponding receiver options. Contact your dealer or visit the JAVAD GNSS website for details.
  - Refer to the *TriVU Software Manual* for a detailed description of options.

### The receiver tracks too few satellites

- ⊙ The elevation mask value is too high (above 15 degrees).
  - Lower the elevation mask.
- ⊙ The survey is conducted near obstructions (tree canopy, tall buildings, etc.).
  - Check that the Multipath Reduction boxes have been enabled.
    - Connect your receiver and a computer and start TriVU. See “Connecting the Receiver and a Computer” on page 26.
    - Click *Configuration* ▶ *Advanced and the Multipath Reduction* tab. Enable the two boxes and click Apply.
  - Move to an area free of obstructions, if applicable.

## **The receiver cannot obtain Code Differential and/or RTK solutions.**

- ⊙ Incorrect Base coordinates entered
  - Specify the correct coordinates for the Base station using TriVU or another suitable field data collection software.
- ⊙ The receiver is not configured as a Base or Rover.
  - If the receiver should function as a Base, ensure it has the proper configuration.
  - If the receiver should function as a Rover, ensure it has the proper configuration.
- ⊙ The corresponding receiver options may be disabled or expired.
  - See “Managing Receiver Options” on page 56 for details on how to check current options.
  - Order a new OAF with the desired options activated to enable or extend validity of the corresponding receiver options. Contact your dealer or visit the JAVAD GNSS website for details.
  - Refer to the *TriVU Software Manual* for a detailed description of options.
- ⊙ There are not enough common satellites. In order to obtain a fixed solution, the Base and Rover should track at least five common satellites.
  - Ensure that both the Rover and Base receivers use the same, and updated, almanac. See “Collecting Almanacs and Ephemerides” on page 28.
  - Check the elevation masks of the Rover and Base receivers; they should be the same.
- ⊙ A discrepancy exists between the differential standards used at the Base and Rover receivers. Ensure the Base and Rover receivers use the same corrections input/output format:
  - Connect your receiver and a computer and start TriVU. See “Connecting the Receiver and a Computer” on page 26. Click and the *Ports* tab. Use the same input/output format for both receivers.
- ⊙ Poor satellite geometry (PDOP/GDOP values are too high).
  - Conduct your survey when PDOP values are low.
- ⊙ The elevation mask is above 15 degrees.
  - Lower the elevation mask.
- ⊙ The battery is low.
  - Attach an external power source to the receiver.
  - See “Powering the Receiver” on page 25 for details.
- ⊙ The Base and Rover modems use different radio link parameters.
  - Configure the Base and Rover radio modems according to the procedures listed in the applicable section.
- ⊙ The distance between the Base and Rover is too far.

- Close the distance between the Base and Rover.
  - Use repeaters to increase radio coverage.
- © There may be a source of radio interference that disrupts radio communications.
- Change the RF channel (if possible).
  - Use a spectrum analyzer to detect the radio characteristics of the interfering signal and change your system’s configuration accordingly.
  - Remove the source of jamming signal or relocate your radio antennas (if possible).

### **The receiver does not start data logging**

- © The memory option is disabled or expired.
- Check that the memory option is enabled. For details, see “Checking an OAF” on page 56.
- © The receiver’s memory has no free space.
- Download and/or delete data files to free up space for new files (see “Downloading Files to a Computer” on page 51 and “Deleting Files” on page 54).

## **6.3. Technical Support**

If the troubleshooting hints and tips in this Operator’s Manual fail to remedy the problem, contact JAVAD GNSS Support. Before contacting JAVAD GNSS Customer support about any problems with the receiver, see “Check This First!” on page 65 for some solutions that may fix the issue.

The JAVAD GNSS website provides current information about our line of products. The support area of the website provides access to frequently asked questions, configuration procedures, manuals, e-mail support, etc. To access the JAVAD GNSS website, use: [www.javad.com](http://www.javad.com)

To contact JAVAD GNSS Support use the QUESTIONS button available on the [www.javad.com](http://www.javad.com).



# SPECIFICATIONS

This JAVAD GNSS product is a 216-channel GNSS receiver with a Bluetooth® wireless technology module, GMS module, and a rugged plastic housing.

**Note:** Performance specifications assume a minimum of 6 GPS satellites above 15 degrees in elevation and adherence to the procedures recommended in this manual.

**Note:** In areas of high multipath, during periods of large PDOP, and during periods of increased ionospheric activity, performance may degrade.

**Note:** Use robust checking procedures in areas of extreme multipath or under dense foliage.

## A.1. Receiver Specifications

The following sections provide specifications for the receiver and its internal components.

### A.1.1. General Details

Table below lists the receiver’s general specifications.

**Table A-1. Receiver General Specifications**

Physical	
Enclosure	Plastic, waterproof
Color	JAVAD GNSS Green
Dimensions	W:178 mm x H:96 mm x D:178 mm
Weight	210 g
GNSS Antenna	Internal
Battery	Internal
Seals	Silicon
Keys	Power – On/Off
LED	Battery status

## Specifications

Receiver Specifications

General Details

<b>Environment</b>	
Operating temperature	-30° C to +55° C (with battery) / -40° C to +80° C (without battery)
Storage temperature	-20° C to +35° C, 45 to 85% RH (with battery within 1 year) -20° C to +40° C, 45 to 85% RH (with battery within 6 month) -20° C to +45° C, 45 to 85% RH (with battery within 1 month) -20° C to +50° C, 45 to 85% RH (with battery within 1 week) -45° C to +85° C (without battery)
Humidity	95% non-condensing
<b>Power</b>	
Internal battery	Li-Ion, 4400 mAh, 7.4 V
Number of built-in batteries	1 battery
Operating time	Up to 7 hours
Input voltage	+4.5 to +6.5 V DC
On-board	Backup battery for timekeeping and almanac data storage 10 years minimum operation
<b>External power</b>	
Port	1 port
Input voltage	+4.5 to +6.5 V DC
<b>I/O</b>	
Communication Port	Bluetooth® V2.0+EDR Class 2 supporting SPP Slave and Master Profiles
Connectors	External power
<b>Data Features</b>	
Up to 100 Hz update rate for real time position and raw data (code and carrier) 10 cm code phase and 1 mm carrier phase precision Hardware Viterbi decoder RTCM SC104 versions 2.x and 3.x Input/Output NMEA 0183 versions 2.x and 3.0 Output Multi-Base Code Differential Rover Code Differential Base Geoid and Magnetic Variation models RAIM Different DATUMs support Output of grid coordinates	
<b>Technology</b>	
Low signal tracking Advanced Multipath mitigation KFK WAAS/EGNOS (SBAS) Adjustable PLL and DLL parameters	
<b>NMEA</b>	
NMEA version	Ver. 2.1, 2.2, 2.3, 3.0

Messages	GGA, GLL, GNS, GRS, GSA, GST, GSV, HDT, RMC, VTG, ZDA, ROT, GMP
Output interval	1Hz standard; 5, 10, 20Hz optional
<b>DGPS</b>	
Correction format	RTCM SC104 Ver 2.1, 2.2, 2.3, and 3.0
RTCM 2.x message type	1, 3, 9, 31, 32, 34; user selectable
RTCM 3.0 message type	1003, 1004, 1005, 1006, 1007, 1008, 1011, 1012, 1019, 1020; user selectable
Process interval	1, 5, 10, 20 Hz optional
Output interval for RTCM correction data	1, 5, 10, 20 Hz optional
Elevation mask	0 to 90 deg (independent of data logging)
Multi-base DGPS	Differential correction select mode: Nearest, Mix, Best (optional)
<b>RTK</b>	
Correction format	RTCM SC104 Ver 2.2, 2.3, or 3.0
RTCM 2.x message type	3, 18, 19, 20, 21, 22; user selectable
RTCM 3.0 message type	1003, 1004, 1005, 1006, 1007, 1008, 1019, 1011, 1012, 1020; user selectable
Ambiguity initialize	OTF (L1, L1/L2)
Baseline Length	Up to 50 km in the morning and evening. Up to 32 km at noon.
Initialize time	5 seconds to 10 min depending on the base line length and multipath conditions
Output interval for CMR/RTCM	1 Hz standard; 5, 10, 20 Hz optional
Elevation	0 to 90 degrees (independent of data logging)
Solution mode	Delay (synchronization) Extrapolation (not synchronized)
Process interval	1, 5, 10, 20, 50, 100 Hz optional
Latency	Delay mode – 20 msec to 20 sec (depends on latency which receives corrections data from base receiver) Extrapolation – 20 to 30 msec
Raw Data logging	The receiver can record raw data at another interval during RTK operation
Status	Fix, Float, DOP, Data Link Status, Modem Latency, Common satellites, Percentage of fixing
Results	RTK coordinates, HRMS, VRMS, Covariance Matrix
Ambiguity fixing level	Selectable thresholds. Low: 95%; Medium: 99.5%; High: 99.9%
<b>Survey Modes</b>	
Base or Rover	Static, Fast Static Kinematic (Stop and Go) RTK (Real-time Kinematic) DGPS (Differential GPS) SBAS DGPS

## Specifications

Receiver Specifications  
GNSS Board Details

<b>Survey Accuracy</b>	
Autonomous	< 2 m
Static, Fast Static	Horizontal: $0.7 \text{ cm} + 0.5 \text{ ppm} * \text{base\_line\_length}$ Vertical: $1 \text{ cm} + 0.5 \text{ ppm} * \text{base\_line\_length}$
Kinematic, RTK	Horizontal: $1.5 \text{ cm} + 1 \text{ ppm} * \text{base\_line\_length}$ Vertical: $2 \text{ cm} + 1.5 \text{ ppm} * \text{base\_line\_length}$
RTK (OTF)	Horizontal: $1.5 \text{ cm} + 1 \text{ ppm} * \text{base\_line\_length}$ Vertical: $2 \text{ cm} + 1.5 \text{ ppm} * \text{base\_line\_length}$
DGPS	< 0.25 m Post Processing, < 0.5 m Real Time
Cold Start	< 35 sec
Warm Start	< 5 sec
Reacquisition	< 1 sec

## A.1.2. GNSS Board Details

Table A-2 lists the GNSS board's general specifications.

**Table A-2. GNSS Board Specifications**

<b>Receiver type</b>	
GISmore	GPS L1 Galileo E1 GLONASS L1
<b>Tracking Specifications</b>	
Standard channels	Total 216 channels: all-in-view (GPS L1, Galileo E1, GLONASS L1, SBAS)
Tracked signals	L1 C/A and P Code & Carrier
<b>Tracking Functions</b>	
Multipath reduction	Code and Carrier
PLL/DLL settings	Bandwidth, order, adjustable Smoothing interval Code and Carrier
WAAS/EGNOS	WAAS optional; EGNOS optional
<b>Memory</b>	
Internal Memory	Up to 256MB of on board non-removable memory for data storage
Raw Data Recording	Up to 100 times per second (100Hz)
Data Type	Code and Carrier from GPS L1, Galileo E1, GLONASS L1

## A.1.3. Bluetooth® Module Details

Table A-3 lists the Bluetooth® wireless technology module’s general specifications.

**Table A-3. Bluetooth® Module Specifications**

Range	up to 10 m (indoor); up to 50 m (outdoor)
Type	Class 2
Service classes	Miscellaneous
Supported profiles	LM, L2CAP, SDP, SPP
Frequency Country Code	North America and Europe

## A.1.4. GSM Module Details

Table A-4 lists the internal general specifications for the internal modem connection for an optional GSM module.

**Table A-4. GSM Module Specifications**

Operating Systems	Quad band: 850/900/1800/1900 MHz
Tx power	850/900 MHz – Class 4 (2 Watt) 1800/1900 MHz – Class 1 (1 Watt)
Typical RX sensitivity	-106dBm (4dB margin on top of spec)
GPRS	Multi-slot class 10 (4 down; 2 up; 5 Total) Max BR 85.6 Kbps Class B GSM 07.10 multiplexing protocol Coding scheme CS1-CS4 Embedded TCP/IP and UDP/IP protocol stack Embedded FTP Embedded SMTP/POP3 – e-mail SSL – Secure Connection
EDGE – Model Dependent	Multi-slot class 10 (4 Down; 2 Up; 5 Total) Max BR Downlink 236.8 Kbps (Over RS232) Coding Scheme MCS1-MCS9
CSD	Max BR 14.4 Kbps
SMS	MO/MT Text and PDU modes Cell broadcast
One serial port	Data and Command port
UART	BR from 300 bps to 460 Kbps, Auto BR
SIM Card	SIM card support, 3.0 V, STK 3.1

## Specifications

Receiver Specifications  
GSM Module Details

Connectors	RF MMCX
Regulatory and Approvals	FCC, IC, CCC FTA, PTCRB R&TTE GCF EMC QS9000 manufacturing RoHS/WEEE

# SAFETY WARNINGS

- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Clean only with a damp cloth.
- Do not block any of the ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Use only with a pole, cart, stand, or tripod, specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, or has been dropped.
- Apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, shall be placed on the apparatus.

## General Warnings

JAVAD GNSS receivers are designed for survey and survey related uses (that is, surveying coordinates, distances, angles and depths, and recording such measurements). This product should never be used:

- Without the user thoroughly understanding operator's manual.
- After disabling safety systems or altering the product.
- With unauthorized accessories.
- Without proper safeguards at the survey site.
- Contrary to applicable laws, rules, and regulations.

**DANGER: THE GISMORE RECEIVER SHOULD NEVER BE USED IN DANGEROUS ENVIRONMENTS. USE IN RAIN OR SNOW FOR A LIMITED PERIOD IS PERMITTED.**

**Warning:** *To comply with RF exposure requirements, maintain at least 20 cm between the user and the GSM module modem.*

## Battery Pack Warnings

**CAUTION:** *Risk of explosion if battery is replaced by an incorrect type. Dispose of used battery according to the instructions.*

**DANGER: NEVER ATTEMPT TO OPEN THE CASING OF THE DETACHABLE BATTERIES! LITHIUM-ION BATTERIES CAN BE DANGEROUS IF MISHANDLED!**

**DANGER: DO NOT INCINERATE OR HEAT BATTERY PACK ABOVE 212 DEGREES FAHRENHEIT (100 DEGREES CELSIUS). EXCESSIVE HEAT CAN CAUSE SERIOUS DAMAGE AND POSSIBLE EXPLOSION.**

**DANGER: THE BATTERIES (OR BATTERIES INSTALLED) SHALL NOT BE EXPOSED TO EXCESSIVE HEAT SUCH AS SUNSHINE, FIRE OR THE LIKE.**

**Warning:** *Do not attempt to open the battery pack.*

**Warning:** *Do not disassemble the battery pack.*

**Warning:** *Do not charge in conditions different than specified.*

**Warning:** *Do not use other than the specified battery charger.*

**Warning:** *Do not short circuit the battery pack.*

**Warning:** *Do not crush or modify the battery pack.*

## Power Supply

Connect the supplied adapter to the side of the unit in the slot marked “PWR”. Plug the two-prong end of the power cord to an AC100-240V outlet.

If you have difficulty inserting the plug, turn it over and reinsert it. If the unit will not be used for a long time, disconnect the plug from the outlet.

**Note:** Before plugging the power cord into an AC outlet, make sure that all the connections have been made.

**CAUTION:** *To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.*

**CAUTION:** *To avoid the introduction of hazards when operating and installing, before connecting of the equipment to the supply, make sure that the supply meets local and national safety ordinances and matches the equipment's voltage and current requirements.*

**CAUTION:** *Never attempt any maintenance or cleaning of the supply while plugged in. Always remove supply from AC power before attempting service or cleaning.*

**Warning:** *If the voltage supplied is below the minimum specification, the receiver will suspend operation. If the voltage supplied is above the maximum specification, the receiver may be permanently damaged, voiding your warranty.*

Make sure cords are located so that will not be stepped on, tripped over, or otherwise subjected to damage or stress. Do not operate equipment with a damaged cord or plug – replace immediately. To reduce the risk of damage to the equipment, pull by the plug body rather than the output cord when disconnecting the equipment.

Do not operate the supply if it has received a sharp blow, been dropped, or otherwise damaged. Do not disassemble the supply.

**Warning:** *Before connecting the external power source and the receiver, make sure that the power source matches the receiver's voltage and current requirements.*

## Usage Warnings

If this product has been dropped, altered, transported or shipped without proper packaging, or otherwise treated without care, erroneous measurements may occur.

**Note:** Do not connect or disconnect equipment with wet hands, you are at risk of electric shock if you do!

The owner should periodically test this product to ensure it provides accurate measurements. Inform JAVAD GNSS immediately if this product does not function properly.

Only allow authorized JAVAD GNSS warranty service centers to service or repair this product.

# WARRANTY TERMS

JAVAD GNSS electronic equipment are guaranteed against defective material and workmanship under normal use and application consistent with this Manual. The equipment is guaranteed for the period indicated, on the warranty card accompanying the product, starting from the date that the product is sold to the original purchaser by JAVAD GNSS' Authorized Dealers<sup>1</sup>.

During the warranty period, JAVAD GNSS will, at its option, repair or replace this product at no additional charge. Repair parts and replacement products will be furnished on an exchange basis and will be either reconditioned or new. This limited warranty does not include service to repair damage to the product resulting from an accident, disaster, misuses, abuse or modification of the product.

Warranty service may be obtained from an authorized JAVAD GNSS warranty service dealer. If this product is delivered by mail, purchaser agrees to insure the product or assume the risk of loss or damage in transit, to prepay shipping charges to the warranty service location and to use the original shipping container or equivalent. A letter should accompany the package furnishing a description of the problem and/or defect.

The purchaser's sole remedy shall be replacement as provided above. In no event shall JAVAD GNSS be liable for any damages or other claim including any claim for lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, the product.

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1. The warranty against defects in JAVAD GNSS battery, charger, or cable is 90 days.



1731 Technology Drive, San Jose, CA 95110 USA

Phone: +1(408)573-8100

Fax: +1(408)573-9100

[www.javad.com](http://www.javad.com)

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