ALPHA

GNSS Receiver

Operator's Manual

Version 2.0

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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 ALPHA receiver and its use is subject to these terms and conditions (the "Terms and Conditions").

Note: Please read these Terms and Conditions carefully.

Terms and Conditions

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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MISCELLANEOUS – The above Terms and Conditions may be amended, modified, superseded, or canceled, at any time by JAVAD GNSS. The above Terms and Conditions will be governed by, and construed in accordance with, the laws of the State of California, without reference to conflict of laws.

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 Réglement 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
File ▸ *Exit*	Click the *File* menu and click *Exit*
TriPad	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

INTRODUCTION

Based on the TRIUMPH Chip, ALPHA is a fully integrated package ready for your demanding jobs, offering precise and automatic performance beyond anything that you have experienced so far. An elegant, rugged, light, and hermetically sealed box accommodates all GNSS and modem electronics, and up to 10 hours of rechargeable batteries (Figure 1).

Figure 1. The ALPHA Receiver

ALPHA can receive and processes multiple signal types (including the latest GPS L5, GLONASS C/A L2, and Galileo signals) improving the accuracy and reliability of your measuring points and positions, especially under difficult jobsite conditions.

The GNSS component of ALPHA receivers means you 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,) and the GLONASS (Global Navigation satellite System) satellites of the Russian Federation, increasing the number of satellites your receiver can detect, thus improving the accuracy of your measuring points, increasing productivity, and reducing cost.

The ALPHA receiver provides the functionality, accuracy, availability, and integrity needed for fast and easy data collection.

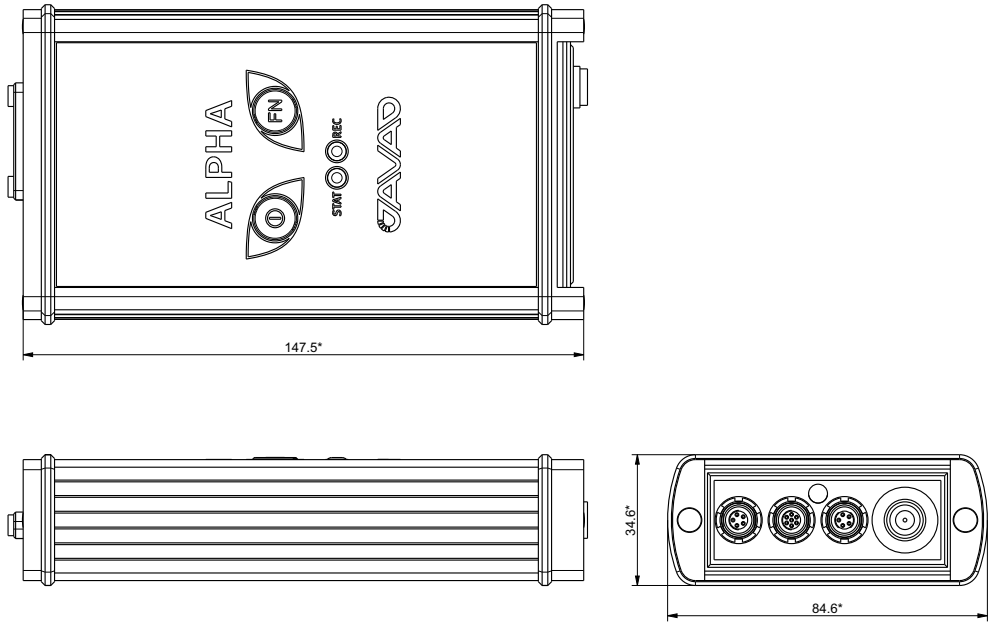

Figure 2. Dimensions

1. Principles of Operation

Measurements, including measuring 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. 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).
- 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.

1.2. 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.

1.3. 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, measured 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.

1.4. Essential Components for Quality measuring

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.

2. Getting Acquainted

The ALPHA receiver is a 216-channel GNSS receiver with internal battery, an interface for controlling and viewing data logging (TriPad), an optional internal GSM modem, a Bluetooth® wireless technology module, and an GSM module.

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

2.1. Internal Components

ALPHA GNSS Receiver

Table below lists the options available for this card model.

Table 1. ALPHA GNSS Receiver

Receiver Type	Available Options
ALPHA-G3	GPS L1, GLONASS L1, Galileo E1, SBAS
ALPHA-G2T	GPS L1/L2/L5, Galileo E1/E5A, SBAS
ALPHA-G3T	GPS L1/L2/L5, Galileo E1/E5A, GLONASS L1/L2, SBAS

Bluetooth® Module

A combination of software and hardware technology that makes the ALPHA mobile, wireless, GNSS receiver that supports a point-to-point serial profile. As such, the ALPHA 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, PCMCA-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 ALPHA 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 ALPHA receiver is equipped with one no removable, on-board, rechargeable Lithium-Ion battery connected to the receiver's board. This Lithium-Ion battery is 7.2 V, 1.37 Ah.

2.2. External Components

The ALPHA receiver has three main panels used for data collection and user interface, and to provide connections for external devices. The ALPHA casing includes a user interface, a power port, and ports for configuration.

Top panel

Figure 3 shows the ALPHA's top panel with TriPad:

Figure 3. ALPHA Top Panel

TriPad is the simple user interface for the ALPHA receiver. The TriPad consists of two keys and two, three-color LEDs.

The *STAT (Status) LED* displays the number of tracked satellites.

- When the receiver is on and no satellites are tracked, the STAT LED will blink red.

- When satellites are tracked, the STAT LED will produce one blink for each tracked satellite (green for GPS, orange for GLONASS).

The *On/Off* (*power) button* turns the receiver on and off.

Pressing the *FN key* for less than one second switches the receiver between different information modes (normal and extended information), or between static and dynamic post-processing modes, depending on the receiver's configuration.

- During the first second of pressing the FN key, the REC LED is orange.
- Pressing the *FN key* for more than one and less than five seconds will start/stop data recording.
- During data recording the REC LED is green or orange.
- If the *REC LED* is red, the receiver has run out of memory, has a hardware problem, or contains an improper OAF (see "Option Authorization File (OAF)" on page 20 for more information on OAFs).
- The *REC LED* blinks green or orange each time data is written to the internal receiver's memory.
- Each time you turn off or on data recording, either a new file opens or data appends to a particular file. See "Always Append to the File parameter" on page 36 and "Files Creation Mode parameter" on page 36 for information on setting this function.
- Pressing the FN key for more than five and less than eight seconds will turn the baud rate of serial port A to 9600. After about five seconds of pressing the FN key, the REC LED becomes red. Release the FN key while the REC LED is red (during the next three seconds).
- Pressing the FN key for more than eight seconds has no impact.
- After loading new firmware or clearing the receiver's NVRAM, the receiver checks its internal file system. During this operation, the REC LED flashes orange, and the file system is not accessible for CDU (control display unit) applications or for data recording. This operation may require from fractions of a second to several minutes, depending on the circumstances and the amount of internal memory.

Front Panel

The ALPHA receiver has the following ports (Figure 4):

- *Power* –used to connect the receiver to an external power source. This port can also be used to charge the batteries.
- *Serial* – used for communication between the receiver and an external device.
- *USB* – used for high-speed data transfer and communication between the receiver and an external device.
- The external antenna connects to the TNC *external antenna connector.*

- BAT LED - the battery status indicator. See “Powering the Receiver” on page 32 for detailed description of the BAT LED.

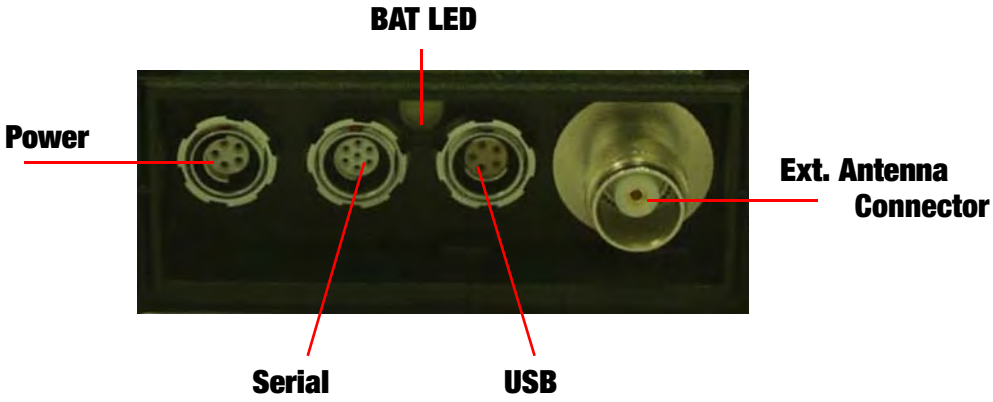

Figure 4. ALPHA Ports

Back panel

Figure 5. ALPHA Back Panel

- Bluetooth Antenna (optional) – Bluetooth antenna for Bluetooth wireless technology.
- GSM Antenna (optional) – This is a SMA female connector for GSM modems.

Bottom Panel

On the bottom receiver's panel (Figure 6) there is the receiver serial number.

Figure 6. ALPHA Bottom Panel

2.3. Cables

The ALPHA receiver package includes standard communication and power cables for configuring the receiver and providing a power source to the receiver.

Receiver-to-computer RS232 serial cable – connects the receiver's serial port and an external device (hand-held controller or computer) p/n p/n 14-578103-01	
Receiver-to-SAE power cable – connects the receiver's power port and the power supply's SAE connector or the extension cable's SAE connector p/n p/n 14-578101-01	
SAE-to-SAE cable extension – connects SAE connectors over longer distances p/n p/n 14-578102-01	
Power supply with SAE connector and power/charger cable p/n p/n 22-570101-01	

2.4. Literature

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

- *ALPHA Operator's Manual*
- Functional specifications

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° +35°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.
4. Always make sure the instrument is completely dry before storing. Dry the receiver with a soft, clean cloth.

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 ALPHA receiver according to particular needs, thus only purchasing those options needed.

Typically, all ALPHA 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.

- Memory (standard 0 MB)
- Update rate standard 1, 5, 10, 20 Hz, or 100 Hz)
- RTK at 1 Hz, 5 Hz, 10 Hz, 20 Hz, or 100 Hz
- RTCM/CMR Input/Output
- Event marker
- Common Tracking
- Advanced multipath reduction
- Wide Area Augmentation System (WAAS) and European Geostationary Navigation Overlay Service (EGNOS)
- Receiver Autonomous Integrity Monitoring (RAIM)
- 1 PPS (Pulse-Per-Second; a timing signal)

OPERATION

1. Installing JAVAD GNSS Software

1.1. Installing NetView

Use the NetView software program for configuring and maintaining the receiver. This software is available on the JAVAD GNSS website. NetView™ is a comprehensive Windows® software product designed for controlling GNSS receivers developed by JAVAD GNSS.

Refer to the NetView Software Manual for full details on installing and using NetView 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 NetView program and double-click the Setup.exe icon.
3. Follow the on-screen installation instructions. Click Install to continue. Keep the default installation location or select a new location.
4. If desired, create a shortcut on the computer's desktop for quick access to NetView

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. 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 installation instructions.

2. Installing 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.

Note: Both the Base and Rover receivers must have a SIM card installed (supporting Circuit Switched Data) and have subscriptions to the same service provider for proper communication.

To install the SIM card:

1. Ensure the receiver is turned off.
2. Open the front of the case screwing off 2 self taping screws (Figure 1)

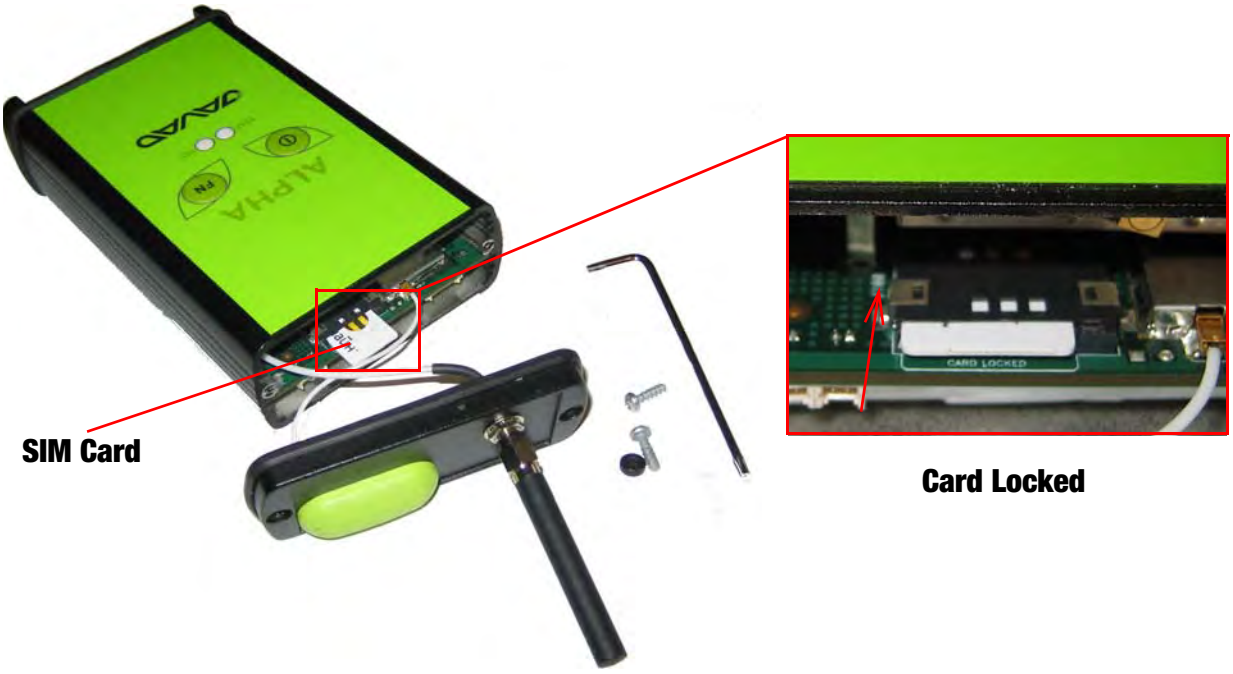

Figure 1. SIM Card Installation

3. Carefully insert the SIM into the SIM card holder, label side up, and push it forward to lock it well.
4. Close the case.

3. Powering the receiver

3.1. Charging the Batteries

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 batteries for maximum operating time. An approximately 6-hour charge cycle will fully charge the batteries; the batteries will charge simultaneously.

The batteries can not be overcharged.

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

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

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.*

3.2. Power supply requirements

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

A single external power supply with 5 pin ODU connector or SAE connector is necessary to operate the ALPHA receiver. If external power supply has only SAE connector, Receiver-to-SAE power cable shall be used. 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 +7...40 V 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.*

To check the status of the internal batteries, view the BAT LED on the receiver's front panel.

- Check the BAT LEDs for battery status. If the receiver is on and uses the battery power the BAT LED blinks every 4 seconds:
  – A green light indicates greater than 90% charge.
  – An orange light indicates an intermediate charge.
  – A red light indicates less than 15% charge.
  – No light receiver is off.

By battery charging if the receiver is on and DC power supply is connected the BAT LED flashes every second. The LED light indicates the same as described above.

If the battery is full charged and the receiver is connected to DC power supply the BAT LED is solid green.

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

- Plug the Receiver-to-SAE cable's 5-pin connector into the power port of the receiver (labeled PWR).
- Connect the opposite end of this cable with the battery charger's SAE connector.
- Plug the appropriate end of the power supply-to-outlet cable into the battery charger.
- 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.

3.3. Turning On/Off the Receiver

To turn ON the receiver, press and hold the power button until the LEDs briefly flash. To turn OFF the receiver, press and hold the power key for more than one and less than four seconds (until both the STAT and the REC LEDs are off).

This delay (about 1 second) will prevent the receiver from being turned off by mistake.

4. Connecting the Receiver and a Computer

JAVAD GNSS NetView 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 using one of the following methods and start NetView:

- a Bluetooth®-enabled external device (computer/controller)
- an RS232 cable and a computer/controller
- a USB cable and a computer/controller with the JAVAD GNSS USB driver installed

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 NetView.

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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 NetView.

4.1. Establishing an RS232 Cable Connection

1. Using the RS232 cable, connect the serial port of your computer (usually COM1) to the receiver's serial port A.
2. Press the power buttons on the receiver and computer to turn them on.

3. Start NetView, select SER as type of connection mode, and specify the port the receiver is connected to.

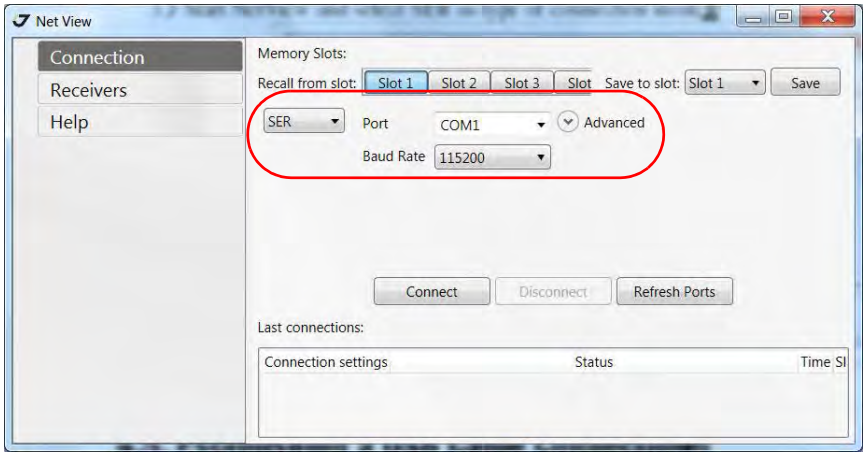

Figure 2. NetView - Connection via serial port

4.2. Establishing a USB Cable Connection

Make sure the computer has JAVAD GNSS's USB driver installed (available from www.javad.com) before continuing.

1. Using the USB cable, connect the USB port on the receiver to a USB port on the computer.
2. Press the power buttons on the receiver and computer to turn them on.
3. Start NetView and select USB as type of connection mode and select USB port ID from the list.

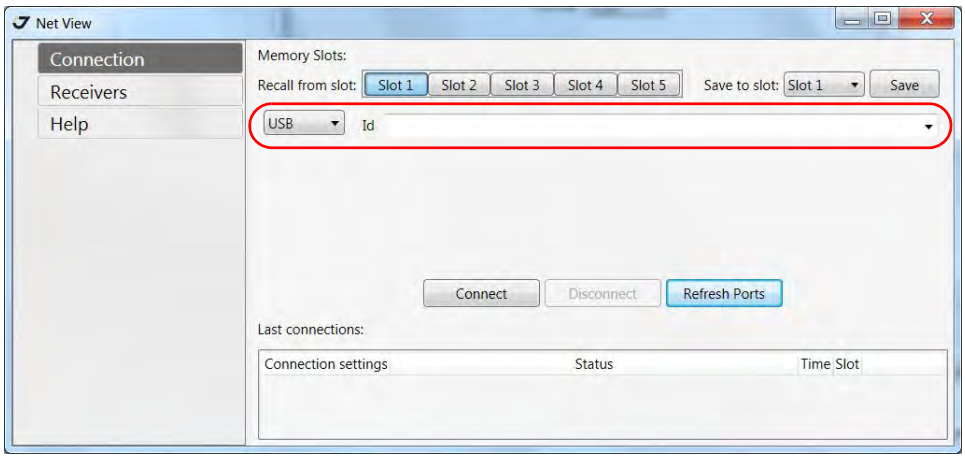

Figure 3. NetView - Connection via USB port

5. Alpha configuration

Both Base and Rover receivers must be configured according to the desired measuring 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 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 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).

5.1. Configuring the Internal GSM 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 module via a serial port.
- Displaying information about the module installed in the receiver.
- Programming the GSM module's settings.

See the *ModemVU Software Manual* available on the JAVAD GNSS website for details on configuring the receiver with an internal GSM radio modem.

For JAVAD GNSS receiver, the integrated GSM radio modem provides TX/RX communications between a Base and Rover. To configure a GSM module, have the following ready:

- Computer running Windows®;
- ModemVU Software installed on the computer;
- A serial cable;

1. Connect the computer and receiver. Turn on the receiver.
2. Start ModemVU.

3. Select the radio type ALPHA (Figure 4), and click *OK*:

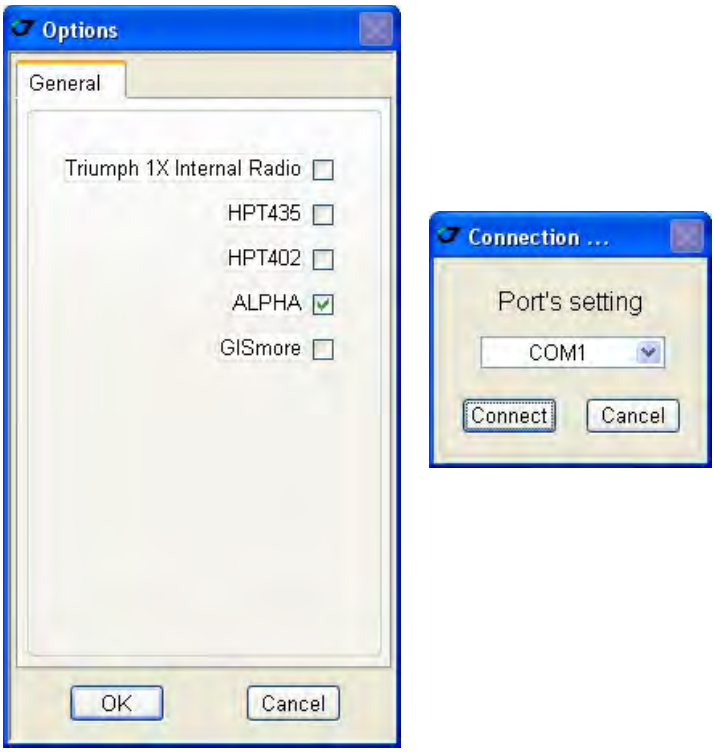

Figure 4. Options window

4. Select the COM port the receiver is connected to. Click *Connect.*

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 1) and click *Apply* (Figure 5 on page 29). In this tab modem and service status and possible errors are displayed.

Table 1. Receiver Parameters for the General Tab

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

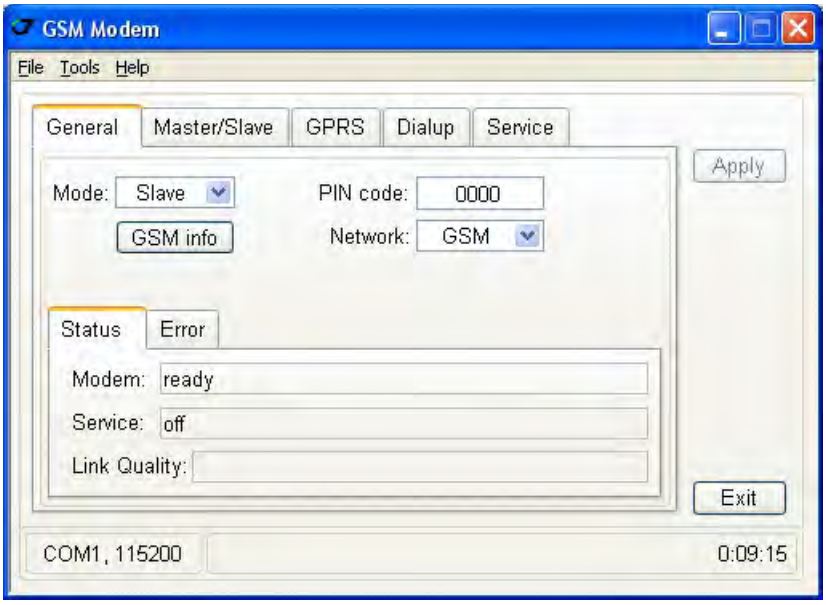

Figure 5. General tab

2. On the *Master/Slave* tab, set the following parameters (Table 2) and click *Apply* (Figure 5 on page 29).

Table 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. • This parameter is used to maintain reliable communication between a pair of modems and avoid unnecessary modem reinitialization. • To ensure reliable and secure modem communication, this parameter must be larger then the period for transmitting differential corrections.	

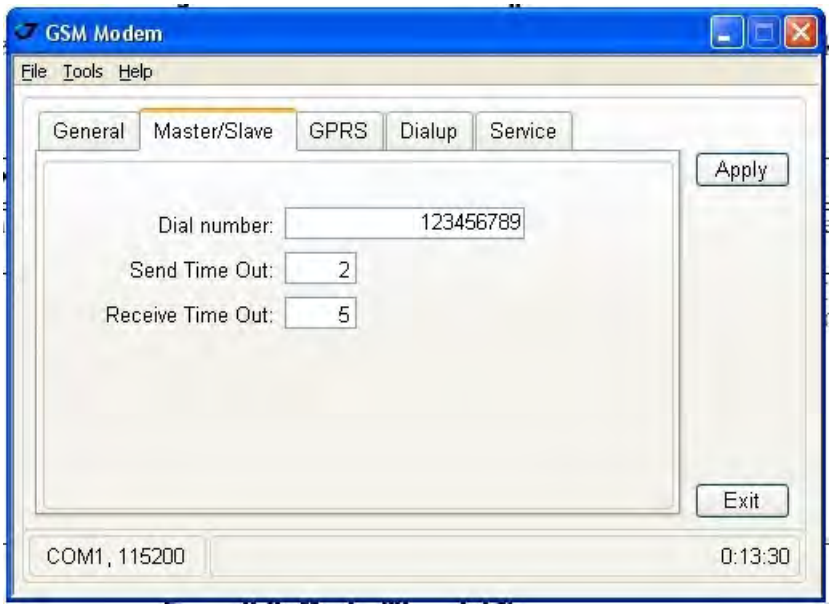

Figure 6. Master/Slave tab

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

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) and click *Apply* (Figure 7 on page 31). In this tab modem and service status and possible errors are displayed.

Table 3. Receiver Parameters for the General Tab

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

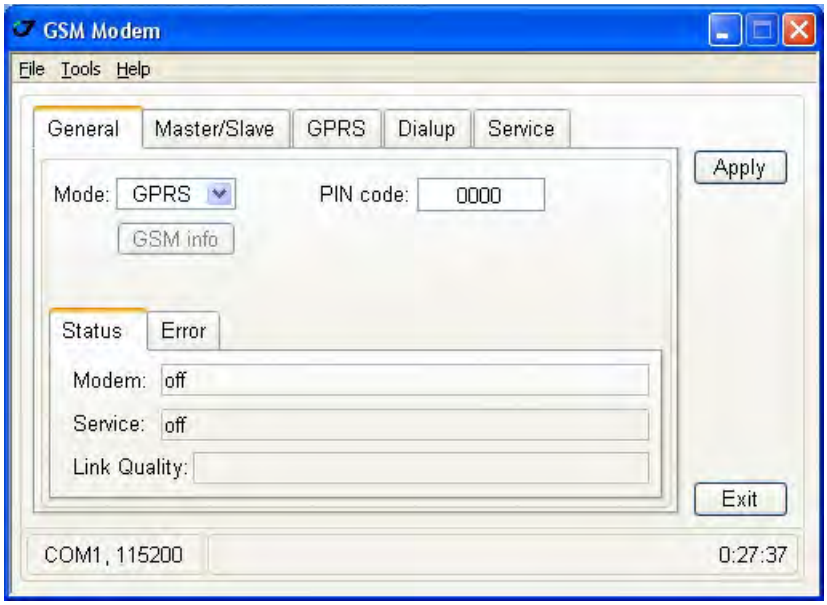

Figure 7. General tab

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 8 on page 32).

   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.

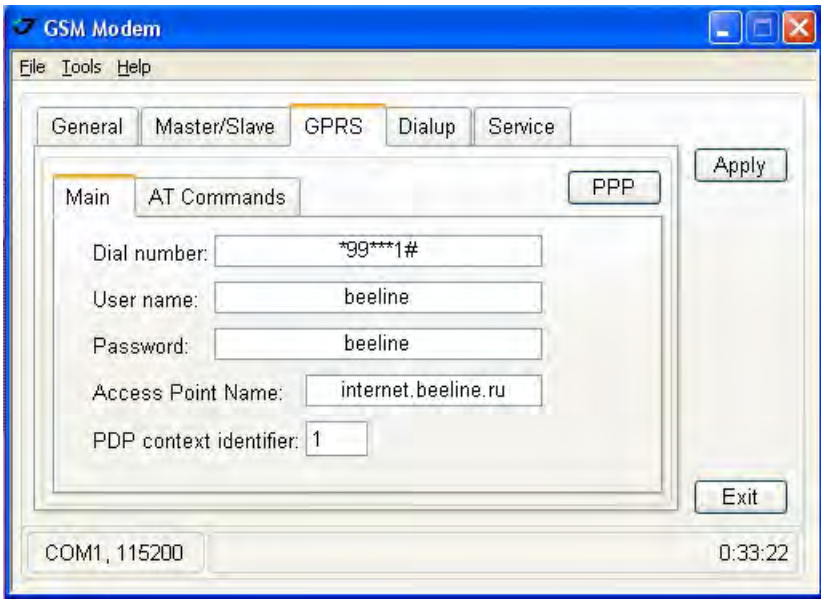

Figure 8. GPRS tab

3. In the *Service* tab *Main* subtab specify the following parameters (Table 4) and click *Apply* (Figure 9 on page 33).

Table 4. Receiver Parameters for the Service Tab Main Subtab

Parameter	Value
Mode	•OFF means service is disabled. •RCV means that modem will receive data from another (remote) JAVAD GNSS receiver configured as a base station. This base station have to be connected with Internet via Ethernet or GPRS and have static IP address. •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. •SERVER - this mode allows working with JAVAD server.
TCPCL port	Specify the type of incoming data to accept on the TCPCL receiver port: •None means that the port will ignore any incoming data. •Command - port is in command mode. Being in this mode, the receiver's port recognizes commands sent by the user. •Echo - echo mode. •RTCM 2.x - RTCM 2.x input mode. •RTCM 3.x - RTCM 3.x input mode. •CMR/CMR+ input mode. For more information on CMR format, please refer to ftp://ftp.trimble.com/pub/survey/cmr. •JPS - JPS input mode. In this mode receiver is capable to recognize both standard and non-standard JPS messages.

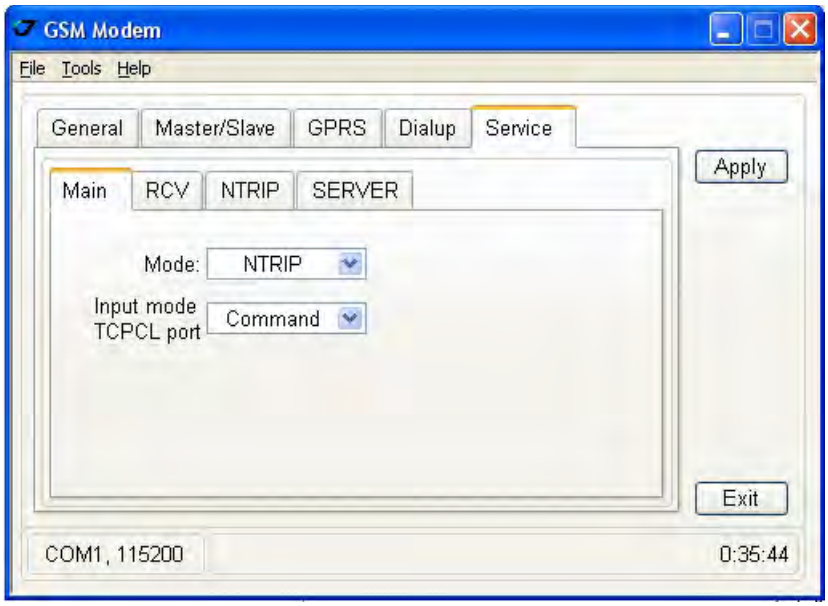

Figure 9. Service tab

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 NetView and set up the receiver to run as an RTK Base station.

Settings for the RCV subtab

The *RCV* subtab is depicted in Figure 10.

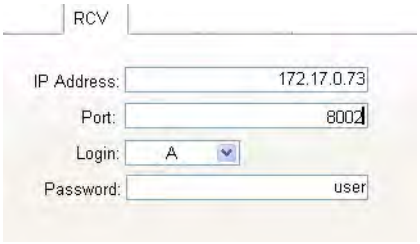

Figure 10. RCV subtab

- *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 *NetView 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 11:

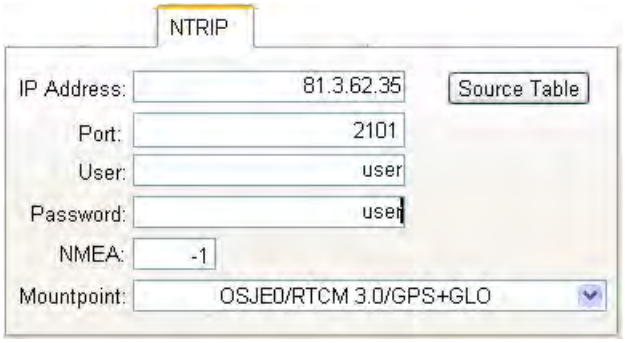

Figure 11. NTRIP subtab

- *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 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.

5.2. Configuring the receiver

ALPHA receiver can be configured according the desired survey type, for RTK or for 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.

Note: Refer to the *NetView Software Manual* for full software description.

1. Connect the receiver and computer as described in "Connecting the Receiver and a Computer" on page 25. Start NetView. Select the connection type and connect the receiver and PC.
2. Click *Receiver* ▸ *Parameters* on the left panel.

Note: Click *Apply* every time after the parameter was changed, otherwise the receiver won't save the changes. Click *Refresh*, to ensure the changed parameters and new configuration are saved.

3. In the *General* tab set the parameter *Antenna Input* to *External* (Figure 12).

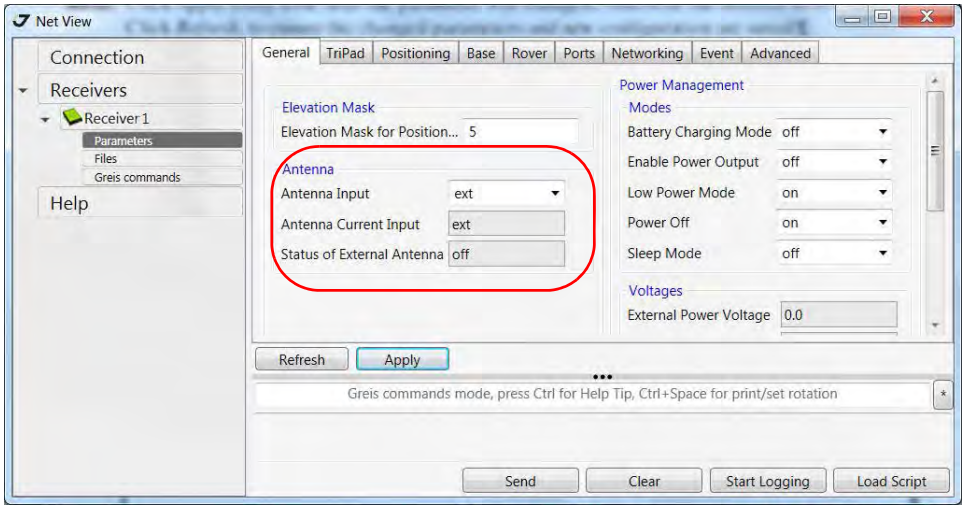

Figure 12. General tab

4. Open the *TriPad* tab and set the following parameters (Table 5), click *Apply* (Figure 13 on page 36).

Table 5. TriPad Settings

Parameter	Base	Rover
Implicit Message Output Period	15 seconds	
Elevation mask angle	15 degrees	
File name prefix	Enter a unique ID, such as the last 3 digits of receiver's serial number. By deafault the prefix is `log`	
FN key mode	(starts/stops the data recording when FN button is used)	
	Select *LED blink mode switch* for Static data	Select *Occupation mode switch* (for RTK)

Parameter	Base	Rover
Initial dynamic mode	-	Select *Dynamic* (for trajectory survey)

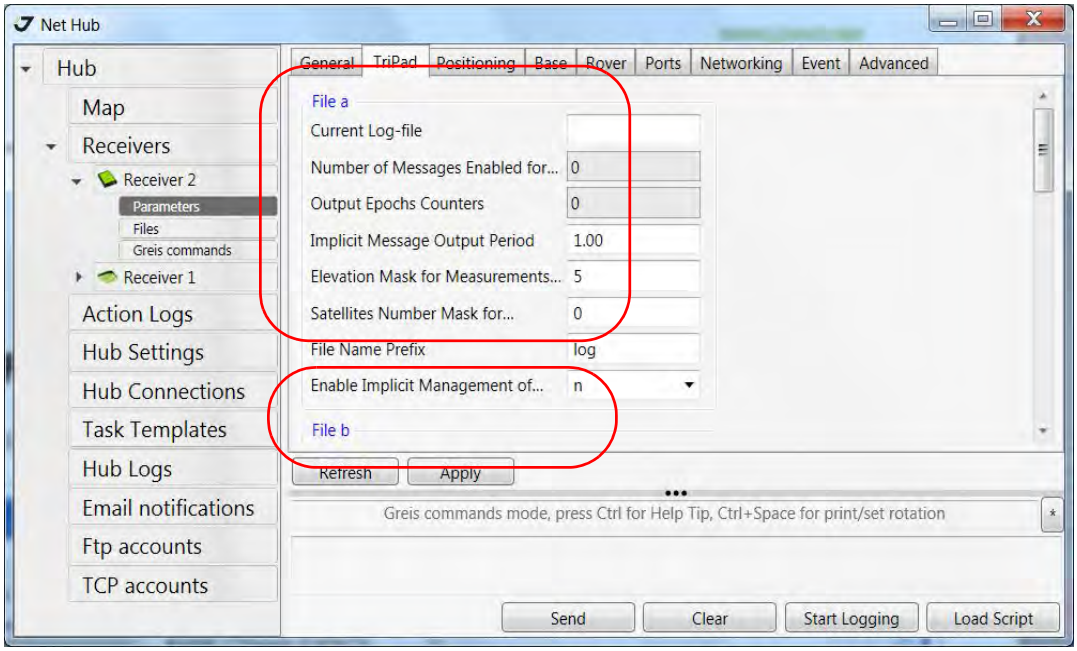

Figure 13. TriPad tab settings

5. Open *Positioning* tab and set the Elevation mask to 15 degrees (Figure 14).

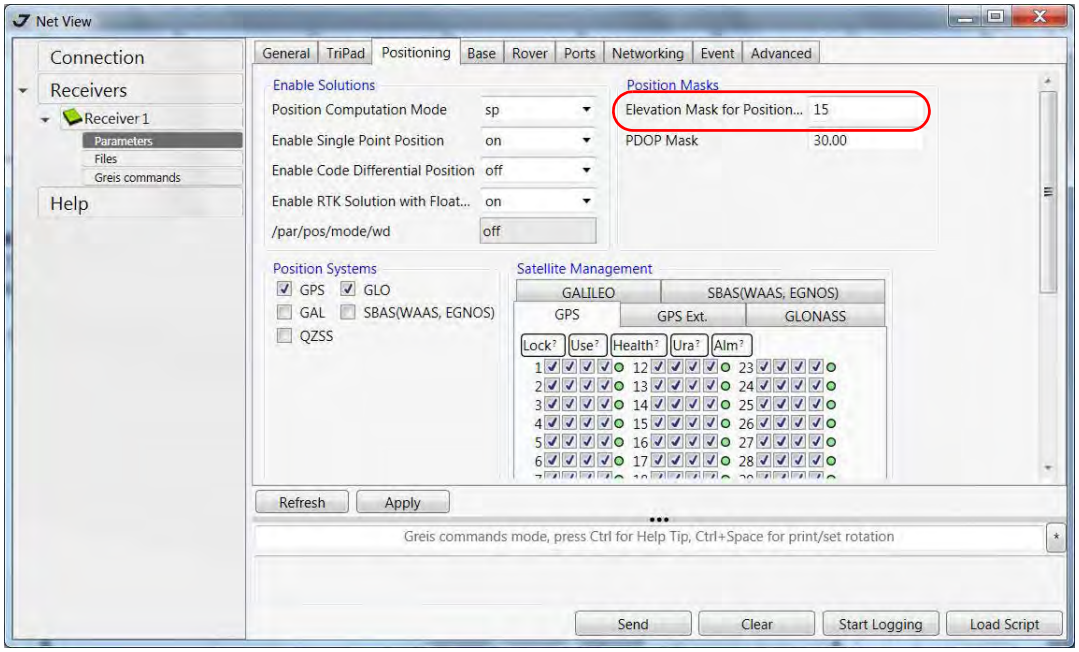

Figure 14. Positioning tab - Elevation Mask

6. To set up the base station, open the *Base tab and set the following parameters* (see Figure 15 on page 37):
   - *Antenna Phase Center Position (APC)* - enter latitude, longitude, and altitude (ellipsoidal height) values of the antenna position. Do one of the following:
   - If known, type in the values.
   - Click *Get from receiver* to use the current antenna position.
7. Restart your receiver. Open the *Base tab and check coordinates.* Click *Refresh*, to refresh the parameters.

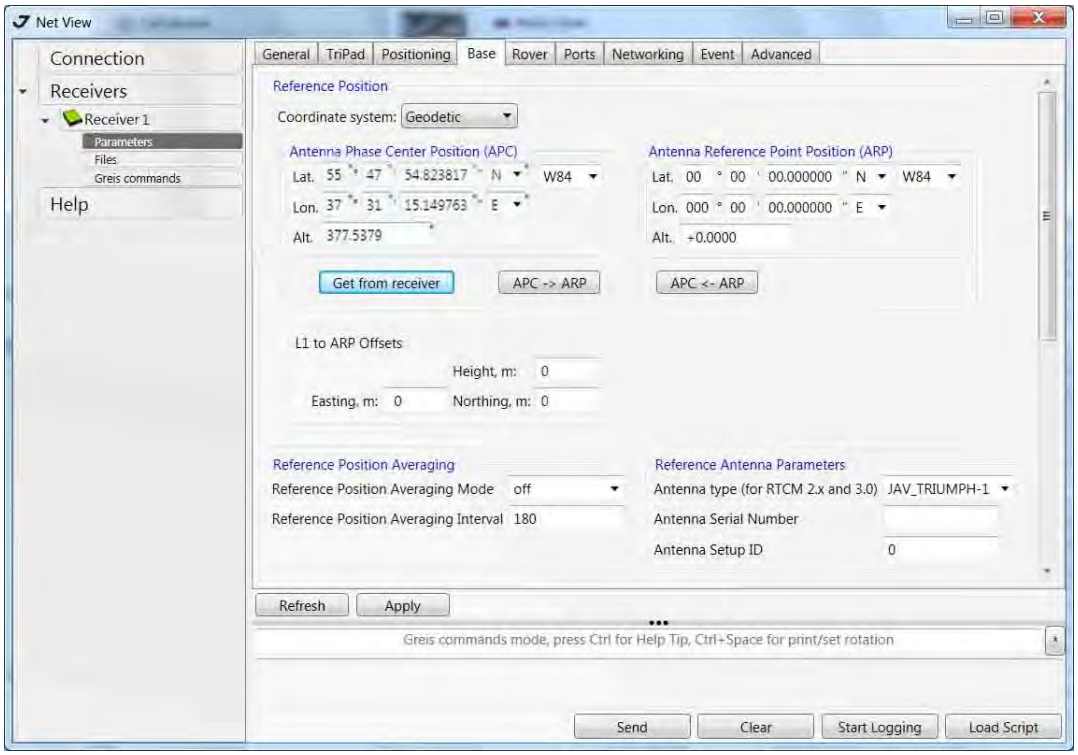

Figure 15. Base tab

- To set up the rover, open *Positioning* tab and set the *Position Computation Mode* - this drop-down list box allows selecting the mode of position computation:
  - pd -carrier phase differential (RTK) with fixed ambiguities
  - pf - carrier phase differential (RTK) with float ambiguities
  - cd- code differential (DGPS) mode
  - wd - wide area code differential mode (WDGPS)
  - sp - single point positioning mode1
- *Open the Rover tab and set up the following parameters:*
  - *RTK Position Computation Mode* – select *Extrapolation* for RTK float (kinematic), or *Delay* for RTK fixed (static).
    If *Extrapolation* is selected, the rover will extrapolate the base station's carrier phase measurements when computing the rover's current RTK position. If *Delay* is selected, the rover will not extrapolate the base station's carrier phase measurements to compute the current rover position. Instead, the RTK engine will compute either a delayed RTK position (for the epoch to

which the newly received RTCM/CMR message corresponds) or the current stand-alone position (while waiting for new RTCM/CMR messages coming from the base).

- *Confidence Level for Ambiguity* – list box governs the process of the RTK engine fixing integer ambiguities. The RTK engine uses the ambiguity fix indicator when making a decision whether to fix ambiguities or not. Low, Medium and High correspond to the indicator's 95%, 99.5% and 99.9% states, respectively. The higher the specified confidence level, the longer the integer ambiguity search time. This is the price one pays for the higher reliability of the ambiguity fixed solution..

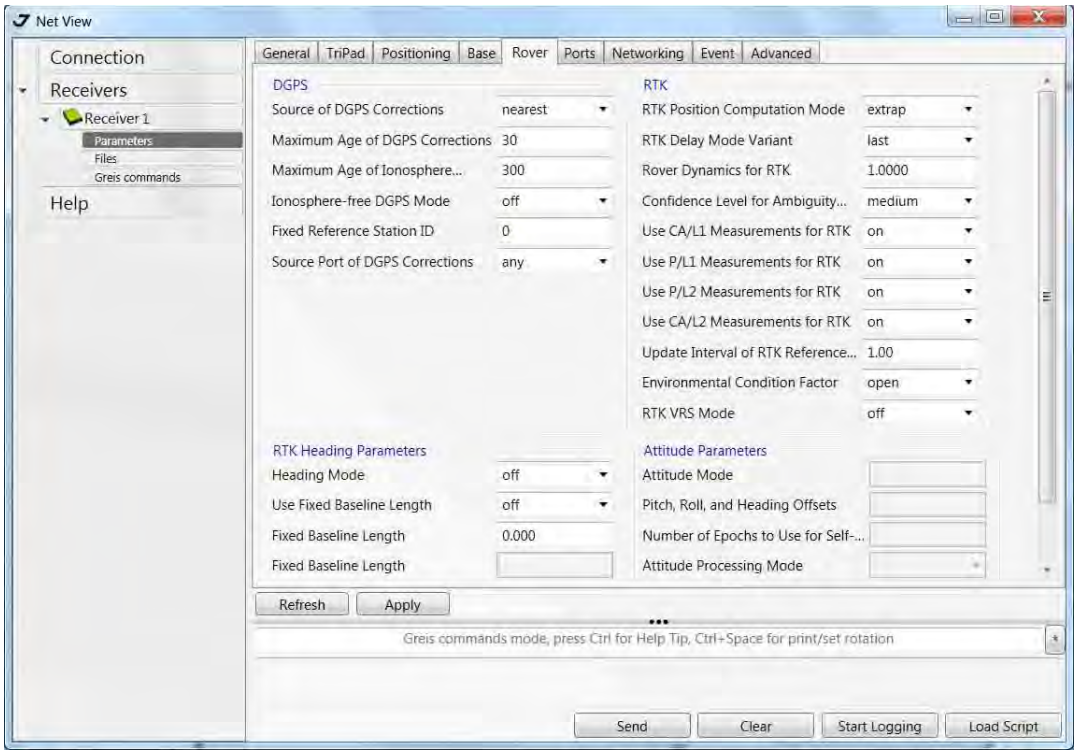

Figure 16. Rover tab

8. For RTK survey, open the *Ports* tab and set up the parameters according Table 6, then click *Apply* (Figure 17 on page 39).

Note: For the survey with the post-processing keep default parameters.

Table 6. Settings for Ports tab

Parameter	Base	Rover
Input	-	The same correction type as Base has
Output	Select the correction type.	None
Period (sec)	Set the period of correction output	-
Baud rate	baud rate for the corresponding receiver port	
RTS/CTS	Enable	

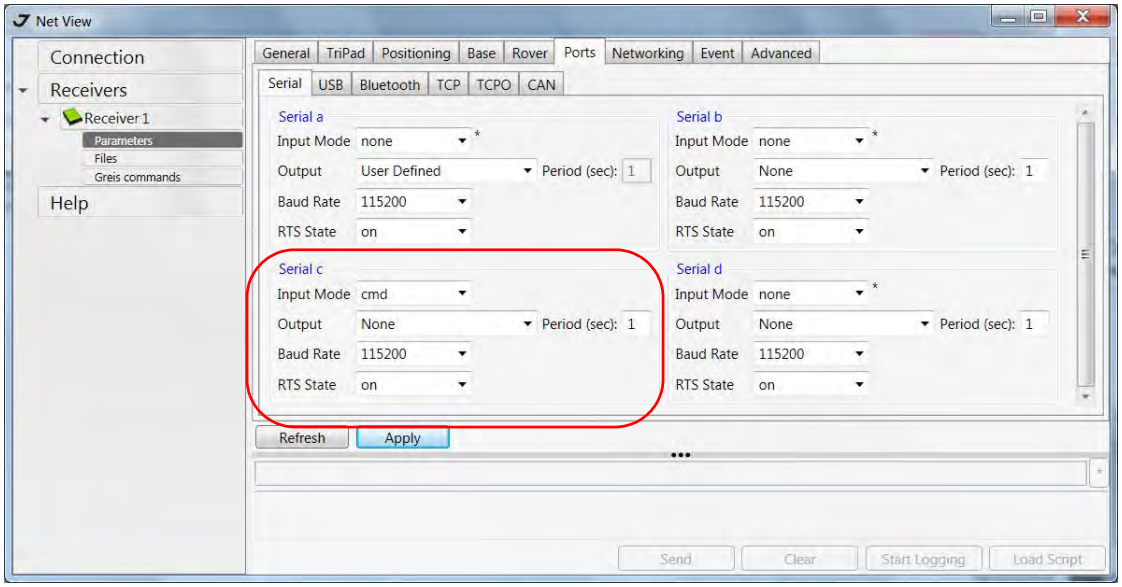

Figure 17. Ports tab

9. Open *Advanced tab*, and then *Multipath Reduction* subtab. Activate *Code multipath reduction* (`mpnew`) on base and rover for DGPS mode.
   For RTK mode activate *Carrier multipath reduction* (`mpnew`) as well (Figure 18).

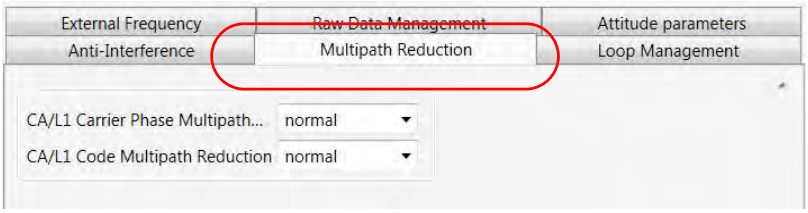

Figure 18. Multipath Reduction

Click *Apply*, to save the made changes and settings into receiver's memory and close the dialog window. The receiver configuration will be kept in the receiver till you will change them or will clear NVRAM. For detailed description of settings and parameters see *NetView Software Manual*.

File a, File b

In the fields *File a, File b* can be specified current log-file name, message output period, etc.

- *Current log-file* edit box allows the user to specify the prefix of the log file, which will be saved into receiver memory during survey.
- In the *Output Epochs Counter* box the number of outputted epochs is shown.
- In the *Implicit Message Output Period* edit box the output period for the implicit messages can be specified. This parameter specifies the interval of outputting messages into the log-file when data logging is activated with the TriPad or through the AFRM.

- *Elevation Mask for Measurements Output* (the minimum elevation angle for the satellites whose data will be put in the receiver files logged when pressing FN).
- *Satellites Number Mask for Position computation* - Satellites with elevations lower than this mask will be excluded from position computation.
- *File Name Prefix* - this setting specifies what prefix will be added to the names of the receiver files created via MinPad, (i.e., by pressing FN). The prefix can be up to 20 characters long. Default is log.
- Enable *Implicit Management of Specific* - enables/disables the management of *Implicit Message Output Period.*

Function Key

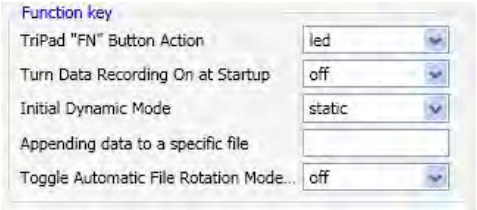

Figure 19. Function Key

- *TriPad "FN" Button Action* - This drop-down list box is used to program how the receiver will react to clicking FN (i.e., keeping the button depressed for less than one (1) second). In *led* blink mode switch mode, clicking FN will toggle between the TriPad's standard and extended information modes. In *occupation* mode switch you click FN to get the receiver to insert into the corresponding log file a message indicating that the occupation type has been changed from static to kinematic, or vice versa.
- *Turn Data Recording on at Startup - enables/disables data recording on at startup,*
- *Initial Dynamic Mode* - specifies the starting occupation type descriptor that will be inserted at the beginning of each receiver files logged via the TriPad. You select *static* and *kinematic* to specify that the corresponding log file will start with a static and kinematic occupation, respectively.
- *Appending data to a specific file* - If the new receiver data are to be appended to an existing log file, enter the desired filename in the Always append to the file edit box. The setting can be up to twenty characters long.
- *Toggle Automatic Rotation Mode* - enables/disables Automatic File Rotation Mode.

Automatic File Rotation Mode (AFRM)

Period – specifies the time duration of each of the multiple log files created in AFRM mode.

- *Phase* – specifies the *phase* (i.e., constant time shift) of the multiple log files created in AFRM mode.

Enable Oldest Log-file removal – if active, the receiver will remove the least recent files if no free space is available in the receiver memory to record the current file.

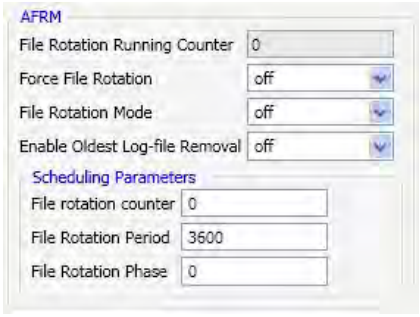

Figure 20. AFRM

6. Setup and Measuring

6.1. External Antenna Setup

The ALPHA receiver can be used with an external antenna. Follow the steps below to connect an external antenna to ALPHA and measure its offset.

1. Attach the antenna to a tripod or bipod and center it over the point at which data will be collected.
2. Measure the antenna height as described below.
3. Record the antenna height, point name, and start time in the field notes.
4. Attach the flexible RF cable from the external antenna to the antenna connector on the bottom panel of the receiver.

Measure Antenna Height

The location of the antenna relative to the point being measured is very important for both measurings in which the elevation of the points is important and in measurings for horizontal location only. Horizontal measurings are often larger in area than can reliably fit on a flat plane, therefore the antenna adjustment must be done in three dimensions and then projected onto a two dimensional plane. The receiver calculates the coordinates of the antenna's phase center. To determine the coordinates of the station marker, the user must specify the following:

- Measured height of the antenna above the station marker
- Method of measuring the antenna height
- Model of the antenna used

Antennas have two types of measurements:

- Vertical – measured from the marker to the antenna reference point (ARP) located on the bottom of the receiver at the base of the mounting threads.

- Slant – measured from the marker to the lower edge of the antenna slant height measure mark (SHMM) located on both end panels of the receiver.

The point to which measuring with GNSS measures is called the Phase Center of the antenna. This is analogous to the point at which a distance meter measures in a prism. A user must enter the prism offset to compensate for this point not being at a physical surface of the prism. For a GNSS antenna, the offset is entered depending on the type of measurement taken.

- For vertical, the offset is simply added to the measured vertical height to produce a "true" vertical height.
- For slant height, the vertical height must first be calculated using the radius of the antenna, then the offset can be added.

The offsets are different because of the difference in location between the slant measuring point and the vertical measuring point.

1. Measure the antenna height above the control point or marker, either the slant height or the vertical height.
2. Record the antenna height, point name, and start time in the field notes.

6.2. TriPad Operation

The TriPad is the receiver's minimum interface used to display and control data input and output.

To turn on/off the receiver, press the On/Off button (Figure).

- When turning on, press the On/Off button until the TriPad's LEDs briefly flash.
- When turning off, press the On/Off button until the LEDs go out, then release.

To start/stop logging data, press the FN button for 1–5 seconds (Figure).

- During data recording, the REC LED is green. Use NetView to set the recording time interval.
- The REC LED blinks green each time data is written to the memory.
- If the REC LED is red, the receiver has run out of memory, has a hardware problem, or contains an improper OAF.

Use NetView to enable the desired FN button mode in the receiver, either "LED blink mode switch" for static measurings or "Occupation mode switch" for kinematic measurings.

Each time you turn off or on data recording, either a new file opens or data appends to a particular file.

To toggle between post-processing modes, press the FN button for less than 1 second when "Occupation mode switch" has been enabled using NetView.

To change the information mode of the receiver, press the FN button for less than 1 second when "LED blink mode switch" has been enabled using NetView.

To change the baud rate of the receiver's serial port, press the FN button for 5–8 seconds. This is useful if the data collector does not support the rate that the receiver port is set to. After about five seconds, the REC LED becomes red. Release the FN button during the next three seconds.

6.3. Static Measuring for Base Stations

Static measuring is the classic measuring method, well suited for all kinds of baselines (short, medium, long). At least two receiver antennas, plumbed over measuring 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 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

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

6.4. Kinematic (Stop & Go) Measuring for Rover Stations

In a kinematic, stop and go measuring, the stationary receiver (Base station) is set up at a known point such as a measuring 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 measuring 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.

6.5. Real Time Kinematic Measuring

With RTK measuring, as with kinematic measuring 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 measurings, RTK measurings 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.

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, UHF radios and 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.
- 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).er transmits this information via radio 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 measuring 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).

7. Receiver and File Maintenance

If post-processing the data after completing a measuring, 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 measuring. 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.

7.1. 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 ALPHA 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. NetView provides a File Manager to download files to your computer and delete files from the receiver ALPHA.

1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 25 for this procedure. Start NetView. Establish connection between NetView and receiver.
2. Click *File* on the left panel. On the right panel appears the list of files, saved in receiver’s memory. Select the file(s) to download (Figure 21).

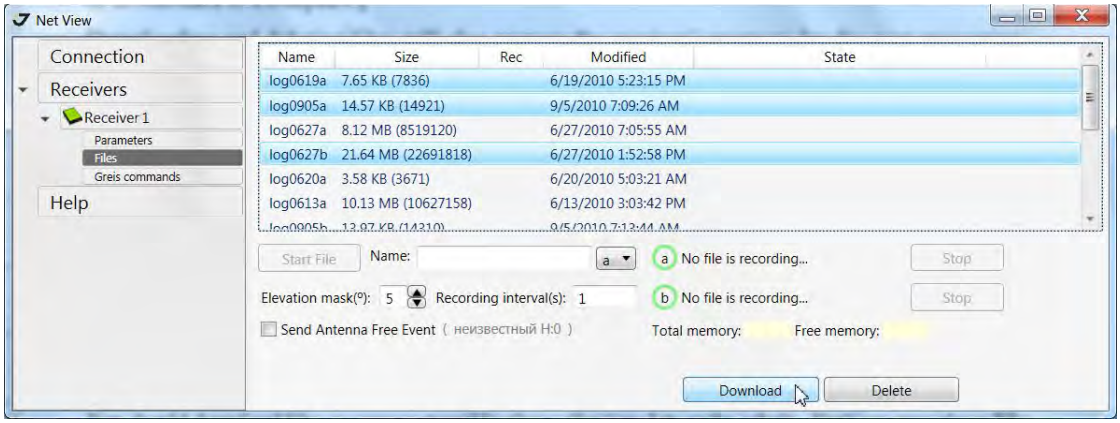

Figure 21. Download Files

Note: 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.

3. Click the *Download* button. During the download, status indicators display each file.

7.2. 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 25 for this procedure. Start NetView. Establish connection between NetView and receiver.
2. Click *File* on the left panel. On the right panel appears the list of files, saved in receiver’s memory. Select the file(s) to delete

Note: 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.

3. Click *Delete*. Click *Yes* at the delete files confirmation dialog box. NetView deletes the selected files.

7.3. Managing Receiver Options

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 via NetView.

1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 25 for this procedure. Start NetView. Establish connection between NetView and receiver.
2. Click on the receiver name on the left panel. On the right open *Options* tab.
   - *Option name* – a name/description of the option
   - *Current* – shows if the option is in force at the present or not
   - *Purchased* – if the option is purchased or not
   - *Leased* – if the option is leased or not
   - *Date* – the date the leased option will be disabled, if applicable

Loading OAFs

JAVAD GNSS dealers provide customers with OAF files. Please have your receiver ID number available.

1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 25 for this procedure. Start NetView. Establish connection between NetView and receiver.
2. Click on the receiver name on the left panel. On the right open *Options* tab.
3. To upload a new options file, click on *Upload* button, and select the options file. *Refresh* – updates the window.
4. Navigate to the location of the new Option Authorization File. OAFs have .jpo extension and are unique to each receiver.

7.4. 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 ALPHA 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 ALPHA’s memory. However, it will reset your receiver settings to factory default values.

In addition, the NVRAM keeps information about the receiver file system. Note that after clearing the NVRAM, the receiver’s SAT LED will flash yellow for a few seconds indicating that the receiver is scanning and checking the file system.

Using TriPad to Clear NVRAM

It is possible to clear NVRAM using only TriPad. To do that:

1. Turn the receiver OFF.
2. Press and hold FN button.
3. Press and release PWR button to turn the receiver ON.
4. Wait until both LEDs will light green.
5. Wait around five seconds, until both LEDs will blink orange.
6. Release FN button.

Note that LEDs will blink orange only during next five seconds, and to clear NVRAM it is essential to release FN button when they blink yellow.

Using NetView to Clear NVRAM

1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 25 for this procedure. Start NetView. Establish connection between NetView and receiver.
2. Click on the receiver name on the left panel. On the right click on *Actions* ▸ *Clear NVRAM*.
3. Confirm NVRAM clearing.

7.5. Checking Firmware Version

Use NetView to check the firmware version of your receiver.

1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 25 for this procedure. Start NetView. Establish connection between NetView and receiver.
2. Click on the receiver name on the left panel. On the right appears the information about receiver including receiver model, ID, firmware version.
3. To save this information to the .txt file, click *Reports* ▸ *Receiver info* on the right panel.

7.6. 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. To load new firmware use NetView.

1. Connect your receiver and computer. See “Connecting the Receiver and a Computer” on page 25 for this procedure. Start NetView. Establish connection between NetView and receiver.
2. Click on the receiver name on the left panel. On the right appears the information about receiver.
3. Click *Action* ▸ *Update firmware*.
   - Select the file with the mew firmware and click *Open*.ALPHA

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.*

1. Check This First!

Before contacting JAVAD GNSS support, check the following:

- Check all external receiver connections carefully to ensure correct and secure connections. Double check for worn or defective cables.
- Check all power sources.
- 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.

Then, try the following:

- Reset the receiver using NetView: *Receiver name (on the left panel)* ▸ *Actions* ▸ *Reset.*
- Restore default settings using NetView *Receiver name (on the left panel)* ▸ *Actions* ▸ *Initial parameters.*
- Clear the NVRAM (see “Clearing the NVRAM” on page 33).

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

2. Receiver Problems

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

Cable specific problems

- The cable is not properly plugged in.
    - Check that the cable connector is attached to the correct receiver port.
    - Unplug the cable, then securely and properly reconnect it to the receiver.
- The cable is damaged.
    - Use an undamaged cable. Contact your Dealer to replace the cable.

Generic problems

- The receiver port used for connection is not in Command mode.
    - Connect your receiver and a computer using a free port (see “Connecting the Receiver and a Computer” on page 19) and start NetView.
    - Change the *Input* for the port used for connection to “Command”.
- The receiver does not lock on to satellites for a long period of time.
    - See “Managing Receiver Options” on page 33 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 *NetView 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. See “TriPad Configuration” on page 26 for information on setting the elevation mask.
- The measuring is conducted near obstructions (tree canopy, tall buildings, etc.).
- Check that the Multipath Reduction boxes have been enabled.
    - Connect your receiver and a computer using a free port (see “Connecting the Receiver and a Computer” on page 19) and start NetView.
    - Click enable Multipath reduction 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 NetView 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 33 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 *NetView 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.
    - Check the elevation masks of the Rover and Base receivers; they should be the same. See “TriPad Configuration” on page 26 for information on setting the elevation mask.
- 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 NetView. See “Connecting the Receiver and a Computer” on page 19.
    - 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 measuring when PDOP values are low.
    - The elevation mask is above 15 degrees.
    - Lower the elevation mask.
- The transmitting and/or receiving antenna may be improperly connected.
    - Check that the radio modem’s antenna is securely and properly connected to the antenna connector.
    - Check that the radio modem’s antenna is undamaged. If damaged, contact your JAVAD GNSS dealer to replace the antenna.
- The specified baud rate is incompatible with the baud rates the receiver supports.
    - The baud rate is the rate at which the receiver transmits differential messages to the receiver and vice versa. Change the baud rate to that which your receiver supports.
- The Base and Rover receivers use different radio link parameters.
    - Configure the Base and Rover radio receivers 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 33.
- The receiver’s memory has no free space.
    - Download and/or delete data files to free up space for new files (see “Connecting the Receiver and a Computer” on page 19 and “Deleting Files” on page 32).

Use the AFRM feature. See“TriPad Configuration” on page 26.

3. Technical Support

If the troubleshooting hints and tips in this Operator's Manual fail to remedy the problem, contact JAVAD GNSS Customer Support.

To contact JAVAD GNSS Customer Support use the QUESTIONS button available on the www.javad.com.

Note: For quick and effective support, provide a detailed description of the problem.

When contacting with JAVAD GNSS customer support, provide the following information for better, faster service:

1. The modem model and configuration settings.

2. The system/hardware specifications for the computer running NetView; such as, operating system and version, memory and storage capacity, processor speed, etc.

3. The symptoms and/or error codes/messages that precede and follow the problem.

4. The activities being tried when the problem occurs. If possible, include the exact steps being taken up to when the error message or other problem occurs.

5. How regularly the problem occurs.

Generally, a customer support representative will reply within 24 hours, depending on the severity of the problem.

3.1. Website

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

SPECIFICATIONS

This JAVAD GNSS product is a 216-channel GNSS receiver with an internal radio modem, a Bluetooth® wireless technology module, GMS module, and a rugged aluminum housing complete with TriPad and cable connectors.

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.

1. Receiver Specifications

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

1.1. General Details

Table below lists the receiver's general specifications.

Table 1. Receiver General Specifications|

Physical	
Enclosure	Aluminum extrusion, waterproof IP66
Color	JAVAD GNSS Green and Black
Dimensions	W: 148 mm x H: 85 mm x D: 35 mm
Weight ALPHA-G3 ALPHA-G2T ALPHA-G3T	 430 g 435 g 448 g
GNSS Antenna	External
Battery	One internal
Keys	Two keys: Power – On/Off, Function (FN) – start/stop data logging.
LEDs	Two LEDs: STAT – Satellite and receiver status, REC – record and data status

Environment	
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
Power	
Internal battery	One internal Li-Ion battery (7.2 V, 1.37 Ah) with internal charger
Number of built-in batteries	1
Operating time	Up to 10 hours
Input voltage	+7 to +40 V DC (for work) +7 to +40 V DC (for charge battery)
External power	
Port	1 port
Input voltage	+7 to +40 V DC
I/O	
Communication Ports	- Serial (RS232) up to 460.8 kbps - 12Mbps USB 2.0 Full-Speed. Virtual RS232 port is being opened via USB link with baud rates 1.4 Mbps - Bluetooth® V1.1 Class 2 supporting SPP Slave and Master Profiles
Connectors	- External GNSS Antenna - Modem Antenna - External power (PWR) - 1PPS output (optional) - Event Marker input (optional)
TriPad	- Two LEDs (STAT, REC) - Two function buttons (ON/OFF, FN)
Data Features	
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	
Technology	
Common tracking; Low signal tracking; Advanced Multipath mitigation; KFK WAAS/EGNOS (SBAS) Adjustable PLL and DLL parameters	
NMEA	
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	1, 5, 10, 20, 50, 100 Hz optional
DGPS	
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, 50, 100 Hz optional
Output interval for RTCM correction data	1, 5, 10, 20, 50, 100 Hz optional
Elevation mask	0 to 90 deg (independent of data logging)
Multi-base DGPS	Differential correction select mode: Nearest, Mix, Best (optional)
RTK	
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, 5, 10, 20, 50, 100 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%
Measuring Modes	
Base or Rover	Static, Fast Static Kinematic (Stop and Go) RTK (Real-time Kinematic) DGPS (Differential GPS) SBAS DGPS
Measuring Accuracy	
Autonomous	< 2 m

Static, Fast Static	Horizontal: 0.3 cm + 0.5 ppm * base_line_length Vertical: 0.5 cm + 0.5 ppm * base_line_length
Kinematic, RTK	Horizontal: 1 cm + 1 ppm * base_line_length Vertical: 1.5 cm + 1.5 ppm * base_line_length
RTK (OTF)	Horizontal: 1 cm + 1 ppm * base_line_length Vertical: 1.5 cm + 1.5 ppm * base_line_length
DGPS	< 0.25 m Post Processing, < 0.5 m Real Time
Cold Start Warm Start Reacquisition	< 35 sec < 5 sec < 1 sec

1.2. GNSS Board Details

Table 2 lists the GNSS board's general specifications.

Table 2. GNSS Board Specifications

Receiver type	
Tracking Channels	ALPHA - G3: GPS L1, GLONASSL1, Galileo E1, SBAS ALPHA- G2T: GPS L1/L2/L5, Galileo E1/E5A, SBAS ALPHA - G3T: GPS L1/L2/L5, Galileo E1/E5A, GLONASS L1/L2, SBAS
Tracking Specifications	
Standard channels	Total 216 channels: all-in-view (GPS L1/L2/L2C/L5, Galileo E1/E5A, GLONASS L1/L2, SBAS)
Tracked signals	L1/L2 C/A and P Code & Carrier
Tracking Functions	
Multipath reduction	Code and Carrier
PLL/DLL settings	Bandwidth, order, adjustable Smoothing interval Code and Carrier
WAAS/EGNOS	WAAS optional; EGNOS optional
Memory	
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, L2, Galileo E1/E5A, GLONASS L1/L2 (G3T only)
1PPS Output (optional)	
Number of PPS ports	1
Edge	Rise, Fall
Period	10 to 1000000000 ms
Offset	-500000000 to 500000000 msec
Reference time	GPS, GLONASS, UTC (USNO), UTC (SU)

Event Marker (optional)	
Number of event Marker ports	1
Edge	Rise, Fall
Reference time	GPS, GLONASS, UTC (USNO), UTC (SU)

1.3. Bluetooth® Module Details

Table 3 lists the Bluetooth® wireless technology module's general specifications.

Table 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, SPPP
Frequency Country Code	North America and Europe

1.4. GSM Module Details

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

Table 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 sensitivity	-107dBm (typ) @ 850/900 MHz -106dBm (typ) @ 1800/1900 MHz
GPRS	Multi-slot class 10 (4 down; 2 up; 5 Total) Mobile station class B Coding scheme CS1-CS4 PBCCH support
CSD	Asynchronous transparent circuit switched data (CSD) up to 14.4 Kbps Asynchronous non-transparent (CSD) up to 9.6 Kbps V.110
SMS	Point-to-point mobile originated and mobile terminated SMS Concatenated SMS supported MO/MT Text and PDU modes Cell broadcast
One serial port	Data and Command port
SIM Card	3.0 V, STK 3.1

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

2. Connector Specifications

Power Connector

The power connector (Figure 1) is a sealed receptacle, 5 pin, ODU p/n G80F1C-T05QF00-0000.

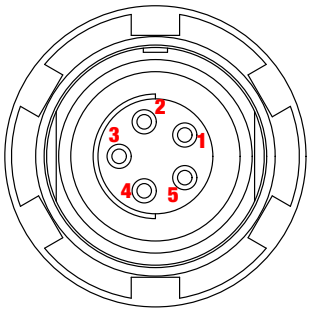

Figure 1. Power Connector

Table 5 gives power connector specifications.

Table 5. Power Connector Specifications

Number	Signal Name	Dir	Details
1	Power_INP	P	10 to 30 volts DC input
2	Power_INP	P	10 to 30 volts DC input
3	Power_GND	P	Ground, power return
4	Power_GND	P	Ground, power return
5			Not used

Serial RS-232C Connector

The RS232 connectors (Figure 2) are sealed receptacle, 7 pin, ODU p/n G80F1C-T07QC00-0000.

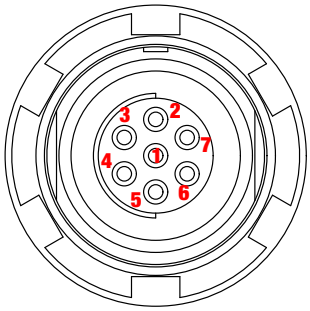

Figure 2. RS-232C Connector

Table 6 gives the RS-232C cable connector specifications.

Table 6. RS-232C Cable Connector Specifications

Number	Signal Name	Dir	Details
1	Power_OUT	P	Power Output (supplied voltage)
2	GND	-	Signal ground
3	CTS	I	Clear to send
4	RTS	O	Request to send
5	RXD	I	Receive data
6	TXD	O	Transmit data
7			Not used

USB Connector

The USB connector is a sealed receptacle, 5 pin, ODU p/n G80F2C-P05QF00-0000 (Figure 3).

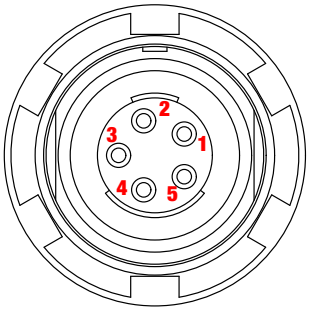

Figure 3. USB Connector

Table 7 gives the USB connector specifications.

Table 7. USB Connector Specifications

Number	Signal Name	Dir	Details
1			Not used
2	USB_PWR	P	Bus power
3	GND	-	Ground
4	USB D+	I/O	Data plus
5	USB D-	I/O	Data minus

RS422 and CAN Connector

The RS422/CAN connector is a sealed receptacle, M12, 8 pin Male receptacle, FM, M16x1.5, flying lead connector Binder-USA p/n 09-3481-700-08 (Figure 4)

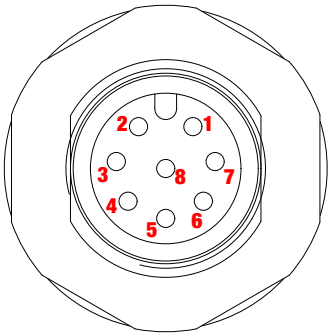

Figure 4. RS422 and CAN Connector

Table 8 gives the RS422/CAN connector specification.

Table 8. RS422/CAN Specification

Number	Signal Name	Dir	Details
1	PWR IN	P	Bus power
2	GND	-	Signal ground
3	422_TX+	O	Port TX+ line
4	422_TX-	O	Port TX- line
5	422_RX+	I	Port RX+ line
6	422_RX-	I	Port RX- line
7	CAN_H	I/O	CAN_H bus line (dominant high)
8	CAN_L	I/O	CAN_H bus line (dominant low)

GNSS External Antenna RF Connector

The external antenna connector type (Table 9) is a TNC RF connector with an Applied Engineering Product p/n 6001-7051-003.

Table 9. GNSS External Antenna RF Connector

Type	Signal Name	Dir	Details
TNC	ANT_IN	I	RF input from LNA, 100 mA at 5.0 volts DC output

EVENT and 1PPS Connectors

The EVENT and 1PPS connectors are coaxial female receptacles of BNC series, Kings Electronics part number KC-79-108. These connectors are optional.

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 measuring and measuring 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 measuring site.
- Contrary to applicable laws, rules, and regulations.

DANGER: THE ALPHA 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.*

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 the 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[1].

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.

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

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