

# iG8a

GNSS RTK Receiver  
with Internal Satel 1-Watt Radio

## User Manual

See also the 'Getting Started Guide'  
for your selected Field Software



This manual is for use with iG8a RTK GNSS receivers produced by iGage Mapping Corporation.

Receivers purchased from other sources that appear to be similar will not match devices provisioned by iGage.

The 'iGx Download Tool' supplied with iG\_ receivers and available for download via the internet, only works with receivers purchased from iGage. This tool is not sold separately.

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# Copyright, Control and Safety

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## GNSS Safety Warning

The iG8a GNSS receiver tracks and utilizes signals from many space-based satellite navigation systems:

The Global Positioning System (GPS) is operated by the US Government which is solely responsible for the accuracy and maintenance of the GPS network. Accuracy can also be affected by bad satellite geometry and obstructions including buildings and tree canopy.

The GLONASS (GLObal Navigation Satellite System), is a satellite navigation system operated by the Russian Aerospace Defense Forces.

The Galileo System is the global navigation satellite system (GNSS) that is operated by the European Union (EU) and European Space Agency (ESA)

BeiDou Navigation Satellite System (BDS) (also known as COMPASS or BeiDou-2) is operated by CNSA (China National Space Administration.)

SBAS (Satellite Based Augmentation Services) including WAAS (USA), MSAS (Japan), EGNOS (Europe), QZSS (Asia), and GAGAN (India) may also be utilized by the iG8a for carrier-phase corrections, in addition to differential corrections.

iGage Mapping Corporation is not responsible for, nor warrants the viability of the space segment portion of the GNSS system. The user is cautioned that they alone are responsible for determining the application of the iG8a to their task at hand.

**Any of the GNSS system components can fail at any time. Be prepared for down time and failures. Do not use the iG8a receiver for any critical navigation purpose.**

## Export Controlled Device

The iG8a device should be considered to be an export-controlled device. Because of the complex federal sanction's regulations governing controlled countries, as well as the severe civil and criminal penalties for sanctions violations, you should not attempt to interpret export licensing requirements or license exclusions for travel to or transactions with comprehensively embargoed countries. Before shipping, providing or hand carrying iG8a devices out of the United States, consult counsel who specializes in ITAR/DOD matters.

The following country list is not exhaustive:

Afghanistan, Balkans, Belarus, Burundi, Central African Republic, Cote d'Ivoire, **Crimea Region of Ukraine, Cuba**, Cyprus, Democratic Republic of the Congo, Eritrea, Fiji, Haiti, **Iran**, Lebanon, Liberia, Libya, Myanmar (formerly Burma), **North Korea**, Republic of the Sudan (Northern

Sudan), Rwanda, Somalia, South Sudan, Sri Lanka, **Sudan, Syria**, Ukraine, Venezuela, Vietnam, Yemen, Zimbabwe

**The countries in bold face type are comprehensively embargoed.** Do not transport an iG8a receiver to one of these countries.

## FCC Compliance

**FCC Notice:** iG8a receivers comply with the limits for a Class B digital device, pursuant to the Part 15 of the FCC rules when it is used in the Portable Mode.

The iG8 and iG8a are identical other than the GSM Modem in the iG8a is disabled in software.

FCC ID: SY4-A01010

Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference
- (2) This device must accept any interference received, including interference that may cause undesired operation

See the section '[Radio Notices](#)' on page 14.

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# Introduction



Thank you very much for choosing to purchase and use an iG8a GNSS receiver from iGage Mapping Corporation!

With a ground-breaking price, outstanding performance, field ready case and easy-to-use features, we know that the iG8a GNSS receiver will be a valuable tool that will quickly pay for itself.

This guide is designed to help you familiarize yourself with your new equipment and successfully use it in the field.

If you have questions or suggestions, don't hesitate to contact us:



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Your input is extremely valuable and we will listen to your suggestions!

Software updates and news are available from:

[www.iG8g.com](http://www.iG8g.com)

Click on 'Tools' for firmware, FAQs and other iG8a information. Don't hesitate to call iGage for assistance updating your device. Remote assistance is available.

## iG8a vs. iG8

The iG8a is a variant of the iG8 that does not enable the internal GSM (Cellular) modem. As the internal modem is 3.75G and it is not possible to activate a 3G modem in the United States the internal modem has no value.

The iG8a and iG8 receivers are identical in every other way.

## X-PAD Field Software

Your iG8a kit may contain a license for X-PAD Ultimate Field Software.

Instructions on installing, configuring and using X-PAD are contained in the dedicated 'X-PAD User Manual'.

## About the iG8a GNSS Receiver

The iG8a GNSS receiver incorporates a GNSS engine, GNSS antenna, internal Satel UHF radio, Bluetooth, Wi-Fi, and dual-batteries in a ruggedized and miniature unit that is easy to use. All-in-One iG8a Base Rover kits include two, identical receivers for use as Base and Rover.

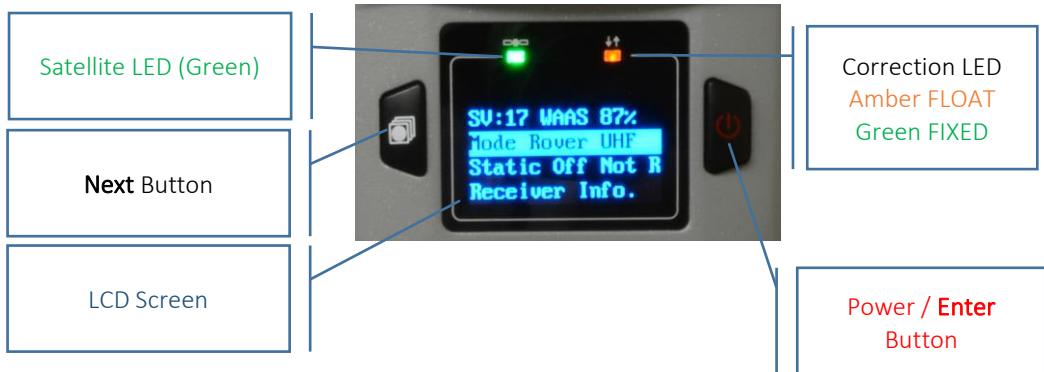
The bright LCD panel enables you to check satellite-tracking, internal battery charge status, Wi-Fi, working mode, data logging status and basic receiver information. Bluetooth and Wi-Fi technology provide cable-free communication between the receiver and a data collector / controller.

You can change the basic settings of the receiver with the LCD panel. Additional configuration settings can be made via the web interface using Wi-Fi or with a Bluetooth connected data collector.

## Front Panel



The Front Panel has a bright LCD screen, two indicator LED's and two pushbuttons.



### Satellite LED

Indicates the number of satellites that the receiver is tracking:

- When the receiver is searching and not tracking and satellites it blinks once every 5 seconds.
- When the receiver is tracking and has a position the left LED blinks once for each tracked satellite.

### Correction LED

Blinks when correction data is transmitted (during BASE operation) or received (during ROVER operation.)

### LCD Screen

Displays status and configuration options, controlled by the two pushbuttons. You can change the screen timeout value under 'Receiver Info.'

### Next Button

Move to the next line of the current menu

Move to the next character of a setting

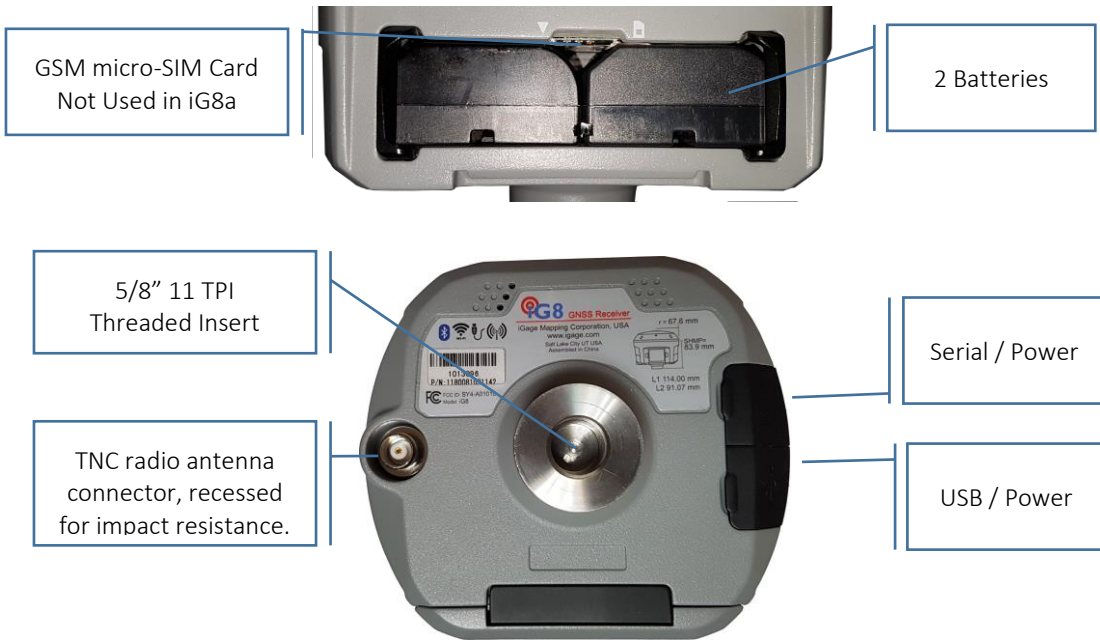
Changes a setting or character after being selected by Enter

### Power / Enter Button

Power

- Press and Hold for 3-seconds to turn the receiver ON or OFF
- Accept a modified value: **Enter**

## Receiver Back and Bottom



### GSM SIM Card

iG8a receivers have a NANO sized Sim Card slot, however no operable GSM modem is included in the iG8a. The iG8a should be used with 'Data Collector Internet' for network Rover applications.

### Batteries

There are slots for two batteries. Push the retaining bars to the side to release batteries, the battery will then spring out. The batteries are hot-swappable. The battery with the higher charge is always used. (Both batteries will run down simultaneously.)



Serial + Power

7-pin LEMO connector that supports RS-232 communication and external power (12 to 36 VDC) input.



USB

Standard Mini-USB connection to computer

When connected to a computer using Mini-USB cable, the iG8a will mount as an external disk drive on the attached computer (no drivers required.)

## What's in the Box

iG8a receivers are available in three standard configurations:



Base Rover Pair Kit: complete Base / Rover pair  
 Network Rover Kit: complete Network Rover, includes internal UHF radio  
 Base Fill Out Kit: fills out a Network Rover kit to a complete Base / Rover pair

Depending on your purchased configuration you will receive different accessories with your iG8a GNSS receivers:

<p><b>iG8a GNSS Receiver</b></p> <p>The iG8a receiver includes a state of the art GNSS engine, a Satel UHF radio, Bluetooth, and Display.</p> <p>The Base and Rover are identical.</p> <p>Included with [Base and Rover]</p>	
<p><b>UHF Antenna</b></p> <p>PN: 0402 000 006</p> <p>5/8 <math>\lambda</math> end-fed-dipole Antennas with TNC Connector, one for each receiver.</p> <p>Included with [Base and Rover]</p>	
<p><b>Quad Battery Charger &amp; Wall Adapter</b></p> <p>The Power Adapter can be used for the battery charger or as an external power source for iG8a Base with the serial cable.</p> <p>Included with [Rover]</p>	
<p><b>Lithium-Ion Batteries</b></p> <p>High Capacity 3,400 mAh 7.4 V Lithium Ion</p> <p>Included with [Base and Rover]</p>	
<p><b>External Heavy Duty Power Cable</b></p> <p>2.5 Meters long, connects to the Serial connector on the bottom of the receiver.</p> <p>Provides extended power to an RTK base.</p> <p>Included with [Base]</p>	

<p><b>SERIAL IO and Power Cable</b></p> <p>Connects the GNSS head to a computer serial port or an external UHF radio.</p> <p>Can be used to provide external power to the head.</p> <p>Included with [Rover]</p>	
<p><b>USB-Mini to USB-Female OTG</b></p> <p>Used to extend internal memory for huge occupation storage and to update the receiver firmware with a thumbdrive</p> <p>Included with [Rover]</p>	
<p><b>USB 2.0 Cable - A-Male to Mini-B</b></p> <p>Used to connect the receiver to a PC and download occupations from the internal memory.</p> <p>Included with [Rover]</p>	
<p><b>Extension Pole</b></p> <p>Raises the Base iG8a GNSS head above a tribrach high enough to allow the UHF antenna to be connected to the receiver.</p> <p>Included with [Base]</p>	
<p><b>TNC Extension Cable</b></p> <p>Allows you to elevate the UHF radio antenna further above the ground, greatly enhancing the radio range.</p> <p>Included with [Base]</p>	
<p><b>This User Manual</b></p> <p>We include a printed copy of this User Manual with every iG8a kit.</p> <p>Included with [every kit]</p>	
<p><b>Field Ready Case</b></p> <p>Sealed rugged hard cases with custom foam inserts, and plenty of compartments to protect your receiver and accessories.</p> <p>Single or Dual head cases are available.</p> <p>Included with [Base and Rover]</p>	

## Optional Accessories

### iGA, High Gain UHF Antenna



Extends UHF Radio range, excellent spare antenna in case the factory antenna is broken.

### iGR, 35-Watt Repeater / Transceiver

Works as a remote repeater or cable connected high power radio.

Kit includes:

Radio, Power/Data Cable, 5-dBi Antenna, cable, 5/8" mount, USB-to-Serial adapter, User Manual



# Safety Information

Before you use your receiver, please make sure that you have read and understand the following warnings and safety requirements.

An absence of specific alerts does not mean that there are no safety risks involved. Warning and Caution information is intended to minimize the risk of personal injury and/or damage to the equipment.

## Use and Care

The iG8a receiver is a field ready instrument; however, it is also a delicate electronic instrument. Take suitable care to avoid damage to the instrument.

Please avoid dropping the receiver directly onto concrete, it can modify the phase center of the GNSS antenna.

Avoid storing the receiver at excessive temperatures (hot or cold) as it will damage the internal batteries.

Avoid storing the batteries at temperatures less than -40° F (-40° C) and temperatures higher than 160°F (70°C) as it will permanently reduce the battery capacity and life

DO NOT leave the iG8a or accessories inside a vehicle in the summer. Temperatures higher than 160°F will permanently reduce battery capacity and battery life.



GNSS receivers and especially Lithium-Ion batteries are like puppies:

In the summer if you leave them in your vehicle with the windows rolled up, you will kill them.

## Battery Warnings, Safety and Disposal



Figure 1 Lithium-Ion Batteries for iG8a receivers

The batteries are Lithium-Ion type cells.

**WARNING** - Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and property damage.

To prevent injury or damage:

- Do not use or charge the battery if it appears to be discolored, warped, the case is bulging, or leaking battery fluid.

- Do not expose the battery to fire, high temperature, or direct sunlight.

- Do not immerse the battery in water.

- Do not store the battery inside a vehicle during hot weather.

Do not drop or puncture the battery.

Do not open the battery or short-circuit its contacts.

Do not charge the batteries in chargers other than the supplied charger or a direct replacement.

Do not charge similar batteries in the supplied charger, even if they fit well.

**WARNING** - Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. The battery fluid is extremely corrosive, and contact with it will result in personal injury and/or property damage.

If battery fluid gets into your eyes, immediately rinse your eyes with clean water and seek medical attention. Do not rub your eyes!

If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.

If you plan on running a Base receiver for an extended period, it is suggested that you use the supplied auxiliary power connector to connect to an external 12-volt battery. Please keep at least one charged battery in the head when using auxiliary power.

**Please keep at least one charged battery in the head when using auxiliary power.**

Fully charge the batteries using the supplied charger before first use.

## Non-Factory Batteries in iG8a Receivers

The CHCNav factory batteries are approximately **70.1 mm** (2.76") in length.

Some 2<sup>nd</sup> party batteries, typically purchased on Amazon, are as long as **72.2 mm** (2.84") in length:



A battery is too long if you have to push the battery into the battery slot with high force in order to have the retaining clip secure the battery end.

If you force the battery into the head, it smashes the spring-loaded Po-Go pins that connect with the battery contacts, deforms the circuit board that they are attached to and eventually the head will not power up.

If you choose to occasionally use non-factory batteries; it may be possible to sand down the plastic ends to remove the molding ridges and reduce the battery length to match factory batteries. As batteries are dangerous, you should decide if this is an appropriate remedy for your battery selection choice.

In any case, please do not force batteries into the battery compartments of GNSS receivers if they do not fit!

## Battery Charger



The supplied battery charger will charge 4 batteries at once.

Plug the charger into the supplied wall transformer or use the supplied alligator clip cable to connect to a 12 Volt battery.

The supplied charger has a **RED** LED on each side to indicate that power is attached.

Next to each battery is a **GREEN** LED.

GREEN LED	STATUS
Off	No Battery Inserted
Blinking	Battery Charging
ON Steady	Battery is fully charged

It is best to remove batteries from the charger when they have completed charging.

## Radio Notices

**FCC Notice:** iG8a+ GNSS receivers comply with the limits for a Class B digital device, pursuant to the Part 15 of the FCC rules when it is used in the Portable Mode.

Operation is subject to the following two conditions:

- This device may not cause harmful interference
- this device must accept any interference received, including interference that may cause undesired operation

**FCC Compliance:**

Function	FCC-ID	Module Type
iG8a Device	SY4-A01010	Assembly
Bluetooth / Wi-Fi	WG7311-EA	802.11 b/g/n BT4.0
3.75G WCDMA module	RI7HE910	Telit HE910-D
Satel TR-Radio	MRBSATEL-TA13G	Satel SATELLINE-M3-TR3

Figure 2 FCC ID's for iG8a receiver's internal radios.

## Bluetooth Radio

Radiated output power from the internal Bluetooth radio is far below FCC radio frequency exposure limits. The Bluetooth radio operates within guidelines for radio frequency safety standards and recommendations, which reflect the consensus of the scientific community.

The level of energy emitted is far less than the electromagnetic energy emitted by wireless devices such as mobile phones. However, the use of wireless radios may be restricted in some situations or environments, such as on aircraft or near blasting areas.

## UHF Radios

Every iG8a GNSS receiver includes a Satel UHF radio capable of broadcasting 1-watt UHF radio transmissions.

## Satel UHF Safety and General Information

When used in the transmitting mode, even though the broadcast power is relatively low, you should take these additional precautions:

### Medical Devices - Hearing Aids

Some digital wireless radios may interfere with some hearing aids. In the event of such interference, you may want to consult your hearing aid manufacturer to discuss alternatives.

### Medical Devices - Pacemakers

The Advanced Medical Technology Association recommends that a minimum separation of 6 inches (15 cm) be maintained between a handheld wireless radio and a pacemaker. These recommendations are consistent with the independent research by, and recommendations of the U.S. Food and Drug Administration.

Persons with pacemakers should:

- ALWAYS keep the radio more than 6 inches (15 cm) from their pacemaker when the radio is turned ON.
- Not carry the radio in the breast pocket.
- Turn the device OFF immediately if you have any reason to suspect that interference is taking place.

### Other Medical Devices

If you use any other personal medical device, consult the manufacturer of your device to determine if it is adequately shielded from RF energy. Your physician may be able to assist you in obtaining this information.

### Blasting Caps and Blasting Areas

To avoid possible interference with blasting operations, turn off your radio when you are near electrical blasting caps, in a blasting area, or in areas posted: "Turn off two-way radio." Obey all signs and instructions.

## FCC Licensing Information

The iG8a includes transmit – receive UHF radios and require FCC licensure for transmit operation in the United States. It is illegal to operate the iG8a device in Transmit mode (as a UHF Base) without a valid FCC license.

This article describes the pitfalls of broadcasting without a license:

[http://www.amerisurv.com/PDF/TheAmericanSurveyor\\_Silver-PirateSurveyors\\_Jan2014.pdf](http://www.amerisurv.com/PDF/TheAmericanSurveyor_Silver-PirateSurveyors_Jan2014.pdf)

If you did not have an FCC license when your receivers were shipped, a default frequency table may have been installed on your receiver. Without an FCC license you may only receive transmissions on these frequencies.

You may not legally use this product in a transmit application without:

Obtaining a valid FCC License.

Verifying the frequency tables match your license.

Adding your FCC ID to the internal radios so that they can properly broadcast your license in Morse Code every 15 minutes.

Putting a label on the devices with your FCC ID.

Keeping a copy of your FCC License with the transmitting devices when they are in use as a transmitter.

In January 2020, the ‘Preventing Illegal Radio Abuse Through Enforcement Act, or “PIRATE” Act (S.1228)’ was signed raising the penalty for non-compliance to \$100,000 per day with a \$2,000,000 maximum!

If you choose to operate the iG8a as a UHF Base without obtaining an FCC license, you do so at your own risk.

### Obtaining a New FCC License

If you don’t have an existing FCC license to transmit UHF corrections and you will be using your receiver as a Base (no license is needed for Rover operation as it is receive-only) you will likely use a ‘Radio Licensing Company’ to obtain frequency coordination and submit an application to the FCC.

This application process typically costs around \$600 of which includes \$125 Frequency Coordination and \$260 for the FCC filling fee. You may be asked these questions when applying for a license:

<b>Frequency Requested</b>	“Standard RTK GPS Pool”, Monitor: NO
<b>Band</b>	451-469, no splits
<b>System</b>	Conventional
<b>Type</b>	Base and Mobile Simplex FB.MO
<b>Wattage</b>	35 Watts Mobile; 35 Watts Base
<b>Bandwidth</b>	12.5 kHz
<b>Interconnection</b>	None
<b>Emission Type</b>	Digital Data
<b>Location</b>	The States where you might work or ‘USA’
<b>Antenna Mounted On</b>	Survey Tripod, not to exceed 20 feet
<b>Emission Designator</b>	9K75F1D



## Front Panel Operation

You can configure your iG8a receiver

- from the front panel using the two-button interface
- from a data collector connected by Bluetooth to the receiver
- via Wi-Fi using a standard web browser

This section describes operation from the front panel.

Most users never need to use the front panel controls so you can safely skip this section.



### Main Menu

After the iG8a starts, the Main Menu will be shown

```
SV:14 Auto 100%
Mode Rover UHF
Static Off Not Recording
Receiver Info.
```

You can move the selected line down by clicking the **Fn Next** (Left) button



Once the desired line is selected, click the **Enter** (right) button



Some lines are too long to fit on the display, when you select these longer lines, they will scroll across the display.

Some menu pages have too many lines to fit on the display, click the **Next** button to scroll down through additional lines.

### Satellite, Power, WiFi, 3G, Base Info

From the Main Menu highlight the top line with the **Fn Next** button:

```
SV:16 Auto 100%
```

**SV: 16** (SV = Satellite Vehicle) Number of currently used satellites

**Auto:** Autonomous GPS solution

**SDGPS:** Differential GPS

**WAAS:** Differential GPS

**Float:** The GNSS engine has achieved a Float solution

**Fixed:** The GNSS engine has a Fixed solution

Click **Enter**


```

16= G09 R02 C01 S00 E03
Pwr: A 100% B 100%
WiFi Status On WiFi Mode
Hotspot
Network Status Offline
Odbm
Base Info
Cancel


```

16 total satellites used: 9 GPS, 2 GLONASS, 1 COMPAS/BDS, 0 SBAS (WAAS), 3 Galileo

**Pwr** Estimated remaining power in Battery A 100% Battery B 100%

**WiFi** is turned On, the Wi-Fi Hotspot is active. Select and click **Enter**  to change.

The Cellular Modem is always turned Offline on the iG8a.

**Base Info**: displays the location of the Base that is in use and the distance to the Base. Highlight and **Enter**  to

**Cancel**: select to return back to the Main Menu

### WiFi Status

Select **WiFi Status**

```

WiFi Status On WiFi Mode
Hotspot

```

to toggle the WiFi radio power:

```

Open WiFi ?
Cancel          OK

```

When you toggle the setting, the display will briefly show:

```

Switching WiFi.....

```


### Base Info

Highlight

```

Base Info

```

Click **Enter**  to display: if the receiver is a Rover the location of the Base which is currently in use, or the Broadcast Base Location if the receiver is a Base:

```

B:N 40:44:10.3475
L:W 111:51:33.5641
H:1308.5900m
Distance: 3.456m
Cancel

```

**B** is the Latitude in DD:MM:SS.ssss, **L** is the Longitude and **H** is the Ellipsoid Height of the antenna phase center. **Distance** is the 2-D length of the vector from the Base to the Rover.

Click **Fn Next**  to highlight **Cancel** and click **Enter**  to return to the previous menu.

## Receiver Mode

From the Main Menu, click **Fn Next**  to highlight **Mode**

```
SV:14 Auto 100%
Mode Rover UHF
Static Off Not Recording
Receiver Info.
```

Click **Enter**  and a list of receiver modes will be shown

```
Base Cable
Base Int. UHF
Base APIS
Base APIS & Cable
Rover APIS
Rover Ntrip/IP
Rover UHF
Cancel
```

Note: In addition to the modes that can be selected from the front panel, there are additional modes like

```
Mode Rover PDA
```

That are only selected by a Bluetooth or Wi-Fi attached data collector.

## Mode Base Cable

Highlight

```
Base Cable
```


Then click Enter to set the receiver as a Base sending corrections out the hardware serial port.

Select **Format**

```
Mode Base Cable
Format CMR
OK
Cancel
```

To choose the correction type from

```
CMR, CMR+, sCMRx, RTCMv2.3, RTCMv3, RTCMv3.2, RTD
```

If you change the Format, you must then select **OK** and press **Enter** .

When you set any Base mode, the receiver AUTOMATICALLY does a 'Read GPS Average' to get an autonomous position and then begins to broadcast corrections out the serial port.

Use the Wi-Fi interface 'IO Settings', 'Serial Port', Settings to configure the baud rate. The default baud rate is 115,200 baud.


## Mode Base Int. UHF


Click **Fn Next**  to highlight


```
Base Int. UHF
```


Then click **Enter**  to configure the receiver as a UHF Base.

```
Mode Base Int. UHF
Channel 7 461.0250
Format CMR
Power 1w
Protocol 3AS
Air Baud 9600
OK
Cancel
```


Highlight the **Channel** to toggle through all of the defined radio channels with the **Enter**  key.

Highlight **Format** to toggle through **CMR, CMR+, sCMRx, RTCMv2, RTCMv3, RTCMv3.2, sCMRx** with the **Enter**  key.

Highlight **Protocol** to toggle through **3AS (Satel), PC4FSK (Pacific Crest Transparent FST), Transparent (PCC), TT450s (TrimTalk 450s/TrimmarkII)** with the **Enter**  key.

Highlight **Air Baud** to toggle through **4800, 9600, 19200** (the options depend on the Highlighted Protocol) with the **Enter**  key.

After choosing your settings, you must highlight **OK** and click **Enter** to active them. When you OK the configuration, the receiver AUTOMATICALLY does a 'Read GPS Average' to get an autonomous position and then begins to broadcast corrections out the UHF radio.

Highlight **Cancel** then click the **Enter**  key to return to the Mode menu without making any changes.

## Mode Base APIS (and APIS & Cable)

Since the iG8a does not have an internal GSM modem, APIS is not available.

## Mode Rover APIS

Since the iG8a does not have an internal GSM modem, APIS is not available.

## Mode Rover NTRIP/IP

Since the iG8a does not have an internal GSM modem, NTRIP/IP is not available.

## Mode Rover UHF

To set the receiver as a UHF Rover, Highlight

```
Rover UHF
```


From the Mode menu


```

Mode Rover UHF
Channel 7 461.0250
Protocol 3AS
Air Baud 9600
OK
Cancel


```

Highlight the **Channel** then click **Enter**  to toggle through all of the defined radio channels.

Highlight **Protocol** then click **Enter**  to toggle through 3AS (Satel), PC4FSK (Pacific Crest Transparent FST), Transparent (PCC) and TT450s (TrimTalk-450s / Trimmark-II / Trimmark-Ile / TT450HW.)

Highlight **Air Baud** then click **Enter**  to toggle through 4800, 9600, 19200 (the speed options depend on the selected Protocol.)

After choosing your settings, you must Highlight OK and click Highlight to activate them.

Highlight **Cancel** and click **Enter**  to return to the Mode menu without making any changes.

Note: the iG8a receiver will automatically detect the correction format (CMR, CMR+, RTCM2, RTCM3, RTCM3.2, sCMRx) and no protocol selection is required for an iG8a Rover.

## Static Recording

The Main Menu displays the static recording mode on the third line

```

Static On Recording


```

If you highlight the line and click **Enter**  the Static Data Menu is shown:

```

Set On
Recorded 00:35
Epoch Intv 1Hz
Mask Angle 10 Degrees
Duration Time 1440 minutes
Antenna Height 2.0000 m
Measurement Vertical
Height
Data Format HCN
RINEX Format Off
OK
Cancel

```

The top line **Set On** displays the current setting. Highlight the line and click Enter to toggle recording **On** and **Off**. You must highlight **OK** and click **Enter**  (at the bottom) to save and activate your changes.

**Recorded** is the length of the current file in minutes.

**Epoch Intv** is the recording rate. Highlight the line and click Enter to toggle through **1Hz, 2s, 5s, 10s, 15s, 30s, 60s, 20Hz, 10Hz, 5Hz, 2Hz**

IMPORTANT: If you want to process your file in OPUS, the recording rate must be one of the bold rates above.

**Mask Angle** is the height above the horizon that a satellite must be above to be included in the observation file. Highlight the line and repeatedly click the **Enter** key to modify. Note, DO NOT push and hold the Enter key or the receiver will turn off. The value will cycle between **0** and **90**, so you may have to push the **Enter** key as many as 90 times to select the desired elevation mask. The Wi-Fi interface is an excellent alternative to the front panel for this setting.

**Duration Time** is the file length. 1440 (24-hours) is the default. It is NOT possible to set the file length longer than 24-hours, however you may highlight the duration, then click Enter to set the file length to any shorter value. When a file reaches the programmed limit, it is closed and another file is opened.

Highlight the **Antenna Height** line and press **Enter** to set the HI that is recorded in the output file.

Highlight the **Measurement** line and press **Enter** to toggle through **Vertical Height**, **Phase Center**, **Oblique (Slant) Height**.

Highlight the **Data Format** line and press **Enter** to toggle through **HCN** (default), **HRC** and **Off**. HCN must be selected to use the iGage **iGx Download** tool to automatically submit jobs to OPUS.

Highlight the **RINEX Format** and click **Enter** to toggle through **2.11**, **3.02** and **Off**. **Off** is the default and recommended setting.

Highlight **OK** and click **Enter** to save your settings and make them current.

Highlight **Cancel** and click **Enter** to discard any changes.

## Receiver Info

From the Main Menu, highlight

**Receiver Info.**

And click **Enter** to display detailed receiver information:

```
SN 1013000
PN 1190081031142
Reg. Permanent
Ver. 1.5.5
IMEI 356136075105942
Language English
Display Time Permanent
Cancel
```

**SN** is the iG8a serial number.

**PN** is the iG8a part number with full option codes

**Reg.** is the date the device will stop working. This is used to deactivate rental and demo receivers.

**Ver.** Is the installed firmware version.

**IMEI** is the cellular modem IMEI number which may be required to activate sim cards.

Language can be selected from **English, Russian, Turkish, Spanish and Chinese**.

**Display Time** can be selected from **10s, 30s, 1m** and **permanent**; however, you must re-select permanent when you turn the receiver on or it will revert to a 1-minute timeout to save power and extend the display's life.

Highlight **Cancel** and click **Enter**  to return to the Main Menu.

## Compatible Field Software

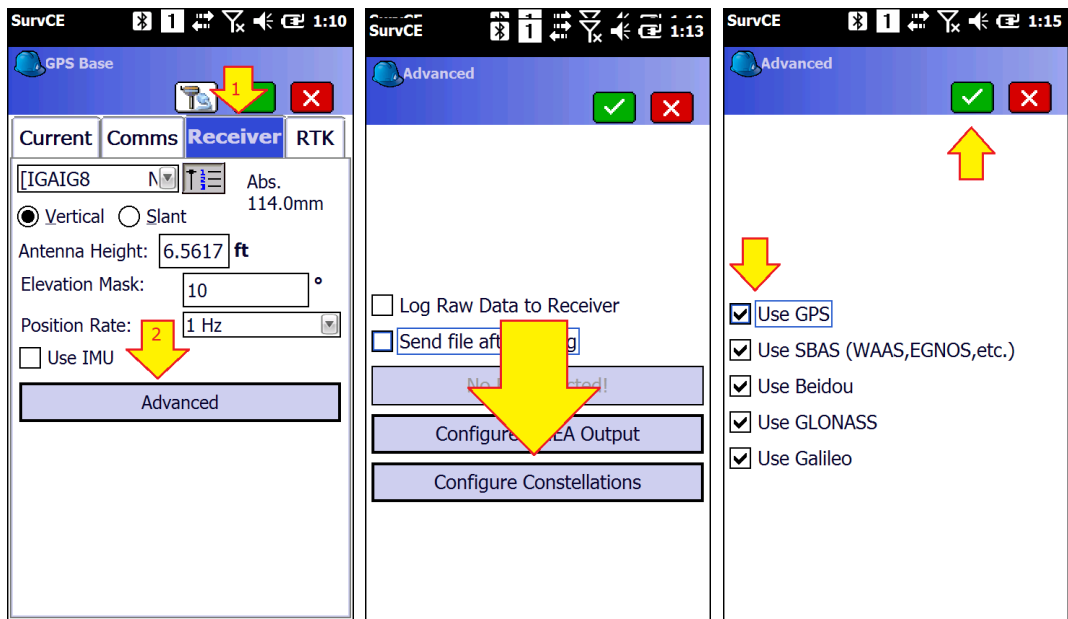
The following field software tools are compatible with the iG8a receiver:

- |   |  |
|---|--|
| GeoMax X-PAD Ultimate:                    | fully compatible                           |
| MicroSurvey Field Genius:                 | fully compatible                           |
| CHCNav LandStar7:                         | fully compatible                           |
| Carlson SurvCE version 5.09 through 6.08: | fully compatible (Check Tracking Settings) |
| Carlson SurvPC version 6.07 through 6.08: | fully compatible (Check Tracking Settings) |
- Note: Carlson has dropped all support for the iG8, iG8a, iG9, iG9a receivers from Version 6.09 forward of both SurvCE and SurvPC.

Very detailed configuration and use instructions are available for X-PAD, LandStar7 and SurvCE/SurvPC. Contact iGage to receive either PDF or hardcopy versions of these Getting Started Guides.

## SurvCE / SurvPC Version 6.06 and Higher Warning

When configuring a Base or Rover from the Equip menu, on the 'Receiver' tab (1) click on the 'Advanced' button (2); next click on the 'Configure Constellations' button; then ensure that all constellations are enabled (checked as shown); finally click the green check mark twice to return to the 'Receiver' tab:



If you upgrade from a SurvCE / SurvPC version prior to 6.06 you will need to change the defaults and replace any Stored Profiles.

This tracking setting is stored in the data collector, not the receiver.



# Setting up an iG8a UHF Base Rover Pair

The iG8a system includes internal Satel Transmit / Receive radios in all Base and Rover receivers. 'Base' and 'Rover' receivers are identical and are labeled for setup convenience. They can be interchanged at any time.

## Configuring the iG8a UHF Base

### Choose a Great Location for the Base

The location of your Base greatly impacts the success of your survey. There are two primary concerns:

1. Minimizing multipath and obstructions between the Base and the sky
2. Maximizing the effective range of the UHF radio which is broadcasting corrections to the Rover

The Base does not need to be located at a control point or parcel corner. You can locate the Base at an optimum location for tracking GNSS signals and broadcasting corrections, then perform a single (or multiple) point Rover localization. It is better to localize your Rover than to use a Base that is under canopy or in a deep canyon.

Any multipath or obstructions at your Base will affect every single shot at your Rover, just as if the multipath existed at the Rover. Your **primary** concern should be finding an open location for the Base that minimizes canopy and multipath.

A clear view of the sky above a 10-degree mask is very important. Partially obstructed/masked satellites (through tree branches) will increase the range of elevation measurements that the Rover observes.

When using a UHF radio, your ability to place the UHF antenna in a high location with the minimum of obstructions to your working area is also important however the best location for your Base is the spot that provides the clearest view of the sky.

### Base Radio Battery

iGage does not provide an external battery for use with the Base as they are difficult to safely ship and you can easily procure a suitable battery locally or online.

Two internal batteries will run the iG8a Base for approximately 6 to 8 hours depending on the configured UHF output power and message type.

For extended operation use an external 12-Volt battery. We recommend an AGM 12V battery like the 'ExpertPower EXP12180 12 Volt 18 Ah Rechargeable Battery' which is available from Amazon for under \$40.



*Figure 3 12V, 18-amp hour sealed lead acid battery with nut/bolt connections*

You can use the supplied dedicated Heavy Duty External Power Cable to provide extended power to the Base:



*Figure 4 Included Heavy Duty External Power Cable attached to external battery*

You may also use the wall transformer supplied with the battery charger and plug it directly into the included serial cable to power the iG8a Base from wall power.

Or, you can use the Serial cable supplied with the iG8a, combined with the optional battery clip cable to provide external power.



*Figure 5 External Power Cable (optional) connected to serial cable for iG8a Base*

## Best Practices for Extending UHF Radio Range

The Satel 1-watt UHF radios in the iG8a have excellent range. However, range is greatly reduced by other users on the same frequency, damaged antennas, damaged cables and configuration issues.

The most common range issues are listed below. If you need to dependably operate at more than 3-miles from your Base, consider purchasing an iGR High Powered Transceiver / Repeater. The iGR is very reasonably priced and is easy to use with the iGR.

### Other Users on Same Radio Frequency

If there is someone or something else on the same radio frequency, they will greatly reduce the distance you can move from your Base. This the NUMBER ONE cause of bad radio range.

Use a Handheld UHF radio to check if the frequency is unused before you start. Carry the Handheld radio with you all day so that you can check if someone sets up on your frequency after your session begins.

The 'BaoFeng UV-5R' is available from Amazon for less than \$25 and is a good-enough choice for monitoring frequencies:



Become familiar with what it sounds like if you are the only user on a frequency and what it sounds like if there are more than one user on the same frequency.

Sources of same-frequency interference include:

- other surveyors and engineers
- voice users (truckers, businesses, railroads, schools, service companies)
- wireless microphones
- SCADA equipment (like water or oil pipeline infrastructure)
- control backhauls on communication links
- nearby AM or FM radio transmitters
- nearby radar systems
- railroad track monitoring systems
- traffic control systems
- national defense systems
- rouge intentional jammers

The radio frequencies that are generally assigned by the FCC in conjunction with frequency coordination are not exclusive and are assigned to multiple users in the same area.

By FCC rules, even unlicensed voice transmissions have a higher priority than licensed data transmissions. The radio built into your Base will wait for other users before it transmits, this is called CSMA: collision sense multiple avoidance.

If you find that the frequency that you were going to transmit is in-use, you can change the channel/frequency of your Base and Rover to an alternate frequency.

## Base Output Power Setting

You probably will want the radio in your Base to output as much power as possible. If 1-watt is not sufficient, then we recommend purchasing a high-power repeater.

## Minimize CSMA

Your Base radio is required to not transmit when there are other users on the same frequency: Collision Sense Multiple Avoidance.

This is an FCC requirement and cannot be disabled. However, the FCC does not specify how carefully we need to listen for adjacent traffic, so, we set the receive sensitivity on the Base to 'Low' to avoid hearing distant users.

## Bad Antennas

The UHF antennas on most GNSS equipment get beat around quite a bit. The antennas on the Base and extension pole get whipped around in the wind a lot. The UHF antennas on Rover's sustain a lot of physical abuse.

If you suspect that you have a bad antenna, we recommend that you purchase two spare antennas and change out both your Base and Rover. If the problem goes away, then you know that one (or perhaps both) of your original antennas have failed.

We recommend that you **not** use  $\frac{1}{4}$  wavelength antennas:



They require a ground plane at the Base of the antenna and have significantly worse range than the  $\frac{1}{2}$  wavelength dipole antennas we supply. The  $\frac{1}{4}$  wavelength antenna are not suitable for use with the antenna extensions that we supply Base receivers.

### External Antenna Extension (Top of Pole Extension)

If you are having range issues, remove the external antenna extension cable and mount the Base antennas directly on the bottom of the Base receiver. We expect at least 1-mile open range with the Base and Rover antenna mounted directly to the heads. (Assuming no other users are on the same frequency.)

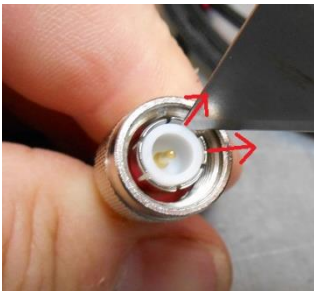
The most common cause of External Antenna Extension Wire failure is failed termination on the pole side adapter due to excessive wind-whipping. The second most common failure is closing the extension wire in the hinge of the carry case which smashes the cable.

### Loose TNC Antenna Connections

The antenna connector can become intermittent and not make a solid connection. If antenna is over-tightened, then the connection points shown above can become 'sprung' and won't make good contact unless the antenna is screwed in even tighter.

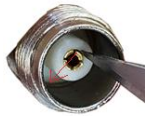
This issue is very difficult to diagnose, however it is very simple to fix.

On the antenna connector bend the grounding sleeves out to make better contact:



*Bending out the ground contacts on the antenna connector.*

On the TNC connector, attached to the bottom of the GNSS receiver, bend the small gold fingers in to make better contact:



*Bending the center contacts in towards the center.*

## Configuring an iG8a UHF Rover

Detailed instructions for configuring a UHF Rover can be found in the [Getting Started Guide](#) for the field software supplied with your receivers by iGage.

## Troubleshooting a UHF Base / Rover Pair

### Base Too Close to UHF Rover

The receive radios in the iG8a Rover are very sensitive. This is why they work well at long distances from the Base.

If the Rover is very near the Base (less than 20 feet), the receiver in the Rover may be 'over saturated' and will not be able to *understand* the Base. The Base will be TOO LOUD for the Rover to decipher the correction messages.

If you suspect you are too close to the Base, move the Rover further away or remove the UHF antenna from the Rover to reduce the received signal strength. Don't forget to reattach the UHF antenna to the Rover when you move away from the Base.

Never remove the UHF antenna from a transmitting Base.

### Verify that the Base is Transmitting

Check to ensure that the orange LED above the display on the right side is flashing once each second on the Base:



This LED blinks when a correction message is sent to the radio.

Check that the Base front panel display shows:

**Mode Base Int. UHF**

Can you hear your Base transmit on a handheld radio? Use your handheld receiver to listen to the corrections. Verify that there is not another Base on the same frequency. If you turn off your Base and you still hear corrections then there is another user on your selected frequency.

Does the **Frequency** on the Rover match the Base? Worry about the **Frequency**, not the **Channel**.

Do the Base and Rover radio **Protocols** match? We recommend 'Satel 9600 Baud, 12.5-bandwidth' for the iG8a.

Does the channel **Spacing** (which limits the over-the-air Baud rate) match?

Is the **Base** tracking more than 7 satellites? ('SV: X'; where X is higher than 7)? If not, check that all constellations are enabled in the field software.

Is the position loaded into the Base within 100 meters (Lat, Lon and Ellipsoid height) of the true location? If the position is in error, then the GNSS engine can not generate corrections to broadcast.

Is there a UHF antenna attached to the Base and Rover?

## Debugging a Rover: FIX, FLOAT, WAAS, DGPS, AUTO, SEARCHING

The modes that a Rover will report are:

<b>FIX</b>	Receiving Base corrections, position is high quality
<b>FLOAT</b>	Receiving Base corrections, position is within a few feet
<b>DGPS/WAAS</b>	No Base or Network corrections, but receiving WAAS; 5-foot accuracy
<b>AUTONOMOUS</b>	Tracking satellites, no corrections from Base or WAAS, 20-foot accuracy
<b>SEARCHING</b>	Position has not been computed yet

### Status = FIX

If the display Status shown on the front panel of the iG8a is 'FIX' and the right-hand LED is flashing GREEN:



*Hint: you may need to click a front panel button to turn the display on.*

You are ready to survey. Congratulations!

### Status = 'FLOAT':

If the Rover reports '**Float**' then the connection to the Base (UHF radio or Network connection) is working and RTK corrections are being received.

The GNSS engine cannot resolve ambiguities to FIX the solution.

1. If the Rover is FLOATing, but never fixes, the programmed Base position could be more than 100 meters from the actual Base location. This can happen when you use an incorrect position to initialize the Base.
2. Is the Base within 30 miles of the Rover position? Extremely long Baseline distances take longer to fix and Base to Rover distances > 60 miles may never FIX.

- Is the 'Correction Age' or 'Latency' less than 4-seconds?

Age corrections	3 sec.
-----------------	--------

The age of corrections should not exceed 4-seconds and usually is 0 or 1-second.

- If your Rover is under moderate or heavy canopy, it may take a while for it to FIX ambiguities. Watch the 'Hsdv' and 'Vsdv' (Horizontal and Vertical estimated errors):

Precision 2D	0.012ft
Precision Elev	0.02ft

If they are dropping, then the receiver may FIX after some time and it is worth waiting. If Hsdv / Vsdv continuously reset from a lower to higher value, there may be too much canopy for the GNSS engine to fix.

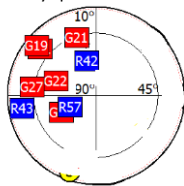
You might be able to move to the open, get a FIX, then carefully move back to the obstructed location and make an accurate measurement.

Changing the elevation mask on the Rover receiver tab may help when under high/dense canopy. Dumping the receiver (turning upside down then right side up) may help.

Raising the rod height may help.

Waiting a while for a better satellite constellation may help.

- If the Rover is FLOATing, but never fixes, there could be high multipath or canopy at the Base. Remember that ANY canopy obstructions at the Base affect EVERY Rover location and every measurement.
- Have you checked Mission Planning?  
If your sky-plot like this:



where all of the satellites are in one quadrant, or the satellite count is very low there may not be enough ranging information get a FIXED solution.

### Status = 'AUTONOMOUS', 'WAAS' or 'DGPS':

The Rover is NOT receiving Base corrections or the Rover is indoors or under very-very heavy canopy and the DGPS/WAAS position is more accurate than the FLOAT position.

When the Rover is in WAAS or DGPS mode, the latency will cycle through 3, 4, 5, 6, 3, 4, 5, 6, ... This is the latency of the WAAS correction, NOT the latency of the UHF radio correction.

Is the right-hand LED flashing once per second?



If it is, then the FEC might not match on the Base and Rover:



If the right-hand LED is not flashing check the following items:

1. UHF Rover: Is a UHF antenna connected to both the Base and Rover?



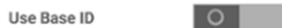
2. UHF Rover: Is the Base broadcasting corrections? See '**Verify the Base is Transmitting**' above.
3. Network Rover: Is the cellular data connection from the data collector to the network server working?
4. UHF Rover: Do the frequencies match on the Base and Rover? The frequencies must match, not just the channel numbers.



5. UHF Rover: Does the radio protocol match? Typically, 'SATEL' on both Base and Rover.



6. UHF Rover: Is the Rover's 'Use Base ID' turned off?



If the Rover is not receiving corrections (the right-hand LED flashing), do not waste of your time waiting for a FLOAT or FIX solution. Your receiver will not FLOAT or FIX until corrections are recieved.

### *Status = 'Searching':*

When the receiver initially boots, it will report 'Searching' until sufficient satellites are tracked to compute an autonomous position. Usually, 7-satellites or more are required to compute a position.

After a long storage or complete engine reset, it may take a few minutes to compute a position.

If the receiver is in a building that completely blocks the view of the sky (a metal roofed building for example) it will not be able to track enough satellites to compute a position and the status will report 'Searching' until the receiver is taken outside.

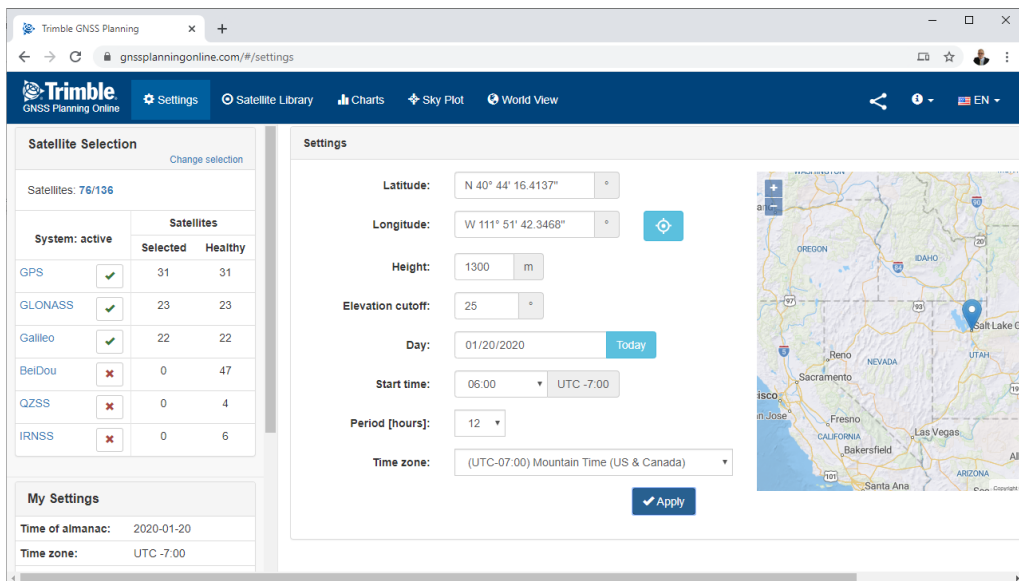


# Mission Planning

Often when working under canopy (urban or forest) the time of day when the worst RTK operation can be easily predicted using 'Online Mission Planning'.

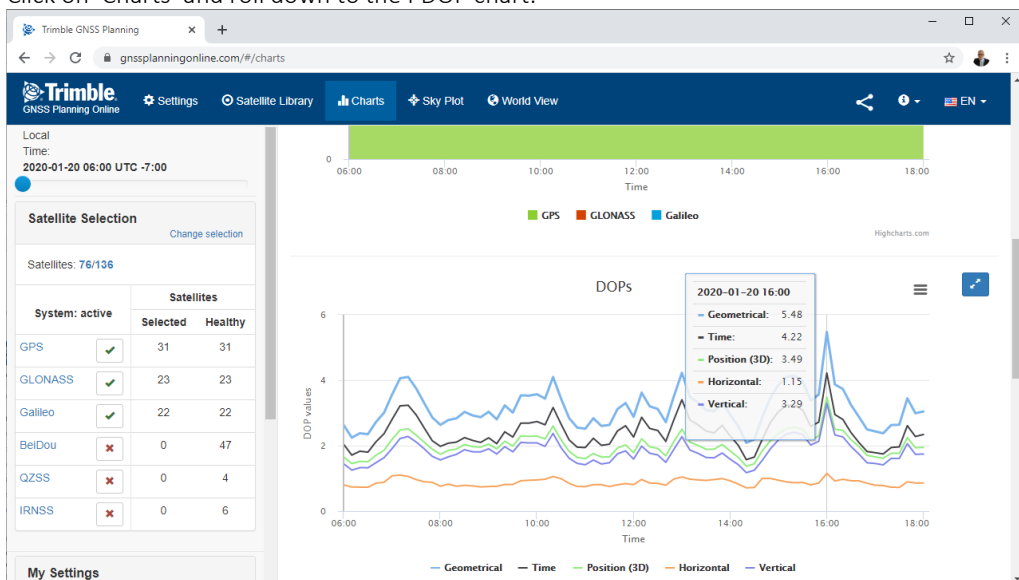
If you perform Mission Planning prior to your field work it is called 'Mission Planning', if you perform it after your field work fails it is called 'Mission Post Mortem'.

There are many web and computer Based mission planning tools. For this example, <https://www.gnssplanningonline.com/> is used.



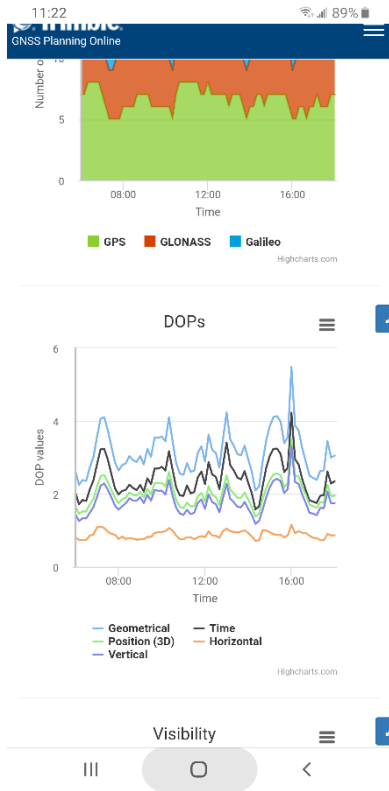
First configure the settings: pay attention to the 'Time Zone' and approximate job height. Set the 'Elevation Cutoff' to a high value like 25 degrees to simulate heavy canopy. Check GPS, GLONASS and Galileo leaving BeiDou unchecked (as it probably will have minimal contribution.) Click 'Apply'.

Click on 'Charts' and roll down to the PDOP chart:



GDOPs higher than 3 will present difficult operation, GDOPs higher than 5 may not fix under canopy. However, as you can see above waiting 20 minutes might make a huge difference.

The Mission Planning tool is also available in a mobile version:



## Configuring an iG8a Network Rover

If your work area is in the service area for a GNSS Network Server and has suitable cellular data coverage you won't necessarily need to setup your own Base. You can use the network to supply corrections. The benefits of a GNSS network include:

- Someone else takes care of getting coordinates correct
- No Base to setup, faster deployment
- No Base to steal, no worry about theft of Base

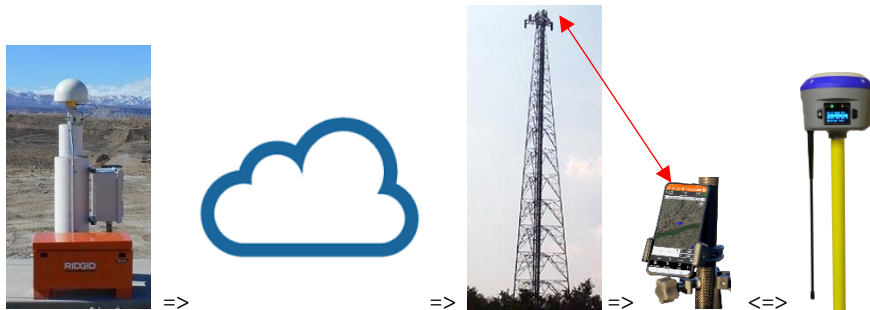
Networks generally provide GPS and GLONASS corrections only or a reduced set of signal tracking.

If the nearest physical network Base is a long distance from your work area, the performance will also suffer from the effective long Baseline from the Base to your Rover. Your working location may be in the center of three network stations, each 30 Km distant. While the Virtual correction won't be as bad as a 30 Km single baseline, it won't be nearly as good as a local base.

While your Rover may not perform as well in difficult conditions (under heavy canopy) the benefit of not having to site and secure a local base is considerable.

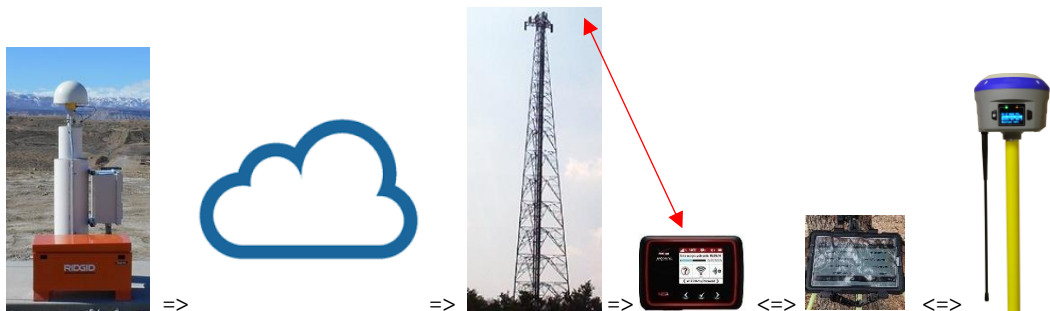
## DCI Method (Data Collector Internet)

DCI (Data Collector Internet) uses the internet connection of the Data Collector to connect to the network server. Corrections are then sent to the GNSS engine in the head:



If the data collector is a Cell Phone or a Tablet with a cellular data connection this is the simplest connection method.

If the data collector does not have a direct cellular connection, then the data collector will need to connect by Wi-Fi to an external hot spot:



## Internal GSM Method



The iG8a does not have a working internal GSM modem so 'Internal GSM' is not possible. Only DCI methods shown above are available.


## Connecting the iG8a to a PC or Smartphone via Wi-Fi



The iG8a receiver has an internal Wi-Fi Access Point which can be used in conjunction with a PC or smartphone to setup and control every feature of the receiver.

First make sure that the Wi-Fi hotspot in the iG8a is turned on.


From the Front Panel

```
SV:14 Auto 100%  
Mode Rover UHF  
Static Off Not Recording  
Receiver Info
```

Highlight the top line, then click on the **Enter** key 

Use the **Fn Next**  button  to move to the third line, highlighting **WiFi Status**

```
18=G08 R05 C00  
Pwr: A 90% B 90%  
WiFi Status Off WiFi Mode  
Hotspot  
3G Status Online
```

If the WiFi Status is **Off**, then click on **Enter** 

```
Open WiFi ?  
Cancel OK
```

Then click on **Enter** again to Open (turn on) Wi-Fi.

The Important Wi-Fi Facts are:

SSID	GNSS-serialnumber
Wi-Fi Key	12345678
Address	192.168.1.1
port	80
User Name	admin
Password	password

Once Wi-Fi is enabled you can connect with a PC or smartphone.

To connect the iG8a, on your PC:

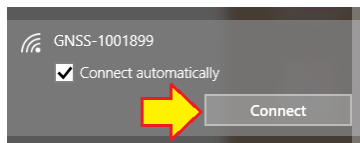


Click on the Network icon in the System Tray

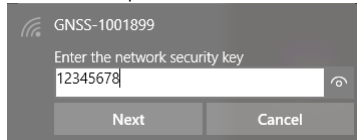
1. Find the iG8a receiver which will be named 'GNSS-' followed by the full serial number of your device:



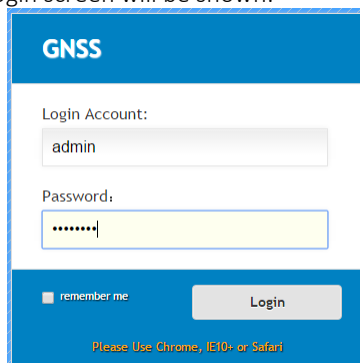
2. Click on 'Connect':



3. Enter the Wi-Fi password "12345678"

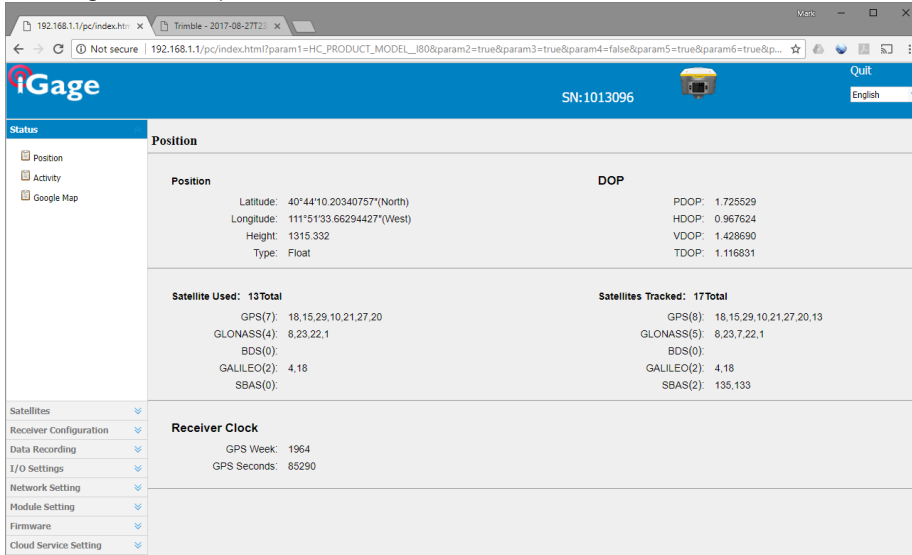


4. Click on 'Next' to connect by Wi-Fi to the GPS head.
5. Open a browser window on your PC and type in the GPS IP address:  
<http://192.168.1.1>
6. A Login screen will be shown:



The **Login Account** is 'admin' and the **Password** is 'password'.

7. Click the 'Login' button, you will be at the 'Home Screen' of the GPS receiver:

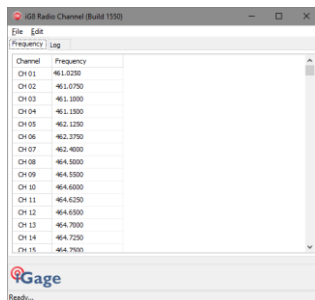


From the Wi-Fi interface, you can configure nearly every aspect of the receiver's operation.

## Programming iG8a Radio Frequencies and FCC ID

In the United States a FCC license is required to operate the UHF radio at any power, on any frequency. Your FCC license will specify one or more frequencies and a 'Call Sign' which must be broadcast at least once every 10-minutes.

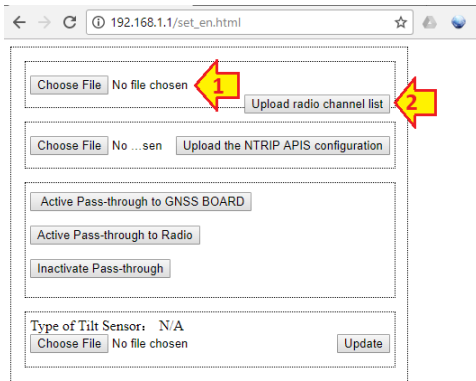
You can download the iG8\_RadioChannel.exe tool from the iG8g.com website. This tool will run on any PC:



With this tool you can create a standard list, modify frequencies, move frequencies up/down. When the frequency list matches your FCC License, then you can save a .CFG file for uploading to the iG8a receiver. The radio tool presents a comprehensive list of warnings please follow them carefully. The fines for illegal operation can be very high.

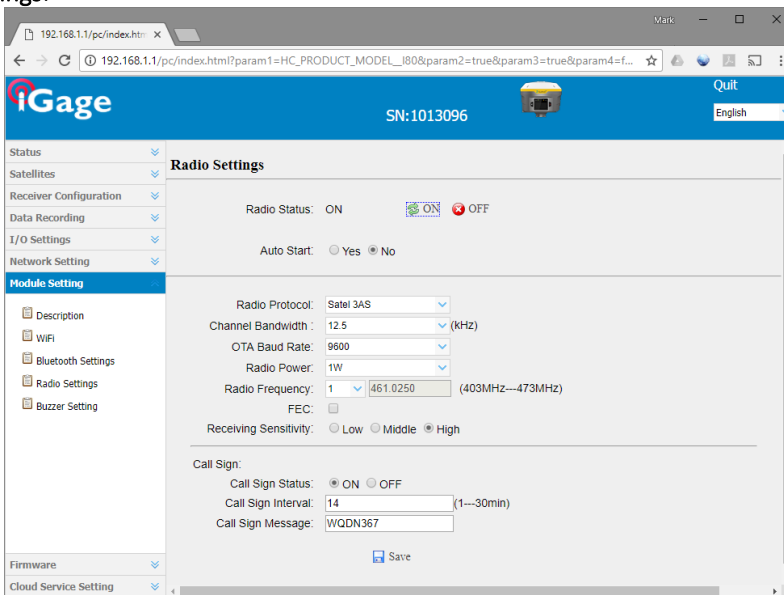
You must login to the GPS receiver using the instructions 'Connecting the iG8a to a PC with Wi-Fi' found on Page 35.

Use a browser and go to this address [http://192.168.1.1/set\\_en.html](http://192.168.1.1/set_en.html) :



(1) Click on 'Choose File' and browse to the settings file, then (2) click on 'Upload radio channel list; and the new radio table list will be installed in the head.

To set the broadcast FCC Call Sign, return to the main menu then click on **Module Setting** then **Radio Settings**:



If the **Radio Status** is **Off**, click **On** to turn on the radio power.

The **Call Sign Status** should be set to **ON**, the **Call Sign Interval** should be 15 minutes or less, the message should be your FCC Assigned Call Sign. Once entered, click on **Save** to commit the changes to the internal radio.

# Downloading, Processing and Archiving Static Data

Your iG8a GNSS receiver works with a download, preprocessing and archive tool called

## iGx Download

This tool works with the NGS OPUS, RTX, AUSPOS and IBGE online products.

iGx Download also automates the generation of RINEX for export to other programs.

## Installing the Download Tool

Insert the provided flash drive in your computer, then run the setup file. Follow the on-screen instructions to install the download tool and the iGx-OPUS support tools on your computer.

You can always get the latest version of the iGx Downloader from the internet and install it directly:

<https://iGGPS.com>

## Downloading Data from iG8a GNSS Receiver

**Summary: Turn on the receiver, wait for it to boot; plug in the USB Cable to your computer.**

The iG8a receiver mounts as a USB thumb drive (flash drive) on your Windows computer. No special drivers are required.

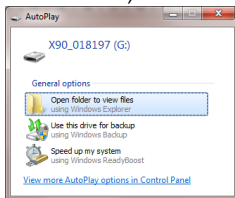
To download data from your receiver:

1. Turn on the GNSS receiver.
2. Wait for the iG8a receiver to fully boot.
3. Plug the USB-C connector into the USB-Mini hole on your iG8a receiver:



and a USB port on your computer.

4. After a moment, for the Window's disk mount screen may appear:



If it does, close it by clicking on the red 'X' in the upper-right corner.

The first time you attach a receiver, you may need to wait up to 2-minutes for standard device drivers to be installed.

The correct drivers are built into Windows XP, Windows Vista, Windows 7, Windows 8 and Windows 10. The drivers are not distributed with the GNSS receiver.

If your receiver does not mount or an error message is displayed, you can unplug the receiver, wait a moment and plug it back in which usually results in a successful connection.



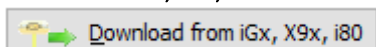
## Starting the Download Tool

You can start the download tool by clicking on the Download shortcut on your desktop:



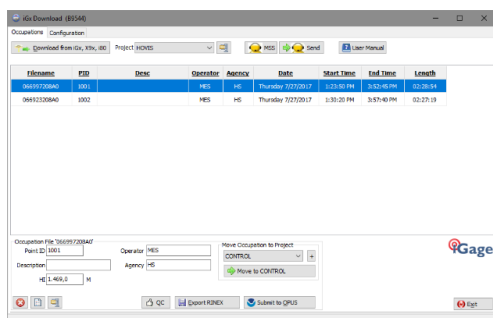
## Using the Download Tool

Assuming the iG8a GNSS receiver is plugged in and has mounted as a drive letter, just press the 'Download from iGx, X9x, i80' button:



The program will automatically switch to the '\_New' project and download every new (not previously downloaded) file from your receiver.

As the .HCN binary files are downloaded from the receiver they are automatically converted to RINEX and added to the '\_New' project and finally displayed in the occupation grid.



You can sort the grid by Filename, PID, Description, Operation, Agency, Start Date/Time, End Date/Time and Length by clicking on the column headers. Clicking twice on the header will reverse order the grid.

If you have any short or unneeded occupations, you can select and delete them:

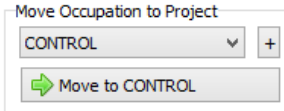


For the remaining observations, enter the values you recorded in your field book:

1. **PID** (Point ID) A unique short identifier for each marker (usually a 4-digit integer.) Only letters, numbers and the underscore are allowed in the PID.
2. **Description** A longer description of the point. Note that quotes "" and "" are not allowed in the description.
3. **HI** The Instrument Height which is the distance from the ground mark to the bottom of the receiver:
  - add 'F' to enter feet
  - add 'S' to enter slant height
  - add 'SF' or 'FS' to enter slant feet height
4. **Operator** This value gets placed in exported RINEX files. By convention this is usually less than 10 alphanumeric characters.

- Agency** This value gets placed in exported RINEX files. By convention this is usually less than 6 characters. A current list of official contributors can be found with this online link: [https://geodesy.noaa.gov/cgi-bin/get\\_contrib2.prl](https://geodesy.noaa.gov/cgi-bin/get_contrib2.prl). If you plan to contribute to NGS or international projects follow this link: <https://geodesy.noaa.gov/FGCS/BlueBook/annexc/annexc.index.shtml> for information on obtaining an agency code.

If the ‘\_New’ folder gets too full, you can make a new project folder (with the “+” button) and move older occupations to the new project:



## Submitting an Occupation to OPUS

Once all of the new occupations have been deleted or assigned to a project you can submit an occupation to NGS OPUS, NGS OPUS-RS, RTX, and AUSPOS. IBGE or post-process them using other software / services.

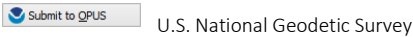
Click on an occupation to select it:

Filename	PID	Desc	Operator	Agency	Date	Start Time	End Time
018197_13_078_A6				IMC	Monday 3/18/2013	4:12:42 PM	4:36:12 PM
018197_13_078_A7				IMC	Monday 3/18/2013	4:36:47 PM	5:04:24 PM
018197_13_079_A1	1001			IMC	Tuesday 3/19/2013	4:03:42 PM	4:19:07 AM

Occupation File: 018197\_13\_079\_A1  
 Point ID: 1001    Operator:    Move Occupation to Project: [dropdown]

Double-check the PID and Instrument Height.

Click on the 'Submit for OPUS' button:



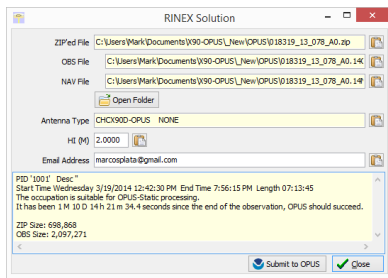
Note, you may select an alternative PPP Service provider (on the configuration tab.) Some of the alternative providers are:



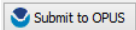
The currently selected occupation will be processed and prepared for upload to OPUS:

- the file is decimated to 15-second epochs, header information is stuffed
- the file is run through TEQC to insure it will be acceptable to OPUS
- an Observation file and a Navigation file are generated
- the Observation file is compressed into a ZIP file

If the ‘Show Advanced Settings’ is set to “Simple” then the program will skip directly to the ‘Verify Filename to Upload’ screen (shown below.) If ‘Show Advanced Settings’ is set to “Normal”, “Support OPUS-Projects” or “Advanced” then this ‘RINEX Solution’ helper screen is shown:

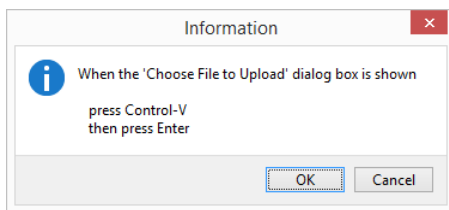


The program will suggest which service (OPUS-Static or OPUS-RS) and list the time since the end of the occupation. You can click the 'Submit to OPUS' button:

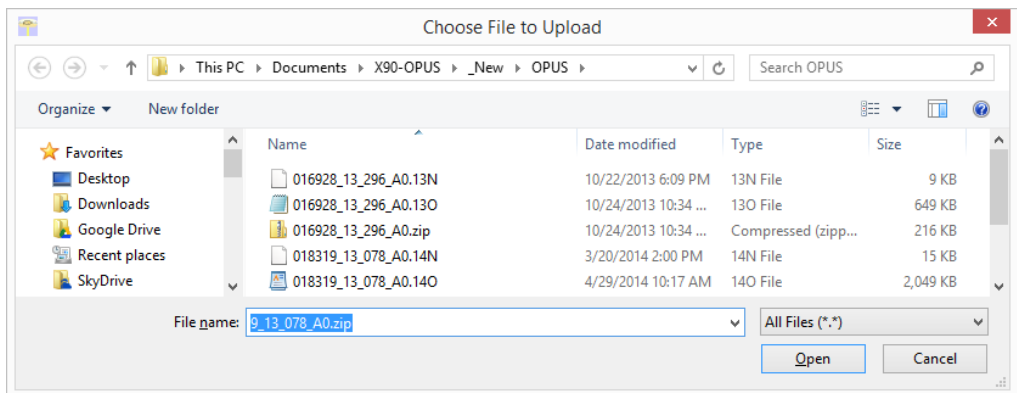


to automatically open an internet browser at the NGS OPUS Submission form. When the web page has loaded, the program will automatically fill in the 'Antenna Height' and the 'Email address.'

**Verify Filename to Upload:** The program will prompt you:



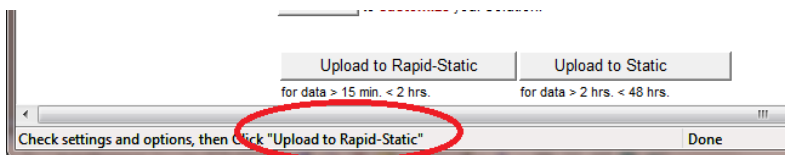
Click OK and then 'Choose File to Upload' will be displayed:



Press Control-V, then the 'Enter' key on your keyboard. You may also press Control-V, then click the 'Open' button with your mouse.

You will need to manually select the antenna type as prompted by the **iGx Download** tool. The download tool cannot automate the antenna selection.

The NGS OPUS Submission form will be ready to submit, check the entries and any extended options that you might want to use. The status bar will prompt you with the correct submission button:



Press either the 'Upload to Rapid-Static' or 'Upload to Static' button as directed, and your occupation will be uploaded to OPUS for processing.

## Setting the Receiver Type

(Hidden when Simple)

When files are downloaded from the receiver, the receiver type is associated with the .HCN file. The 'Receiver Model' shows an occupation's associated hardware type:

Receiver Model

If this is consistently incorrect, you can modify the device type while it is connected on the 'Configuration' tab.

## Viewing the Observation Log

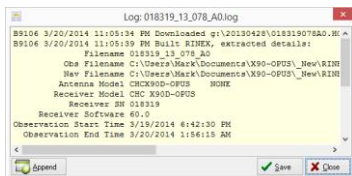
(Hidden when Simple)

A detailed log is automatically kept for the files that you download and submit for processing.

Pressing the 'Log'



button shows the log file for the currently selected observation:



Pressing the 'Append'



button adds a date/time stamp and opens the log for user editing.

Press 'Save' to store your changes or 'Close' to close without saving.

## Trimming Occupation Files

(Hidden when Simple)

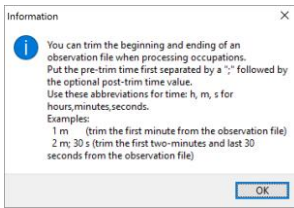
Trim RINEX  ?

Sometimes you may want to trim the start or end of an occupation file before you submit it to OPUS.

Common reasons for wanting to do this include:

- Receiver is turned on while sitting on your tailgate and then moved 20 feet and spun onto the tripod. The first 5-minutes of the observation are bogus.
- The operator forgets to turn off the receiver and observation data is collected while the receiver is transported back to the truck. The last 2 minutes of the observation file are bogus.
- The observation extends 5-minutes past midnight UTC, you don't want to wait an extra day to process. Trim 6 minutes from the end of the file.

Clicking the '?' button to the right of the trim dialog displays usage instructions:



Note: the trimmed length is not reflected in subsequent screens or on the occupation grid. Only the submitted file is trimmed, all the original data remains in the stored occupation. The trim settings must be reloaded after each submission.

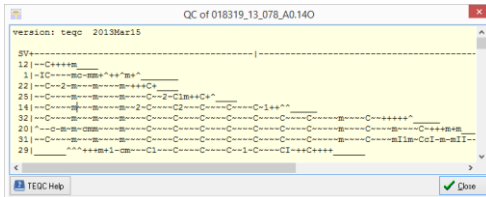
## Performing Quality Control Checks

*(Hidden when Simple)*

Pressing the



button will launch the UNAVCO TEQC tool and run a standard RINEX QC run on the currently selected observation file. When the run is complete, the results will be shown in a window:



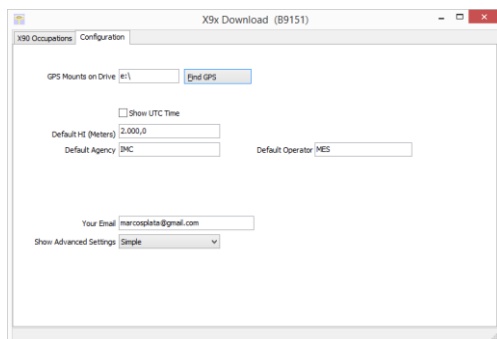
You can press the 'TEQC Help' button to download the User Guide for TEQC from the UNAVCO web site.

TEQC is a great tool for evaluating both the receiver's performance and the site suitability for collected data.

## Advanced Download Settings

### Configuring the Download Tool

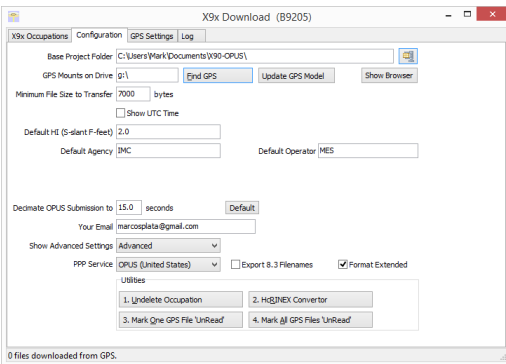
Click on the 'Configuration':



At a minimum enter these values:

- Agency** your company name
- Operator** the name of the default operator
- Email** your email address

If you change 'Show Advanced Settings' from 'Simple' to 'Normal', 'Support OPUS Projects' or 'Advanced' additional setup values are shown:



You can change the rest of the configuration values as needed. Here are detailed descriptions for each of them:

## 'Base Project Folder'

*(Hidden when Simple)*

Base Project Folder:

This is the full Window's path to the Base folder where all of the data is stored. The default location is in your 'Documents' folder in a folder named **iGx\_Projects**.

Double-click over the current path to change the folder location.

The download tool will create a sub-folder for each Project that you add. In addition, there are always three special folders:

### **\_New**

New occupation files downloaded from the receiver are placed here first.

### **\_Deleted**

Deleted occupations are not really deleted, they are moved to the **\_Deleted** folder. An undelete function is included in Utilities on the Settings tab.

### **\_Error**

Sometimes short occupations won't include navigation records, these short files end up in this folder.

## 'Archive All Projects'

*(Hidden when Simple)*



Pressing the 'Archive' button to the right of the Base Project Folder entry will back up every occupation in every project to a single ZIP file.

This is handy if you want to move all your data to another computer or make regular disaster backups.

There are similar Archive buttons on the main page: one archives the current occupation and the other archives the current project.

The download tool does not provide a method to restore these backups, however they are standard ZIP files and the Windows operating system does include a tool to decompress them.

## 'GPS Mounts on Drive'

GPS Mounts on Drive

This is the drive letter that the GPS receiver was last found on. Don't worry if the drive letter changes each time you plug in a receiver, the program will automatically find the receiver as you download data.

If you want to verify that the GPS receiver is connected and has successfully mounted as a drive, press 'Find GPS'.

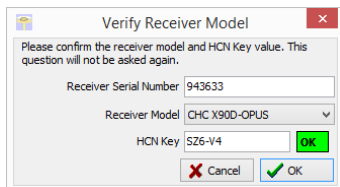
Note: If you manually delete every single file and folder from the GPS receiver, the program won't be able to automatically detect the receiver until the GPS has recorded at least one file.

## 'Update GPS Model'

*(Shown only when Advanced selected.)*

The GPS Model is written into the receiver at the factory. If you delete ALL of the files on the receiver or format the receiver (it is a standard flash drive) it is possible that it will lose its receiver type.

With the receiver attached to your computer with the USB cable, click on the 'Update GPS Model' button to display this dialog:



Use the drop-down 'Receiver Model' to change the receiver type. If the HCN Key has been lost, you can find it written on a white sticker inside the battery compartment. You cannot edit the 'Receiver Serial Number'.

If the HCN Key has been correctly entered, the 'OK' will be shown in a green box, otherwise it will display '????' in a red box.

## 'Minimum File Size to Transfer'

*(Hidden when Simple)*

Minimum File Size to Transfer  bytes

Every time you turn on the GPS receiver, it will attempt to track satellites and open a new occupation file. Often several small junk files will be created that don't have any meaningful data and are of no value.

The download tool will automatically ignore files smaller than this minimum value. This keeps useless files from being transferred to your computer.

## 'Show UTC Time'

Show UTC Time

When unchecked (the default,) the download tool will show the observation start and end times in your local time zone. If you check 'Show UTC Time', then the times are displayed in the UTC time zone.

## 'Default HI'

Default HI (S-slant F-feet)

When you download an occupation from the receiver, this HI will be the default associated with every occupation. You can change the HI for each individual occupation later, this is just the default. If you ALWAYS use a 2-meter range pole, then this value will always be 2.000 and you won't have to worry about HI blunders.

**FEET:** If you measure up in feet, you can enter the height in decimal feet and put an 'F' after the measurement. The program will automatically convert to Meters for you.

**SLANT HEIGHT in Meters:** If you measure a slant height, enter an 'S' after the measurement and the program will compute the vertical height for you.

**SLANT HEIGHT in FEET:** If you measure a slant height in feet, enter 'SF' or 'FS' after the measurement and the program will compute the vertical height in Meters for you.

Note: if you use the 'PPP Service' = 'RTX (CenterPoint)' the submitted RINEX file spoofs an 'UNKNOWN EXT NONE' and adjusts your actual HI to reflect the generic antenna L1 offset.

## 'Default Agency'

Default Agency

Enter your company name here. This value is placed into every RINEX file that is exported. You can override this value on a file-by-file basis.

Typically, the Agency name is two to five characters with no spaces. While most strings up to 20 characters in length will be accepted, you may cause issues with other programs that consume generated RINEX. It is safest to keep this short with no special characters.

## 'Default Operator'

Default Operator

Enter the default name of the operator here. This value is placed into every RINEX file that is exported. You can override this value on a file-by-file basis.

Typically, the Operator name is two to five characters with no spaces. While most strings up to 20 characters in length will be accepted, you may cause issues with other programs that consume generated RINEX. It is safest to keep this short with no special characters.

## 'Decimate OPUS Submission to ...'

*(Hidden when Simple)*

Decimate OPUS Submission to  seconds

When you submit a file to OPUS, it is always decimated at the NGS server to 30-second epochs (recording interval = 1 point every 15 seconds.) The default recording interval for most iGage receivers is 1 or 5-seconds.

By pre-decimating the RINEX file before upload, it is reduced to 1/6<sup>th</sup> to 1/30<sup>th</sup> the original size. This makes the upload process much faster while having no impact on the resulting solution.



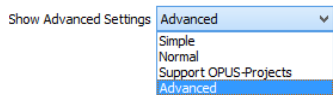
Observations submitted to RTX are not decimated, AUSPOS submissions are decimated to 15 seconds. Observations exported directly to RINEX using the 'Export RINEX' button are never decimated.

## 'Your Email'

Your Email

When you submit a file to OPUS, you need to provide your Email address so the OPUS processor can return a solution to you. The email address that you enter here will be used for all automatic submissions.

## 'Show Advanced Settings'



This setting determines the complexity of the **iGx Download** program.

### **Simple:** *(the Default setting)*

Hides archive functions, Minimum File size,

Receiver Model, Antenna Name Decimate setting, QC function, Export to RINEX button, OPUS-Projects, the GPS Settings tab and the Log tab.

### **Normal:**

Shows everything except for OPUS-Projects, the GPS Settings and Log tab.

### **OPUS-Projects:**

Displays the OPUS-Projects checkbox which allows automatic submission to an NGS registered project.

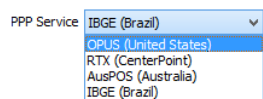
### **Advanced:**

Displays the GPS Settings and Log tabs.

Typically, you will never need to use the 'Advanced' setting and functions.

## 'PPP Service'

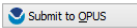

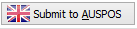
*(Hidden when Simple)*



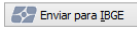
The Download tool supports several PPP (Precise Point Positioning) services.

The submit button on the main page tracks this setting and the upload strategy is adjusted to each available service.

Additional Information is available on each service on the web:

- OPUS:   
<https://geodesy.noaa.gov/OPUS/>
- RTX:   
<http://trimblertx.com>
- AUSPOS:   
<http://www.ga.gov.au/bin/gps.pl>

IBGE:



<http://www.ibge.gov.br/home/geociencias/geodesia/ppp/default.shtm>

## Export 8.3 Filename

*(Hidden when Simple)*

Export 8.3 Filenames

When unchecked, the Download program submits files using filenames like this:

917226\_20\_072\_A0.OBS

The device serial number, the year, the Julian day of year and the observation number. Some services and programs (like NGS OPUS) prefer names in an 8.3 (xxxxxxx.xxx) format.

Checking this box results in exported filenames like:

10050720.200

Where 1005 is the first four characters of the Point ID, 072 is the Julian date, 0 is the observation number, 20 is the year and O indicates an observation file.

## Format Extended

*(Only shown when PPP Service = OPUS)*

Format Extended

The NGS returns three styles of reports:

**Standard:**

Single Page Report

**Extended:**

Standard + Baseline details + State Plane in US Survey Feet or International Feet as appropriate Standard XML: Single Page XML

For new OPUS users, the 'Format Extended' includes one important addition: State Plane coordinates are shown in both Meters and US Survey Feet (or International Feet) at the bottom of the report. The download tool defaults to 'Extended' checked for this reason.

Prior to submitting an OPUS report, you can modify any of the Option settings, however checking this box results in the extended output always initially being checked.

## Utilities

*(Hidden when Simple)*

Additional utilities for working with observations are included.

### “1. Undelete Occupations”

When you delete an observation, it is actually moved to a special “\_Deleted” folder.

Clicking the **Undelete Occupation** button allows you to specify a deleted observation to restore.

When an occupation is undeleted, it is always returned to the \_New project.

## “2. CHCData RINEX Convertor”

Files are stored on the receiver in an '.HCN' binary file. When the tool downloads a file, it is automatically converted to standard RINEX using the CHCData RINEX tool.

Clicking this button runs the CHCData RINEX tool in manual mode. You can browse for HCN files and manually convert them to standard RINEX files. Results are always placed in a subfolder named 'RINEX' under the file to be converted.

## “3. Mark One File Unread”

When files are downloaded from the receiver, they are not deleted from the receiver. The filename on the receiver is modified to begin with an underscore '\_'.

This function allows you to specify a single file to mark as 'unread.' Once a file is unread the next download action will re-download and convert the file.

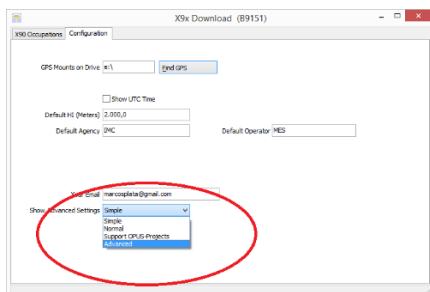
## “4. Mark All GPS Files Unread”

This function marks EVERY observation file on the receiver as unread. The next download will read every single file on the receiver. (This will take quite a bit of time if your receiver has hundreds of files.)

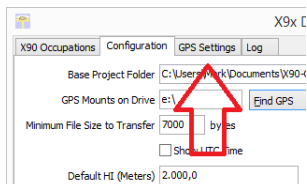
## GPS Settings

*(Hidden when Simple)*

To modify the 'GPS Settings' or view the log, select the 'Configuration' tab, then choose 'Show Advanced Settings = Advanced.'



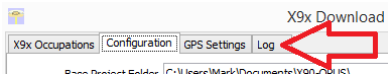
When 'Advanced' is selected, two additional tabs will be displayed:



## GPS 'Settings' Tab

The GPS Settings options on the download tool are not compatible with the iG8a. You can use the front panel controls or the Wi-Fi connection to make recording interval changes to the iG8a.

## The 'Log' Tab



The 'Log' tab shows detailed results of the current program operation. It may be useful to debug some aspect of file processing.

## OPUS: What is it?

OPUS (Online Positioning User Service) is a free service provided by the NGS (National Geodetic Survey.)

From the NGS Website:

“This Online Positioning User Service (OPUS) provides simplified access to high-accuracy National Spatial Reference System (NSRS) coordinates. Upload a GPS data file collected with a survey-grade receiver and obtain an NSRS position via email.

OPUS requires minimal user input and uses software which computes coordinates for NGS' Continuously Operating Reference Station (CORS) network. The resulting positions are accurate and consistent with other National Spatial Reference System users.”

Here are direct links to more detailed information:

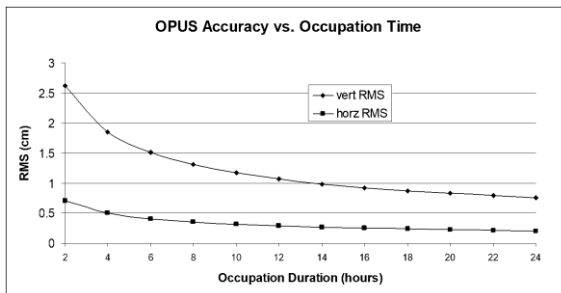
<http://geodesy.noaa.gov/INFO/OnePagers/OPUSOnePager.pdf>

<http://geodesy.noaa.gov/OPUS/about.jsp>

One of the most important contributors to vertical accuracy computed by OPUS-Static is the length of occupation: longer times are better.

If you are concerned about elevation, please remember that a 2-hour OPUS static observation has an expected height accuracy of 2.5 cm. A 6-hour occupation has an expected accuracy of 1.5 cm.

Again, longer times are better. Your expectations should be tempered by this NGS graph:



## OPUS-RS (Rapid Static)

Standard OPUS-Static sessions require 2-hour observations. OPUS-RS sessions can be as short as 15-minutes.

However, OPUS-RS solutions are not available universally. In general, OPUS-RS requires:

3 (or more) CORS within 250 km of your site your site must be within 50 km of the polygon formed by the CORS sites

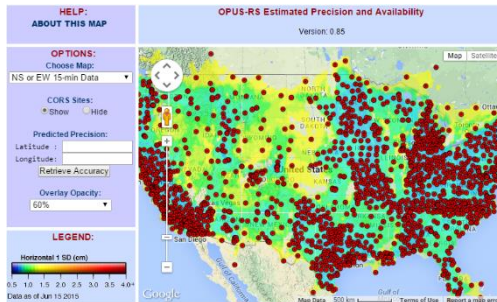
If you are working in a remote area or in a coastal area where it is not possible to surround your site with CORS, OPUS-RS probably will not work and you will have to collect more than 2 hours of data for submission to OPUS-STATIC!

Prior to collecting data for OPUS-RS check the latest status map to ensure that OPUS-RS will work.

The online OPUS-RS resource

[http://geodesy.noaa.gov/OPUS/Plots/Gmap/OPUSRS\\_sigmap.shtml](http://geodesy.noaa.gov/OPUS/Plots/Gmap/OPUSRS_sigmap.shtml)

is updated routinely and reflects the probability that an occupation at a given location will be successful and the expected accuracy for a 15-minute and 1-hour occupation.



In some areas there is a risk that if a single CORS site is unavailable, your OPUS-RS job will not be processed. Caution and planning are suggested for OPUS-RS jobs.

## OPUS-Projects

OPUS Projects is an online processing tool. Its use requires taking a NGS training class, but the invested time is well worth it as OPUS-Projects will allow you to combine the observation files from multiple receivers and multiple sessions.

There is an excellent article and video describing OPUS Projects in the October 2013 'American Surveyor' magazine. Search for "OPUS-Projects: The Next Revolution in GPS" to find a full resolution PDF.

## OPUS Error Messages and Failures

There are lots of possible error messages when processing OPUS solutions. It is our experience that almost all errors fall into a single category:

"There is not enough nearby CORS data to effectively process your occupation...yet."

In general, the solution is nearly always the same:

"Wait until more data becomes available and resubmit your job."

If you are processing OPUS-RS jobs in an area with very few CORS stations, and one CORS station was offline, waiting will not help. OPUS-Static is the solution for locations where OPUS-RS is not dependable.

CORS stations can report observations hourly or daily. In some areas (typically UNAVCO PBO sites) most of the sites report once at the end of each day (GMT.) So, data that is needed to process your job is not available until 4:00 am GMT on the day after you collect data.

The Download tool allows you to submit jobs to alternative services like AUSPOS and RTX. Typically, these alternative services closely match OPUS.

If you submit an observation to OPUS and nothing comes back, check your SPAM folder. OPUS solutions are regularly misidentified as spam.

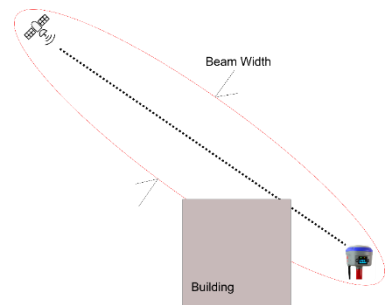
OPUS is sometimes unavailable or takes longer than other times.

The Fresnel effect explains for why your GPS receiver will track a satellite which is fully behind a building or ridgetop. The beam width is wide enough that a portion of the signal reaches the GPS receiver, even though the beam's center is fully blocked by the building.

Tracking a satellite means that the satellite is 'visible' to your receiver, however just tracking is not sufficient to accurately evaluate a carrier-phase position.

To compute an accurate position, your receiver needs a very clean signal with few reflections, obstructions, or delays. Any object blocking a part of the beam can be a source of reflection, attenuation, or delay.

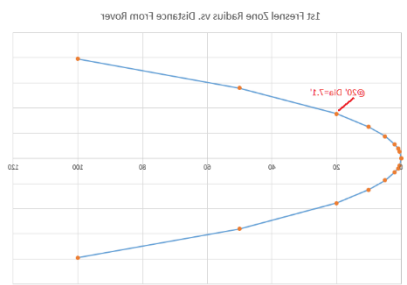
Clear path means that you don't just need a small opening in the trees for a laser beam to shoot through. You need an opening in the trees large enough that most of the energy which is spread out over the Fresnel beam width reaches the receiver with no obstructions.



**How wide is the Fresnel beam along the path?** Much wider than you think!

Here is a beam-width chart for GPS L1 (1.575 GHz):

Distance	1st Fresnel Dia
0.0	0.0
0.5	1.1
1.0	1.6
2.0	2.2
5.0	3.5
10.0	5.0
20.0	7.1
50.0	11.2
100.0	15.8
33000000.0	6414.3



1 foot above your GNSS antenna, the beam width is 1.6' in diameter. 20 feet above the Rover antenna (perhaps the midpoint of tree canopy), the 1<sup>st</sup> Fresnel beam diameter is 7 feet! A clearing in the treetops 100' above your antenna needs to be 16' in diameter.

At the midpoint between your receiver and the satellite, the Fresnel beam is over 6,000 feet in diameter! And that is for the signal for a single satellite, multiply this by the number of tracked satellites and there is signal energy everywhere.

## OPUS Best Practices Conclusion

There are lots of things that can go wrong with OPUS occupations. Some you can control, some you can't.

If you stack multiple problems:

Bad Constellation + Short Occupation + Moderate Canopy + Bad HI => FAILURE

Your OPUS solutions will fail or have high RMS estimates and the time you spent collecting the observation will be wasted.

The OPUS family of online tools: OPUS-Static, OPUS-RS, OPUS-Projects are amazing. They allow users to generate reliable X, Y and Height coordinates for GPS suitable locations, anywhere in the world. Hopefully by utilizing the simple rules presented in this chapter, all your jobs will be

***OPUS-Successful!***

# Troubleshooting the iG8a Receiver

## 1. Receiver won't turn on:

Battery is fully discharged: Charge battery or use external power.

Contacts on battery are dirty: Clean battery and receiver contacts with a soft cloth or soft eraser.

Battery is bad: Try another battery.

## 2. Is the receiver tracking satellites?

The BLUE LED flashes once for each SV (satellite vehicle) that is currently tracked.

If you are indoors, the LED will flash **once** every 5-seconds. However no SV's will be tracked.

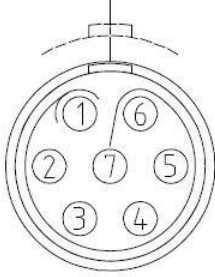
The receiver should begin tracking within 30-seconds after a warm start. After a cold start (off for more than 1 week) it may take 90-seconds for the receiver to begin tracking.

## 5. The GPS receiver won't mount as a Disk Drive.

1. Before plugging GPS cable into your PC, did you wait for the power LED to blink 3 times?
2. Unplug, wait 15-seconds, try again
3. Try another USB port.
4. Use an external USB Hub (this fixes intermittent disk mounts)
5. Try other computers.
6. Try turning off your PC, wait a minute and then turn on again. Reinsert the USB cable.

# iG8a Serial and USB IO Port Definitions

## Serial IO Port Definition

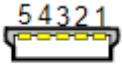


PIN	FUNCTION
1	Ground (-)
2	Ground (-)
3	RS232-TX (Output)
4	PPS (Pulse Output)
5	Not Used
6	VIN
7	RS232-RX (Input)

Figure 6 iG8a 7-Pin Serial IO Lemo Connection Information

## USB Port Definition

The iG8a has a standard USB-Mini connector.



Mini-B

Pin	Name	Wire color	Description
1	V <sub>BUS</sub>		+5 V
2	D-	White	Data-
3	D+		Data+
4	ID	No wire	"A" plug (host): connected to GND "B" plug (device): not connected
5	GND		Signal ground



# Upgrading Firmware

## Updating Firmware with the OTG Cable

*Note: You can also upgrade the device using a Wi-Fi connection using a web browser.*

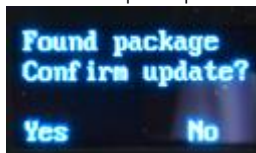




Figure 7 updating the iG8a Firmware with the OTG Cable

1. Download the latest OEM firmware from the iG8a website:  
<https://ig8g.com/out/firmware/OEM/index.htm>
2. Copy the firmware file (xxx.bin file) to the root directory of a thumbdrive.
3. Turn off the receiver.
4. Connect the thumbdrive to the receiver through USB port using the OTG cable.



5. Restart the receiver by pressing the power button for three seconds. After 15-seconds the LCD screen will prompt to upgrade the firmware.



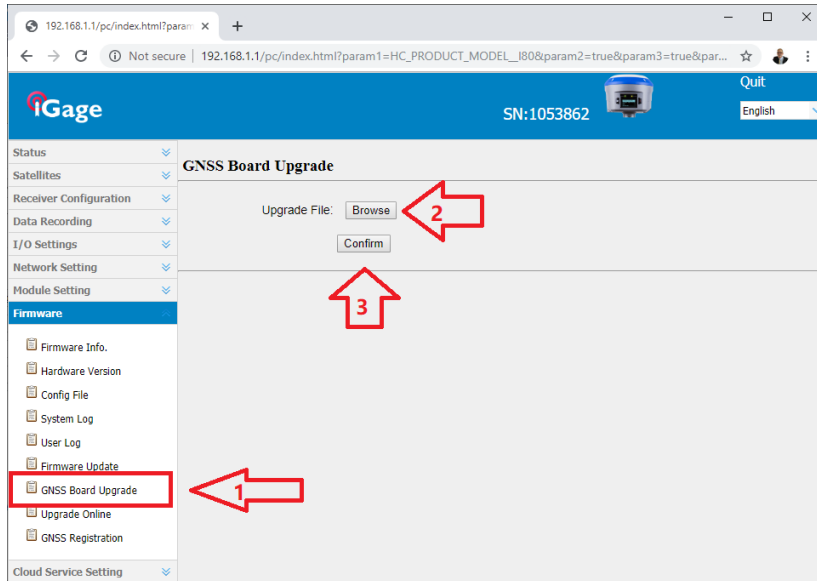
6. Press left-hand pages button  to upgrade the firmware.
7. When the firmware upgrade is complete, the receiver will be restarted and the LCD screen will again prompt to upgrade the firmware again.
8. Press the right-hand select button  to quit the upgrade process, then remove the OTG cable.

## Updating Firmware with the Web Interface

Download the OEM firmware from the iG8a website:

<https://ig8g.com/out/firmware/OEM/index.htm>

Follow the instructions in section ‘Connecting the iG8a to a PC or Smartphone via Wi-Fi’ on page 35 to get your PC connected to the receiver by Wi-Fi. (1) Click on Firmware, then ‘GNSS Board Upgrade’, then (2) ‘Browse’ and find the firmware finally (3) click on ‘Confirm’. The receiver will reboot twice during the upgrade process.



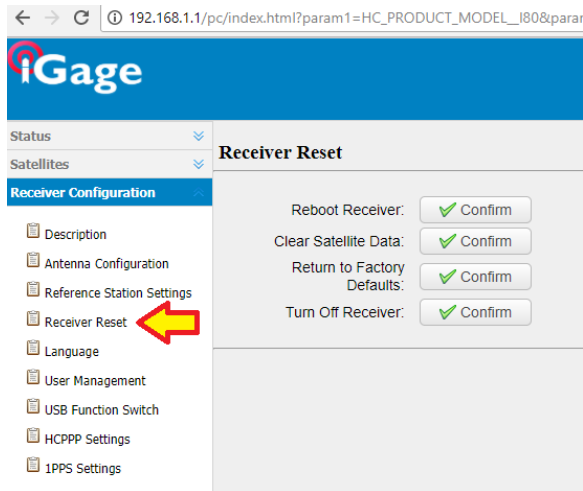
## GNSS Reset

It is possible to reset the iG8a from the Front Panel and from the web interface. This procedure should not be required for normal operation.

### Web Interface Reset

Connect your PC or smartphone to the iG8a receiver as shown in 'Connecting the iG8a to a PC with Wi-Fi' on page 35.

From the Main Menu,



Click on **Receiver Configuration: Receiver Reset**. You can reboot the entire receiver, clear the satellite ephemeris data, and reset the iG8a head back to factory defaults or turn off the receiver.

### Front Panel Reset

To reset the system from the Front Panel:

From the main menu:



Push and hold the pages key  then quickly click (press-release) the power key  five times.

Watch the display for the SV count to go to 0, the SV count will change to 'Getting' as the GNSS engine re-initializes.

# iG8a Antenna Model

The iG8a receiver has a robotic type mean antenna calibration performed by Geo++ GmbH.

The .atx and .gra files for the iG8a can be found on the website <https://iG8g.com>

## Summary

L1	114.0 mm
L2	91.07 mm
Radius	67.7 mm
SHMP	83.9 mm
ARP	Bottom of Antenna Mount (BAM)
North Reference	Turn Display to North

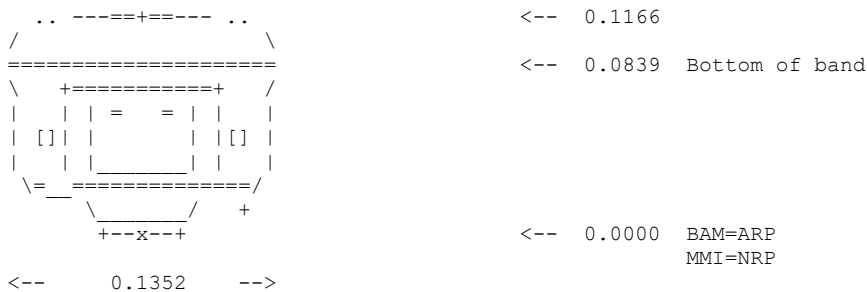
The antenna designator is "IGAIG8 NONE"  
12345678901234567890

A summary of the .atx file:

```
G01                                START OF FREQUENCY
  -0.76      +0.28   +114.00      NORTH / EAST / UP
G02                                START OF FREQUENCY
  +2.50      +0.48   +91.07      NORTH / EAST / UP
```

Filename: igai8.gra; Antenna reference points and dimensions

IGAIG8



## 'Slant Height' to 'Vertical Height':

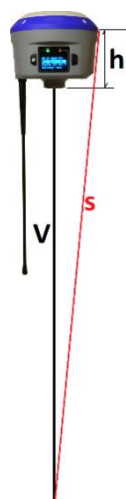
### Manually Converting Heights

Receiver	Radius r (meters)	SHMP h (meters)
iG8a	0.0677	0.0839

$$v = \sqrt{s^2 - r^2} - h$$

### Examples

Measured Slant s (feet)	Slant s (m)	iG8a Vertical v
6.965	2.123	2.0380
5.148	1.569	1.4837



## Warranty

Before you get hung-up with hardware and software problems, please give us (iGage Mapping Corporation) a call:

+1-801-412-0011

Our goal is to take great care of our customers and be reasonable with everyone. Our response to issues may exceed your expectations and our written warranty.

IMC is "iGage Mapping Corporation" of Salt Lake City Utah USA.

IMC warrants the iG8a receivers, which we sell, to be free of defects in material and workmanship and will conform to our published specifications for these periods:

iG8a GPS receivers:	1-years
Cables and accessories:	1-year
Batteries:	90-days

This warranty applies only to the original purchaser of the product.

**Hardware:** Purchaser's exclusive remedy under this warranty shall be limited to the repair or replacement, at IMC's option, of any defective part of the receiver or accessories which are covered by this warranty. Repairs under this warranty shall only be made by IMC at an IMC service center. Any repairs by a service center not authorized by IMC will void this warranty.

In the event of a defect, IMC will at its option, repair or replace the hardware product with no charge to the purchaser for parts or labor. The repaired or replaced product will be warranted for 30-days from the date of return shipment, or for the balance of the original warranty, whichever is longer.

**Software:** IMC warrants that software products included with hardware products will be free from media defects for a period of 30-days from the date of shipment and will substantially conform to the then-current user documentation provided with the software. IMC's sole obligation shall be the

correction or replacement of the media so that it will substantially conform to the then-current user documentation. IMC does not warrant the software will meet purchaser's requirements or that its operation will be uninterrupted, error-free or virus-free. Purchaser assumes the entire risk of using the software.

## Exclusions

The following are excluded from the warranty coverage:

- Periodic maintenance and repair or replacement of parts due to normal wear and tear.
- Display windows.
- Product Finishes.
- Batteries exposed to heat, cold; or batteries opened or physically damaged.
- Installations or defects resulting from installation.
- Any damage caused by (i) shipping, misuse, abuse, negligence, tampering, or improper use; (ii) disasters such as fire, flood, wind, and lightning; (iii) unauthorized attachments or modification.
- Service performed or attempted by anyone other than an authorized IMC service center.
- That the receiver will be free from any claim for infringement of any patent, trademark, copyright or other proprietary right, including trade secrets.
- Any damage due to accident, resulting from inaccurate satellite transmissions. Inaccurate transmissions can occur due to changes in the position, health or geometry of a satellite or modifications to the receiver that may be required due to any change in the GPS. IMC GPS receivers use GPS satellites to obtain position, velocity and time information. GPS is operated by the US government, which is solely responsible for the accuracy and maintenance of the GPS system. OPUS and OPUS-RS is a service of the NGS and IMC shall not be responsible for issues with NGS provided services.

Except as set forth in this limited warranty, all other expressed or implied fitness for any particular purpose, merchantability or non-infringement, are hereby disclaimed.

IMC shall not be liable to the purchaser or any other person for any incidental or consequential damages whatsoever, including but not limited to lost profits, damages resulting from delay or loss of use, loss of or damages arising out of breach of this warranty or any implied warranty even though caused by negligence or other fault of IMC or negligent usage of the product.

In no event will IMC be responsible for such damages, even if IMC has been advised of the possibility of such damages.

**This written warranty is the complete, final and exclusive agreement between IMC and the Purchaser.**

## RMA

To obtain warranty service from iGage Mapping Corporation the purchaser must obtain a return materials authorization (RMA) number prior to shipping by calling

+1-801-412-0011

Or by email:

info@iGage.com

Purchaser's return address and the RMA number must be clearly printed on the outside of the package. IMC reserves the right to refuse to provide free-of-charge service if the date of sale cannot be determined or if the serial number is altered or removed. IMC will not be responsible for any losses or damage to the product incurred while the product is in transit or is being shipped for repair. Insurance is recommended. IMC suggests using a traceable shipping method such as UPS, FedEx or USPS with signature tracking when returning a product for service.

Do NOT send batteries with equipment for repair. If you do, they will not be returned as we are unable to ship used batteries.

The Purchaser shall always pay shipping to IMC, **IMC will return warranty repairs by UPS ground**, unless the Purchaser agrees to prepay expedited service costs. IMC will not pay for warranty returns to destination outside of the contiguous 48-states. The purchaser shall always pay any associated duty associated with warranty repairs.