

USER GUIDE

Trimble R1 GNSS Receiver

Version 1.00
Revision C
June 2016



Corporate Office

Trimble Navigation Limited
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Legal Notices

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Made for

- iPhone 6 Plus, iPhone 6
- iPhone 5s, iPhone 5c, iPhone 5
- iPad Air, iPad Air 2
- iPad mini with Retina display
- iPad (4th generation)
- iPad mini



"Made for iPhone," and "Made for iPad" mean that an electronic accessory has been designed to connect specifically to iPhone or iPad, respectively, and has been certified by the developer to meet Apple performance standards. Apple is not responsible for the operation of this device or its compliance with safety and regulatory standards. Please note that the use of this accessory with iPhone or iPad may affect wireless performance.

Limited Warranty Terms and Conditions

Product Limited Warranty

Subject to the terms and conditions set forth herein, Trimble Navigation Limited ("Trimble") warrants that for a period of 2 years from date of purchase this Trimble product (the "Product") will substantially conform to Trimble's publicly available specifications for the Product and that the hardware and any storage media components of the Product will be substantially free from defects in materials and workmanship.

Product Software

Product software, whether built into hardware circuitry as firmware, provided as a standalone computer software product, embedded in flash memory, or stored on magnetic or other media, is licensed solely for use with or as an integral part of the Product and is not sold. The terms of the end user license agreement, as included below, govern the use of the Product Software, including any differing limited warranty terms, exclusions and limitations, which shall control over the terms and conditions set forth in the limited Product warranty.

Warranty Remedies

If the Trimble Product fails during the warranty period for reasons covered by this limited warranty and you notify Trimble of such failure during the warranty period, Trimble will repair OR replace the nonconforming Product with new, equivalent to new, or reconditioned parts or Product, OR refund the Product purchase price paid by you, at Trimble's option, upon your return of the Product in accordance with Trimble's product return procedures then in effect.

How to Obtain Warranty Service

To obtain warranty service for the Product, please contact your Trimble dealer. Alternatively, you may contact Trimble to request warranty service at +1-408-481-6940 (24 hours a day) or email your request to trimble_support@trimble.com. Please be prepared to provide:
–your name, address, and telephone numbers;
–proof of purchase;

- a copy of this Trimble warranty
 - a description of the nonconforming Product including the model number; and
 - an explanation of the problem.
- The customer service representative may need additional information from you depending on the nature of the problem.

Warranty Exclusions and Disclaimer

This Product limited warranty shall only apply in the event and to the extent that (i) the Product is properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Trimble's applicable operator's manual and specifications, and; (ii) the Product is not modified or misused. This Product limited warranty shall not apply to, and Trimble shall not be responsible for, defects or performance problems resulting from (i) the combination or utilization of the Product with hardware or software products, information, data, systems, interfaces, or devices not made, supplied, or specified by Trimble; (ii) the operation of the Product under any specification other than, or in addition to, Trimble's standard specifications for its products; (iii) the unauthorized installation, modification, or use of the Product; (iv) damage caused by: accident, lightning or other electrical discharge, fresh or salt water immersion or spray (outside of Product specifications); or exposure to environmental conditions for which the Product is not intended; (v) normal wear and tear on consumable parts (e.g., batteries); or (vi) cosmetic damage. Trimble does not warrant or guarantee the results obtained through the use of the Product or Software, or that software components will operate error free.

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PLEASE NOTE: THE ABOVE TRIMBLE LIMITED WARRANTY PROVISIONS WILL NOT APPLY TO PRODUCTS PURCHASED IN THOSE JURISDICTIONS (E.G., MEMBER STATES OF THE EUROPEAN ECONOMIC AREA) IN WHICH PRODUCT WARRANTIES ARE THE RESPONSIBILITY OF THE LOCAL DEALER FROM WHOM THE PRODUCTS ARE ACQUIRED. IN SUCH

A CASE, PLEASE CONTACT YOUR TRIMBLE DEALER FOR APPLICABLE WARRANTY INFORMATION.

Notice to Australian Purchasers

The Australian Consumer Law

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Trimble's warranty, as set out in the user manual accompanying this statement, or as described in the warranty card accompanying the Product you purchased, is in addition to any mandatory rights and remedies that you may have under the Australian Consumer Law.

Official Language

THE OFFICIAL LANGUAGE OF THESE TERMS AND CONDITIONS IS ENGLISH. IN THE EVENT OF A CONFLICT BETWEEN ENGLISH AND OTHER LANGUAGE VERSIONS, THE ENGLISH LANGUAGE SHALL CONTROL.

Notices

COCOM limits

The U.S. Department of Commerce requires that all exportable GPS products contain performance limitations so that they cannot be used in a manner that could threaten the security of the United States. The following limitations are implemented on this product:

– Immediate access to satellite measurements and navigation results is disabled when the receiver velocity is computed to be greater than 1,000 knots, or its altitude is computed to be above 18,000 meters. The receiver GPS subsystem resets until the COCOM situation clears. As a result, all logging and stream configurations stop until the GPS subsystem is cleared.

Class B statement- Notice to users

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions may cause harmful interference to radio communication.

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

- Reorient or relocate the receiving antenna.
 - Increase the separation between the equipment and the receiver.
 - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
 - Consult the dealer or an experienced radio/TV technician for help.
- Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules. The radios in this device have been designed and manufactured to not exceed stipulated emission limits for exposure to radio frequency (RF) energy as required by the Federal Communications Commission of the U.S. Government 47 C.F.R. § 2.1091 and 2.1093. The external antenna connector provided in this device is for GNSS antennas only.

Canada

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

Antenna Statement

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

Licence exempt

This device complies with Industry Canada licence-exempt RSS standard (s). Operation is subject to the following two conditions:

- (1) this device may not cause interference, and
- (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

- (1) l'appareil ne doit pas produire de brouillage, et
- (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Europe

This product has been tested and found to comply with all requirements for CE Marking and sale within the European Economic Area (EEA). It is classified and marked as being Class 2 Radio Equipment under 2000/299/EC, as Bluetooth and wireless LAN approvals are country specific. Please consult your local distributor for more information.

EU – Restrictions for Use in the 2.4GHz band

This device may be operated indoors or outdoors in all countries of the European Community using the 2.4GHz band, except where noted below.

–In Norway, this unit may not be operated within 20 km of Ny Alesund This GNSS receiver has Bluetooth approval in most EU countries and satisfies the requirements for Radio and Telecommunication Terminal Equipment specified by European Council Directive 1999/5/EC. These requirements provide reasonable protection against harmful interference when the equipment is operated appropriately in a residential or commercial environment.

A copy of the CE Declaration of Conformity can be accessed from <http://www.trimble.com/support.shtml>.

Australia and New Zealand

This product conforms with the regulatory requirements of the Australian Communications and Media Authority (ACMA) EMC framework, thus satisfying the requirements for C-Tick Marking and sale within Australia and New Zealand.

Japan

This device has been granted two designation numbers by Ministry of Internal Affairs and Communications: according: Ordinance concerning Technical Regulations Conformity Certification etc. of Specified Radio Equipment (特定無線設備の技術基準適合証明等に関する規則)

Article 2 clause 1 item 19

Approval no: 007-AC0223

This device should not be modified (otherwise the granted designation numbers will be invalid).

Restriction of Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)

Trimble products in this guide are in compliance in all material respects with DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast).



This certification is limited to Product placed on the market in the Member States of the European Union on or after 1-January-2013.

Waste Electrical and Electronic Equipment (WEEE)

For product recycling instructions and more information, please go to www.trimble.com/ev.shtml.

Recycling in Europe: To recycle Trimble WEEE (Waste Electrical and Electronic Equipment, products that run on electrical power.), Call +31 497 53 24 30, and ask for the "WEEE Associate". Or, mail a request for recycling instructions to:



Trimble Europe BV
c/o Menlo Worldwide Logistics
Meerheide 45
5521 DZ Eersel, NL

FCC Declaration of Conformity

We, Trimble Navigation Limited.

935 Stewart Drive
PO Box 3642
Sunnyvale, CA 94088-3642
United States
+1-408-481-8000

Declare under sole responsibility that DoC products comply with Part 15 of FCC Rules.

Operation is subject to the following two conditions:

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

Unlicensed radios in products

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:

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

Licensed radios in products

This device complies with part 15 of the FCC Rules.

Operation is subject to the condition that this device may not cause harmful interference.

Release Notice

This is the June 2016 release (Revision C) of the R1 GNSS receiver User Guide.

Safety Information

Before you use your Trimble product, make sure that you have read and understood all safety requirements.



WARNING – This alert warns of a potential hazard which, if not avoided, could result in severe injury or even death.



CAUTION – This alert warns of a potential hazard or unsafe practice that could result in minor injury or property damage or irretrievable data loss.

Note – *An absence of specific alerts does not mean that there are no safety risks involved.*

Use and care

This product is a high-precision electronic instrument and should be treated with reasonable care.



CAUTION – Operating or storing the receiver outside the specified temperature range can damage it.

Using an external antenna



WARNING – Antennas are excellent conductors of electricity, so use extreme caution when operating near power lines and other sources of electric current or during stormy weather.

Exposure to radio frequency radiation from Bluetooth transmitters

This device is approved as a portable device with respect to Radio Frequency (RF) exposure compliance. The radiated output power of the internal wireless radio transmitters is less than 100 milliwatt, which results in exposure levels far below the FCC radio frequency exposure limits, even when operated in close proximity to the body. The internal wireless radios operate within guidelines found in international radio frequency safety standards and recommendations, which reflect the consensus of the international scientific community. Trimble therefore believes the internal wireless radios are safe for use by users. The level of electromagnetic energy emitted is hundreds of times lower 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. If you are unsure of restrictions, you are encouraged to ask for authorization before turning on the wireless radios.

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Introduction

In this chapter:

- [What is the R1 GNSS receiver](#)
- [What's in the box](#)
- [Accessories](#)
- [Supported software](#)
- [Related information and technical support](#)

The Trimble R1 GNSS Receiver User Guide describes how to use a Trimble® R1 GNSS receiver.

Even if you have used other GNSS or GPS products before, Trimble recommends that you spend some time reading this manual to learn about the special features of this product. If you are not familiar with GNSS or GPS, visit the Trimble website (www.trimble.com).

What is the R1 GNSS receiver

The R1 GNSS receiver is a high-performance GNSS receiver with an integrated antenna, and Bluetooth® wireless technology for connectivity with field computers and smart phones. It is rated IP65, and is small enough to be carried in a pocket or worn on a belt clip in its pouch.

The R1 GNSS receiver achieves best real time performance when used with a real-time correction source, such as SBAS, over L-Band (Trimble RTX™ technology), or IP via a phone device (Trimble VRS™ or RTX technology).

Supported devices

The R1 GNSS receiver is compatible with devices powered by the following operating systems:

- Android versions 4.1x and later
- iOS
- Windows® 7 and Windows 8.x
- Windows Embedded Handheld 6.5

Supported constellations

The R1 GNSS receiver supports the following L1 constellations:

- GPS L1 C/A
- GLONASS L1 C/A (G1)
- Galileo E1
- BeiDou B1
- QZSS L1 C/A

Supported correction sources

The R1 GNSS receiver supports the following correction signals:

- SBAS (WAAAS / EGNOS / MSAS / GAGAN, SDCM)
- CMR, CMR+, CMRx
- RTCM 2.0 to 2.3 (DGPS and RTK), RTCM 3.0 and 3.1
- QZSS L1 SAIF
- RTX ViewPoint™ (via Internet and L-Band satellite)



CAUTION – SBAS and L-Band signals are highly compromised when the receiver is used close to the body; geostationary satellites will have a lower signal margin at the receiver than the typical orbiting GNSS satellites. Performance will heavily depend on factors such as user orientation, position of the receiver on body, how exposed the antenna is, and geographic location.

What's in the box

- R1 GNSS receiver
- USB cable
- International adaptor kit
- Belt pouch / clip
- Quick Start Guide

Accessories

The following accessories are available for purchase to use with the R1 GNSS receiver:

- Belt pouch / clip
- Pole pouch
- External antenna

Supported software

You can use the following Trimble software with the R1 GNSS receiver:

- TerraFlex™ mobile software
- TerraSync™ software
- Positions™ ArcPad extension
- GPS Pathfinder® Field toolkit

If you are not using Trimble field software, use the Trimble GNSS Status utility to manage the connection to the R1 GNSS receiver. See [Downloading the GNSS Status utility, page 21](#).

For full details of compatibility with Trimble software, refer to the [Product Compatibility List](#). For information on using the receiver with Trimble field software, refer to the documentation for the software you are using.

Related information and technical support

Product updates, documentation, and any support issues are available for download on the Support area of the Trimble website (www.trimble.com/Support/). Sources of related information include the following:

- Release notes – The release notes describe new features of the product, information not included in the manuals, and any changes to the manuals.

1 Introduction

- Support notes – Support notes describe any known issues and offer solutions or workarounds that may be required throughout the life of the product.

These documents can be downloaded from the Trimble website at www.trimble.com/Support/Support_AZ.aspx. Select the product you need information on.

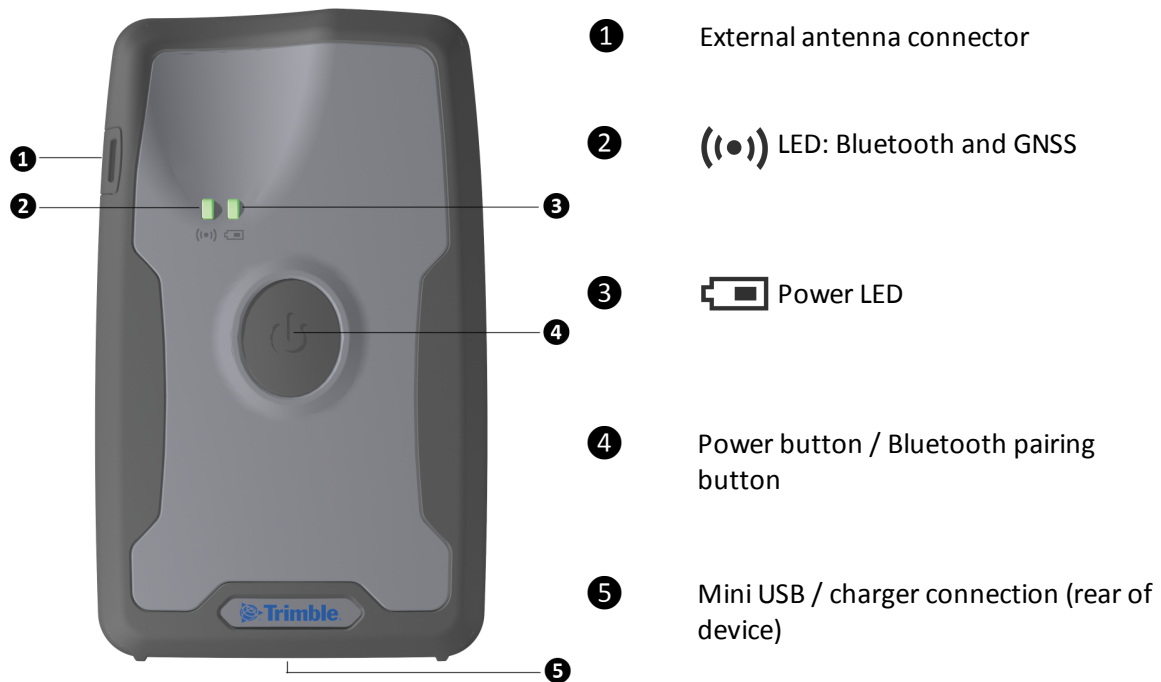
If you have a problem and cannot find the information you need in the product documentation, contact your local dealer.

Using the R1 GNSS receiver


In this chapter:

- Parts of the receiver
- Charging the battery
- Turning on and turning off the receiver
- LED status information
- Connecting the R1 GNSS receiver to a device
- Using the receiver with GIS software on Windows Embedded Handheld and Windows devices
- Using an external antenna

Parts of the receiver





Charging the battery

 **WARNING** – Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions.

To prevent injury or damage:

- Discontinue charging a battery that gives off extreme heat or a burning odor.
- Never attempt to remove, replace, or repair the battery yourself.
- If the battery requires attention, send the receiver to an authorized Trimble Service Center.



Before using a new R1 GNSS receiver, or one which has been unused for months, charge the device with the supplied charger until the Power LED  is solid green .


To charge the internal battery, do one of the following:

- Connect the R1 GNSS receiver to your laptop or office computer using the USB cable supplied with the product.
- Connect the R1 GNSS receiver to mains power using the USB cable and international adaptor kit supplied with the product.

Charging the receiver's battery using the Trimble-supplied charger connected to mains power can take up to 5 hours. Charging from a laptop or desktop computer or using an unapproved charger can take longer.

When the battery is charging, the Power LED  shows solid amber .

When the battery is fully charged, and the charger is still connected, the  LED changes to solid green .

Note – *If the battery is severely discharged, for example if the receiver is new and not yet charged, or it has been stored for more than a few months, the Power LED  will not turn on until the battery has charged for a while. In this case, charge the battery for an hour using the supplied charger then disconnect and reconnect the USB cable. The Power LED should turn on.*

See [LED status information, page 14](#) for more information on the status of the LEDs.









Turning on and turning off the receiver

To turn on the R1 GNSS receiver:

1. Press and hold the Power button until both LEDs =  (green), then release the Power button.
2. After a few seconds, the  LED flashes  ---  ---  ---  (blue / amber).

To pair the receiver with your device using Bluetooth wireless technology, see [Connecting the R1 GNSS receiver to a device, page 15](#).






To turn off the R1 GNSS receiver:


1. Press and hold the Power button until both LEDs are  (red).
2. Continue holding the Power button until the  LED turns off (the  stays red ), then release the Power button.
3. If the receiver is connected to external power via USB, the  LED turns off, and the  LED turns on  (green) or  (amber) almost immediately, depending on the level of charge. If the receiver is not connected to external power, both LEDs will turn off.

For a description of the LED behavior, see [LED status information, page 14](#).



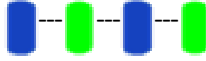



LED status information

Power LED

LED		Status
	Solid amber	Battery is charging, charge is < 100%.
	Solid green	Battery is fully charged (Charger is connected).
Off		Battery charge is >50% (Charger is not connected).
	Slow flashing amber	Battery charge is >15% (Charger is not connected).
	Slow flashing red	Battery charge is <15% (Charger is not connected). The battery needs charging.
	Rapid flashing red	Battery / power error.

Note – If the battery is severely discharged, for example if the receiver is new and not yet charged, or it has been stored for more than a few months, the Power LED  will not turn on until the battery has charged for a while. In this case, charge the battery for an hour using the supplied charger then disconnect and reconnect the USB cable. The Power LED should turn on.

Bluetooth / GNSS LED (i●i)

LED		Bluetooth status	GNSS status
	Rapid flashing blue	Receiver is in Bluetooth pairing mode (see Connecting the R1 GNSS receiver to a device, page 15.)	Not connected.
	Flashing blue / amber	Not connected.	Not connected.
	Flashing blue / green	Not connected.	Connected.
	Flashing amber	Connected.	Not connected.
	Slow flashing green	Connected.	Connected, sending autonomous positions.
	Solid green	Connected.	Connected, sending corrected positions.

Connecting the R1 GNSS receiver to a device

You can connect a R1 GNSS receiver to a handheld device or tablet powered by the following operating systems:

- Android versions 4.1x and later
- iOS
- Windows® 7 and Windows 8.x
- Windows Embedded Handheld 6.5




Enabling Mock Locations on Android devices

On Android devices, you must enable Mock Locations to allow the Android device to use GNSS positions from the R1 GNSS receiver.

The method for enabling Mock Locations differs for different Android devices. Generally, this is done under *Settings / Developer options, Allow mock locations*. Refer to the documentation for your device for specific instructions.


Pairing a R1 GNSS receiver and a device

The first time you use a R1 GNSS receiver, you must pair it with your device.

1. Make sure the device you want to use has Bluetooth wireless technology turned on.
2. To place the R1 GNSS receiver in Bluetooth pairing mode, press and hold the Power button until the  LED flashes blue .
3. Depending on the device you want to pair the receiver with, do one of the following:
 - On a device powered by the Windows 7 or 8.x operating system, Windows Embedded Handheld 6.5, or Android versions 4.1.x or later, use the GNSS Status utility to pair with the receiver.
 - a. Tap GNSS Status  to launch the GNSS Status utility.
 - b. Tap *Select new receiver*. The device you are using searches for receivers within range.
 - c. When the required receiver appears in the *Select Receiver* list, tap it, then tap the connection icon to the right of the receiver ID to pair.
 - On an iPhone or iPad, go to *Settings / Bluetooth*, and tap the R1 [ID] device you want to pair with.

Connecting to a R1 GNSS receiver

To reconnect to a receiver at any time, make sure it is turned on, then:

- On a device powered by the Windows 7 or 8.x operating system, Windows Embedded Handheld 6.5, or Android versions 4.1.x or later, use the GNSS Status utility to connect with the receiver:
 - a. Tap GNSS Status  to launch the GNSS Status utility.
 - b. Tap the R1 [ID] at the bottom of the screen to bring up the *Select Receiver* list. Tap the device [R1 ID] you want to reconnect to. Tap the connection icon to the right of the receiver ID to connect to it.
- On an iPhone or iPad, go to *Settings / Bluetooth*, and tap the R1 [ID] device you want to connect to.

See [Downloading the GNSS Status utility, page 21](#) for more information.

Using the receiver with GIS software on Windows Embedded Handheld and Windows devices

Using Trimble software

If you are using Trimble GIS software (for example, TerraSync software, Trimble Positions software, or the GPS Pathfinder Field toolkit) on devices powered by the Windows Embedded Handheld or Windows Desktop operating systems, you do not need to install the GNSS Status utility, unless you want to install an option (subscription service) that you have purchased (see [Downloading the GNSS Status utility, page 21](#)). You can connect to the R1 GNSS receiver from within the software when the receiver is in Bluetooth pairing mode, as with other Trimble GIS external receivers.

Using other software with NMEA

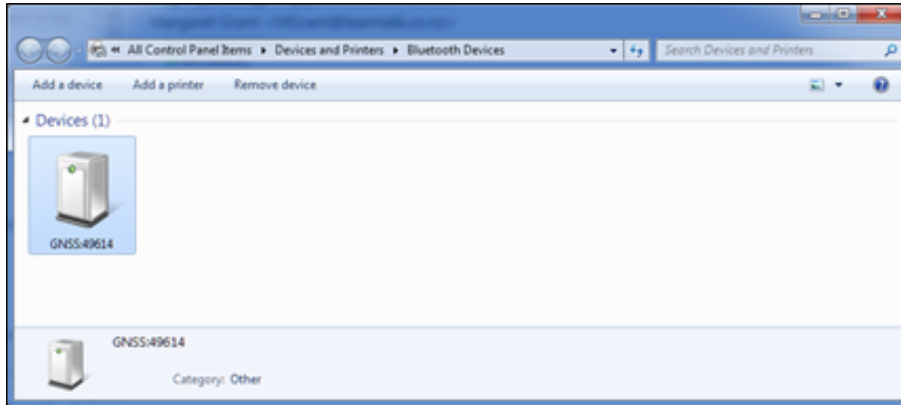
When using software that understands NMEA for position information, you must use the GNSS Status utility to configure the receiver to output NMEA on the correct port. Because the receiver uses Serial Port Profile (SPP) ports, and software run on a Windows device uses Windows COM ports, it is important to understand the relationship between Bluetooth Serial Port Profile ports and Windows COM ports, as described below.

Understanding the relationship between Bluetooth Serial Port Profile (SPP) ports and Windows COM ports

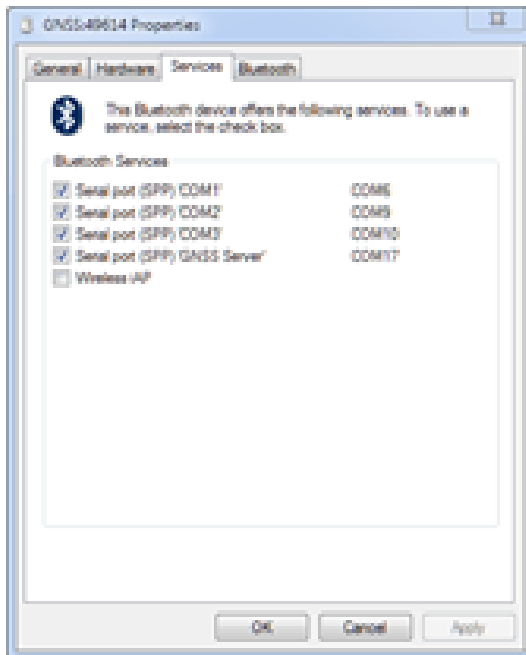
Note – *This process is specific to the Windows 7 operating system; instructions are similar for Windows 8 / 8.1 and Windows 10 operating systems.*

2 Using the R1 GNSS receiver

When you first connect a R1 receiver, the Windows operating system installs the appropriate drivers and associates Bluetooth Serial Port Profile (SPP) ports with Windows COM ports. The receiver is listed in the *Bluetooth Devices* screen:



To see which Windows COM ports are associated with the device SPP ports, right-click on the device and select *Properties*. Then select the *Services* tab.



Applications that run on Windows devices (for example, the Trimble TerraFlex software) will see, in this example, COM6, COM9, COM10 and COM17. COM17 is the *GNSS Server* SPP port; it should NOT be selected for use by applications as it is used to supply positions to *Location Services* on the device. The *GNSS Server* port will reset to a default configuration each time it is connected, irrespective of any changes you make.

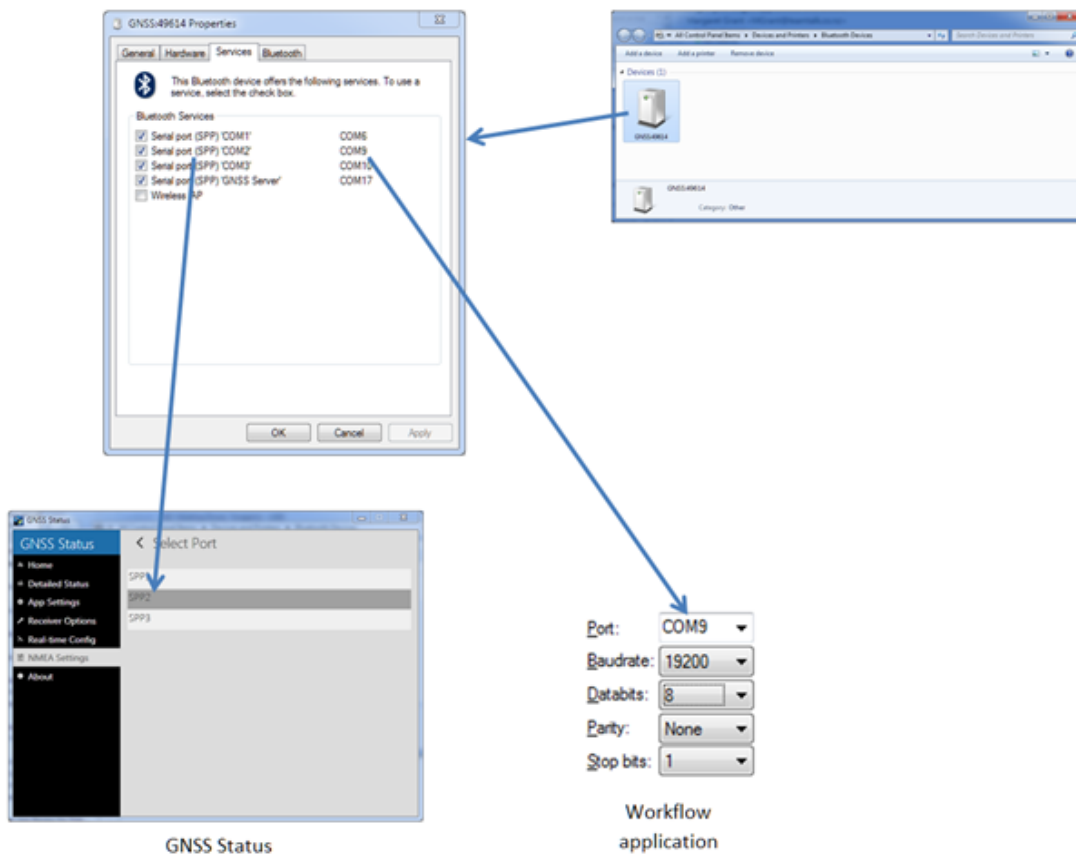
Note – *Different installations will result in different Windows COM port assignments.*

2 Using the R1 GNSS receiver

The application you are using to collect data will have a configuration screen that will include options such as:

Port:	COM9
Baudrate:	19200
Databits:	8
Parity:	None
Stop bits:	1

In this example, the COM9 Windows COM port is selected, which corresponds to SPP2 on the receiver.



The above diagram illustrates the overall association. The following is specific to the example above (your Windows COM Port numbers may be different):

Bluetooth Serial Port Profile (SPP)	Windows COM Port
SPP1	COM6
SPP2	COM9
SPP3	COM10

Using an external antenna



WARNING – Antennas are excellent conductors of electricity, so use extreme caution when operating near power lines and other sources of electric current or during stormy weather.

Only use an external antenna that is designed to be used with the R1 GNSS receiver.

To connect an external antenna, open the external antenna cover on the left side of the receiver and connect your antenna cable.

Using the GNSS status utility

In this chapter:

- [Downloading the GNSS Status utility](#)
- [Using the GNSS Status utility](#)

If you are not using Trimble field software on your field device, use the Trimble GNSS Status utility to manage the connection to the R1 GNSS receiver.

Downloading the GNSS Status utility

Download the GNSS Status utility for your device:

- for Windows, Windows Embedded Handheld, go to [the product downloads page on www.trimble.com](http://www.trimble.com)
- for Android, go to Google Play store and search for "GNSS Status Utility"
- for iOS, go to iTunes app store and search for "GNSS Status Utility"


Using the GNSS Status utility

On your device, tap GNSS Status  to launch the GNSS Status utility.

If the device you are using is not connected to a R1 GNSS receiver, the GNSS Status utility shows:


- *Select new receiver* enabling you to select a R1 GNSS receiver to connect to

If the device you are using is connected to a R1 GNSS receiver, the GNSS Status utility *Home* screen shows:

- The estimated GNSS accuracy
- The R1 GNSS receiver's battery status
- The DGNSS status
- The menu (on tablets), or Menu icon  (on smartphones and handheld devices)
- The ID of the connected R1 GNSS receiver

The menu options are described below.

Detailed status


Tap the *Estimated Accuracy* shown on the *Home* screen. Or, flick the current screen to the right to display the menu options, or tap , then tap *Detailed Status*.

The *Detailed Status* screen shows:

- the receiver's GNSS status
- the satellites that are in use and being tracked (for all supported constellations; see [Supported constellations, page 8](#))
- the real-time correction source in use
- the receiver's serial number, firmware version, and battery charge status
- packets received (if you are using Internet based sources) and error messages


App settings

You can configure the GNSS Status utility to use metric or imperial (US) units.

1. Tap  or flick the current screen to the right to display the menu options.
2. Tap *App Settings*. On an iOS or Android device, tap *Unit System*.
3. Select Metric or US.

Receiver options

You can configure the R1 GNSS receiver to use options (subscription services) if you have purchased them.


1. Tap  or flick the current screen to the right to display the menu options.
2. Tap *Receiver Options*.
3. In the *Install Option* field, enter the key you received when you purchased the option.
4. Tap *Submit*.

The *Subscription Status* is shown on the lower part of the screen.

For more information on purchasing receiver options, contact your local Trimble reseller.


Real-time config

To configure real-time correction sources:

1. If a receiver is connected, tap the *DGNSS Status* shown on the *Home* screen. Or, flick the current screen to the right to display the menu options, or tap , then tap *Real-time Config*.
2. Tap *Edit*. On an iOS or Android device, tap *Primary Source Type*.
3. Select Internet, SBAS, or Uncorrected as the primary real-time correction source.
4. If you selected Internet as the primary source, tap the fields on the *Real-time Config* screen to configure the primary source, and set a *Secondary Source Type* (SBAS or Uncorrected).
5. Tap *Apply*.

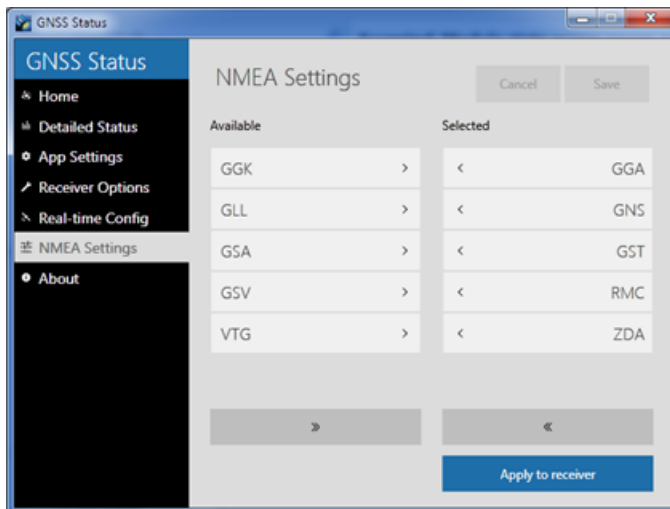
NMEA Settings

To configure the connected receiver to output specific NMEA sentences:

1. Tap  or flick the current screen to the right to display the menu options.
2. Tap *NMEA Settings*.

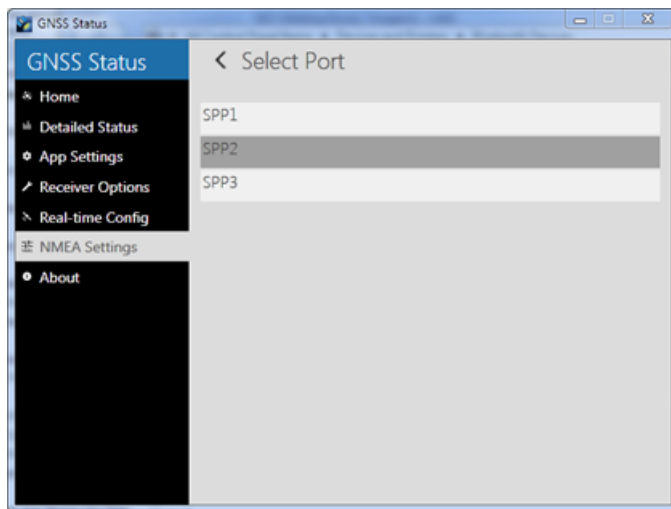
3 Using the GNSS status utility

3. Configure the NMEA sentences that are needed by the workflow application. The available settings are listed in the *Available* column on the left; the settings you have selected to apply to the receiver are listed in the *Selected* column on the right.
 - To select an individual setting, tap it in the *Available* list on the left, and it will move to the *Selected* list.
 - To remove an individual setting, tap it in the *Selected* list on the right, and it will move to the *Available* list.
 - To select all the available settings, tap the double arrow >> below the *Available* column.
 - To remove all the selected settings, tap the double arrow << below the *Selected* column.



4. If no receiver is connected, you can save the settings; tap **Save** at the top right of the screen. To apply the NMEA settings to the receiver, make sure that the receiver is [paired with the PC](#) and that the GNSS Status utility is connected to the receiver. Click **Apply to receiver**.
5. In the *Select Port* screen, select the SPP port to use for NMEA configurations. For instructions on configuring SPP ports with Windows COM ports for NMEA port handling on devices powered by the Windows operating system, see [Understanding the relationship between Bluetooth Serial Port Profile \(SPP\) ports and Windows COM ports](#), page 16.

3 Using the GNSS status utility



About

The *About* screen shows the GNSS Status utility version number.

Troubleshooting

In this chapter:




- [Receiver won't turn on](#)
- [Battery indicator for R1 GNSS receiver shows empty on an iOS device](#)
- [R1 GNSS receiver firmware upgrade](#)
- [Incorrect R1 GNSS receiver name showing in Bluetooth settings on iOS device](#)

This section describes some possible receiver issues, possible causes, and how to solve them. Please read this section before you contact Technical Support.

Receiver won't turn on

The R1 GNSS receiver will not turn on. There is no LED indication when the Power button is pressed.

Cause: The battery is severely discharged. This may be because the device is new and has not yet been charged, or it has been in storage for more than a few months.

Solution: Charge the battery for an hour using the supplied charger, then disconnect and reconnect the USB cable. The Power LED  should turn on. Leave the device on charge until the Power LED  =  (Green).

See [Charging the battery](#), page 12.

Battery indicator for R1 GNSS receiver shows empty on an iOS device

On an iOS device, the small battery level indicator at the top of the status bar shows empty in error.

Cause: This is an iOS issue which has been logged with Apple.


Solution: Use the GNSS Status utility to view the battery status. See [Downloading the GNSS Status utility](#), page 21.

R1 GNSS receiver firmware upgrade

When you upgrade the firmware on a R1 GNSS receiver, and it was previously paired with an iOS device, you cannot reconnect.

Cause: The iOS device no longer recognises the R1 GNSS receiver when the firmware is upgraded on the receiver.

Solution: Before you can reconnect your iOS device with a previously connected R1 GNSS receiver, you must 'forget' the connection on the iOS device:

1. Go to *Settings / Bluetooth*, and tap the Info button  next to the R1 [serial number] device you want to forget.
2. Tap *Forget this device*.



You can then reconnect as usual (see [Connecting the R1 GNSS receiver to a device, page 15](#)).

Incorrect R1 GNSS receiver name showing in Bluetooth settings on iOS device

When you restart an iOS device that has been connected to a R1 GNSS receiver, the receiver appears in the list under Bluetooth Settings as 'iAP2'.

This does not affect operation of the R1 GNSS receiver.

Solution: To make the name of the R1 GNSS receiver reappear:

1. On the iOS device, go to *Settings / Bluetooth*, and connect to the 'iAP2' device.
2. While the Bluetooth settings screen is open on the iOS device, place the R1 GNSS receiver into Bluetooth pairing mode (press and hold the Power button until the  LED flashes blue .
3. After a short time the R1 GNSS receiver's name will reappear.

Glossary

BeiDou	<p>The BeiDou Navigation System (Compass) Navigation Satellite System is a Chinese satellite navigation system.</p> <p>The first BeiDou system (known as BeiDou-1), consists of three satellites and has limited coverage and applications. It has been offering navigation services mainly for customers in China and from neighboring regions since 2000.</p> <p>The second generation of the system (known as Compass or BeiDou-2) consists of 35 satellites. It became operational with coverage of China in December 2011 with 10 satellites in use. Services were planned to be offered to customers in Asia-Pacific region by 2012 and the global system should be finished by 2020.</p>
carrier	A radio wave having at least one characteristic (such as frequency, amplitude, or phase) that can be varied from a known reference value by modulation.
carrier frequency	The frequency of the unmodulated fundamental output of a radio transmitter. The GPS L1 carrier frequency is 1575.42 MHz.
carrier phase	Is the cumulative phase count of the GPS or GLONASS carrier signal at a given time.
CMR/CMR+	Compact Measurement Record. A real-time message format developed by Trimble for broadcasting corrections to other Trimble receivers. CMR is a more efficient alternative to RTCM .
CMRx	A real-time message format developed by Trimble for transmitting more satellite corrections resulting from more satellite signals, more constellations, and more satellites. Its compactness means more repeaters can be used on a site.
DGNSS	See real-time differential GNSS .
differential GNSS	See real-time differential GNSS .
EGNOS	European Geostationary Navigation Overlay Service. A Satellite-Based Augmentation System (SBAS) that provides a free-to-air differential correction service for GNSS. EGNOS is the European equivalent of WAAS , which is available in the United States.
firmware	The program inside the receiver that controls receiver operations and hardware.
GAGAN	GPS Aided Geo Augmented Navigation. A regional SBAS system currently in development by the Indian government.
Galileo	Galileo is a GNSS system built by the European Union and the European Space Agency. It is complimentary to GPS and GLONASS.
GLONASS	Global Orbiting Navigation Satellite System. Comparable to the American GPS system, GLONASS is a space-based navigation system operated by the Russian Aerospace Defence Forces, consisting of 24 satellites in 3 orbit planes.
GNSS	Global Navigation Satellite System.
GPS	Global Positioning System. GPS is a space-based satellite navigation system consisting of multiple satellites in six orbit planes.
L1	The primary L-band carrier used by GPS and GLONASS satellites to transmit satellite data.
MSAS	Multi-functional Satellite Augmentation System. A Satellite-Based Augmentation System (SBAS) that provides a free-to-air differential correction service for GNSS. MSAS is the Japanese equivalent of WAAS .
QZSS	Quasi-Zenith Satellite System. A Japanese regional time transfer and Satellite Based

	Augmentation System (SBAS) for the GNSS, consisting of three geosynchronous satellites over Japan.
real-time differential GNSS	Also known as <i>real-time differential correction</i> or <i>DGNSS</i> . Real-time differential GNSS is the process of correcting GNSS data as you collect it. Corrections are calculated at a base station and then sent to the receiver through a radio link. As the rover receives the position it applies the corrections to give you a very accurate position in the field. Most real-time differential correction methods apply corrections to code phase positions. While DGNSS is a generic term, its common interpretation is that it entails the use of single-frequency code phase data sent from a GNSS base station to a rover GNSS receiver to provide sub-meter position accuracy. The rover receiver can be at a long range (greater than 100 kms (62 miles)) from the base station.
RTX	Real-time extended. A real-time differential GNSS method that uses carrier phase measurements for greater accuracy.
SBAS	Satellite-Based Augmentation System. SBAS is based on differential GPS, but applies to wide area (WAAS/EGNOS/MSAS) networks of reference stations. Corrections and additional information are broadcast using geostationary satellites.
SDCM	System for Differential Correction and Monitoring (Russian SBAS system, similar to WAAS and EGNOS)
VRS	Virtual Reference Station. A VRS system consists of GNSS hardware, software, and communication links. It uses data from a network of base stations to provide corrections to each rover that are more accurate than corrections from a single base station. To start using VRS corrections, the rover sends its position to the VRS server. The VRS server uses the base station data to model systematic errors (such as ionospheric noise) at the rover position. It then sends RTCM correction messages back to the rover.
WAAS	Wide Area Augmentation System. WAAS was established by the Federal Aviation Administration (FAA) for flight and approach navigation for civil aviation. WAAS improves the accuracy and availability of the basic GNSS signals over its coverage area, which includes the continental United States and outlying parts of Canada and Mexico. The WAAS system provides correction data for visible satellites. Corrections are computed from ground station observations and then uploaded to two geostationary satellites. This data is then broadcast on the L1 frequency, and is tracked using a channel on the GNSS receiver, exactly like a GNSS satellite. Use WAAS when other correction sources are unavailable, to obtain greater accuracy than autonomous positions. For more information on WAAS, refer to the FAA website at http://gps.faa.gov . The EGNOS service is the European equivalent and MSAS is the Japanese equivalent of WAAS.
