GETTING STARTED GUIDE

Trimble SPS855 GNSS Receiver

Version 4.60
Revision A
June 2012

Trimble

Corporate Office

Trimble Navigation Limited
935 Stewart Drive
Sunnyvale, CA 94085
USA
www.trimble.com

Heavy Highway business area

Trimble Navigation Limited
Heavy Highway business area
5475 Kellenburger Road
Dayton, Ohio 45424-1099
USA
800-538-7800 (toll free in USA)
+1-937-245-5600 Phone
+1-937-233-9004 Fax
www.trimble.com
Email: trimble_support@trimble.com

Legal Notices

NTP Software Copyright

Release Notice

This is the April 2012 release (Revision A) of the SPS Modular Receiver documentation. It applies to version 4.60 of the receiver firmware.

Product Limited Warranty Information

For applicable product Limited Warranty information, please refer to the Limited Warranty Card included with this Trimble product, or consult your local Trimble authorized dealer.

COCOM limits

This notice applies to the SPS351, SPS555H, SPSx61, SPS855, and SPS985 receivers.
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.

Notices

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. Some equipment configurations include an optional 410 MHz to 470 MHz UHF radio transceiver module compliant with Part 90. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio 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:
– 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.
This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any other antenna or transmitters (except in accordance with the FCC multi - transmitter product procedures).

Canada

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.
This apparatus complies with Canadian RSS-GEN, RSS-310, RSS-210, and RSS-119.
Cet appareil est conforme à la norme CNR-GEN, CNR-310, CNR-210, et CNR-119 du Canada.

Europe

The product covered by this guide are intended to be used in all EU member countries, Norway, and Switzerland. Products been tested and found to comply with the requirements for a Class B device pursuant to European Council Directive 89/336/EEC on EMC, thereby satisfying the requirements for CE Marking and sale within the European Economic Area (EEA). Contains a Bluetooth radio module. These requirements are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential or commercial environment. The 450 MHZ (PMR) bands and 2.4 GHz are non-harmonized throughout Europe.

CE Declaration of Conformity

Hereby, Trimble Navigation, declares that the GPS receivers are in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

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.

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

Trimble products in this guide comply in all material respects with DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive) and Amendment 2005/618/EC filed under C(2005) 3143, with exemptions for lead in solder pursuant to Paragraph 7 of the Annex to the RoHS Directive applied.

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.

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 designed to withstand the rough treatment and tough environment that typically occurs in construction applications. However, the receiver 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.

Regulations and safety

Some receiver models with base station capability contain an internal radio-modem for transmission or can transmit through an external data communications radio. Regulations regarding the use of the 410 MHz to 470 MHz radio-modems vary greatly from country to country. In some countries, the unit can be used without obtaining an end-user license. Other countries require end-user licensing. For licensing information, consult your local Trimble dealer.

All Trimble receiver models described in this documentation are capable of transmitting data through Bluetooth wireless technology.

Bluetooth wireless technology, and 900 MHz radio-modems operate in license-free bands.

Note – *900 MHz radios are not used in Europe.*

Before operating a Trimble receiver or GSM modem, determine if authorization or a license to operate the unit is required in your country. It is the responsibility of the end user to obtain an operator's permit or license for the receiver for the location or country of use.

For FCC regulations, see Notices.

Type approval

Type approval, or acceptance, covers technical parameters of the equipment related to emissions that can cause interference. Type approval is granted to the manufacturer of the transmission equipment, independent from the operation or licensing of the units. Some countries have unique technical requirements for operation in particular radio-modem frequency bands. To comply with those requirements, Trimble may have modified your equipment to be granted Type approval.

Unauthorized modification of the units voids the Type approval, the warranty, and the operational license of the equipment.

Exposure to radio frequency radiation

For 450 MHz radio

Safety. Exposure to RF energy is an important safety consideration. The FCC has adopted a safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC regulated equipment as a result of its actions in General Docket 79-144 on March 13, 1986.

Proper use of this radio modem results in exposure below government limits. The following precautions are recommended:

- ***DO NOT*** operate the transmitter when someone is within 20 cm (7.8 inches) of the antenna.
- ***DO NOT*** operate the transmitter unless all RF connectors are secure and any open connectors are properly terminated.
- ***DO NOT*** operate the equipment near electrical blasting caps or in an explosive atmosphere.
- All equipment must be properly grounded according to Trimble installation instructions for safe operation.
- All equipment should be serviced only by a qualified technician.

For license-free 900 MHz radio

CAUTION – For your own safety, and in terms of the RF exposure requirements of the FCC, always observe these precautions:
– Always maintain a minimum separation distance of 20 cm (7.8 inches) between yourself and the radiating antenna.
– Do not co-locate the antenna with any other transmitting device.

Note – *900 MHz radios are not used in Europe.*

For Bluetooth radio

The radiated output power of the internal Bluetooth wireless radio is far below the FCC radio frequency exposure limits. Nevertheless, the wireless radio shall be used in such a manner that the Trimble receiver is 20 cm or further from the human body. The internal wireless radio operates within guidelines found in radio frequency safety standards and recommendations, which reflect the consensus of the scientific community. Trimble therefore believes that the internal wireless radio is safe for use by consumers. 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. If you are unsure of restrictions, you are encouraged to ask for authorization before turning on the wireless radio.

For GSM/GPRS radio

Safety. Exposure to RF energy is an important safety consideration. The FCC has adopted a safety standard for human exposure to radio frequency electromagnetic energy emitted by FCC regulated equipment as a result of its actions in General Docket 79-144 on March 13, 1986.

Proper use of this radio modem results in exposure below government limits. The following precautions are recommended:

- ***DO NOT*** operate the transmitter when someone is within 28 cm (11 inches) of the antenna.
- All equipment should be serviced only by a qualified technician.

Installing antennas

CAUTION – For your own safety, and in terms of the RF exposure requirements of the FCC, always observe these precautions:
– Always maintain a minimum separation distance of 20 cm (7.8 inches) between yourself and the radiating antenna.
– Do not co-locate the antenna with any other transmitting device.

WARNING – The GNSS antenna and its cabling should be installed in accordance with all national and local electrical codes, regulations, and practices.
The antenna and cabling should be installed where they will not become energized as a result of falling nearby power lines, nor be mounted where they are subjected to over-voltage transients, particularly lightning. Such installations require additional protective means that are detailed in national and local electrical codes.

Trimble receiver internal radios have been designed to operate with the antennas listed below. Antennas not included in this list are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

The antennas that can be used (country dependent) with the:

- ***450 MHz radio*** are 0 dBi and 5 dBi whip antennas

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen so that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

Battery safety

Internal lithium-ion battery

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/or property damage.
To prevent injury or damage:
– Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to,

discoloration, warping, and leaking battery fluid.
– Do not expose the battery to fire, high temperature, or direct sunlight.
– Do not immerse the battery in water.
– Do not use or 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.

WARNING – Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage.
To prevent injury or damage:
– If the battery leaks, avoid contact with the battery fluid.
– 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.

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.

Connecting the receiver to a vehicle battery

WARNING – Use caution when connecting battery cable's clip leads to a vehicle battery. Do not allow any metal object or jewelry to connect (short) the battery's positive (+) terminal to either the negative (-) terminal or the metal of the vehicle connected to the battery. This could result in high current, arcing, and high temperatures, exposing the user to possible injury.

WARNING – When connecting an external battery, such as a vehicle battery, to the receiver, be sure to use the Trimble cable with proper over-current protection intended for this purpose, to avoid a safety hazard to the user or damage to the product.

Wet locations

WARNING – This product is not intended to be used outdoors or in a wet location when it is powered by the PoE interface, or by the external power supply. The connection is not waterproof and could be subject to electrical shorting.

WARNING – The external power adaptor and its associated power cord and plug are not intended to be installed outdoors, or in a wet location.

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Introduction

The Trimble SPS855 GNSS Modular receiver is ideal for the following site development and construction applications:

- Base station for precision GNSS applications such as site positioning and machine control
- Location RTK for site vehicle and supervisors
- Precision RTK rover on-site
- System integrator applications using Location GNSS augmentation, including OmniSTAR, Location RTK, SBAS, and DGPS RTCM and Precision RTK

The receiver has a keypad and display, so you can configure the receiver without using a controller or computer. It can be ordered with a 410 MHz to 470 MHz UHF receive and transmit radio or a license-free 900 MHz receive and transmit radio.

All the receivers can optionally record GNSS data to the internal memory, and transfer the data over a serial or Ethernet connection.

Related information

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. They can be downloaded from the Trimble website at www.trimble.com/support.shtml.
- Trimble training courses – Consider a training course to help you use your GNSS system to its fullest potential. For more information, go to the Trimble website at www.trimble.com/training.html.

Technical support

If you have a problem and cannot find the information you need in the product documentation, contact your local dealer. Alternatively, go to the Support area of the Trimble website (www.trimble.com/support.shtml). Select the product you need information on. Product updates, documentation, and any support issues are available for download.

If you need to contact Trimble technical support, complete the online inquiry form at www.trimble.com/support_form.asp.

Batteries and power

Batteries

The receiver has one internal rechargeable Lithium-ion battery.

The operational time provided by the internal battery depends on the type of measurement and operating conditions. Typically, the internal battery provides 10 hours operation as a base station and 12 hours as a rover during measurement operations using the internal radio.

The receiver can also be powered by an external power source that is connected to the Lemo or modem port.

All battery operation tests are carried out with new, fully-charged batteries at room temperature and with full receiver configuration operational. Older batteries, at temperatures significantly higher or lower than room temperature, will have a reduced performance. Receivers operating with reduced configuration will have a higher performance.

Battery safety

Charge and use the battery only in strict accordance with the instructions provided.

Internal lithium-ion battery

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/or property damage.
To prevent injury or damage:
– Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
– Do not expose the battery to fire, high temperature, or direct sunlight.
– Do not immerse the battery in water.
– Do not use or 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.

WARNING – Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage.
To prevent injury or damage:
– If the battery leaks, avoid contact with the battery fluid.
– 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.

Connecting the receiver to a vehicle battery

WARNING – Use caution when connecting battery cable's clip leads to a vehicle battery. Do not allow any metal object or jewelry to connect (short) the battery's positive (+) terminal to either the negative (-) terminal or the metal of the vehicle connected to the battery. This could result in high current, arcing, and high temperatures, exposing the user to possible injury.

WARNING – When connecting an external battery, such as a vehicle battery, to the receiver, be sure to use the Trimble cable with proper over-current protection intended for this purpose, to avoid a safety hazard to the user or damage to the product.

Charging the Lithium-ion batteries

The rechargeable Lithium-ion batteries are supplied partially charged. Charge the battery completely before using it for the first time. If the battery has been stored for longer than three months, charge

it before use.

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.

The internal battery charges fully in 8 hours when connected to a suitable power source.

When the internal temperature of the receiver is greater than 50 °C (122 °F) or less than 5 °C (41 °F), the internal battery charger stops charging and the receiver's display shows Charger Disabled, Temp Limited. However, the receiver will still draw its power from the external DC source, extending the operating time in the field.

When the external DC voltage is not able to support the power drain, an X is displayed across the battery status icon on the front panel display, which indicates that the internal charger is off.

Using the Lithium-ion battery as a Universal Power Supply (UPS)

The internal battery will only charge from an external power source as long as that source can support the power drain, for example, an AC power adaptor. The receiver is supplied with an AC power (also known as mains power) supply unit that recharges the battery inside the receiver when it is connected through the adaptor to the modem port or the Lemo port. When you use the receiver on large projects, from a permanent or semi-permanent base station location in a site trailer, Trimble recommends that you use this power supply at all times to keep the internal battery charged. This provides an uninterrupted power supply and will keep the site operational for more than 10 hours after a power failure.

Keep all batteries on continuous charge when not in use. You can keep batteries on charge indefinitely without damage to the receiver or to the batteries.

Removing the rechargeable Lithium-ion battery

The internal Lithium-ion battery should be removed only at an authorized Trimble Service Center. If the battery is removed at an unauthorized service center, the remaining warranty on the product will be void.

Storing the Lithium-ion battery

If you must store a Lithium-ion battery for long periods, make sure that it is fully charged before it is stored, and that you charge it at least once every three months while it is stored.

Do not allow a battery that is in storage to discharge to below 5 V. A battery that reaches deep discharge level (5 V or less) cannot be recharged and must be replaced. To protect a battery that is in use from deep discharge, the receiver switches power sources or stops drawing power when the battery pack discharges to 5.9 V.

All batteries discharge over time when not in use, and they discharge faster in colder temperatures. Do not store the receiver at temperatures outside the range –40 °C to +70 °C (–40 °F to +158 °F).

External power

Sources of external power include:

- AC power
- 12 V vehicle battery
- Trimble custom external battery pack
- Generator power
- Solar panel

The receiver uses an external power source in preference to its internal batteries. If the receiver is not connected to an external power source, or if the external power supply fails, the internal batteries are used.

While carrying out static measurements for postprocessed computations using the internal memory, if no external power is supplied and the internal battery is drained, the receiver shuts down. No data is lost and when power is restored, the receiver restarts in the same status as it was when power was lost.

It is possible to turn off the internal battery using the web interface. In this case, when external power is switched off, there is a limited time (30 seconds) before the unit turns off.

Supported power cables

Part Number	Receiver Connection	Power Connection	Power Source	Other Connectors
46125-20	7-pin Lemo	'Croc' clips	Power from 12 V vehicle battery	None
59044-HH	7-pin Lemo	Cable with DC plug	Power to host devices from AC adapter	Serial
67384	7-pin Lemo	Cable with DC plug	Power to host devices from AC adapter	Serial-to-serial for Moving Base applications
57167	26-pin	Adapter with DC plug	Power from AC adapter	USB(B) socket and Ethernet socket
57168	26-pin	Adapter with DC plug	Power from AC adapter	Serial and Ethernet socket
60789-00, 77070-00	26-pin	Cable with DC plug	Power from AC adapter	2 x Serial, Ethernet plug, USB(A) plug, 1PPS (BNC)
65791-00, 78235-00	26-pin	Cable with DC plug	Power from AC adapter	2 x Serial, Ethernet socket

Note – *SPS855 low voltage cut-offs:*
Power applied through the Lemo connector models a standard 12.4 V lead acid battery. Shut-down voltage is temperature-compensated and is designed to prolong the life of a lead acid battery and not place it into a deep discharge state.
Power applied through the 26-pin adaptor cable models a standard 11.1 V lithium-ion battery.

Shut-down voltage is temperature-compensated and is designed to prolong the life of a lithium-ion battery.
The external DC voltage supply can be used by the receiver if it is in the range stated by the label on the receiver.

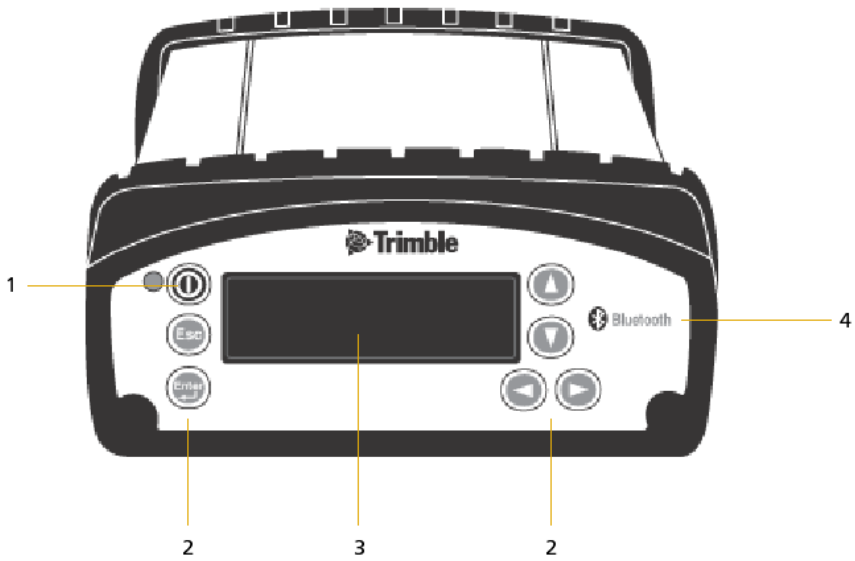
Connecting the receiver to a vehicle battery

WARNING – Use caution when connecting battery cable's clip leads to a vehicle battery. Do not allow any metal object or jewelry to connect (short) the battery's positive (+) terminal to either the negative (-) terminal or the metal of the vehicle connected to the battery. This could result in high current, arcing, and high temperatures, exposing the user to possible injury.

WARNING – When connecting an external battery, such as a vehicle battery, to the receiver, be sure to use the Trimble cable with proper over-current protection intended for this purpose, to avoid a safety hazard to the user or damage to the product.

Front panel guide

Keypad and display



Item	Feature	Description
1	Power button	Indicates if the receiver is on or off.
2	Buttons	Used to turn on and configure the receiver.
3	Display	The receiver has a Vacuum Fluorescent Display that enables you to see how the receiver is operating and view the configuration

Item	Feature	Description
		settings.
4	Bluetooth antenna	Location of the Bluetooth antenna.

Button operations

Use the buttons on the front panel to turn the receiver on and off and to check or change the receiver settings.

Button	Name	Function
	**Power**	Turns the receiver on and off and performs reset operations.
	**Escape**	Returns to the previous screen or cancels changes being made on a screen.
	**Enter**	Advances to the next screen or accepts changes made on a screen.
	**Up**	Moves the cursor between multiple fields on a screen or makes changes to an editable field.
	**Down**	Moves the cursor between multiple fields on a screen or makes changes to an editable field.
	**Left**	Moves the cursor between characters in a field that can be changed.
	**Right**	Moves the cursor between characters in a field that can be changed.

Power button operations

Press the **Power** button  to turn the receiver on and off.

In addition, you can tap  to return to the *Home* screen, or hold down  to perform the following operations:

To...	Hold the Power button for...	Notes
turn off the receiver	two seconds	The display shows a countdown timer. When the display goes blank, release the **Power**button.
clear the almanac, ephemeris, and SV information	15 seconds	The display shows a countdown timer. When the display goes blank, continue to hold the **Power** button. The display shows a countdown time to clear the almanac and ephemeris. When the counter reaches 0, release the **Power** button.
reset the receiver to its factory defaults and the	35 seconds	The display shows a countdown timer. When the display goes blank, continue to hold the **Power** button. The display show a countdown to clear the almanac and

To...	Hold the Power button for...	Notes
default application file		ephemeris. When the counter reaches 0, continue to hold the **Power** button. The display indicates a countdown to resetting the receiver. When the counter reaches 0, release the **Power** button.
force the receiver to power down	at least 60 seconds	If the reset method above does not work, use this method to force the receiver to turn off. When the Power LED goes off, release the **Power** button.

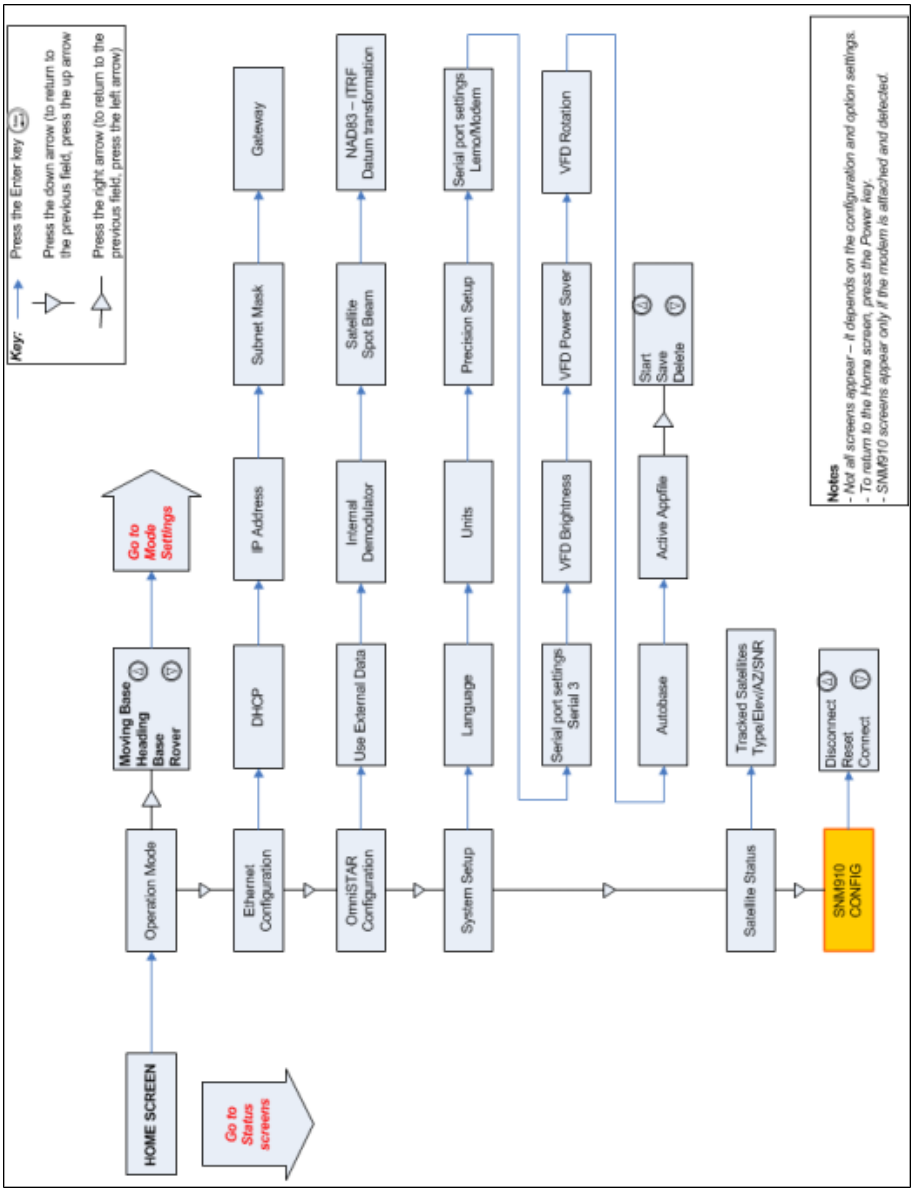
Status screens

The receiver has several view-only status screens that allow you to review the current settings of the receiver. The status screens provide the following information:

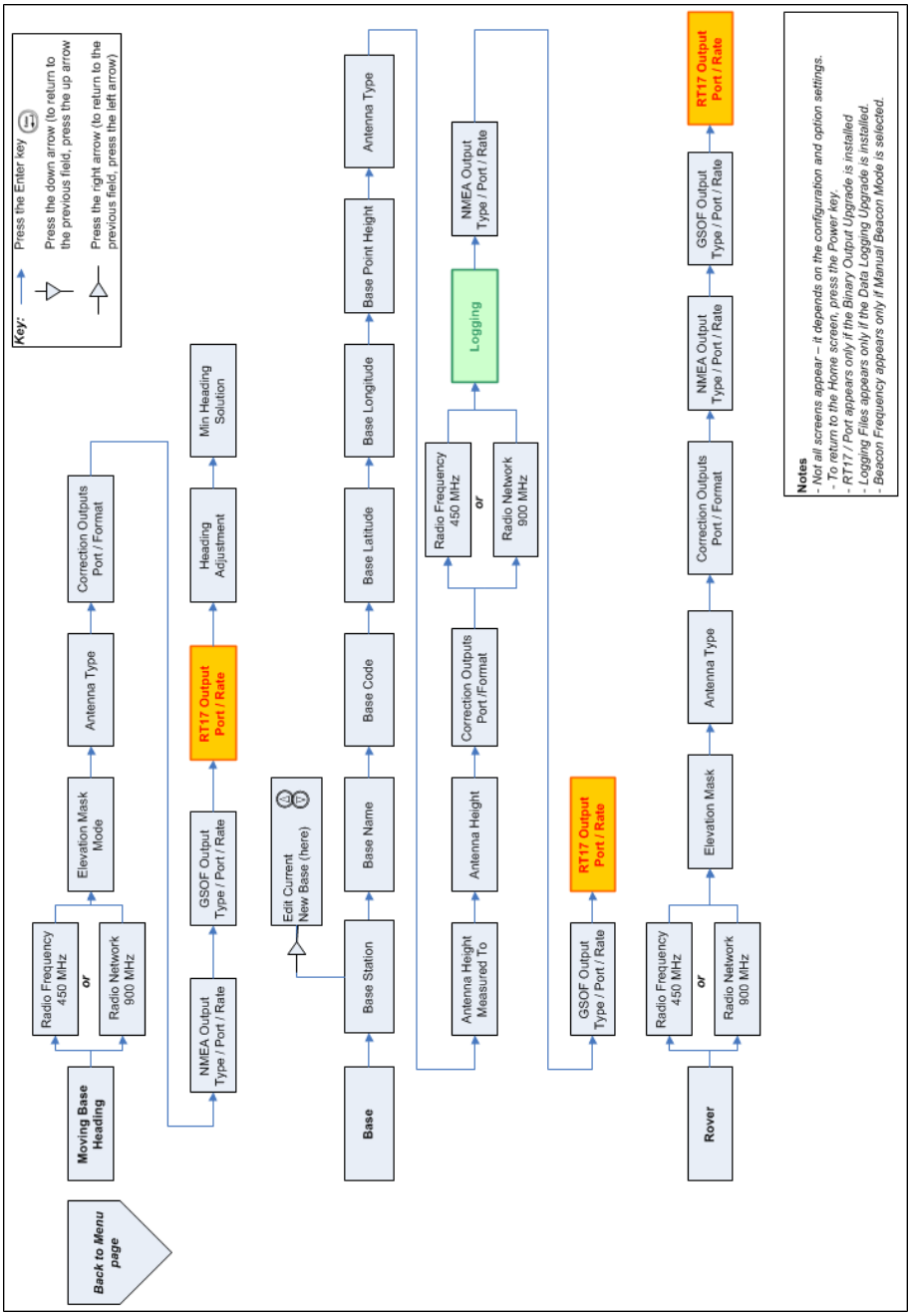
- Position solution and precisions
- CMR and RTCM IDs or OmniSTAR satellite and link status
- Base name and code
- Latitude, longitude, and height
- Antenna height
- Horizontal and vertical precision
- Receiver model and hardware version
- Receiver firmware version
- Receiver serial number
- Receiver IP address

To access these screens from the Home screen, press  or  .

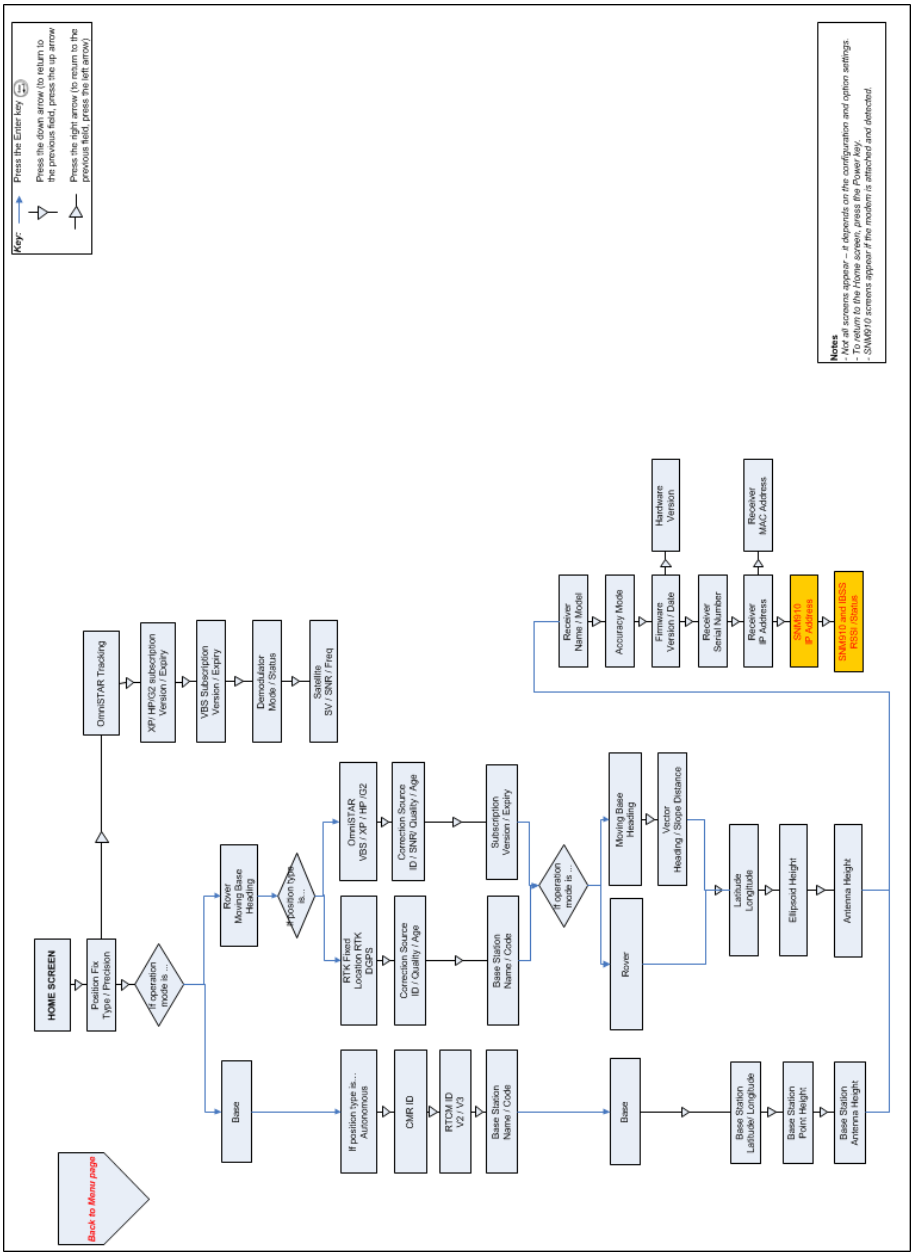
SPS85x configuration screens



SPS85x mode screens



SPS85x status screens



Configuring system settings

You can use the keypad and display of the receiver to configure the following settings:

- Display language
- Display and input units
- Baud rate, parity, data bits, and stop bits for serial ports
- Display power saver
- AutoBase
- Set position precisions

To access the system settings:

1. In the *Home* screen, press  . Use the *Operation Mode* screen to configure system settings or mode settings, and to view the SV (satellite) status. Mode Settings is the default setting.
2. Press  . When the operation mode begins to flash, the receiver is in Edit mode and you can change this setting.
3. Press  to change to *System Setup*.
4. Press  to accept the change.
5. Press  again.
6. Use the *Display Language* screen, if required, to change the language. Choose English, Finnish, French, German, Italian, Spanish, or Swedish. Press  to accept the change.
7. Press  again. Use the *Display and Input Units* screen, if required, to change the units to Meters or US Feet.
8. Press  to accept the change.
9. Press  again. Use the *Port Settings* screen, if required, to change the port.
10. Press  to accept the change.
11. Press  again. Use the *Screen Pwr Savr* screen to choose On, Off, or Auto. If you use the Auto setting, the screen turns off after 60 seconds of inactivity. The Power LED remains lit so that you can tell if the receiver is on or off. If an error message appears, the screen comes back on. Press  to accept the change and then press  again to move to the next screen.
12. If you are using an SPS Modular RTK base station, the *Autobase warning* screen appears.
13. Press  to accept the change.
14. Press  again. When the *Home* screen appears, the system setup is complete.

Turning off AutoBase technology

To turn off AutoBase technology, use either the receiver's keypad and display or the web interface.

When AutoBase technology is off, you can establish a new base station position in the receiver using the *Edit Current* or *New Base (Here)* menus. This does not automatically generate a new application file, but changes the settings in the current application file. When the receiver is turned on again, the most recent settings are always used.

To turn off AutoBase technology using the receiver:

1. In the *Home* screen, press  .
2. Press  . When the operation mode begins to flash, the receiver is in Edit mode and you can change this setting.
3. Press  to change to *System Setup*.
4. Press  to accept the change.
5. Press  again. You start to scroll through options in the *System Setup* menu.
6. Keep pressing  until *Autobase* appears.
7. Press  . The setting On flashes.
8. Press  until it displays Off. Press  to accept the change.
9. Press  again. The *Active Appfile* screen appears.

To change the application file:

- Press to display START Appfile.
- Press to show SAVE Appfile.
- Press to show DELETE Appfile.
- Press to show START Appfile.

Signal tracking

This table shows the signal tracking capability for the SPS855 receiver:

Signal Type	Class	SPS855 (Construction and Marine)
GPS signals	L1	Yes
	L2	Yes
	L2C	Yes
	L5	Optional
QZSS	L1 C/A, L1C, L1 SAIF, L2C, L5	Yes (L5 optional)
GLONASS signals	L1, L2	Optional
Galileo	L1 CBOC, E5A, E5B, and E5AltBOC8	Optional
Compass	B1, B2, B3	Optional
SBAS corrections	WAAS	Yes
	EGNOS	Yes
	MSAS	Yes
OmniSTAR corrections	XP	Yes
	HP	Yes
	G2	Yes
	VBS	Yes
Beacon corrections	MSK	No

Variable configuration options

This table lists the default options for the receiver:

Configuration Option	SPS555H	SPS855
Rover options		
Precise horizontal	-	Optional
Precise vertical	-	Optional
Moving Base/Heading	Yes	Optional
Location RTK	-	Optional
RTCM DGPS	-	Optional
Moving Base RTK range limit	2.4 km	None
Base options		
Static RTK	-	Optional
Moving Base/Heading	Yes	Optional
RTCM DGPS	-	Optional
General options		
Data logging	-	Optional
VRS support	-	Yes
Max data rate	20 Hz	20 Hz

Upgrading the receiver

When you purchase the upgrade after you have received the receiver, your Trimble dealer will provide you with a code to change the receiver configuration.

The SPS855 can be upgraded as follows:

- With GLONASS, L5, Galileo, Compass.
- Models with 450 MHz UHF internal radio can be upgraded to 2 W transmission power, if it is legally allowed in its country of use.
- To allow internal data logging.
- To Location RTK rover 10/10, Location RTK rover 10/2, Precision RTK rover, Precision RTK base, Precision RTK base/rover, or Moving Base/Heading.

Managing application files

You can use the front panel to manage application files in the receiver. You can see which application file the receiver is currently using and then choose to make changes to it and save it, load a different application file, or delete an application file.

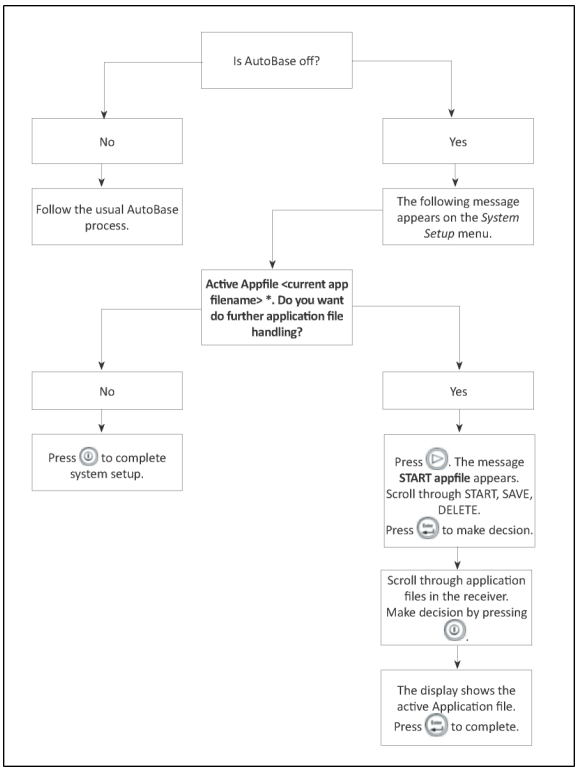
To manage the application files, use the *System Setup*menu. You can only manage application files when the AutoBase feature is turned off.

To save an application file, configure all the settings you need through the front panel and then save the file. When you save the file, the receiver provides a default filename, which you can change, based on the currently set mode. For example:

Receiver mode	Suggested application file name	Notes
Base	BASE01	Does not apply to the SPS555H receiver.
Heading	HDG01	
Moving Base	MB01	Does not apply to the SPS555H receiver.
Rover	ROV01	Does not apply to the SPS555H receiver.

Note – *If you start an application file that is saved with AutoBase turned on in the file, then it turns on AutoBase in the receiver, even if it was off before the file was loaded.*

The following figure shows how application files are handled through the front panel of the receiver:



Default receiver settings

All settings are stored in application files. The default application file, Default.cfg, is stored permanently in the receiver, and contains the factory default settings. Whenever the receiver is reset to its factory defaults, the current settings (stored in the current application file, Current.cfg) are reset to the values in the default application file.

You cannot modify the default application file. However, you can create a power-up application file so that the settings in this file can be applied immediately after the default application file, overriding the factory defaults.

These settings are defined in the default application file.

Function	Settings	Factory default
SV Enable		All SVs enabled
General Controls	Elevation mask	10°
	PDOP mask	7
	RTK positioning mode	Low Latency
	Motion	Kinematic
Serial Port 3	Baud rate	38,400
	Format	8-None-1
	Flow control	None
Serial Port (Modem) 2	Baud rate	38,400
	Format	8-None-1
	Flow control	None
Input Setup	Station	Any
NMEA/ASCII (all support messages)		None
Streamed Output		All types Off
		Offset=00
RT17/Binary		All ports Off
OmniSTAR	Internal demodulator	Off
Antenna	Type	Zephyr Geodetic Model 2
	Height (true vertical)	0.00 m
	Measurement method	Antenna Phase Center

Resetting the receiver to factory defaults

To reset the receiver to its factory defaults, do one of the following:

- Press  for 15 seconds.
- In the GPS Configurator software, select *Connect to Receiver* and then click **Reset Receiver** in the *General* tab.
- In the Configuration Toolbox software, select the *General* tab and then click **Reset Receiver**.

For more information on the GPS Configurator and Configuration Toolbox software, refer to the "Configuring the Receiver Settings" section of the *Trimble SPS Series Receiver Help*.

Default behavior

If a power-up application file is present in the receiver, its settings are applied immediately after the default settings. This means you can use a power-up file to define your own set of defaults. The factory defaults are also applied when you perform a full reset of the receiver because resetting the receiver deletes the power-up files.

When starting any of the SPS receivers as a base station or rover receiver using the Trimble SCS900 site controller software or the HYDROpro software, the settings required for those operations are automatically set and configured in that software. To change the receiver settings for special applications or for use with third-party software, use the GPS Configurator software or the Configuration Toolbox software.

Logging data

Data logging involves the collection of GNSS measurement data over a period of time at a static point or points, and subsequent postprocessing of the information to accurately compute baseline information. Data logging using receivers requires access to suitable GNSS postprocessing software such as the Trimble Business Center software.

Postprocessed GNSS data is typically used for control network measurement applications and precise monitoring. GNSS measurement data is collected over a period of time at a static point or points and then postprocessed to accurately compute baseline information.

By default, the Data Logging option is turned off. For information on how to enable the Data Logging option, and the required postprocessing software options, contact your Trimble dealer.

Logging data after a power loss

If power is unexpectedly lost while the receiver is logging data, the receiver tries to return to the state it was in immediately before the power loss. The receiver does not reset itself to default settings.

If the receiver was logging data when power was lost, it resumes logging data when power is restored.

Adding radio frequencies

Adding frequencies for the 450 MHz internal radio using the WinFlash utility

If your receiver has the optional internal radio installed, you can use the WinFlash utility to add receiving frequencies to the default list.

You can also use the web interface to add and manage receiver 450 MHz frequencies.

If you purchase a transmit upgrade (after initial purchase), the broadcast frequencies must be programmed using a .set file obtained from a Trimble service provider.

1. Start the WinFlash utility. The *Device Configuration* screen appears.
2. From the *Device type* list, select the receiver.
3. From the *PC serial port* field, select the serial (COM) port on the computer that the receiver is connected to.
4. Click **Next**.

   The *Operation Selection* screen appears. The *Operations* list shows all of the supported operations for the selected device. A description of the selected operation is shown in the *Description* field.
5. Select *Configure Radio* and then click **Next**.

   The *Frequency Selection* dialog appears.
6. In the *Wireless Format* group, select the appropriate channel and wireless mode. The wireless mode must be the same for all radios in your network.
7. In the Specify Frequency field, enter the frequency you require.
8. Click **Add**. The new frequency appears in the *Selected Frequencies* list.

   Note – *The frequencies that you program must conform to the channel spacing and minimum tuning requirements for the radio. To view this information, click* **Radio Info***. You may select either 12.5 or 25 kHz channel spacing. All radios in your network must use the same channel spacing.*
9. When you have configured all the frequencies you require, click **OK**.

   The WinFlash utility updates the receiver radio frequencies and then restarts the receiver.

   Note – *You can only configure receive frequencies. The FCC-approved transmit frequencies must be specified and configured by Trimble.*

Setting UHF reception radio frequencies using the web interface

To enter your own Receive (Rx) frequency using the web interface:

1. Select the *Radio* menu.
2. Select the *Frequency Management* submenu.

3. Make a note of the details shown in the *Frequency range* and *Tuning step* fields. Any new frequencies must be within the range shown and must also be a multiple of the KHz shown in the *Tuning step* field.
4. Select the *Add Channel* option and then enter the new channel frequency.
5. Click **OK**.

To delete a channel frequency:

1. Select the *Delete channel* option.
2. Select a channel to delete from the list that appears.

You cannot add or delete Transmit (Tx) channels using the web interface.

Troubleshooting receiver issues

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

The receiver does not turn on

Possible cause	Solution
External power is too low.	Check the charge on the external power supply, and check the fuse if applicable. If required, replace the battery.
Internal power is too low.	Do the following: • Check the charge on the internal batteries and replace if required. • Ensure battery contacts are clean.
External power is not properly connected.	Do the following: • Check that the Lemo connection is seated properly. • Check for broken or bent pins in the connector.
Faulty external power cable.	Do the following: • Try a different cable. • Check pinouts with multimeter to ensure internal wiring is intact.

The receiver is not tracking any satellites

Possible cause	Solution
The GNSS antenna does not have clear line of sight to the sky.	Ensure that the antenna has a clear line of sight.
The cable between the receiver and the GNSS antenna is damaged.	Replace the cable.
The cable connections at receiver or antenna are not tightly seated, or are connected incorrectly.	Check all cable connections.

The receiver does not log data

Possible cause	Solution
Insufficient memory in the internal memory.	Delete old files using the GPS Configurator software, or press  for 30 seconds.
The receiver is tracking fewer than	• Wait until the SV Tracking LED is flashing slowly. Use the SCS900

Possible cause	Solution
four satellites.	software. • Go to the SkyPlot screen and press **Ctrl**+**M** to access the current elevation mask settings. Reduce the mask value to make more satellites available. • The default mask setting for receiver is 10° above the horizon. Change the value to a lower setting temporarily while you are waiting for a better constellation availability.
The data logging option is not enabled.	Check the original purchase order or the receiver configuration using the WinFlash utility. If data logging is not enabled on the receiver, you can order the option from your local Trimble Site Positioning Systems dealer, and upgrade the receiver using the WinFlash utility.

The receiver is not responding

Possible cause	Solution
The receiver needs a soft reset.	Turn off the receiver and then turn it back on again.
The receiver needs a full reset.	Press  for 30 seconds.

The receiver cannot be set up as a base station using the SCS900 software

Possible cause	Solution
The SPS Modular receiver may have been purchased as a rover receiver rather than with the optional base station capability.	Ask your local dealer to check the Option Bit settings, else check the setting yourself using the WinFlash utility. If required, upgrade the receiver.

Glossary

1PPS	Pulse-per-second. Used in hardware timing. A pulse is generated in conjunction with a time stamp. This defines the instant when the time stamp is applicable.
almanac	A file that contains orbit information on all the satellites, clock corrections, and atmospheric delay parameters. The almanac is transmitted by a GNSS satellite to a GNSS receiver, where it facilitates rapid acquisition of GNSS signals when you start collecting data, or when you have lost track of satellites and are trying to regain GNSS signals. The orbit information is a subset of the ephemeris/ephemerides data.
AutoBase	AutoBase technology uses the position of the receiver to automatically select the correct base station; allowing for one button press operation of a base station. It shortens setup time associated with repeated daily base station setups at the same location on jobsites.
base station	Also called *reference station*. In construction, a base station is a receiver placed at a known point on a jobsite that tracks the same satellites as an RTK rover, and provides a real-time differential correction message stream through radio to the rover, to obtain centimeter level positions on a continuous real-time basis. A base station can also be a part of a virtual reference station network, or a location at which GNSS observations are collected over a period of time, for subsequent postprocessing to obtain the most accurate position for the location.
beacon	Source of RTCM DGPS corrections transmitted from coastal reference stations in the 283.5 to 325.0 kHz range.
BINEX	BInary EXchange format. BINEX is an operational binary format standard for GPS/GLONASS/SBAS research purposes. It is designed to grow and allow encapsulation of all (or most) of the information currently allowed for in a range of other formats.
broadcast server	An Internet server that manages authentication and password control for a network of VRS servers, and relays VRS corrections from the VRS server that you select.
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.
cellular modems	A wireless adaptor that connects a laptop computer to a cellular phone system for data transfer. Cellular modems, which contain their own antennas, plug into a PC Card slot or into the USB port of the computer and are available for a variety of wireless data services such as GPRS.
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.
Compass	The BeiDou Navigation Satellite System (Compass) is a Chinese satellite navigation system. 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. 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. It is planned to offer services to customers in Asia-Pacific region by 2012 and the global system should be finished by 2020.
covariance	A statistical measure of the variance of two random variables that are observed or measured in the same mean time period. This measure is equal to the product of the deviations of corresponding values of the two variables from their respective means.
datum	Also called *geodetic datum*. A mathematical model designed to best fit the geoid, defined by the relationship between an ellipsoid and, a point on the topographic surface, established as the origin of the datum. World geodetic datums are typically defined by the size and shape of an ellipsoid and the relationship between the center of the ellipsoid and the center of the earth. Because the earth is not a perfect ellipsoid, any single datum will provide a better model in some locations than in others. Therefore, various datums have been established to suit particular regions. For example, maps in Europe are often based on the European datum of 1950 (ED-50). Maps in the United States are often based on the North American datum of 1927 (NAD-27) or 1983 (NAD-83). All GPS coordinates are based on the WGS-84 datum surface.
deep discharge	Withdrawal of all electrical energy to the end-point voltage before the cell or battery is recharged.
DGPS	See real-time differential GPS.
differential correction	Differential correction is the process of correcting GNSS data collected on a rover with data collected simultaneously at a base station. Because the base station is on a known location, any errors in data collected at the base station can be measured, and the necessary corrections applied to the rover data. Differential correction can be done in real-time, or after the data is collected by postprocessing.
differential GPS	See real-time differential GPS.
DOP	Dilution of Precision. A measure of the quality of GNSS positions, based on the geometry of the satellites used to compute the positions. When satellites are widely spaced relative to each other, the DOP value is lower, and position accuracy is greater. When satellites are close together in the sky, the DOP is higher and GNSS positions may contain a greater level of error. PDOP (Position DOP) indicates the three-dimensional geometry of the satellites. Other DOP values include HDOP (Horizontal DOP) and VDOP (Vertical DOP),

	which indicate the accuracy of horizontal measurements (latitude and longitude) and vertical measurements respectively. PDOP is related to HDOP and VDOP as follows: $PDOP^2 = HDOP^2 + VDOP^2$.
dual-frequency GPS	A type of receiver that uses both L1 and L2 signals from GPS satellites. A dual-frequency receiver can compute more precise position fixes over longer distances and under more adverse conditions because it compensates for ionospheric delays.
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.
elevation mask	The angle below which the receiver will not track satellites. Normally set to 10 degrees to avoid interference problems caused by buildings and trees, atmospheric issues, and multipath errors.
ellipsoid	An ellipsoid is the three-dimensional shape that is used as the basis for mathematically modeling the earth's surface. The ellipsoid is defined by the lengths of the minor and major axes. The earth's minor axis is the polar axis and the major axis is the equatorial axis.
EHT	Height above ellipsoid.
ephemeris/ephemerides	A list of predicted (accurate) positions or locations of satellites as a function of time. A set of numerical parameters that can be used to determine a satellite's position. Available as broadcast ephemeris or as postprocessed precise ephemeris.
epoch	The measurement interval of a GNSS receiver. The epoch varies according to the measurement type: for real-time measurement it is set at one second; for postprocessed measurement it can be set to a rate of between one second and one minute. For example, if data is measured every 15 seconds, loading data using 30-second epochs means loading every alternate measurement.
feature	A feature is a physical object or event that has a location in the real world, which you want to collect position and/or descriptive information (attributes) about. Features can be classified as surface or non-surface features, and again as points, lines/breaklines, or boundaries/areas.
firmware	The program inside the receiver that controls receiver operations and hardware.
Galileo	Galileo is a GNSS system built by the European Union and the European Space Agency. It is complimentary to GPS and GLONASS.
GHT	Height above geoid.
GIOVE	Galileo In-Orbit Validation Element. The name of each satellite for the European Space Agency to test the Galileo positioning system.
GLONASS	Global Orbiting Navigation Satellite System. GLONASS is a Soviet space-based navigation system comparable to the American GPS system. The operational system consists of 21 operational and 3 non-operational satellites in 3 orbit planes.

GNSS	Global Navigation Satellite System.
GSOF	General Serial Output Format. A Trimble proprietary message format.
HDOP	Horizontal Dilution of Precision. HDOP is a DOP value that indicates the accuracy of horizontal measurements. Other DOP values include VDOP (vertical DOP) and PDOP (Position DOP). Using a maximum HDOP is ideal for situations where vertical precision is not particularly important, and your position yield would be decreased by the vertical component of the PDOP (for example, if you are collecting data under canopy).
IBSS	Internet Base Station Service. This Trimble service makes the setup of an Internet-capable receiver as simple as possible. The base station can be connected to the Internet (cable or wirelessly). To access the distribution server, the user enter a password into the receiver. To use the server, the user must have a Trimble Connected Community site license.
L1	The primary L-band carrier used by GPS and GLONASS satellites to transmit satellite data.
L2	The secondary L-band carrier used by GPS and GLONASS satellites to transmit satellite data.
L2C	A modernized code that allows significantly better ability to track the L2 frequency.
L5	The third L-band carrier used by GPS satellites to transmit satellite data. L5 will provide a higher power level than the other carriers. As a result, acquiring and tracking weak signals will be easier.
Location RTK	Some applications such as vehicular-mounted site supervisor systems do not require Precision RTK accuracy. Location RTK is a mode in which, once initialized, the receiver will operate either in 10 cm horizontal and 10 cm vertical accuracy, or in 10 cm horizontal and and 2 cm vertical accuracy.
Mountpoint	Every single NTripSource needs a unique mountpoint on an NTripCaster. Before transmitting GNSS data to the NTripCaster, the NTripServer sends an assignment of the mountpoint.
Moving Base	Moving Base is an RTK positioning technique in which both reference and rover receivers are mobile. Corrections are sent from a “base” receiver to a “rover” receiver and the resultant baseline (vector) has centimeter-level accuracy.
MSAS	MTSAT Satellite-Based 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, which is available in the United States.
multipath	Interference, similar to ghosts on an analog television screen, that occurs when GNSS signals arrive at an antenna having traversed different paths. The signal traversing the longer path yields a larger pseudorange estimate and increases the error. Multiple paths can arise from reflections off the ground or off structures near the antenna.
NMEA	National Marine Electronics Association. NMEA 0183 defines the standard for interfacing marine electronic navigational devices. This standard defines a

	number of 'strings' referred to as NMEA strings that contain navigational details such as positions. Most Trimble GNSS receivers can output positions as NMEA strings.
NTrip Protocol	Networked Transport of RTCM via Internet Protocol (NTrip) is an application-level protocol that supports streaming Global Navigation Satellite System (GNSS) data over the Internet. NTrip is a generic, stateless protocol based on the Hypertext Transfer Protocol (HTTP). The HTTP objects are extended to GNSS data streams.
NTripCaster	The NTripCaster is basically an HTTP server supporting a subset of HTTP request/response messages and adjusted to low-bandwidth streaming data. The NTripCaster accepts request messages on a single port from either the NTripServer or the NTripClient. Depending on these messages, the NTripCaster decides whether there is streaming data to receive or to send. Trimble NTripCaster integrates the NTripServer and the NTripCaster. This port is used only to accept requests from NTripClients.
NTripClient	An NTripClient will be accepted by and receive data from an NTripCaster, if the NTripClient sends the correct request message (TCP/UDP connection to the specified NTripCaster IP and listening port).
NTripServer	The NTripServer is used to transfer GNSS data of an NTripSource to the NTripCaster. An NTripServer in its simplest setup is a computer program running on a PC that sends correction data of an NTripSource (for example, as received through the serial communication port from a GNSS receiver) to the NTripCaster. The NTripServer - NTripCaster communication extends HTTP by additional message formats and status codes.
NTripSource	The NTripSources provide continuous GNSS data (for example, RTCM-104 corrections) as streaming data. A single source represents GNSS data referring to a specific location. Source description parameters are compiled in the source-table.
OmniSTAR	The OmniSTAR HP/XP service allows the use of new generation dual-frequency receivers with the OmniSTAR service. The HP/XP service does not rely on local reference stations for its signal, but utilizes a global satellite monitoring network. Additionally, while most current dual-frequency GNSS systems are accurate to within a meter or so, OmniSTAR with XP is accurate in 3D to better than 30 cm.
PDOP	Position Dilution of Precision. PDOP is a DOP value that indicates the accuracy of three-dimensional measurements. Other DOP values include VDOP (vertical DOP) and HDOP (Horizontal Dilution of Precision). Using a maximum PDOP value is ideal for situations where both vertical and horizontal precision are important.
POE	Power Over Ethernet. Provides DC power to the receiver using an Ethernet cable.
postprocessing	Postprocessing is the processing of satellite data after it is collected, in order to eliminate error. This involves using computer software to compare data from the rover with data collected at the base station.
QZSS	Quasi-Zenith Satellite System. A Japanese regional GNSS eventually consisting of three geosynchronous satellites over Japan.

real-time differential GPS	Also known as *real-time differential correction* or *DGPS*. Real-time differential GPS is the process of correcting GPS 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 DGPS 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.
rover	A rover is any mobile GNSS receiver that is used to collect or update data in the field, typically at an unknown location.
Roving mode	Roving mode applies to the use of a rover receiver to collect data, stakeout, or control earthmoving machinery in real time using RTK techniques.
RTCM	Radio Technical Commission for Maritime Services. A commission established to define a differential data link for the real-time differential correction of roving GNSS receivers. There are three versions of RTCM correction messages. All Trimble GNSS receivers use Version 2 protocol for single-frequency DGPS type corrections. Carrier phase corrections are available on Version 2, or on the newer Version 3 RTCM protocol, which is available on certain Trimble dual-frequency receivers. The Version 3 RTCM protocol is more compact but is not as widely supported as Version 2.
RTK	real-time kinematic. A real-time differential GPS 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.
signal-to-noise ratio	SNR. The signal strength of a satellite is a measure of the information content of the signal, relative to the signal's noise. The typical SNR of a satellite at 30° elevation is between 47 and 50 dBHz.
skyplot	The satellite skyplot confirms reception of a differentially corrected GNSS signal and displays the number of satellites tracked by the GNSS receiver, as well as their relative positions.
SNR	See signal-to-noise ratio.
Source-table	The NTripCaster maintains a source-table containing information on available NTripSources, networks of NTripSources, and NTripCasters, to be sent to an NTripClient on request. Source-table records are dedicated to one of the following: • data STReams (record type STR) • CASters (record type CAS) • NETworks of data streams (record type NET)

	All NTripClients must be able to decode record type STR. Decoding types CAS and NET is an optional feature. All data fields in the source-table records are separated using the semicolon character.
triple frequency GPS	A type of receiver that uses three carrier phase measurements (L1, L2, and L5).
UTC	Universal Time Coordinated. A time standard based on local solar mean time at the Greenwich meridian.
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.
WGS-84	World Geodetic System 1984. Since January 1987, WGS-84 has superseded WGS-72 as the datum used by GPS. The WGS-84 datum is based on the ellipsoid of the same name.