

RE-S1

915+ Spread Spectrum Radio



Operator's Manual



RE-S1

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Rev A

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Introduction

The RE-S1 is a 1W radio extension system using 915+ spread spectrum technology. The RE-S1 can be used to enhance the following survey-related systems:

- As a stand-alone repeater to increase the range between a Base and Rover in spread spectrum systems, such as with the GR-3 or HiPer Lite+ GPS systems.
- As a transmit/receive external 915+ radio for any Base system, such as with the GB or Legacy series GPS receiver.

Obstructions—such as buildings, terrain, trees, etc—greatly affect the usability and range of any radio system. The RE-S1 provides radio repeater capabilities and increase the operational range and effectivity of the system in unfavorable environments.



The RE-S1 simply extends the operational range of a spread spectrum system. It does not increase range beyond the system's OAF limitations.

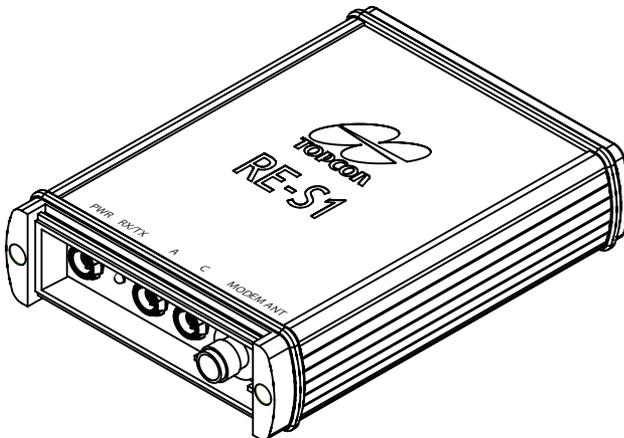


Figure 1. RE-S1

Getting Acquainted

The RE-S1 is a transmit/receive/repeat 915+ spread spectrum radio modem. The RE-S1 is compatible with existing Topcon spread spectrum radio systems (some older HiPer models may need a radio modem upgrade), as well as Topcon base stations. Simple features allow the RE-S1 to be easily adaptable to any situation, and make it easy to use.

RX/TX LED

The RX/TX LED provides the following indications for the modem:

- Green flashes – the modem is in receive mode and is searching for radio link.
- Green solid – a radio link has been established.
- Green solid with Red flash – the modem is receiving.
- Red solid – the modem is in transmit mode.
- Red flashes – an improper configuration has been detected.

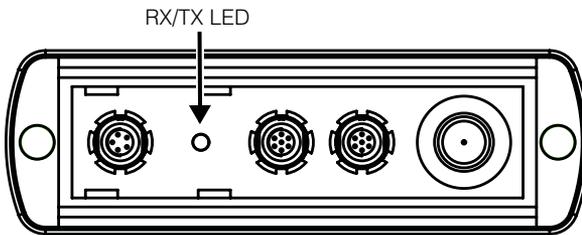


Figure 2. RE-S1 Receive/Transmit LED

LED notes: The RX/TX LED will be solid green with a red flash when the Base receiver is within radio range of the repeater system. The red flash indicates the following:

- A data packet has been received from the Base.
- A data packet has been transmitted from the repeater system.

If the RX/TX LED flashes green for an extended period of time, check the following:

- The repeater's distance from the Base.

- The channel of the RE-S1, Base, and Rover.
- The protocol of the RE-S1, Base, and Rover (FH915 Plus).

Ports

The RE-S1 has the following ports:

- Power Port – used to connect the repeater an external power source.
- Serial Ports A and C – used for communication between the repeater and an external device (computer or controller).
- Modem Antenna Port – provides connection to a spread spectrum reverse TNC radio antenna to receive/transmit a radio signal.

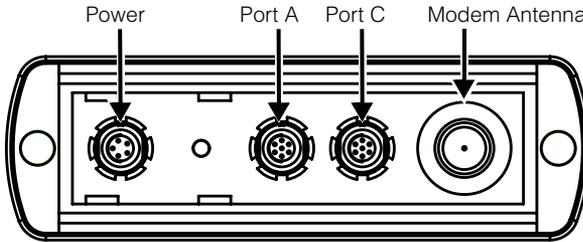


Figure 3. RE-S1 Ports

Radio Modem Antenna

The spread spectrum modem antenna is a reverse polarity TNC RF connection (p/n 30-030012-01).

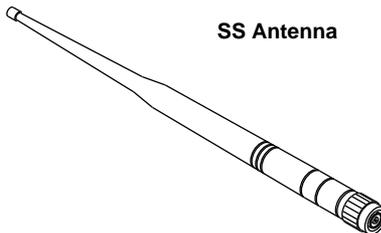
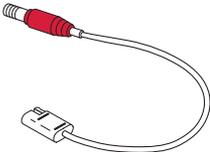
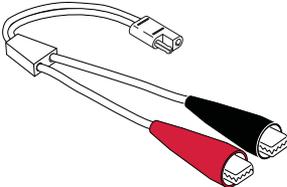
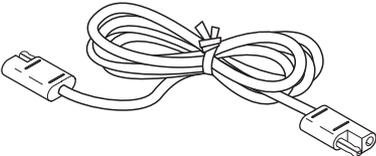
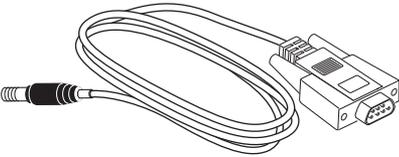


Figure 4. Modem Antenna

Standard Kit Cables

The standard RE-S1 package includes communication and power cables for configuring the repeater and providing a power to the repeater. Table 1-1 lists the cables included in the package.

Table 1-1. RE-S1 Standard Package Cables

Cable Description	Cable Illustration
<p>Power cable, power port-to-SAE Connects the repeater and the power supply unit via SAE connectors for battery charging. Body of connector is red. p/n 14-008016-03</p>	
<p>Alligator clips-to-SAE cable Connects the repeater to a mobile external power source. p/n 14-008025-01</p>	
<p>SAE-to-SAE extension cable Connects the SAE ends of two cables together. For example from the alligator clips to the charging cable. p/n 14-008022-01</p>	
<p>Serial cable Connects the repeater to an external device (controller or computer) for modifying the configuration. Body of connector is black. p/n 14-008005-03</p>	

RE-S1 Configuration

Once the RE-S1 is configured, it simply needs to be connected to a power source to begin operating.

Installing Modem-TPS

Modem-TPS is a configuration program for the radio modem board inside the unit. Modem-TPS is available from the TPS website or on the GPS+ CD.

Computer requirements for Modem-TPS are: Windows® 98 or newer and an RS-232C port. Use Modem-TPS version 2.0 or newer to correctly configure the RE-S1.

1. Navigate to the location of the Modem-TPS program and double-click the **Setup.exe icon**.
2. Keep the default installation location or select a new location. Click **Finish** (Figure 5).

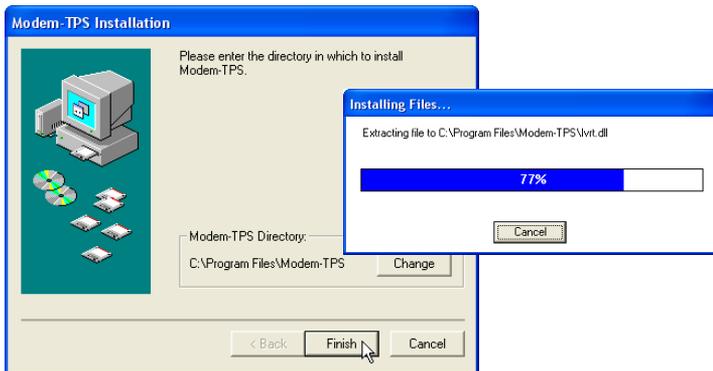


Figure 5. Select Modem-TPS Installation Location and Install

3. Click **OK** to complete the installation (Figure 6 on page 6).

- If desired, create a shortcut on the computer's desktop for quick access to Modem-TPS (Figure 6).



Figure 6. Installation Complete and Shortcut

To uninstall Modem-TPS, use the Start menu on your computer:

Click **Start** ▶ **Programs** ▶ **Modem-TPS** ▶ **Uninstall Modem-TPS**, and click **Yes** at the prompt. Then click **OK** when the uninstall completes.

Configuring the RE-S1 as a Repeater

After being configured as a repeater (Figure 7 on page 7), the RE-S1 will pick up any radio signal on the same channel and forward it to another radio modem. All modems connected to the repeater must use the same protocol and channel.

- Connect the power cable to the RE-S1 and to a power source.
- Using the RS-232 serial cable, connect port A of the RE-S1 to a computer.
- Open Modem-TPS and click Connect.
- Select the protocol: FH915 Plus.



The Base, Rover, and Repeater must use the same protocol.

- Select your location: United States or Australia.
- Select the operation mode: Repeater.
- Select the output power: 1W or 250mW.

- Select the channel: 1–5.



The Base, Rover, and Repeater must use the same channel.

- Click Apply.

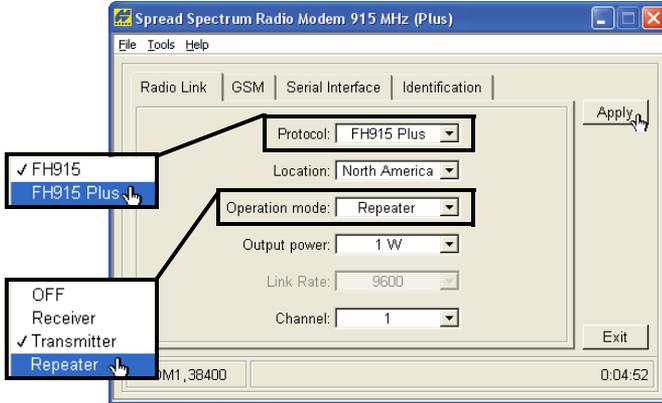


Figure 7. Configure the RE-S1 using Modem-TPS

When setting up the RE-S1 on the jobsite, use an external battery that provides 6 to 14 volts DC power.



The power input for this device should be 6 to 14 volts DC input.

Specifications

This TPS product is a 915+ spread spectrum radio capable of transmitting, receiving, or repeating radio corrections. Table A-1 lists the specifications for the RE-S1.

Table A-1. RE-S1 Specifications

Physical Details	
Enclosure	Aluminum
Color	Topcon Yellow and Black
Dimensions	W:145 x H:110 x D:35 mm
Weight	0.4 kg
Antenna	External
Battery	External (no internal power source)
Controller	External
LEDs	One LED: RX TX – modem status
Environment	
Operating temperature	40 C° to +55 C°
Storage temperature	40 C° to +75 C°
Humidity	95%
I/O	
Communication Ports	Two high speed RS232 serial ports

Table A-1. RE-S1 Specifications (Continued)

Port specifications	RS232 Serial Port Baud rate: 460800,230400,115200(Default),57600, 38400,19200,9600,4800,2400,1200,600, 300 Flow control: RTS/CTS Length: 7,8 (default) Sop bit: 1 (default), 2 Parity: None (default), Odd, Even
Connectors	Modem Antenna (reverse polarity TNC), PWR, RS232
MINTER	One LED (see “LEDs” on page 9 for details)
General Modem Details	
Frequency Range country/region/ purpose dependent	902 to 928 MHz, United States 915 to 925 MHz, Australia
Signal structuring	Frequency-hopping spread spectrum
Hopping pattern	5 per band, user-selectable
Hopping channels	128
Occupied bandwidth	100 KHz
Frequency modulation technique	FSK, 64 Kbps
System gain	29 dB
Operation mode	Transmitter, Receiver, Repeater
Protocol	FH915, FH915+
Data communications	
Serial interface	RS232
Serial data rate	9600, 19200, 38400, 57600 bps, user selectable
Effective radio link rate	9600, 10200, 17000, 51000 bps User selectable for FH915; automatic selection for FH915+
Error correction	FEC (15.7), majority decoding

Table A-1. RE-S1 Specifications (Continued)

Antenna Type	
Type	1/2 wave articulating whip
Connector	Reverse polarity TNC
Gain	2.5 dBi

The modem connector (Table A-2) is a reverse polarity TNC connector for spread spectrum RF connector.

Table A-2. Modem Connector Specifications

Modem	Type	Signal Type	Dir	Details
Spread Spectrum	Reverse polarity TNC	Modem I/O	I/O	RF/GSM output from modem antenna

The power connector is a sealed receptacle, 5 pin, ODU part number G80F1C-T05QF00-0000 rimmed in red.



The power input for this device should be 6 to 14 volts DC input.

The serial RS232 connector is a sealed receptacle, 7 pin, ODU part number G80F1C-T07QC00-0000 rimmed in black.

Regulatory Information and Safety Warnings

The following sections provide information on this product's compliance with government regulations for use, and some guidelines on the safe use of the product.

FCC Compliance

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

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

This equipment has been tested and found to comply with the limits for a digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in residential installations. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause interference to radio or television equipment reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Move the equipment away from the receiver.

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



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

Canadian Emissions Labeling Requirements

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

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

Community of Europe Compliance

The product described in this manual is in compliance with the R&TTE and EMC directives from the European Community.

WEEE Directive

Following information is for EU-member states only:

The use of the symbol indicates that this product may not be treated as household waste. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. For more detailed

information about the take-back and recycling of this product, please contact your supplier where you purchased the product or consult.



Safety and Usage Warnings



To comply with RF exposure requirements, maintain at least 20cm between the user and the radio modem.



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

The owner should periodically test this product to ensure it provides accurate measurements.

Inform TPS immediately if this product does not function properly.



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

Warranty Terms

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

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

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

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

1. The warranty against defects in a Topcon battery, charger, or cable is 90 days.



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