

User Guide

Trimble® SNB900 Radio-Modem

Version 1.0
Revision B
May 2005



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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, and Part 90 of the FCC rules. 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:

- 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

Before operating these radio-modems, users are legally required to obtain frequency licenses, as required by the country-of-use. Please contact your local communications governing agency for the licensing requirements for each of these radio-modems.

Safety

You must maintain a minimum separation distance of 21 cm (approximately 8 in) between yourself and the radiating antenna for this device to satisfy the RF Exposure requirements of the FCC and Industry Canada. The antenna may not be co-located with any other transmitting device. For mobile operation, the maximum gain of the antenna must not exceed 5 dBi.



Trimble and the Environment

For product recycling instructions and more information, please go to www.trimble.com/environment/summary.html.

Europe

To recycle Trimble WEEE (Waste from Electrical and Electronic Equipment), do one of the following:

- call +31 497 53 2436, and ask for the WEEE Associate
- mail a request to:
Trimble Europe BV
c/o Menlo Worldwide Logistics
Meerheide 455521 DZ Eersel, NL



Taiwan - Battery Recycling Requirements

The product contains a removable Lithium-Ion battery. Taiwanese regulations require that waste batteries are recycled.



Declaration of Conformity (Canada)

Company name	Trimble Navigation Limited
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Model number	SNB900
Specification code	1756A-48480
Specification	RSS210
Issue	3
Band	650KG1D
Power	0.832 watt
From frequency	902.6 MHz
To frequency	927.6 MHz

Safety

Warnings and Cautions

Always observe safety instructions that are presented in the following format:



WARNING – A Warning alerts you to a possible hazard or unsafe practice that could result in serious injury or property damage. A Warning describes how to protect people and/or equipment from this risk.



CAUTION – A Caution alerts you to a possible risk of damage to the equipment and/or loss of data. A Caution describes how to protect the equipment and/or data from this risk.

Battery Safety



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. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage.

To prevent injury or damage:

- Do not charge or use the battery if it appears to be damaged or leaking.
 - Charge the Lithium-ion battery only in a Trimble product that is specified to charge it. Be sure to follow all instructions that are provided with the battery charger.
 - Discontinue charging a battery that gives off extreme heat or a burning odor.
 - Use the battery only in Trimble equipment that is specified to use it.
 - Use the battery only for its intended use and according to the instructions in the product documentation.
-

Disposing of the Battery



WARNING – The SNB900 radio-modem contains a Lithium-ion battery and should not be disposed of with general refuse. Dispose of the SNB900 radio-modem in accordance with all local codes and regulations for products containing lithium ion batteries. Contact your local environmental control or disposal agency for further details.

Battery Consumption



CAUTION – Turbo mode increases power consumption by approximately 20%. If you work in Turbo mode, the battery will run down faster.

Installing Antennas



CAUTION – For your own safety, and in terms of the RF Exposure requirements of the FCC, always observe the precautions listed here.

- Always maintain a minimum separation distance of 21 cm (approximately 8 inches) between yourself and the radiating antenna on the SNB900 radio-modem.
- Do not co-locate the antenna with any other transmitting device.
- For mobile operation, do not allow the maximum gain of the antenna to exceed 5 dBi.

Operation and Storage



CAUTION – Do not operate or store the SNB900 radio-modem outside the temperature range specified. Doing so can damage the instrument.

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Introduction

In this chapter:

- [Welcome](#)
- [Related Information](#)
- [Technical Assistance](#)
- [Your Comments](#)

Welcome

This manual describes how to set up, install, and use a Trimble® SNB900 radio-modem.

Even if you have used other radio-modems, Trimble recommends that you read this manual to learn about the special features of the product.



Tip – For an interactive look at GPS, go to the Trimble website at www.trimble.com.

Related Information

Sources of related information include the following:

- Release notes
To read a summary of new and enhanced software features, read about small changes to the documentation, and receive step-by-step instructions for installing the software, open the release notes.
- Support page on the Trimble website
For additional information such as service bulletins and FAQs, go to www.trimble.com/support.shtml. The website also has related utility programs, firmware, and software patches that you can download.
- Trimble training courses
Consider a training course to help you use this GPS system to its fullest potential. For more information, go to the Trimble website at www.trimble.com/training.shtml.
- Extended warranty
For information about extended warranty programs for hardware and firmware, contact your local Trimble dealer.

Technical Assistance

If you cannot find the information you need, contact your local dealer. Alternatively, do one of the following:

- Request technical support:
 - a. Go to www.trimble.com.
 - b. Click the **Support** button at the top of the screen. The *Support A-Z* list of products appears.
 - c. Scroll to the bottom of the list.
 - d. Click the **submit an inquiry** link. A form appears.
 - e. Complete the form and then click **Send**.
- Send an e-mail to trimble_support@trimble.com.

Your Comments

Your feedback about the supporting documentation helps us to improve it with each revision. Send an e-mail with your comments to ReaderFeedback@trimble.com.

Getting Started

In this chapter:

- [Frequency Band](#)
- [Features](#)
- [Front Panel Display](#)
- [Menus](#)
- [Ports](#)
- [Cables and Accessories](#)
- [Use and Care](#)

The rugged Trimble SNB900 radio-modem is packaged in a weatherproof housing, making it ideal for harsh environments, such as those associated with construction, seismic, and mining surveys. To establish a robust wireless data broadcast network for real-time differential and real-time kinematic GPS applications, use the versatile SNB900 radio-modem with a Trimble GPS rover.

Frequency Band

The SNB900 radio-modem operates in the 902–928 MHz frequency band. It is certified for unlicensed use in this band as a transmitter, pursuant to 47 C.F.R. §§ 15.247, 15.249 (1993) (unlicensed, low-power devices) Subpart C of Part 15 of FCC Rules regarding Spread Spectrum Systems for the United States. License-free operation in Canada is covered by RSS-210 of Industrie Canada.

The SNB900 radio-modem is available with a reduced frequency range for use in Australia and New Zealand. It is available in single-frequency mode for use in other countries.

Note – The 902–928 MHz band is a shared-use band and as such is subject to interfering signals.

This frequency band is allocated to other uses, including cellular telephony, in other parts of the world. Regulations regarding its use vary greatly from country to country. Use of the radio-modem outside the United States, Canada, Australia, and New Zealand must be approved by the local radio authority. Contact your local radio communications governing authority for regulations and restrictions on operation in the country or area where you want to use the SNB900.

Features

The SNB900 radio-modem has the following standard features:

- Frequency:
 - 902–928 MHz in USA/Canada
 - 921–928 MHz in New Zealand
 - 916–928 MHz in Australia
 - Single-frequency configuration for specific countries
- +30 dBm (1 Watt)
- Frequency hopping on 50 channels

- High-speed wireless data rate
- Interfaces with Trimble survey-grade and construction-grade GPS receivers
- Rugged, weatherproof construction
- Internal battery
- Two-line, 16-character VFD display
- Compatible with Trimble CMR+™ and RTCM SC-104
- Operational parameters configured using the WinFlash utility, a handheld controller, or the front panel
- Can be configured as a base, repeater, or rover
- Compatible with TRIMCOMM™ 900, SiteNet™ 900 and SNR900 external radios, and Trimble 5700 and 5800 internal 900 MHz radios

Note – In this manual, CMR™ and CMR+ formats are both represented by CMR+.

Front Panel Display

The front panel of the SNB900 radio-modem (see [Figure 2.1](#)) has a Vacuum Fluorescent Display (VFD) that shows the network frequency and radio status, as well as error messages.

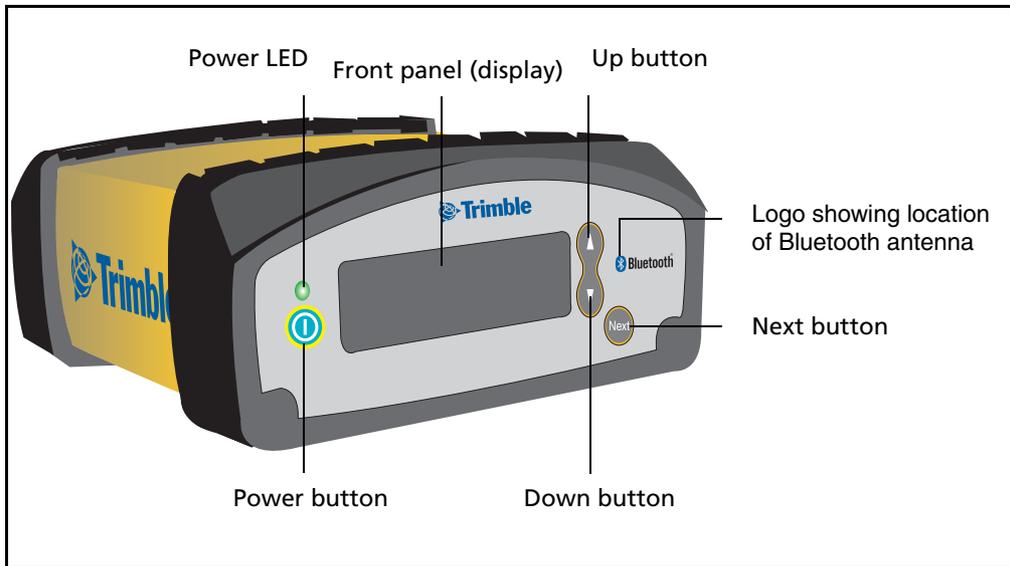


Figure 2.1 Front view of the SNB900 radio-modem

Menus

When you start the SNB900 radio-modem, the default *Status* menu screen is displayed on the front panel. This screen shows a summary of the radio-modem's configuration settings.

Selecting a menu

To move to a different menu, press the  button on the front panel display. To scroll through the available settings in a menu, press the Up button ▲ or the Down button ▼.

Main menus

[Table 2.1](#) lists each main menu and describes its use.

Table 2.1 Main menus

Use this menu ...	To ...	For details, see ...
Status	View information about the operation of the radio.	page 18
Network	Select an operating network for the radio-modem. Each network has a unique hopping pattern to help reduce interference from nearby radio transmitters.	page 22
Mode	Specify whether the radio-modem is to operate as a base, a rover, or as one of up to four repeaters.	page 22
Turbo Mode	Enable or disable Turbo mode. Use Turbo mode in areas of high RF interference to improve performance.	page 23
Port Config LEMO Port Config Modem Port Config	Configure the settings for two of the ports that are on the back of the radio-modem (the seven-pin LEMO port and the 26-pin Modem port).	page 24
Display Config	Configure when the display will power down.	page 25

Note – The radio-modem unit settings determine which menus are available.

Table 2.2 lists the possible settings and the default setting for each main menu.

Table 2.2 Settings

Main menu	Options	Default setting
Network	1–40	1
Mode	BASE ROVER REPEATER 1 REPEATER 2 REPEATER 3 REPEATER 4	BASE
Turbo Mode	DISABLED ENABLED	DISABLED
Port Config LEMO Port Config	4800 8-None-1 4800 8-Odd-1 4800 8-Even-1 9600 8-None-1 9600 8-Odd-1 9600 8-Even-1 19200 8-None-1 19200 8-Odd-1 19200 8-Even-1 38400 8-None-1 38400 8-Odd-1 38400 8-Even-1 57600 8-None-1 57600 8-Odd-1 57600 8-Even-1 115200 8-None-1 115200 8-Odd-1 115200 8-Even-1	38400 8-None-1

Table 2.2 Settings (continued)

Main menu	Options	Default setting
Port Config Modem Port Config	4800 8-None-1	
	4800 8-Odd-1	
	4800 8-Even-1	
	9600 8-None-1	
	9600 8-Odd-1	
	9600 8-Even-1	
	19200 8-None-1	
	19200 8-Odd-1	
	19200 8-Even-1	
	38400 8-None-1	38400 8-None-1
	38400 8-Odd-1	
	38400 8-Even-1	
	57600 8-None-1	
	57600 8-Odd-1	
	57600 8-Even-1	
Display Config	115200 8-None-1	
	115200 8-Odd-1	
	115200 8-Even-1	
	Never Power Down Idle Power Down PwrDwn on Battery	Never Power Down



Tip – Before you operate the radio-modem for the first time, Trimble recommends that you change the Network setting from its default setting. This reduces the likelihood of interference from other radio-modems that may be operating with default settings.

Note – All radios in a single network must be configured to use the same network.

For more information about the SNB900 radio-modem menus and screens, see [Chapter 3, Configuration and Installation](#).

Ports

Figure 2.2 shows the location of three ports on the back panel of the SNB900 radio-modem:

- a reverse polarity female TNC connector – the Radio-antenna port
- a 26-pin D sub connector for power/data – the Modem port
- a seven-pin female LEMO 0-shell connector for power/data – the LEMO port

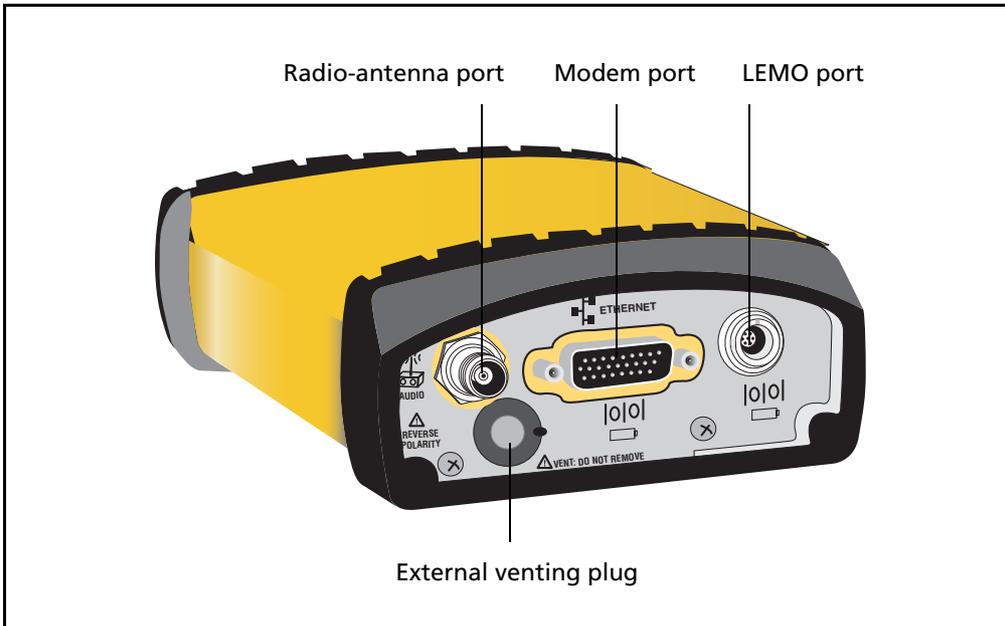


Figure 2.2 Back view of the SNB900 radio-modem

Cables and Accessories

The SNB900 radio-modem equipment set includes:

- an antenna cable
- an antenna bracket
- a power supply

When the radio-modem is configured as a *base*:

- Data is received at the LEMO or 26-pin connector from a Trimble GPS receiver. *When the unit is configured as a repeater, no data connection is required.*
- The unit is powered by an internal battery or by a suitable power source, such as a stable DC power supply.

Additional parts

The radio-modem is supplied as a stand-alone product, but additional parts are available. For example, additional parts enable you to connect the SNB900 radio-modem to a Trimble MS750™, 5700, 5800, R7, or R8 GPS receiver.

Optional accessories

The following accessories can be purchased in addition to the standard system:

- 18 Ah battery with carry pouch (P/N 44103-18)
- Battery charger, 18 Ah (P/N 44111-00)
- 6 Ah battery with carry pouch and charger (P/N 34106-00)
- 10 Ah battery with carry pouch and charger (P/N 34107-00)
- 12 V fused power cable, 0S/7P/M LEMO to battery clips (P/N 46125-00)

Use and Care

The radio-modem is configured as a base or rover, and can be connected to most Trimble survey-grade and construction-grade GPS receivers through a single serial I/O cable and power cable. When used as a repeater, the radio-modem operates autonomously and requires only a power and antenna connection, with no connection to the serial port.

To achieve line-of-sight (LOS) coverage to all points in a survey area, an SNB900 radio-modem network can include repeaters. The rovers use the data packet from the base or repeater, whichever the rover receives first.

The radio-modem is designed to withstand rough treatment typical of equipment used in the field. However, it is a precision electronic instrument and should be treated with reasonable care. It operates at temperatures from -40°C through $+65^{\circ}\text{C}$ (-40°F through 149°F). The casing is sealed and weatherproof.



CAUTION – Do not operate or store the SNB900 radio-modem outside the temperature range specified. Doing so can damage the instrument.

Use and care of the internal 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. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage.

To prevent injury or damage:

- Do not charge or use the battery if it appears to be damaged or leaking.
 - Charge the Lithium-ion battery only in a Trimble product that is specified to charge it. Be sure to follow all instructions that are provided with the battery charger.
 - Discontinue charging a battery that gives off extreme heat or a burning odor.
 - Use the battery only in Trimble equipment that is specified to use it.
 - Use the battery only for its intended use and according to the instructions in the product documentation.
-



WARNING – The SNB900 radio-modem contains a Lithium-ion battery and should not be disposed of with general refuse. Dispose of the SNB900 radio-modem in accordance with all local codes and regulations for products containing lithium ion batteries. Contact your local environmental control or disposal agency for further details.

The SNB900 radio-modem has an internal battery that supplies power and enables it to operate when no external power is supplied. The internal battery operates at temperatures from -20 °C through +60 °C (-4 °F through 140 °F). If the temperature is above or below this range, the radio-modem no longer accepts power from the internal battery and an external power source is required. Charge the internal battery only at temperatures from 0 °C through 40 °C (32 °F through 104 °F).

To charge the radio-modem's internal battery, connect the unit to a 15 Volt external power source and turn in on. If the SNB900 radio-modem is turned off, the internal battery will not be charged. Trimble provides the recommended power supply (P/N 48800-00) in the SNB900 kit.

The internal battery of the SNB900 radio-modem will gradually lose capacity over its life. After approximately 500 charge/discharge cycles, the battery will be down to 80 % of its original capacity. After 750 cycles, the battery will have approximately 50 % of its original capacity.

This is true of all batteries. The cycles specified by Trimble are based on the battery manufacturer's specifications. After 500 cycles, the battery will still charge. However, the battery will not charge to full capacity.

When the battery can no longer take or hold a charge, please arrange for an authorized Trimble service center to replace the battery. If the radio-modem is operating on external power and the unit is not being recharged, then the internal battery is not completing charge/discharge cycles and will therefore last much longer.

If users operate their SNB900 radio-modem for 200 days a year on only internal battery and recharge the unit each day, the radio-modem's internal battery will reach the 500 cycle mark after about 2½ years.

Note – *The SNB900 radio-modem continues to operate from an external power supply even when the internal battery is unusable.*

Configuration and Installation

In this chapter:

- [Configuring the SNB900 Radio-Modem Using the Front Panel Display](#)
- [Configuring the SNB900 Radio-Modem Using the WinFlash Utility](#)
- [Upgrading the SNB900 Radio-Modem Firmware](#)
- [Installing the SNB900 Radio-Modem in the Field](#)

To configure the SNB900 radio-modem for optimum use with a particular application, use the display on the front panel of the radio-modem. Alternatively, you can configure the radio-modem on an office computer that is running the Trimble WinFlash utility.

Configuring the SNB900 Radio-Modem Using the Front Panel Display

You can use the configuration menus that are displayed on the front panel of the SNB900 radio-modem to configure the radio-modem. No computer is required.

The front panel provides access to the following menus:

- *Status* menu
- *Network* menu
- *Mode* menu
- *Turbo Mode* menu
- *Port Configuration* menu
- *Display Configuration* menu

Status menu

The *Status* menu has four different screens:

- the default *Status* menu screen
- a CMR Statistics screen
- a Serial Number screen
- a Firmware screen

Status menu screens: (1) Default screen

Figure 3.1 shows the first *Status* menu screen. This is the default screen that is displayed when you supply power to the radio-modem.

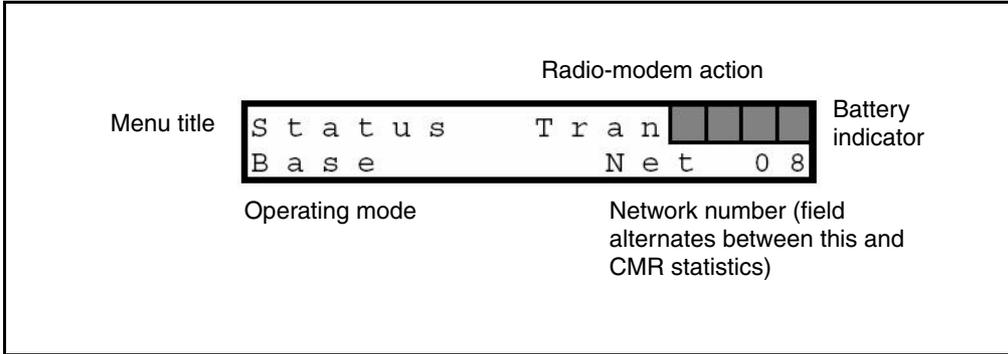


Figure 3.1 Default screen, Status menu

The default screen provides the following information:

Field	Description
Radio-modem action	<p>The options are:</p> <ul style="list-style-type: none"> • Sync – the radio-modem is synchronized to the hopping pattern of the selected network • Tran – the radio-modem is transmitting GPS corrections • Rcv – the radio-modem is receiving GPS corrections <p>The operating mode determines which options are displayed:</p> <ul style="list-style-type: none"> • Base operating mode – Sync and Tran • Rover operating mode – Sync and Rcv • Repeater operating mode – Sync, Rcv, and Tran
Battery indicator	<p>Graphically shows the approximate capacity remaining in the internal battery.</p> <p>While the internal battery is being charged from an external source, the indicator changes from empty to full. The icon “fills” from right to left.</p> <p>If the voltage from the external source is too low to charge the internal battery, an X appears over the battery indicator.</p>

Field	Description
Network number or CMR statistics	<p>This field switches between the network number and the CMR statistics approximately once every two seconds.</p> <p>When the network number is displayed, the field shows which network the radio-modem is operating on. Each network follows a unique hopping pattern.</p> <p>When CMR statistics are displayed, the field shows information appropriate to the selected operating mode:</p> <ul style="list-style-type: none">• Base operating mode – n/a (not applicable)• Rover operating mode – the percentage of CMRs received for the last minute• Repeater operating mode – the percentage of CMRs received for the last minute <p>See also Status menu screens: (2) CMR Statistics screen, page 21.</p>
Operating mode	<p>Identifies how the radio-modem is operating. See Mode menu, page 22.</p>

Status menu screens: (2) CMR Statistics screen

A second *Status* menu screen, the CMR Statistics screen, displays additional CMR information.

To access the CMR Statistics screen, press the ▲ button when the default *Status* menu screen is displayed.

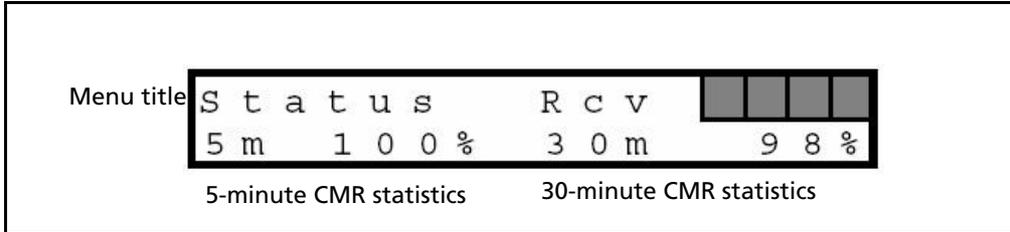


Figure 3.2 CMR Statistics screen, Status menu

The CMR Statistics screen shows:

- the percentage of CMRs received for the last five minutes
- the percentage of CMRs received for the last 30 minutes

Status menu screens: (3) Serial Number screen

A third *Status* menu screen, the Serial Number screen, displays the serial number of the radio-modem.

To access the Serial Number screen, press the ▲ button when the CMR Statistics screen (above) is displayed.

Status menu screens: (4) Firmware screen

A fourth *Status* menu screen, the Firmware screen, displays the version and date of the firmware that is loaded on the radio-modem.

To access the Firmware screen, press the ▲ button when the Serial Number screen (above) is displayed.

To return to the default *Status* menu screen, press the ▲ button when the Firmware screen is displayed. Alternatively, press the ▼ button to retrace your steps.

Network menu

Use this menu to control which network the radio-modem is operating on. Each network has a unique hopping pattern. By choosing a unique hopping pattern, you can reduce the likelihood of interference from nearby transmitters.

To access the *Network* menu, press the (Next) button on the front panel display until the menu appears:

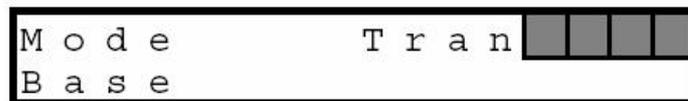


To scroll through the 40 available networks, press the ▲ button or the ▼ button.

Mode menu

Use this menu to set the operating mode of the SNB900 radio-modem.

To access the *Mode* menu, press the (Next) button on the front panel display until the menu appears:



To cycle through the available operating modes, press the ▲ button or the ▼ button. Every radio in a SiteNet™ network can be set to one of three operational modes:

- Base – the radio is connected to the base station GPS receiver that is generating the CMR corrections
- Rover – the radio is connected to a roving GPS receiver

- Repeater – the radio is being used as part of a network, in order to extend radio coverage

Repeater radios

Note – A single network can have only one base radio but it can have many rovers and up to four repeaters.

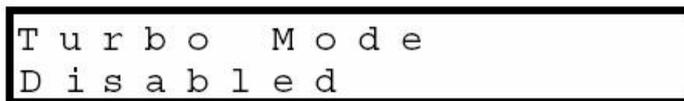
Each repeater in a network must be uniquely identified by the number #1, #2, #3, or #4.

Turbo Mode menu

In areas of high radio frequency interference, Turbo mode can help to improve the reliability of the radio network.

Note – If Turbo mode is used at a site, enable Turbo mode for every radio at that site.

To access the *Turbo Mode* menu, press the  button on the front panel display until the menu appears.



```
T u r b o   M o d e
D i s a b l e d
```

The options are Enabled and Disabled. To toggle between them, press the ▲ button or the ▼ button.



CAUTION – Turbo mode increases power consumption by approximately 20%. If you work in Turbo mode, the battery will run down faster.

Port Configuration menu: LEMO Port Configuration and Modem Port Configuration

You can configure settings for the two data ports that are on the back panel of the SNB900 radio-modem.

Use this port ...	To connect the SNB900 to ...
LEMO port, the 7-pin port	A Trimble GPS receiver, via a LEMO cable
Modem port, the 26-pin port	An office computer, or to another device that uses serial communication



Tip – For the location of these ports, see [Figure 2.2](#) on [page 12](#).

Accessing the port configuration menus

- When any menu screen is displayed, press the  button on the front panel display until the first port configuration menu screen appears:

```

P o r t   C o n f i g
▼ ▲   t o   v i e w . . .
    
```

- Press the ▲ button or the ▼ button to access the LEMO port configuration menu:

```

L e m o   P o r t   C o n f i g
3 8 4 0 0 - 8 - N o n e - 1
    
```

- To edit the settings, see below.
- Press the  button to access the Modem port configuration menu.
 - To edit the settings, see below.
 - Press the  button again to return to the first port configuration menu screen.

Editing the port configuration settings

Use the *LEMO Port Config* menu to change the baud rate and parity settings for the LEMO port, and the *Modem Port Config* menu to change the baud rate and parity settings for the Modem port.

To edit the port configuration settings:

1. Access the required port configuration menu as described above.
2. Press the ▲ button or the ▼ button until the *Baud rate* field is selected.



Tip – A field is editable if it blinks when selected.

3. To select a different baud rate setting, press the ▲ button or the ▼ button.
4. To accept the setting for the *Baud rate* field and move to the *Parity* field, press the (Next) button.
5. To select a different parity setting, press the ▲ button or the ▼ button.
6. To accept the setting for the *Parity* field, press the (Next) button. The current port configuration menu is displayed again. No fields are blinking.
7. To leave this port configuration menu, press the (Next) button again.

Press the (Next) button repeatedly to step from one port configuration screen to the next. Screens appear in the order *LEMO Port Config*, *Modem Port Config*, *Port Config*. When you press the (Next) button again, the *Display Config* menu screen appears.

Display Configuration menu

Configure the radio-modem display to switch off (power down) when appropriate.



Tip – To extend the life of the internal battery by approximately 20%, use the radio-modem with the display switched off.

To access the display configuration menu, press the  button on the front panel display until the required menu appears:



```
Display Config
Never Power Down
```

To edit this setting, press the ▲ button or the ▼ button.

When this option is selected ...	The radio-modem display is ...
Never Power Down	Always on
Idle Power Down	Automatically switched off if the radio-modem is idle for 120 seconds
Power Down on Battery	Automatically switched off if the radio-modem is idle for 120 seconds and is running on its internal battery

Configuring the SNB900 Radio-Modem Using the WinFlash Utility

In addition to using the front panel display to configure the SNB900 radio-modem, you can use a computer. The software that you need for this is a free Trimble utility called WinFlash. Install WinFlash from the *Trimble Radio Communications CD*, or download the latest version from the Trimble website as described below.

Procedure

To configure the SNB900 radio-modem using WinFlash, complete these steps. For more information about each step, see below.

1. Install the WinFlash utility on a computer that is running a Microsoft® Windows® 2000 or Windows XP operating system.
2. Connect the radio-modem to the computer.
3. Start the WinFlash utility and configure it to connect to the radio-modem.
4. Configure the radio-modem settings.

Step 1: Installing the WinFlash utility

Install this free utility from the *Trimble Radio Communications* CD.

Alternatively, download and install the latest version of WinFlash from the Trimble website:

1. Go to www.trimble.com.
2. Click **Support**.
3. From the list, select **SNB900**.
4. Click **Downloads**.
5. Download the file that contains the latest version of WinFlash.
6. Run the file that you have downloaded. Follow the installation instructions provided by the wizard.

Step 2: Connecting the SNB900 radio-modem to the computer

1. Connect the radio-modem to the serial COM port on the computer. Use one of the following:
 - a 7-pin LEMO to 9-pin serial cable (P/N 32960)
 - a Null Modem serial cable (P/N 18532), attached to the 26-pin to 9-pin adaptor (P/N 52111) that is provided with the radio-modem
2. Press the **Power** button  on the radio-modem. For the location of this button, see [Figure 2.1](#) on [page 8](#).

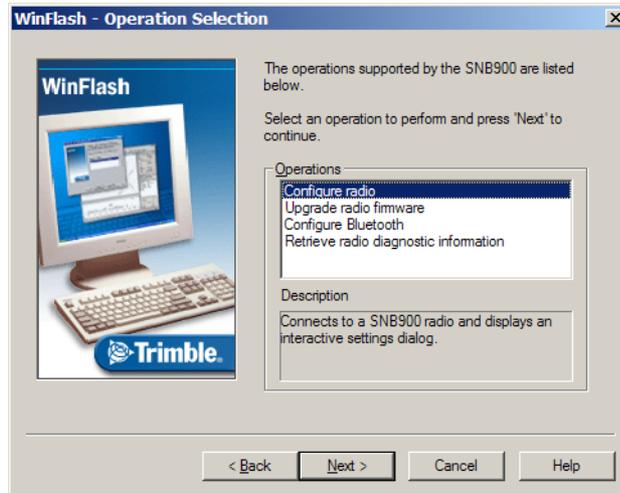
Step 3: Starting WinFlash and configuring it to connect to the SNB900

1. On the computer, run the WinFlash utility. The *Device Configuration* dialog appears:



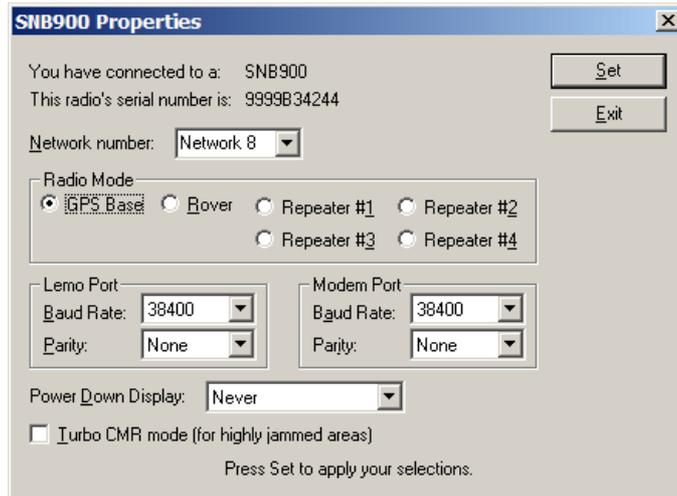
2. Follow the instructions provided on the screen:

- a. Select the appropriate computer serial port (COM port).
- b. Select SNB900 and then click **Next**. The *Operation Selection* dialog appears:



- c. Select the Configure radio option and then click **Next**. The *Settings Review* dialog appears.
- d. Make sure that you have selected the correct operation and then click **Finish**. A connection status window appears.

When the status reaches 100%, the *SNB900 Properties* dialog appears:



Use the dialog to configure the SNB900 settings.

Configuring the SNB900 settings



Tip – For more information about settings, see [Configuring the SNB900 Radio-Modem Using the Front Panel Display, page 18](#).

To configure the radio-modem, edit the fields in the *SNB900 Properties* dialog:

1. In the *Network number* field, select the appropriate operating network. The default is Network 1.

Before you operate the radio-modem for the first time, Trimble recommends that you change the Network setting from its default setting. This reduces the likelihood of interference from other radio-modems that may be operating with default settings.

Note – All radios in a single network must be configured to use the same network.

2. In the *Mode* field, select the appropriate operating mode for the intended use. The default is GPS Base.
3. In the *LEMO Port* and *Modem Port* groups, select the required baud rate and parity settings. For both ports, the defaults are 38400 and None.
4. Choose a setting in the *Power Down Display* field. The default is Never Power Down.



Tip – To extend the life of the internal battery by approximately 20%, use the radio-modem with the display switched off.

5. If Turbo mode is required, select the check box called *Turbo CMR mode (for highly jammed areas)*.



CAUTION – Turbo mode increases power consumption by approximately 20%. If you work in Turbo mode, the battery will run down faster.

6. Click **Set**. The configuration is updated. A status dialog shows when the configuration is complete.
7. Do one of the following:
 - To close the WinFlash utility, click **Exit**.
 - To return to the WinFlash menu, click **Menu**. The *Operation Selection* dialog appears, see [page 29](#).

Upgrading the SNB900 Radio-Modem Firmware

Firmware upgrades for the SNB900 radio-modem are periodically available from the Trimble website.

To upgrade the firmware:

1. Download the latest upgrade from the same location as the WinFlash utility. For more information, see [Step 1: Installing the WinFlash utility, page 27](#).
2. Use the WinFlash utility to upgrade the firmware in the SNB900. In the *Operation Selection* dialog (see [page 29](#)), select the Upgrade radio firmware option.

Installing the SNB900 Radio-Modem in the Field

You can install an SNB900 radio-modem as a base, a rover, or a repeater.

Important notes

- Make sure that each radio-modem in the network is set to the same network number.
- High-power signals from a nearby radio station or radar transmitter can overwhelm radio-modem circuits. This does not harm the radio-modem, but it can prevent it from functioning correctly. To avoid problems, try not to use the radio-modem within 400 meters (1300 feet) of powerful radar, television, or other transmitters. Low-power transmitters, such as those in portable phones and walkie-talkies, do not normally interfere with SNB900 radio-modem operation.

Installing the SNB900 radio-modem as a base

When the radio-modem is used as a base radio, it transmits GPS corrections from a base station receiver to rovers in a network.

To install the radio-modem as a base:

1. If necessary, reconfigure the radio-modem serial port settings. These settings must be the same on the radio-modem as they are on the GPS receiver.
2. Connect the radio-modem to the base station GPS receiver.

Note – Data that is received in CMR format on the LEMO port is reflected out the Modem port. This means that you can monitor how much data in CMR format is entering the SNB900 radio-modem. It also means that no special cable is needed if you want to attach an extra radio-modem, such as a TRIMMARK™ 3 radio-modem, to the GPS receiver.

3. Assemble the antenna and then attach the antenna to the antenna bracket.
4. Attach the antenna bracket to a tripod or pole.
5. Connect the antenna cable to the radio-antenna port on the radio-modem. For the location of this port, see [Figure 2.2](#) on [page 12](#).
6. Connect a 12 V DC power source to one of the ports on the radio-modem. Use either the LEMO connector or the 26-pin connector for this, depending on which power source you are using.
7. Make sure that the Sync and Tran messages are flashing on the radio-modem display.

Installing the SNB900 radio-modem as a repeater

To achieve coverage to all points in a project site, you can add up to four repeaters to the network. Repeaters retransmit data packets in a way that prevents mutual interference with the base and with each other.

A rover receiver uses data packets from the base or from a repeater, whichever it receives first. (The operation of the repeaters is transparent to the rovers.)

To install the SNB900 radio-modem as a repeater:

1. If the network has only one repeater, make sure that the SNB900 radio-modem is configured as Repeater 1. If the network has multiple repeaters, make sure that the repeaters are numbered sequentially. For example, this radio-modem cannot be Repeater 3, unless there is also a Repeater 1 and a Repeater 2 in the network.
2. Assemble the antenna and then attach the antenna to the antenna bracket.
3. Attach the antenna bracket to a tripod or pole.
4. Connect the antenna cable to the radio-antenna port on the SNB900 radio-modem. For the location of this port, see [Figure 2.2](#) on [page 21](#).
5. Connect a 12 VDC power source to one of the ports on the SNB900 radio-modem. You can use either the LEMO connector or the 26-pin connector for this, depending on which power source you are using.
6. Make sure that the Sync, Tran, and Rcv messages are flashing on the radio-modem display.

Installing the SNB900 radio-modem as a rover

When the SNB900 is used as a rover, it receives GPS corrections from the network for use by a GPS receiver.

To install the SNB900 radio-modem as a rover:

1. If necessary, reconfigure the radio-modem serial port settings. These settings must be the same on the radio-modem as they are on the GPS receiver.
2. Connect the radio-modem to the rover GPS receiver.
3. Assemble the antenna and then attach the antenna to the antenna bracket.
4. Attach the antenna bracket to a tripod or pole.
5. Connect the antenna cable to the radio-antenna port on the radio-modem. For the location of this port, see [Figure 2.2](#) on [page 12](#).
6. Connect a 12 V DC power source to one of the ports on the radio-modem. You can use either the LEMO connector or the 26-pin connector for this.
7. Make sure that the Sync and Rcv messages are flashing on the radio-modem display.

Installing antennas

Trimble recommends that you use the 5 dB whip antenna when the SNB900 radio-modem is operating as a base or repeater radio, and the 3 dB whip antenna when the radio-modem is operating as a rover radio. Both antennas are provided with the radio-modem.

Safety



CAUTION – For your own safety, and in terms of the RF Exposure requirements of the FCC, always observe the precautions listed here.
- Always maintain a minimum separation distance of 21 cm

(approximately 8 inches) between yourself and the radiating antenna on the SNB900 radio-modem.

- Do not co-locate the antenna with any other transmitting device.
 - For mobile operation, do not allow the maximum gain of the antenna to exceed 5 dBi.
-

Height

Antenna height is the single most important factor in achieving maximum range with a radio-modem: Doubling the height of an antenna results in an approximately 40% increase in line-of-sight range.

When installing and locating an antenna, place it as high as is legally possible. An antenna should be higher than any surrounding hills, trees, vehicles, buildings, or other obstructions. Try to make sure that the radiating element of the antenna is higher than any possible obstruction.

If you need to increase the length of the antenna cable in order to elevate the antenna, use low loss cable.

Other objects

If possible, do not place an antenna near any other object. Metal objects, in particular, can severely limit the efficiency of an antenna.

Antenna Details

In this chapter:

- [Omni-Directional Antennas](#)
- [SNB900 Radio-Modem Antenna Range](#)
- [Energy Patterns](#)

The SNB900 radio-modem uses an omni-directional antenna that concentrates radio frequency energy and then radiates it equally at all azimuths in the horizontal plane.

Omni-Directional Antennas

The SNB900 radio-modem uses an omni-directional antenna. The antenna concentrates the radio frequency energy that it receives from the radio-modem and then radiates that energy equally in all directions in the horizontal plane. The antenna does not increase the energy that it receives.

Note – The omni-directional antenna used with the radio-modem is not omni-directional in the vertical plane. You must orient the antenna vertically.

The degree to which an antenna concentrates radio frequency energy in one direction is called **directivity**. Like antenna gain, directivity is measured in decibels (dB).

High antenna gain results in high directivity, as more energy is concentrated and then radiated in the particular plane.

SNB900 Radio-Modem Antenna Range

In an omni-directional antenna, all azimuths receive equal energy, but a 5 dB antenna radiates four times more power in the horizontal plane than a 0 dB antenna does. In the field, this equates to almost double the range.

However, it is the elevation and orientation of the rover antenna that determines which antenna—the 5 dB or the 0 dB antenna—provides the stronger signal.

Energy Patterns

Figure 4.1 shows the radiated energy patterns of an omni-directional antenna, viewed from above. Energy is radiated in the horizontal (azimuth) plane.

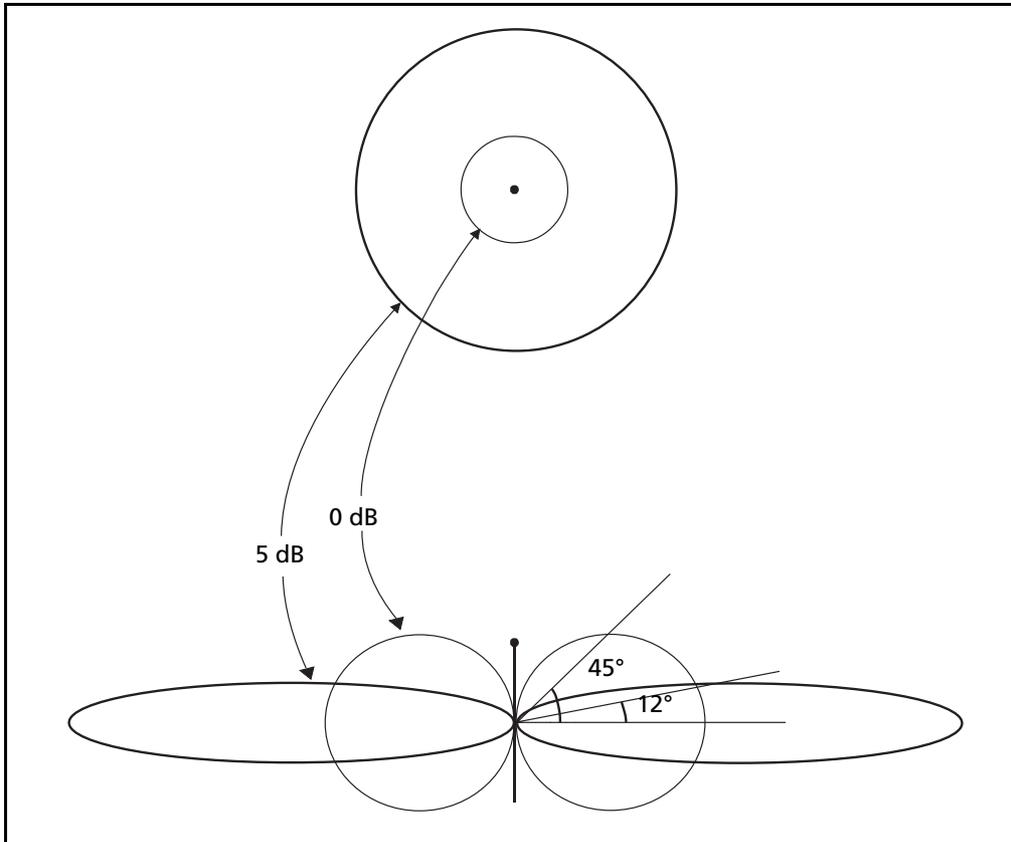


Figure 4.1 Antenna gain patterns in horizontal plane



Tip – The horizontal plane is the plane that perpendicularly bisects the length of the antenna.

Troubleshooting

In this chapter:

- [Servicing](#)
- [Status Messages](#)

The SNB900 radio-modem provides status messages that you can use to isolate and correct system configuration or operational issues.

Servicing

There are no user-serviceable parts in an SNB900 radio-modem. Contact your Trimble representative or local service provider for assistance.

Status Messages

A status message can appear as a one or two line message on the front panel.

Table 5.1 Status messages

Message	Description	Action
Battery Low	The internal battery is below approximately 25% capacity and the external voltage is below 11.6 V.	To ensure uninterrupted radio transmission, connect a charged external power supply before the radio-modem drops below 5% capacity.
Battery Low Radio Turned Off	The transmitter has turned off because the internal battery is below approximately 5% capacity and the external voltage is below 11.0 V.	Connect a charged external power supply before the radio-modem drops below 1% capacity—at which point it switches off.
Battery Dead Power Off	The power will be turned off because the internal battery is below approximately 1% capacity and the external voltage is below 10.7 V.	Connect a charged external power supply to the radio-modem and then switch on the radio.
Bluetooth Port 11 Connected		
Bluetooth Port 12 Connected	A connection on the Bluetooth port has been established.	Not applicable.
Bluetooth Port 13 Connected		
Bluetooth Port 14 Connected		

Table 5.1 Status messages (continued)

Message	Description	Action
Bluetooth Port 11 Disconnected		
Bluetooth Port 12 Disconnected	The connection on the Bluetooth port has been dropped.	You may need to re-establish the Bluetooth connection.
Bluetooth Port 13 Disconnected		
Bluetooth Port 14 Disconnected		
Charger Disable Radio Hot	The charger has been disabled because the internal temperature of the radio-modem is above 45 °C (113 °F)	The radio-modem must cool down before the internal battery can be charged.
Charger Disable Radio Cold	The charger has been disabled because the internal temperature of the radio-modem is below 0 °C (32 °F)	The radio-modem must warm up before the internal battery can be charged.
Charging Complete	The internal battery is charged.	Not applicable.
WARNING: No GPS Source Available	The radio-modem is transmitting synchronization frames but no GPS corrections.	Make sure that the radio-modem is connected to a GPS receiver, and that the GPS receiver is correctly configured.
WARNING: No GPS Corrections	The radio-modem is receiving synchronization frames but no GPS corrections.	Make sure that the base radio is connected to a GPS receiver, and that the receiver is correctly configured.
Hardware Error: XX (code number)	The radio-modem has a fatal error.	Return the radio-modem to your local distributor for servicing.
Loader Active PC in Control	The radio-modem is receiving configuration/firmware from an external application.	Do not disturb the radio-modem. Wait for the configuration/firmware upgrade to be completed.

Table 5.1 Status messages (continued)

Message	Description	Action
Port 2 Error Check Data Rate		
Port 3 Error Check Data Rate	There was an error on the serial port (baud rate/ parity/stop bits).	Check the port data rate settings.
Port 4 Error Check Data Rate		
ERROR: Radio Hot Turned Off	58 °C (136 °F) while on internal battery power or 80 °C (176 °F) while on external power	The radio-modem must cool down before it can transmit again.
WARNING: Radio Hot	The internal temperature of the radio-modem is above: 50 °C (122 °F) while on internal battery power or 65 °C (149 °F) while on external power	Try to keep the radio-modem from getting hotter. Consider the equipment setup as well as the environment.
ERROR: Radio Hot Power Off	The power is about to be turned off because the internal temperature of the radio-modem is above: 60 °C (140 °F) while on internal battery power or 85 °C (185 °F) while on external power	Wait for the radio-modem to cool down before you turn it on.

Table 5.1 Status messages (continued)

Message	Description	Action
WARNING: Radio Cold	The internal temperature of the radio-modem is below $-12\text{ }^{\circ}\text{C}$ ($10\text{ }^{\circ}\text{F}$) while on internal battery power or on external power.	Try to keep the radio-modem from getting colder. Consider the equipment setup as well as the environment.
ERROR: Radio Cold Turned Off	The transmitter has turned off because the internal temperature of the radio-modem is below: $-18\text{ }^{\circ}\text{C}$ ($0\text{ }^{\circ}\text{F}$) while on internal battery or $-39\text{ }^{\circ}\text{C}$ ($-38\text{ }^{\circ}\text{F}$) while on external power	The radio-modem must warm up before it can transmit again.
ERROR: Radio Cold Power Off	The power is about to be turned off because the internal temperature of the radio-modem is below: $-20\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$) while on internal battery or $-40\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$) while on external power	Wait for the radio-modem to warm up before you turn it on.

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