

***RBS 1107***

***Field Guide for Release 7.5***


92-F0423-1

R1

January 15, 2001

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**RBS 1107 Field Guide for Release 7.5, 92-F0423-1 R1, January 15, 2001**

The contents of this document are subject to revision without notice due to continued progress in methodology, design, and manufacturing.

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Printed in the United States of America.

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# Revision History

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## Document Revisions

This manual is revised periodically to maintain consistency with current system hardware and software releases, operational enhancements, and to incorporate customer suggestions.

Version	Release Date	Notes
R1	January 15, 2001	Release 7.5 for the RBS 1107.

## Changes to Manual Content

This manual was current and accurate when it was released. Look for subsequent changes in the following places:

If you are looking for...	Refer to...
Changes made after the manual was released but before the software was delivered	Release Notes  The Release Notes document is distributed as part of the initial manual set.
Changes made after software delivery that could seriously affect system operation	Technical Bulletin  Technical Bulletins are distributed as they are written.
Significant changes	Manual Revisions  Manuals are reissued with a new revision level (for example, Rev. B would replace Rev. A) to reflect substantial product changes.

# Safety Summary

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For your safety and the protection of the equipment, observe these precautions when installing, operating, or servicing the equipment.

## Warning and Caution Symbols

Throughout this manual, the following warning and caution symbols precede the procedures to which they apply:



**WARNING**

**WARNING with this alert symbol indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.**



**WARNING**

**WARNING with this alert symbol indicates risk of electrical shock that could result in serious injury or death.**



**CAUTION**

**CAUTION with this alert symbol indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury.**

**CAUTION**

**CAUTION without an alert symbol indicates a potentially hazardous situation that, if not avoided, may result in property damage.**

## Follow All Warnings and Instructions

Follow all warnings and instructions marked on the equipment and included in this manual.

## Qualified Personnel Only

Only technically qualified service personnel are permitted to install, operate, or maintain the equipment.

## Lead-Acid Batteries

Procedures in this document may involve working with lead-acid, storage-type batteries. Batteries of this type present a chemical hazard, electrical shock hazard, and hydrogen gas hazard.

## **Dangerous Voltages and Current**

Procedures in this document may involve working with electrical circuits carrying high voltage and high current. There is a danger of electrical shock leading to personal injury or death.

Because dangerous voltages and current may be present even after power is disconnected, always allow sufficient time for components to discharge before touching.

Never insert objects of any kind through openings in the equipment. Conductive foreign objects could produce a short circuit that could cause fire, electrical shock, or equipment damage.

Prior to performing maintenance, remove rings, watches, and other metallic objects that may cause electrical shock or burn hazards.

## **RF Energy**

This equipment generates, uses, and can radiate RF energy and, if not installed and used properly, may cause personal injury or death.

## **ESD Protection**

Ensure that proper ESD equipment is used to avoid damage to circuit cards, modules, and other electronic components.

## **Do Not Service or Adjust Alone**

Do not attempt internal service or adjustment of equipment unless you are qualified to perform these actions. You must be accompanied by someone capable of rendering aid and resuscitation.

## **Avoid Contact with Rotating Fans**

Use care to prevent external fans from taking in foreign objects, including hair and clothing. Avoid contact with moving fans in the equipment shelves.

## **Use Care in Handling Equipment**

Use care when sliding equipment out of racks. Rack-mounted equipment can be unstable. The equipment may be heavy. Use care when installing and lifting racks or components.

# Typographic Conventions

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The following typographic conventions are used in this manual:

Font	Used For
<i>Italic</i>	<ul style="list-style-type: none"><li>■ Emphasis Slide the card into the <i>left</i> slot.</li><li>■ Document titles Refer to the <i>RBS 1107 Field Guide</i>.</li></ul>
SMALL CAPS	<ul style="list-style-type: none"><li>■ Key names Press ENTER.</li></ul>
<b>Sans serif bold</b>	<ul style="list-style-type: none"><li>■ Button labels Click <b>OK</b>.</li><li>■ Window titles Open the <b>bsmcontrol</b> window.</li><li>■ Dialog box titles The <b>Save Text Records</b> dialog box opens.</li><li>■ Labels for controls (boxes, fields) Use the <b>Sort By</b> button to choose a new sort order for the alarm list.</li><li>■ Specific item to pick from a list Select <b>Start Menu</b>►<b>Program Files</b>►<b>Exceed</b>►<b>xconfig</b>.</li></ul>

Font	Used For
Monospace	Displayed or printed text samples that appear in a shell or command line. The command completed successfully.
<i>Monospace italic</i>	<ul style="list-style-type: none"> <li>A variable element in a command and is information that you must supply <code>cp [-i] <i>oldfile newfile</i></code></li> <li>Appears in text you enter at the command line, with italics indicating the elements for which you must supply values <code>physmo -s fiberipaddr <i>ab.cd.ef.gh</i></code> where: <i>ab.cd.ef.gh</i> is the new fiber IP address</li> </ul>
<b>Monospace bold</b>	<ul style="list-style-type: none"> <li>Text you type on a command line <code>ls -CF</code></li> <li>Name of a program <code>bsminstall</code></li> </ul>

## Graphics

The graphical representations of equipment used in this manual are line drawings to show size, shape, access, and basic configuration.

Throughout this manual, the following symbols precede the text to which they apply:

### ATTENTION

**ATTENTION indicates information that, if ignored, could result in degraded or unpredictable operation, unreliable results, incorrect system configuration, or corruption of data.**



### Note

A note adds commentary to the manual. It may contain a point that requires special attention during a procedure.



### Steps

Steps indicate the detailed actions that you must perform in the order given to complete a specific procedure.



**The check symbol indicates an item that must be completed as part of the verification checklist.**

## **CDMA Technical Support**

If technical support is required while performing any of the procedures provided in this manual, please follow your site escalation plan or contact your Site Manager who will contact the appropriate technical personnel.

### **Key Site Contacts**

**Name**

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# Agency Requirements

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## 1900 MHz FCC Part 24

### 1900 MHz FCC ID #: *OJYKAG7 (pending)*

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

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

## CANADIAN DEPARTMENT OF COMMUNICATIONS COMPLIANCE STATEMENT

This equipment does not exceed Class B limits per radio noise emissions for digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the owner or operator to take whatever steps are necessary to correct the interference.

## AVIS DE CONFORMITÉ AUX NORMES DU MINISTÈRE DES COMMUNICATIONS DU CANADA

Cet équipement ne dépasse pas les limites de Classe B d'émission de bruits radioélectriques pour les appareils numériques telles que prescrites par le Règlement sur le brouillage radioélectrique établi par le Ministère des Communications du Canada. L'exploitation faite en milieu résidentiel peut entraîner le brouillage des réceptions radio et télévision, ce qui obligerait le propriétaire ou l'opérateur à prendre les dispositions nécessaires pour en éliminer les causes.

## UL

### UL File #: *E194633*

This product meets UL Requirement UL 1950, 3rd Edition, "Safety of Information Technology Equipment, Including Electrical Business Equipment."



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# 1

# Getting Started

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## About This Guide

This guide tells you how to prepare the site, install the RBS 1107 Compact (RBS), check the setup, and commission the RBS. In addition, this guide explains how to troubleshoot the RBS, including its cabling and power, and fix any associated problems.

Due to the versatility of the RBS, the installation process can vary significantly from location to location. This document assumes you are following a staged installation, where first you install mounting brackets, conduit, and cables, second you install the RBS, and lastly you commission the RBS. In any case, using the Compact RBS Main and Remote Site Preparation Kits and the Compact RBS Main and Remote Installation Hardware Kits available from your RBS supplier will greatly help you with the installation.

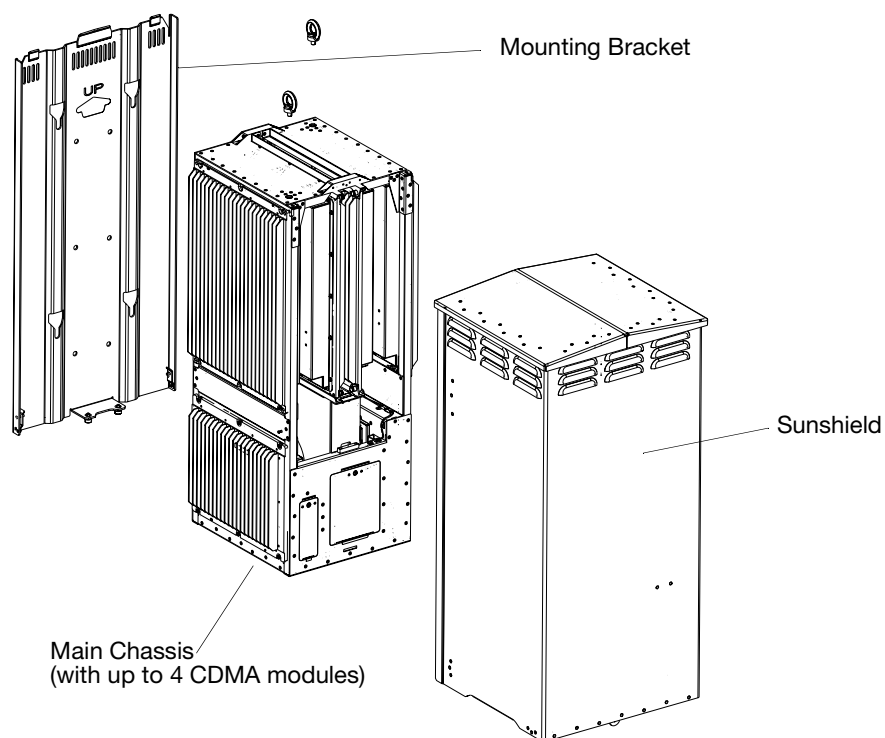


Whether you install and commission the RBS in stages or install and commission it all at one time, read this document completely before attempting the installation so that you can tune the procedures for the individual site.

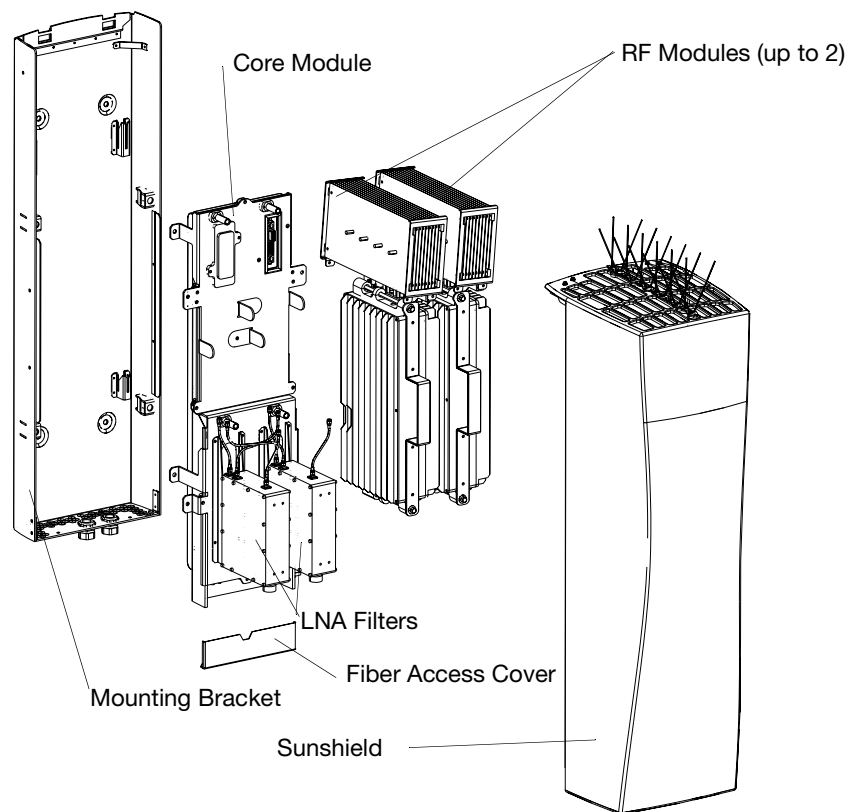
## About the RBS

The RBS 1107 Compact is an indoor/outdoor RBS, consisting of two to seven units: one main unit and one to six remote units. Each remote unit supports a single sector and up to 2 RF carriers. The remote unit is modular in design such that a second carrier can be added when needed. In addition, multiple remote units can be deployed on the same RF carrier for multi-sector support. The units are small enough to be easily mounted to a wall, rooftop, telephone pole, monopole, or tower.

[Figure 1–1](#) and [Figure 1–2](#) illustrate the principal assemblies of the RBS.



**Figure 1-1 RBS Main Unit**



**Figure 1-2 RBS Remote Unit**

## RBS Main Unit

The main unit performs most of the digital and unit control functions. It contains circuit card assemblies, which provide connectivity and data routing functions within the RBS. The main unit also performs signal processing functions, and distributes timing and frequency references.

The main unit contains several interfaces, including multi-mode fiber optic cable interfaces to the remote units, E1/T1 backhaul interfaces, as well as interfaces to the alarm contacts and to the GPS receiver. Serial and Ethernet connections are also provided for commissioning via a laptop PC.

## Enclosure and Mounting

The main unit is equipped with a metal sunshield, to protect against exposure to direct sunlight, wind, and other environmental conditions.

The main unit is also equipped with a unique mounting bracket that can accommodate wall, pole, tower, and other mounting. To provide flexibility in the network build-out, installation of the mounting brackets and most site electrical work can be completed prior to installation and commissioning.

**CAUTION**      **Always use the Ericsson sunshield, with the original factory paint. The sunshield color effects the operating temperature of the RBS. If the unit absolutely must be painted (e.g., for zoning reasons), Ericsson will work with you to find a solution. If you paint the sunshield without the approval of Ericsson, you will void Ericsson's warranty on that unit.**

## RBS Remote Unit

The remote unit provides the RF functions for the RBS. Each remote unit can support up to two RF carriers. Remote unit functions include filtering, amplification and frequency conversion of the CDMA signals. Signals are received from the main unit and sent to the transmit antenna on the forward link and received from the antenna and sent to the main unit on the reverse link. The remote unit contains the transmit power amplifier, low-noise amplifiers, and the transmit and receive filters. It also contains the upconverters and downconverters necessary for translation to and from baseband and RF. For the PCS version of the RBS 1107 Compact, there are three frequency-band options, each covering 20 MHz (A/D, B/E and F/C bands). In addition, the remote unit is modular in design, thus, a second RF carrier can be added as needed.

The remote unit has an internal duplexer for built-in antenna sharing. The duplexer is connected to the antenna interface and multiplexes a receive link with a transmit link on a single antenna. Additionally, the internal duplexer allows implementation of adjacent carriers so that odd/even frequency planning is not required.

The remote unit is connected to the main unit via a fiber optic cable, which can extend up to 2000 ft. (609.6 m). This feature enables maximum RF output power to be achieved by allowing the remote unit to be located as close as possible to the antenna, minimizing the impact of cable loss between the amplifiers and the antenna. The remote unit can transmit an average maximum of 20 W per RF carrier at the demarcation point (the point at which the transmit antenna cable is attached at the unit).

## Enclosure and Mounting

The remote unit is equipped with a sunshield to protect it against exposure to direct sunlight, wind, and other environmental conditions.

The remote unit is also equipped with a unique mounting bracket that can accommodate wall, telephone pole, monopole, tower, or other mounting. To provide flexibility in the network build-out, the mounting bracket can be pre-installed, allowing all site electrical work to be completed prior to RF installation and commissioning.

### CAUTION

**Always use the Ericsson sunshield, with the original factory paint. The sunshield color effects the operating temperature of the RBS. If the unit absolutely must be painted (e.g., for zoning reasons), Ericsson will work with the customer to find a solution. If you paint the sunshield without the approval of Ericsson, you will void Ericsson's warranty on that unit.**

## GPS Receiver

The RBS uses a GPS receiver and the GPS satellite system to maintain synchronous operation within the wireless infrastructure network.

The GPS receiver is colocated with the GPS antenna. The receiver and antenna assembly can be remotely located up to 2000 feet away from the main unit. A single GPS receiver can be daisy chained to support up to 4 CDMA modules in a single RBS or up to 2 RBSs with a single CDMA module in each. If synchronization with the GPS satellite constellation is lost, the RBS can maintain synchronization with other infrastructure subsystems for a minimum of 8 hours.

## Reliability

Each RBS main and remote unit is designed to have a Mean Time Between Failure (MTBF) of no less than 10 years (using TR332, Issue 5 Bellcore Reliability Prediction Procedure, 1995 as a guideline). Extensive lab testing including HALT (highly accelerated lifecycle testing) and other methods are used to validate their reliability.

## Remotely Controlled Features

The RBS has the following capabilities:

- All RBS software is downloadable from the network.
- Operating parameters can be downloaded from the network separately from the software downloads and do not require interruptions of service.
- The assigned CDMA channel number for each CDMA module can be remotely changed (over the network) within the specified 20 MHz band.
- RF performance measurements can be provided either remotely or locally. Performance measurements include traffic and overhead channel statistics, handoff statistics, RF power monitoring, and message tracing.
- The RBS has test capabilities for remote RF diagnostics and optimization, as well as loopback testing between the RBS and the Base Station Controller (BSC).

## Testing and Diagnostics

The RBS provides a number of diagnostic capabilities, which can be performed on-site or remotely, and on a periodic or on-demand basis. Diagnostics include the origination of test calls on each channel element, allowing validation of each sector and channel element.

The following is a list of available local tests:

- Forward noise (Sounder Mode — lock in on a single Pseudo-Noise Offset (PN))
- Temporal analyzer display (Temporal Analysis (TA) data, Frame Error Rate (FER))
- Channel usage (call status, call details, etc.)
- Over-the-air message tracing (IS-95, J-STD-008)
- Backhaul loopback

## Installation and Commissioning

In addition to being designed for deployment flexibility, the RBS is ideal for simplified and rapid installation. Each of the units is factory assembled, tested, calibrated, sealed, and ready for installation. Commissioning after installation is accomplished via a user-friendly Web browser interface. To commission the RBS, a field engineer can use a standard Web browser on a laptop or notebook computer. The commissioning, test, and diagnostic software resident on the RBS allows RBS installation and operation to be verified without requiring a connection to the BSC or Base Station Manager (BSM). For information on preparing your laptop PC, see [“Configuring the Laptop PC” on page B-1](#). For information on using the Commissioning Wizard, see [“Commissioning the RBS” on page 6-1](#).

# The RBS Specifications

Table 1–1 below contains the basic specifications for the RBS main and remote units. Table 1–7 on page 1-11 contains the basic specifications for the Uninterruptable Power Supply (UPS) system.

**Table 1–1 RBS Specifications**

Item	Specifications
<b>Equipment Description:</b>	
Model Type	RBS 1107 Compact Multi-Carrier RBS
<b>Performance Specifications:</b>	
Air Interface	ANSI J-STD-008, IS-95A
Number of Carriers	Up to 4 carriers by 3 sectors
Number of Sectors	1 to 3
Number of Channel Elements	Up to 640, 160 per 1x3 RF carrier
Number of T1/E1 Spans per RBS	4 primary, 4 secondary
T1/E1 Daisy-Chain Capability	Up to two 1x3 RF carriers per T1/E1
<b>Forward (Transmit) Link:</b>	
Frequency Band PCS	A & D 1930–1950 MHz (MCN -1) B & E 1950–1970 MHz (MCN -2) F & C 1970–1990 MHz (MCN -3)
Power Output (per carrier)	20 Watts average maximum
Modulation	CDMA spread spectrum
Bandwidth	1.2288 MHz
<b>Reverse (Receive) Link:</b>	
Frequency Band, PCS	A & D 1850–1870 MHz (MCN -1) B & E 1870–1890 MHz (MCN -2) F & C 1890–1910 MHz (MCN -3)
Receiver Sensitivity (at 1% FER)	-120.0 dBm (for Rate Set 2: 14.4 Kbps) -122.0 dBm (for Rate Set 1: 9.6 Kbps)

**Table 1–1 RBS Specifications (continued)**

Item	Specifications
<b>Environmental and Regulatory Specifications:</b>	
Electromagnetic Compatibility	Meets the requirements specified in FCC Part 15, using Class B limits, and FCC Part 24 Bellcore GR-1089-CORE Chapters 2 and 3, using Class B limits
Product Safety	Meets the requirements specified in UL 1950 and IEC 950
Operating Temperature Range	-40° to 52° C (-40° to 125.6° F)
Storage Temperature Range	-50° to 70° C (-58° to 158° F)
Operating Relative Humidity Range	5% to 95% non-condensing
Altitude Range	-60 to 1800 meters above sea level, above 1500 meters, de-rate maximum operating temperature by 2° C per 300 meters
Seismic	Meets requirements of Bellcore GR-63-CORE to withstand a Zone 4 earthquake
Lightning and Surge Protection	In accordance with IEEE C62.41-1991 and IEC 1000-4-5 (individual installations may require greater protection)
Safety	Meets requirements specified in UL1950 and IEC 950
FCC Compliance	FCC Part 15 (using Class B limits) and FCC Part 24 compliant
Grounding	<ul style="list-style-type: none"> <li>■ The RBS external protective Earth ground must be tested after installation; the impedance to Earth ground must be less than 5 <math>\Omega</math>.</li> <li>■ Tests should be performed twice a year to ensure ground integrity.</li> </ul>

**Table 1–2 Supported Configurations**

Hardware	Configurations									
	1x1	1x2	1x3	1x6	2x1	2x2	2x3	2x6	3x3	4x3
Main Unit	1	1	1	1	1	1	1	1	1	1
GPS	1	1	1	1	1	1	1	1	1	1
CDMA Modules	1	1	1	2	2	2	2	4	3	4
Remote Unit Core Modules	1	2	3	6	1	2	3	6	6	6
RF Modules	1	2	3	6	2	4	6	12	9	12

**Table 1–3 Input Power Specifications**

Frequency	50 or 60 Hertz			
Phase	Single-phase AC			
Power Factor	0.7 to 1, leading Note: At light loads (for instance, when the remote is plugged in but not radiating), the power factor will be worse. For power factor specifics, contact Ericsson.			
Total Harmonic Distortion	$\leq 5\%$			
Any Individual Harmonic	$\leq 3\%$			
Single Remote Unit ■ 1 PA ■ 2 PA	■ 250W, 263VA, <60A Pk. inrush, for <30 mS ■ 470W, 495VA, <60A Pk. inrush, for <30 mS			
Single Main Unit ■ 1x3 ■ 2x3 ■ 3x3 ■ 4x3	■ 60W, 63VA, <30A Pk. inrush, for <30 mS ■ 120W, 126VA, <30A Pk. inrush, for <30 mS ■ 180W, 190VA, <30A Pk. inrush, for <30 mS ■ 240W, 253VA, <30A Pk. inrush, for <30 mS			
Main & Remote Combination	1x3	2x3	3x3	4x3
Main Unit	60W	120W	180W	240W

**Table 1–3 Input Power Specifications (continued)**

Remotes Units	1 PA	750W(3)	—	750W(3)	—
	2 PA	—	1410W(3)	1410W(3)	2820W(6)
Total Power		810W	1530W	2340W	3060W
Total VA		852VA	1610VA	2463VA	3221VA
Recommended Number of Circuit Breakers (for the type of circuit breakers, see notes below)		4	4	7	7
Notes: <ul style="list-style-type: none"> <li>■ Wattages are based on worst case engineering estimates, no additional margin is added.</li> <li>■ All wattages and VAs remain essentially constant over the operating range of 180VAC to 265VAC (240VAC nominal).</li> <li>■ Installed circuit breakers must comply with local wiring codes and support both the steady-state and inrush current specifications in this table. For more information, contact Ericsson.</li> </ul>					

**Table 1–4 RBS Physical Specifications**

<b>Size:</b>	
Main Unit	435mm W x 410mm D x 925mm H (17.1" W x 16.1" D x 36.4" H)
Remote Unit	305mm W x 356mm D x 1016mm H (12.0" W x 14.0" D x 40.0" H)
<b>Weight:</b>	
Main Unit	1 FA: 36.0 kg (79.5 lbs) 2 FA: 44.5 kg (98.0 lbs) 3 FA: 53.3 kg (117.5 lbs) 4 FA: 59.0 kg (130 lbs)
Remote Unit	1 FA: 27.2 kg (60.0 lbs) 2 FA: 36.3 kg (80.0 lbs)

**Table 1–5 Alarms Specifications**

Alarm Inputs	<ul style="list-style-type: none"> <li>■ Number of alarm inputs per CDMA module: 6 (plus sunshield alarm)</li> <li>■ Open Circuit Voltage: +5 Volt DC</li> <li>■ Short Circuit Current: 5mA</li> <li>■ Maximum series resistance to sense closure: <math>\leq 100</math> ohms</li> <li>■ Minimum series resistance to sense open: <math>\geq 1000</math> ohms</li> <li>■ Approved wiring: Category 5 twisted pair wire</li> </ul>
Alarm Outputs	<ul style="list-style-type: none"> <li>■ Number of alarm outputs (relays) per CDMA module: 2</li> <li>■ Maximum switched current: 50mA at 48VDC, 50mA (RMS) at 30VAC (RMS)</li> <li>■ Maximum series resistance with contacts closed: <math>\leq 10</math> ohms</li> <li>■ Minimum series resistance with contacts open: <math>\geq 2000</math> ohms</li> <li>■ Approved wiring: Category 5 twisted pair wire</li> </ul> <p>Note: Do not raise any contact's potential above 48V peak from chassis.</p>

## Backhaul (T1/E1) Description

The RBS backhaul carries both traffic and control channels to and from the RBS, and consists of T1 or E1 lines, which must be protected from lightning.

**Table 1–6 RBS Backhaul Description**

Backhaul	Cable	Connector
T1/E1 (balanced)	Category 5 twisted-pair cable	RJ-45 connector

## GPS Description

The RBS uses the GPS Satellite system to maintain precise timing. The GPS receiver must be installed within a 2000 foot cable run of the furthest RBS main using its signal. If you need a longer cable than that supplied by Ericsson, use 24AWG solid conductor with drain wire category 5-type twisted pair cable to extend or replace the supplied cable.

## UPS Specifications

If your RBS site uses an AC Uninterruptable Power Supply (UPS), the site power service provisioning must be designed for the RBS requirements and the additional requirements of the UPS. The RBS 1107 has been tested with the following UPSs. Contact Alpha for current information (Alpha Technologies, Bellingham, WA, USA, 800-421-8089, [www.alpha.com](http://www.alpha.com), <<http://www.alpha.com>>).

### CAUTION

**The UPSs listed in Table 1-7 have been qualified, tested, and approved for use with the RBS 1107. If you wish to use a different UPS, contact Ericsson to arrange for system integration testing. If you do not use a qualified, tested, and approved UPS, you may seriously damage your RBS system and your Ericsson warranty will be void.**



### WARNING

**Ensure that all circuit breakers have been configured as required by the UPS vendor and by the local wiring codes, and that they support both the steady-state and inrush current specifications in Table 1-3 on page 1-8.**

**Table 1-7 UPS Specifications**

RBS Configuration	UPS Information
Up to 2x3 RBS 4-hour backup (approximate)	1 x NOVUS 2000XT <ul style="list-style-type: none"> <li>■ Output: AC, 2000VA, 1600W</li> <li>■ 8 batteries (80 amp hours, 12V 66 lbs per battery)</li> <li>■ 91.4cm W x 96.5cm H x 38cm D (36" W x 38" H x 15" D)</li> <li>■ 324.3 kg (715 lbs)</li> </ul>
Up to 4x3 RBS 4-hour backup (approximate)	2 x NOVUS 2000XT <ul style="list-style-type: none"> <li>■ Output: 2000VA, 1600W</li> <li>■ 16 batteries (80 amp hours, 12V 66 lbs per battery)</li> <li>■ 2 cabinets, each 91.4cm W x 96.5cm H x 38cm D (36" W x 38" H x 15" D)</li> <li>■ 648.3 kg (1430 lbs)</li> </ul>

**Table 1–7 UPS Specifications (continued)**

<b>RBS Configuration</b>	<b>UPS Information</b>
Up to 2x3 RBS 2-hour backup (approximate)	1 x NOVUS 2000XT (small cabinet) <ul style="list-style-type: none"> <li>■ Output: AC, 2000VA, 1600W</li> <li>■ 4 batteries (80 amp hours., 12V 66 lbs per battery)</li> <li>■ 61cm W x 96.5cm H x 38cm D (26" W x 37" H x 15" D)</li> <li>■ 150 kg (330 lbs)</li> </ul>
Up to 4x3 RBS 2-hour backup (approximate)	2 x NOVUS 2000XT (small cabinet) <ul style="list-style-type: none"> <li>■ Output: AC, 2000VA, 1600W</li> <li>■ 4 batteries (80 amp hours, 12V 66 lbs per battery)</li> <li>■ 2 cabinets, each 61cm W x 96.5cm H x 38cm D (26" W x 37" H x 15" D)</li> <li>■ 150 kg (330 lbs)</li> </ul>
Up to 4x3 RBS 2-hour backup (approximate)	1 x NOVUS CFR 5000XT <ul style="list-style-type: none"> <li>■ Output: AC, 5000VA, 3300W</li> <li>■ 8 batteries (80 amp hours, 12V 66 lbs per battery)</li> <li>■ 66cm W x 111.8cm H x 61cm D (26" W x 44" H x 24" D)</li> <li>■ 417.3 kg (920 lbs)</li> <li>■ Note: The NOVUS CFR 5000XT is also available with an attached cabinet with a propane motor generator unit. The overall size is approximately doubled with this addition.</li> </ul>

# Fiber Optic Cable Specifications

Use multi-mode fiber optic cable to connect the RBS main and remote units. [Table 1–8](#) contains specifications for the cables and related materials.

**Table 1–8 Fiber Optic Cable Specifications**

Multimode Fiber Optic Cables  <i>Available from LANtech</i>	<ul style="list-style-type: none"> <li>■ Optical Cable Corporation, P/N BX02-070D-W3SB-1UC-900-R with UV inhibitor (indoor/outdoor-rated, not plenum-rated, cable) or equivalent</li> <li>■ Optical Cable Corporation, P/N BX02-070K-W3SB-1UC-900-P with UV inhibitor (plenum rated indoor/outdoor cable) or equivalent</li> </ul>
Terminating Connector  <i>Available from Molex</i>	<ul style="list-style-type: none"> <li>■ Molex ST</li> </ul>
Testing Instruments  <i>Available from R&amp;R Instrumentation</i>	<ul style="list-style-type: none"> <li>■ Connector cleaner kit (lint free cloth or lint free wipes and alcohol)</li> <li>■ Siecor OTS-200 fiber optic cable test set or equivalent</li> <li>■ Reference cable FOC ST-ST</li> </ul>
Terminating Kits  <i>Available from Molex</i>	<ul style="list-style-type: none"> <li>■ Fiber termination kit for ST connectors</li> <li>■ Molex ST</li> </ul>
Pulling-Eye Kit	<ul style="list-style-type: none"> <li>■ Pulling-eye kit (to accommodate the specified cable and connector)</li> </ul>
Training	<ul style="list-style-type: none"> <li>■ Introduction to fiber</li> <li>■ Fiber placement and handling</li> <li>■ Multi-mode fiber termination</li> </ul>
Weatherproofing kit	<ul style="list-style-type: none"> <li>■ Dust caps</li> <li>■ Weatherproof bags</li> </ul>

# Antenna Configurations

Table 1–9 shows the possible RBS antenna configurations by number of carriers. The antenna connection on the RBS is a female 7/16 DIN, and will require the use of a 7/16 male antenna jumper.

**Table 1–9 RBS Antenna Configurations**

Number of Carriers	Possible Antenna Configurations
1	<ul style="list-style-type: none"><li>■ 2 vertical linear antennas per sector</li><li>■ 1 dual-polarized antenna per sector</li></ul>
2	<ul style="list-style-type: none"><li>■ 2 vertical linear antennas per sector</li><li>■ 1 dual-polarized antenna per sector</li></ul>
3	<ul style="list-style-type: none"><li>■ 2 dual-polarized antennas per sector</li></ul>
4	<ul style="list-style-type: none"><li>■ 2 dual-polarized antennas per sector</li></ul>

## Required Resources

[Table 1–10](#) lists the resources you required for RBS installation.

**Table 1–10 Required Resources**

Documents	<ul style="list-style-type: none"> <li>■ <i>RBS 1107 Field Guide</i> (This document): Provides a complete description of the installation and commissioning process for the RBS.</li> <li>■ <i>RBS 1107 Site Preparation Pocket Guide</i> (92-F0422-1): Supplies steps and important information about preparing a site for installation of the RBS.</li> <li>■ <i>RBS 1107 Installation Pocket Guide</i> (92-F0424-1): Supplies steps and important information about installing the RBS.</li> <li>■ <i>RBS 1107 Commissioning Pocket Guide</i> (92-F0426-1): Supplies steps and important information about commissioning the RBS.</li> <li>■ <i>RBS 1107 Troubleshooting Pocket Guide</i> (92-F0425-1): Supplies steps and important information about troubleshooting the RBS.</li> <li>■ <i>Compact RBS Software, Release 7.5 Advanced User Guide</i> (92-F0201-1): Describes how to use the RBS's software. Use this guide when operating the RBS directly, at the site or in a staging area.</li> </ul>
Laptop <ul style="list-style-type: none"> <li>■ System and Software</li> </ul>	<ul style="list-style-type: none"> <li>■ Pentium I, 90MHz processor or faster</li> <li>■ 32 MB of RAM recommended, 16 MB of RAM minimum</li> <li>■ Microsoft Windows® 98</li> <li>■ Installed Ethernet card</li> <li>■ Support for the SVGA monitor display mode</li> <li>■ Installed Netscape® Communicator v4.5</li> </ul>
<ul style="list-style-type: none"> <li>■ Ethernet</li> </ul>	<ul style="list-style-type: none"> <li>■ 10Base-T compatible Ethernet connection with 10Base-T Ethernet cable</li> </ul>
<ul style="list-style-type: none"> <li>■ Serial</li> </ul>	<ul style="list-style-type: none"> <li>■ Serial null modem cable, see <a href="#">page C-5</a></li> </ul>

**Table 1–10 Required Resources (continued)**

Installation Kits	<ul style="list-style-type: none"> <li>■ Compact RBS Site Preparation Kits Main/Remote</li> <li>■ Compact RBS Installation Hardware Kits Main/Remote</li> </ul>
Materials <ul style="list-style-type: none"> <li>■ General</li> <li>■ Pole mount</li> <li>■ Wall mount</li> </ul>	<ul style="list-style-type: none"> <li>■ Metallic conduit, 3/4" (19mm), fluid tight or rigid</li> <li>■ Grounding kits, for main and remotes</li> <li>■ Junction boxes, for conduit and fiber optic cable</li> <li>■ Cable ties</li> <li>■ Connector weatherproofing kit</li> <li>■ <i>Contact your monopole supplier for monopole accessories</i></li> <li>■ Unistrut<sup>®</sup> extruded channel or equivalent</li> <li>■ Wall fasteners to anchor Unistrut</li> </ul>
Tools <ul style="list-style-type: none"> <li>■ Required</li> <li>■ Recommended</li> </ul>	<ul style="list-style-type: none"> <li>■ Plumb bob or Level (accurate to 1/4°)</li> <li>■ SMA connector torque wrench (8–9 in/lbs)</li> <li>■ Standard #2 Phillips-head screwdriver</li> <li>■ 1/4" flat blade screwdriver</li> <li>■ 3/32" flat blade screwdriver</li> <li>■ Combination wrench sets (standard and metric)</li> <li>■ Nut drivers (standard and metric)</li> <li>■ Adjustable pliers</li> <li>■ Wire stripper for 10–26 AWG (0.41 mm to 2.59 mm diameter) wire</li> <li>■ Telco cable stripper</li> <li>■ ESD wrist strap and cable</li> <li>■ RJ-45 crimper</li> <li>■ 1/4" allen wrench</li> <li>■ See <a href="#">Table 1–8 on page 1-13</a> for fiber optic cable tools</li> <li>■ Anritsu Wiltron SiteMaster or equivalent</li> <li>■ Leatherman<sup>®</sup></li> <li>■ Small flashlight</li> <li>■ Electrician's soap</li> </ul>

## Preparing the RBS Site

The RBS 1107 Compact offers you flexible installation options so you can tailor each installation to fit the location and limitations of the site. However, each installation follows the same basic steps whether you are installing the RBS in stages or installing the complete RBS system all at one time. This chapter provides information on preparing the site for installing the main RBS components using the Compact RBS Site Preparation Kit.

The following table provides a preview of the major steps in preparing the RBS site.

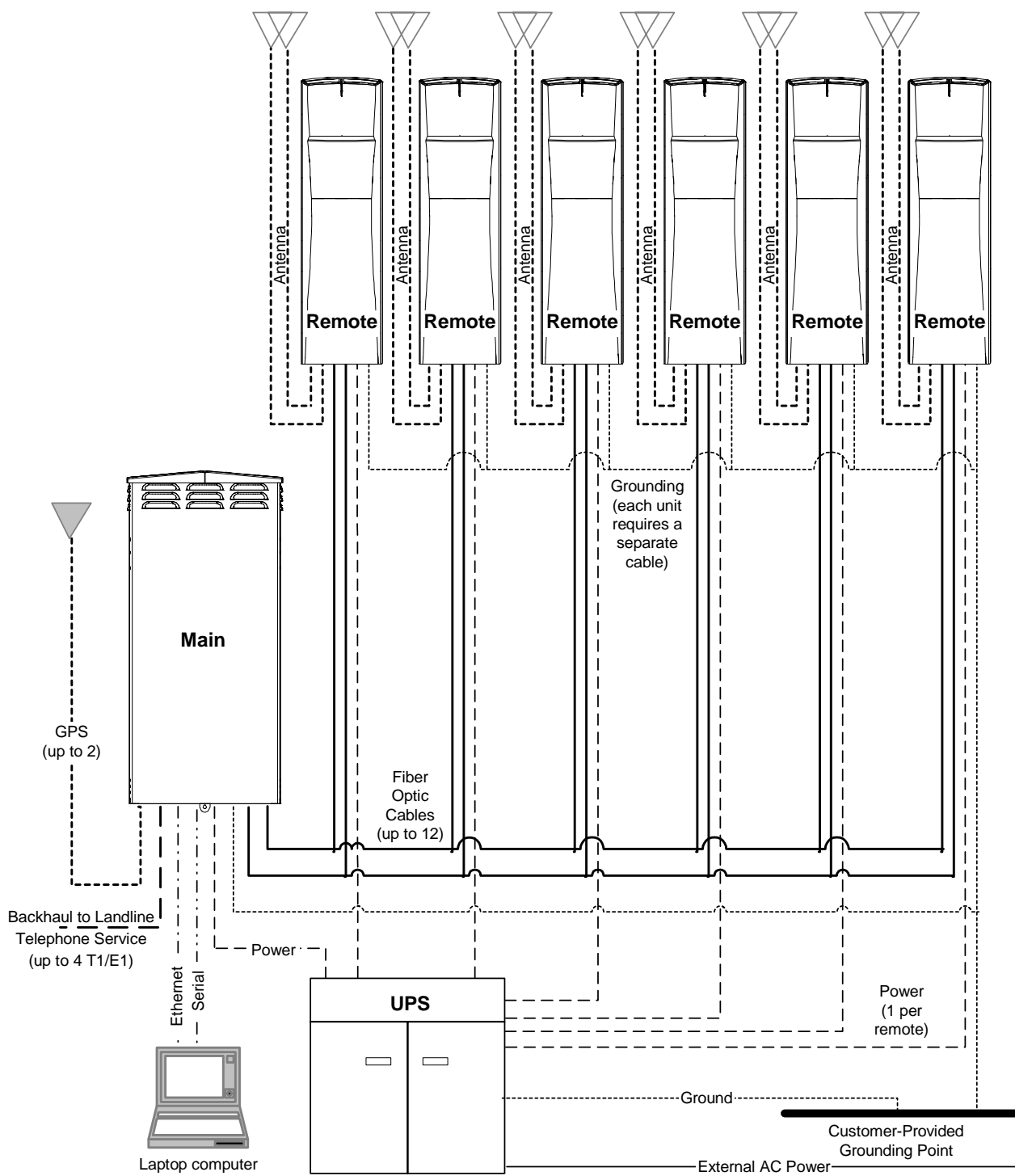


### ***Procedure Preview: How to prepare the site for the RBS installation***

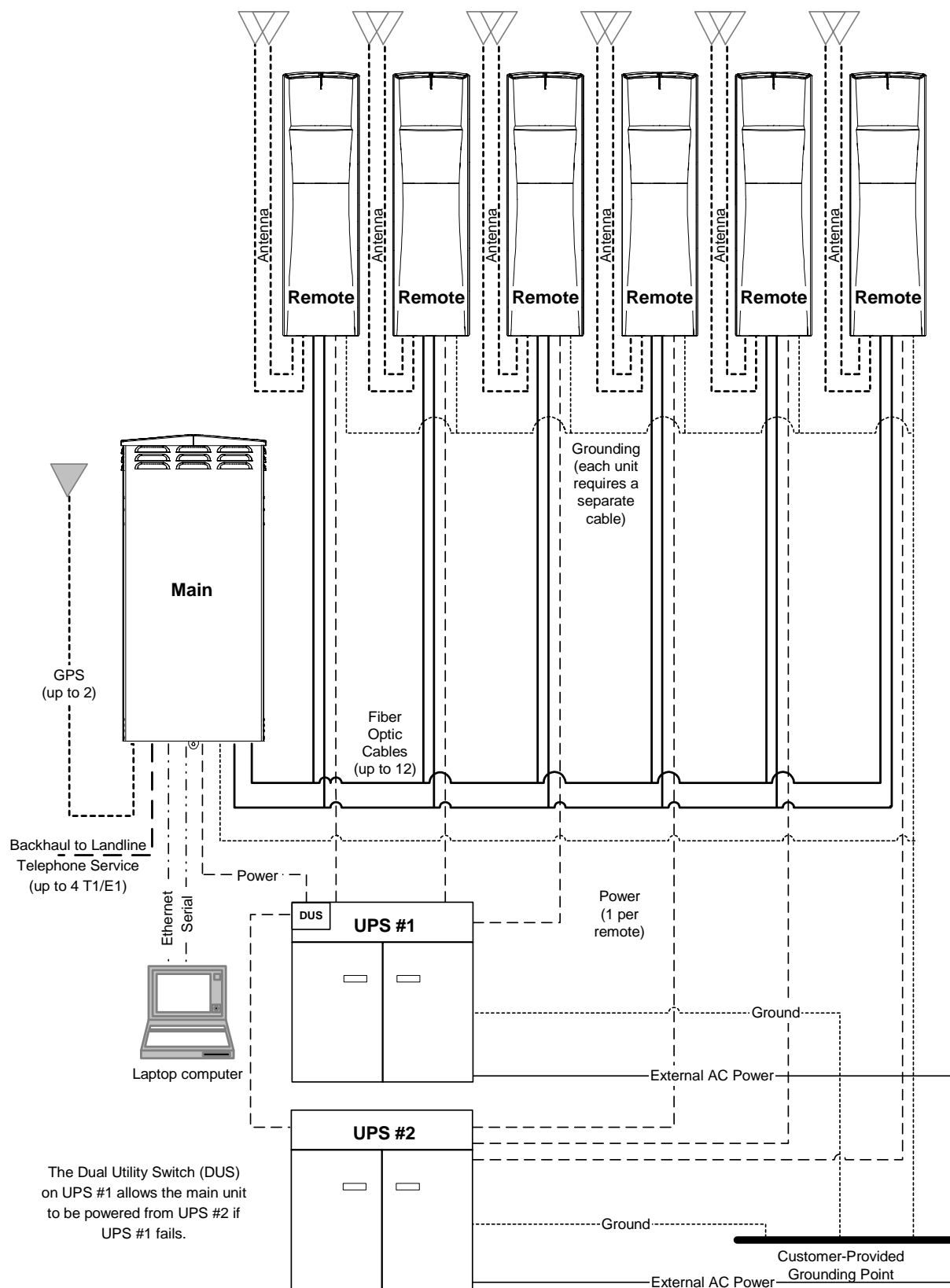
Step	Action	Described on
1	Install the main and remote unit mounting brackets.	<a href="#">page 2-4</a>
2	Supply power.	<a href="#">page 2-8</a>
3	Install all conduit and the GPS mounting bracket.	<a href="#">page 2-9</a>
4	Pull the power cables from the UPS to the main and each remote unit mounting bracket.	<a href="#">page 2-12</a>
5	Install the RF antennas and cables.	<a href="#">page 2-13</a>
6	Verify the connection to the RF antennas and cables.	<a href="#">page 2-13</a>
7	Install the backhaul T1/E1 cables.	<a href="#">page 2-14</a>
8	Install the fiber optic cables between the main and remote unit mounting brackets.	<a href="#">page 2-14</a>
9	Install the GPS cable.	<a href="#">page 2-15</a>
10	Install the grounding cables.	<a href="#">page 2-15</a>

## RBS Overview

Figure 2–1 shows the field wiring diagram for a fully configured, one-UPS RBS system. Figure 2–2 on page 2-3 shows the field wiring diagram for a fully-configured, two-UPS RBS system.



**Figure 2–1 RBS 1107 Compact, One-UPS Field Wiring Diagram**



**Figure 2-2 RBS 1107 Compact, Two-UPS Field Wiring Diagram**

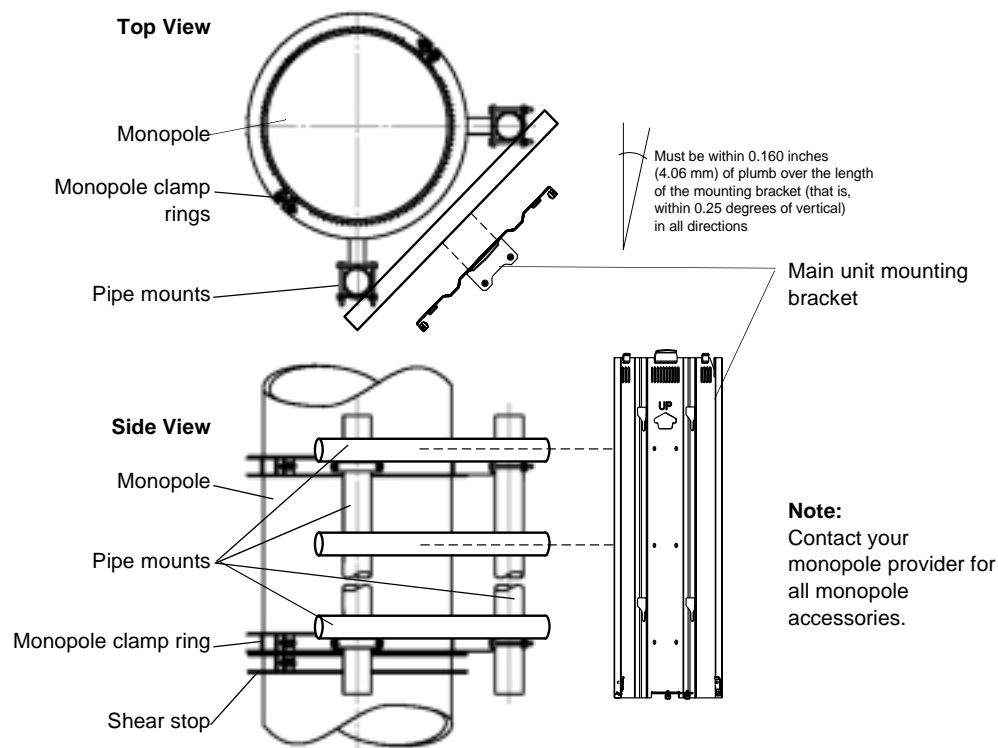
## Installing the Main and Remote Unit Mounting Brackets

The compact size of the RBS lets you install it in a variety of different locations. Typical installations include on a monopole, on a wall, or on a roof. Because the RBS can be mounted in such diverse ways, you will need to supply all specialized mounting hardware for your installation.

**CAUTION** To avoid RBS overheating, mount the main and remote units' mounting brackets such that they remain flat and within 0.160" (4.06 mm) of plumb over the length of the mounting bracket (that is, within 0.25° of vertical).

### Installing the Main Mounting Bracket on a Monopole

Figure 2–3 below shows a typical installation for a monopole. For the required materials and information for installation, contact your monopole provider.



**Figure 2–3 RBS Main Unit Mounting Bracket Monopole Mounting**

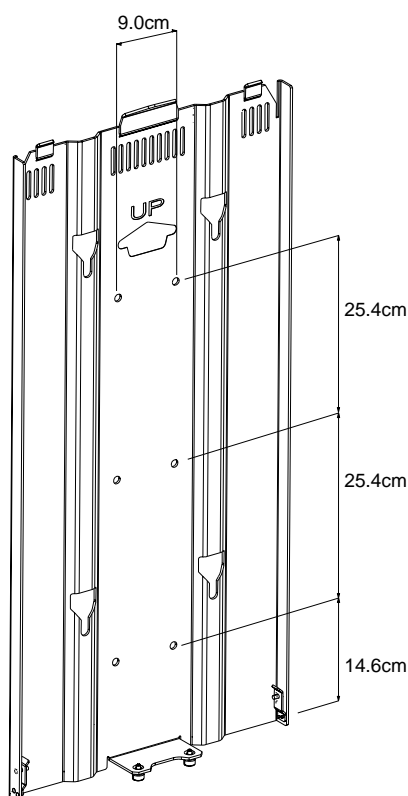
#### **1 2 3** Steps

#### **To install the main mounting bracket on a monopole**

1. Attach the monopole clamp rings at a height that will allow you easy access to the main unit.
2. Connect the pipe mounts to the clamp ring standoffs. For the mounting bracket hole locations, see [Figure 2–4](#).
3. Fasten the main unit mounting bracket to the pipe mounts.

## Installing the Main Unit Mounting Bracket on a Wall

Figure 2–4 shows the RBS main unit mounting bracket and dimensions. The wall and hardware used to mount the RBS must be capable of supporting the weight of the unit. The wall must be flat so the mounting bracket does not deform during installation. If the wall is not sufficiently flat, use metal flashing to shim the mounting bracket flat to the wall. The mounting bracket must be installed such that it is within 0.160" (4.06 mm) of plumb over the length of the mounting bracket (that is, within 0.25° of vertical). For the weight of the main and remote units, and for the required materials for wall installation, see Table 1–4 on page 1-9.



**Figure 2–4 RBS Main Unit Mounting Bracket**

### **1 2 3** Steps

#### **To install the main unit mounting bracket on a wall**

1. Using the appropriate wall fasteners, anchor Unistrut (or equivalent extruded channel) horizontally on the wall to match the mounting bracket hole locations. For the mounting bracket hole locations, see Figure 2–4 on page 2-5.
2. Position the mounting bracket on the wall using a minimum clearance of 18 inches (45.7 cm) on all sides.
3. Attach the mounting bracket (using all six holes of the mounting bracket) to the Unistrut using the appropriate bolts and flat and split-lock washers.

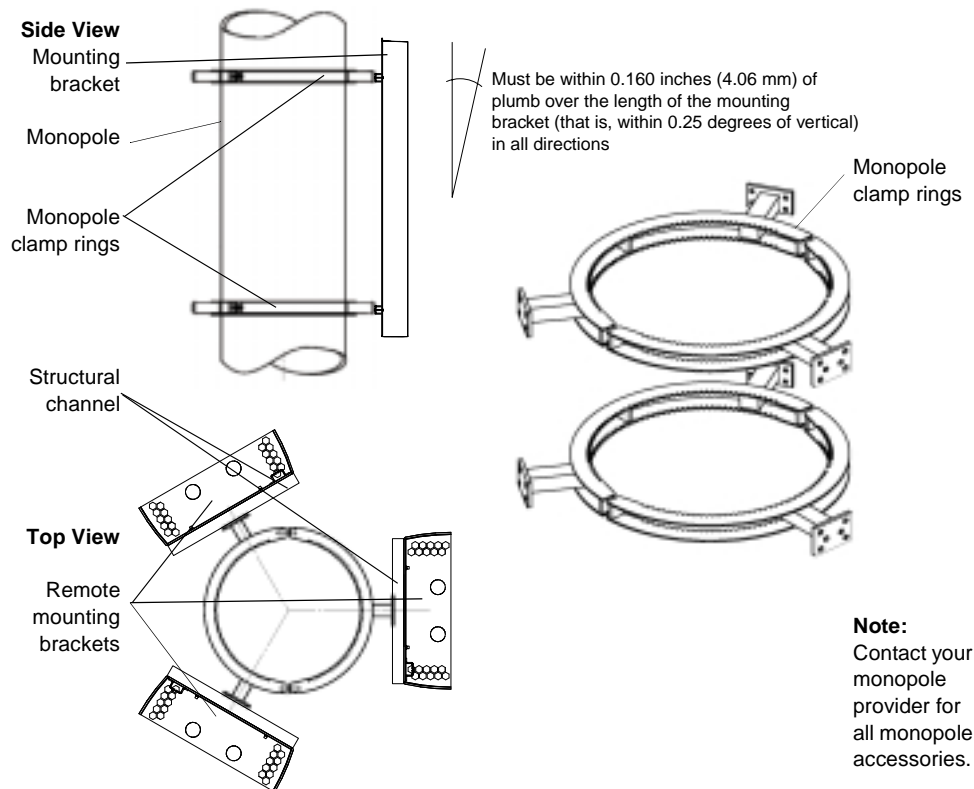
#### **CAUTION**

**To help avoid bending or deforming the mounting bracket, make sure you fasten the mounting bracket to the mounting structure using all six holes on the bracket.**

## Installing the Remote Mounting Brackets on a Monopole

Figure 2–5 shows a typical installation for a monopole. For the required materials and information for installation, contact your monopole provider.

The mounting bracket must be installed such that it is within 0.160" in. (4.06 mm) of plumb over the length of the mounting bracket (that is, within 0.25° of vertical).



**Figure 2–5 RBS Remote Unit Mounting Bracket for Pole Mounting**

### 1 2 3 Steps

#### **To install a remote unit mounting bracket on a monopole**

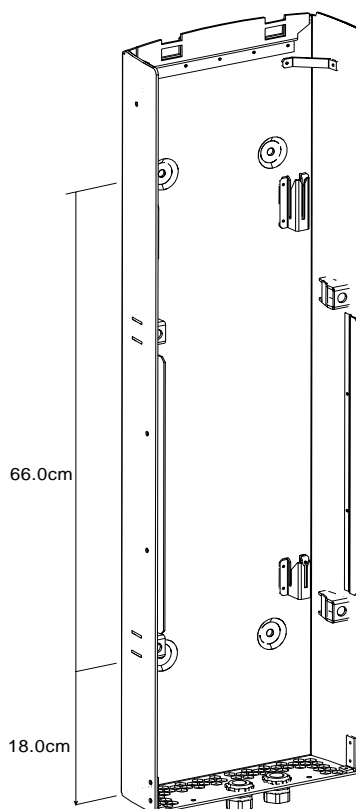
1. Attach the monopole clamp rings at a height that affords a minimum of distance from the remote units to the antennas. For the mounting bracket hole locations, see [Figure 2–6 on page 2-7](#).
2. Mount structural channel to the monopole clamp ring standoffs.
3. Fasten the remote unit mounting brackets to the structural channel.

#### **CAUTION**

**To avoid RBS overheating, the remote unit mounting bracket must be mounted such that it is within 0.160" in. (4.06 mm) of plumb over the length of the mounting bracket (that is, within 0.25° of vertical).**

## Installing the Remote Mounting Brackets on a Wall

Figure 2–6 shows the RBS remote unit mounting bracket and dimensions. The wall and hardware used to mount the RBS must be capable of supporting the weight of the unit. The wall must be flat so the mounting bracket does not deform and is within 0.160" in. (4.06 mm) of plumb over the length of the mounting bracket (that is, within 0.25° of vertical). If the wall is not sufficiently flat, use metal flashing to shim the mounting bracket flat to the wall. For the weight of the main and remote units, and for the required materials for wall installation, see Table 1–4 on page 1-9.



**Figure 2–6 Remote Unit Mounting Bracket**

### **1 2 3** Steps

#### **To install a remote mounting bracket on a wall**

1. Using the appropriate fasteners, anchor the Unistrut (or equivalent extruded channel) horizontally on the wall to match the mounting bracket hole locations. For the mounting bracket hole locations, see Figure 2–6.
2. Position the mounting bracket on the wall with the conduit openings facing down. Maintain a minimum of 18 inches (45.7 cm) at the bottom of the units.
3. Attach all four holes of the mounting bracket to the Unistrut using the appropriate bolts and flat and split-lock washers.

#### **CAUTION**

**To avoid RBS overheating, the remote unit mounting bracket must be mounted such that it is within 0.160" (4.06 mm) of plumb over the length of the mounting bracket (that is, within 0.25° of vertical).**

## Supplying Power to the RBS

Using a UPS is highly recommended for all RBS installations. Provide power following local electrical codes and such that the main and each remote unit can be shut down independently. For power requirements, see [Figure 1–3 on page 1-8](#).

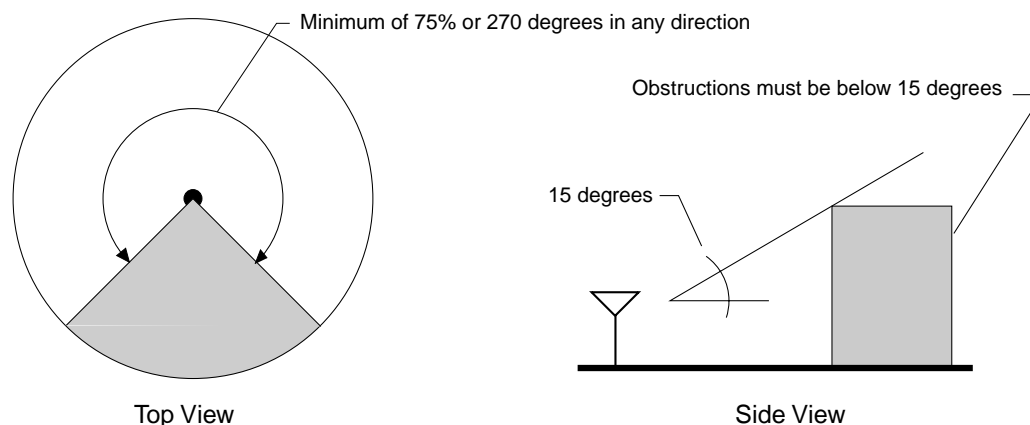
## Mounting and Wiring the UPS

Mount and wire the UPS following the UPS manufacturer's documentation and in accordance with all local electrical codes. For the UPS power requirements, see [Table 1–7 on page 1-11](#).

## Positioning the GPS Bracket

Use 1-inch (25.4 mm) conduit to serve as the GPS receiver bracket. For information on installing conduit, see [“Installing Conduit for the RBS” on page 2-9](#). When you install the GPS receiver bracket, ensure that it is:

- Installed within 2000 linear feet (610 m) of the RBS main unit (the cable supplied in the Compact RBS Site Preparation Kit is 100 feet (30.5 m) long). If you need a longer GPS cable, use Category 5 twisted pair cable to extend or replace the provided cable.
- Located to provide the widest possible view of the sky (a tree or building can block signals from the satellite), see [Figure 2–7](#).
- A minimum of two feet from all lightning rods.
- Clear of the main lobe of the RF transmitting antennas.



**Figure 2–7 GPS Minimum Sky-View Requirements**