



Receive Redundant RXR Systems

Operations Manual

24-Hour Technical Support: +1 669.258.9740

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REVISION HISTORY

Revision	Date	Description
A	07/07/2021	Initial Release



This manual provides information about the Terrasat Communications, Inc. line of Receive Redundant RXR Systems (Rx 1+1 RXR).

Conventions and References

Before you start using this manual, it is important to understand the typographical conventions and terms used in the documentation.

[Table P.1](#) describes typographical conventions used in Terrasat Communications, Inc. documentation. For definitions of specialized terms used in the documentation, see [Appendix G, Glossary](#).

Table P.1 Typographical Conventions

Convention	Description/Example
Emphasis	Used to emphasize the importance of a point. The IP Address <i>must</i> be a unique number.
Internal cross-references	References to a section in the same document are marked in blue and are hyperlinked. See Warranty Information on page 1-4 .
Product and feature names	Named Terrasat products and features are identified on first use. ...line of receive redundant systems (Rx 1+1).
Technical Publication References	References to other Terrasat publications. If the reference is hyperlinked, it is also underscored. For detailed information, see the Terrasat Communications, Inc. Rx 1+1 Operations Manual .
User-entered values	A special font marks text that you type. At the password prompt, type <code>MyPassword</code> .

Cautions and Warnings



CAUTION

CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury. CAUTION might also be used to indicate other unsafe practices or risks of property damage.



HIGH-VOLTAGE



HIGH VOLTAGE indicates the presence of a high-voltage hazard.



WARNING

WARNING indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

Trademarks

Terrasat Communications Inc. is a registered trademark. Also, other product names mentioned in this manual may be trademarks or registered trademarks of their respective companies and are hereby acknowledged.

Electrical Safety Notice

This equipment has been designed to minimize exposure of personnel to hazards. All operators and technicians must:

- Know how to work around, with, and on high-voltage equipment.
- Exercise every precaution to ensure safety of personnel.
- Exercise extreme care when working near high voltages.
- Be familiar with the warnings in this manual.

INTRODUCTION

This manual is intended for users of Terrasat Communications, Inc. receive redundant (Rx1+1) systems. It contains information about

- Installation, operation, and maintenance of Rx 1+1 RXR systems.
- Use of user interface protocols for remote monitor and control capabilities

Receive Redundant Systems

The Rx 1+1 RXR is a AC-powered Receive Redundant System that performs all the required functions for redundant operation of Multiband LNBS. The Rx 1+1 RXR system also supports up to 4 redundant 10MHz sources:

- Provided to connector J8 by any source
- Multiplexed into modem connection cable
- Internal 10MHz source #1
- Internal 10MHz source #2

Reference Documents

Use the satellite operation standards listed in [Table 1.1](#) as reference documents.

Table 1.1 Satellite Operation Standards

Earth Station Standards	
Intelsat IESS 308/309	Performance Characteristics for Intermediate Data Rate Digital Carriers Using Convolutional Encoding and QPSK Modulation
Eutelsat EESS 502	Minimum Technical and Operational Requirements for Earth Stations Transmitting to a Eutelsat Transponder for Non-Standard Structured Types of SMS Transmissions. Standard M.

Table 1.1 Satellite Operation Standards (Continued)

ETSI EN 301 427	Satellite Earth Stations and Systems (SES); Harmonized EN for Low Data Rate Mobile Satellite Earth Stations (MESs) except aeronautical mobile satellite earth stations, operating in the 11/12/14 GHz frequency bands covering essential requirements under article 3.2 of the Radio & Telecommunications Terminal Equipment (R&TTE) directive.
ETSI EN 301 428 V2.1.2 (2017-05)	Satellite Earth Stations and Systems (SES); Harmonised Standard for Very Small Aperture Terminal (VSAT); Transmit-only, transmit/receive or receive-only satellite earth stations operating in the 11/12/14 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU
ETSI EN 301 430 V2.1.1 (2016-05)	Satellite Earth Stations and Systems (SES); Harmonised Standard for Satellite News Gathering Transportable Earth Stations (SNG TES) operating in the 11 GHz to 12 GHz/13 GHz to 14 GHz frequency bands covering the essential requirements of article 3.2 of the Directive 2014/53/EU
ETSI EN 301 443	Satellite Earth Stations and Systems (SES); Harmonized EN for Very Small Aperture Terminal (VSAT); Transmit-only, transmit/receive, or receive-only satellite earth stations operating in the 4GHz and 6 GHz frequency bands covering essential requirements under article 3.2 of the R&TTE Directive.
MIL-STD-188-164A with Change 3	Interoperability of Super High Frequency (SHF) Satellite Communications Terminals for tactical and long-haul communications.
MIL-STD 810F	Material acquisition program planning and engineering direction for considering the influences that environmental stresses have on materiel throughout all phases of its service life.
ANSI/TIA/EIA 568	Commercial Building Telecommunications Cabling Standard
Environmental Standards	
ETS 300 019-1-1	Equipment Engineering (EE): Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-1: Classification of environmental conditions. Storage.
ETS 300 019-1-2	Equipment Engineering (EE): Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-2: Classification of environmental conditions. Transportation.
ETS 300 019-1-4	Equipment Engineering (EE): Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 1-4: Classification of environmental conditions. Stationary use at non-weather protected locations.
ETS 300 019-2-1	Equipment Engineering (EE): Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 2-1: Specification of environmental tests; Storage
ETS 300 019-2-2	Equipment Engineering (EE): Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 2.2: Specification of environmental tests; Transportation
ETS 300 019-2-4	Equipment Engineering (EE): Environmental Conditions and Environmental Tests for Telecommunications Equipment. Part 2-4: Specification of environmental tests; Stationary use at non-weather protected locations

Table 1.1 Satellite Operation Standards (Continued)

EMC/EMI Standards	
99/5/EEC	The Radio and Telecommunications Terminal Equipment Directive (R&TTE)
ETSI EN 301 489-1	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
ETSI EN 301 489-12	Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 12: Specific conditions for Very Small Aperture Terminal, Satellite Interactive Earth Stations operated in the frequency ranges from 4 GHz through 30 GHz in the Fixed Satellite Services (FSS)
EN 55022A	Information Technology Equipment - Radio Disturbance Characteristics - Limits and methods of measurements.
EN 61000-3-2:2014	Electromagnetic compatibility (EMC) - Part 3-2: Limits for harmonic current emissions (equipment input current \leq 16 A per phase)
EN 61000-3-3:2013	Electromagnetic compatibility (EMC) - Part 3-3: Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current \leq 16 A per phase and not subject to conditional connection
EN 61000-4-2:2009	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test
EN 61000-4-3:2006/A2:2010	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4:2012	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test
EN 61000-4-5:2014/A1:2017	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test
EN 61000-4-6:2014/AC:2015	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-11:2004/A1:2017	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests
Safety Standards	
2006/95/EC	The Low Voltage Directive (supersedes 73/23/EEC)
EN 60950-1	Information technology equipment - Safety as applied to mains-powered or battery-powered information technology equipment, including electrical business equipment and associated equipment, with a rated voltage not exceeding 600V.

Warranty Information

Determination of warranty status of equipment shall be in accordance with the following Terrasat Communications, Inc. Warranty Policy.

(A) This warranty is for equipment of Terrasat Communications, Inc. The term “Terrasat” as used throughout this warranty shall mean Terrasat Communications, Inc., if the equipment was manufactured by Terrasat Communications, Inc.

(B) Terrasat warrants that its equipment shall be free from defects in material or workmanship at the time of shipment and that it will conform to applicable specifications.

For all Satcom products, the buyer shall exercise any and all warranty claims within a period of thirty-six (36) months.

(1) The warranty does not apply to any part of a product if it has been altered, repaired, or misused in any way that, in the opinion of Terrasat, affects the reliability of, or detracts from the performance of, any part of the product; or it is damaged as a result of the use of such part in or in connection with equipment not previously approved by Terrasat.

(2) The warranty does not apply to any product or parts thereof if its serial number or the serial number of any of its parts has been altered, defaced, or removed.

(3) The warranty does not cover damages or losses incurred in transport.

(4) The warranty does not cover replacement or repair necessitated by loss or damage resulting from cases beyond the control of Terrasat.

(5) The warranty does not include the furnishing of any labor involved or connected with the removal and/or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for replacement or repair.

(6) In no event shall Terrasat be liable to buyer for any indirect, special, or consequential damages or lost profits arising from the use of the equipment or products, even if Terrasat has been advised of the possibility thereof, or for any inability to use them either separated from or in combination with any other equipment or products.

(C) Terrasat’s warranty, as stated herein, is in lieu of all other warranties, expressed, implied or statutory, including those of merchantability and fitness for a particular purpose, and Terrasat neither assumes nor authorizes any person to assume for it any other obligation or liability to any person in connection with the sale or use of Terrasat’s products. The buyer shall pass on to any purchaser, lessee, or other user of Terrasat’s products, the aforementioned warranty and shall indemnify and hold upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

(D) A fixed charge established for each product will be imposed for all equipment returned for warranty repair and where the cause of failure cannot be identified by Terrasat.

Note: Warranty seals are designed to break upon internal access. Access to the internal electronic components without prior written approval will void the warranty.

For more information about returning a product for repair, see [Repair Policy](#) on page 6-5

FUNCTIONAL DESCRIPTION

The Terrasat RXR Series of Receive Redundant RXR System (Rx 1+1 RXR) is a separate outdoor interface module that can receive power from AC mains and performs all required functions for redundant operation of non-multiband and multiband low-noise block converters (LNBS). No indoor controllers are necessary. Typically, the Rx switch and LNBS are mounted directly to the antenna feed and a separate mounting bracket for the interface module is available.

System Components

This chapter contains detailed information about the various system components. A system diagram is provided in [Figure 2.1](#), focusing in the Rx 1+1 redundant system.

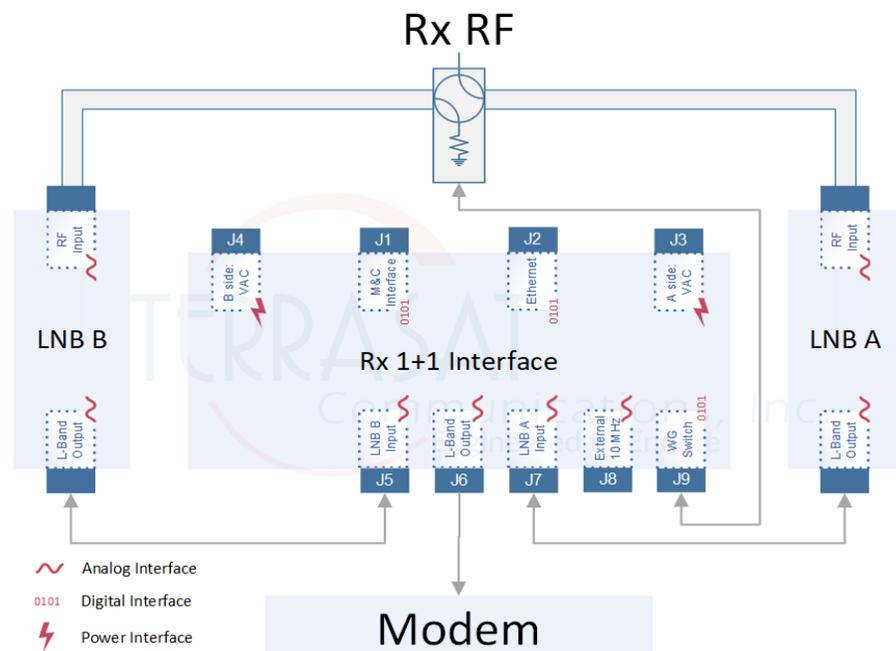


Figure 2.1 Rx 1+1 RXR redundant systems

Low-Noise Block Converter

The Low-Noise Block converter (LNB) houses the Low-Noise amplifier (LNA), the Rx conversion circuitry, and the L-band IF interface. The interface with LNB consists of a coaxial cable that carries the L-Band receive signal, 10 MHz reference signal, DC power, and 22kHz Tone. The LNB waveguide types to the LNB are listed in [Table 2.1](#).

Note: LNBs are not furnished with the Rx 1+1 RXR and need to be ordered separately

Table 2.1 WaveguideTypes

Signal	Waveguide Type	Signal	Waveguide Type
C-band	WR229	Ku-band	WR75
X-band	WR112	Ka-band	WR42

Input to the LNB is typically between -125 dBm to -80 dBm depending on the system design (including such variables as antenna size, satellite operator, number of carriers, etc.). The LNB amplifies the RF input signal and downconverts it to an L-band signal. The local LNB local oscillator is phase locked to the 10 MHz signal that has been multiplexed onto the L-band output connector. Typically, the 10 MHz input level is between 0 dBm to -10 dBm and meets minimum phase noise requirements.

Modern LNBs present multiband operation as a feature. To control which band is operational, both DC voltage and a 22kHz Tone are multiplexed onto the L-band output connector. DC voltage can be tuned to one of four values: 13 V, 15 V, 18 V, and 24 V, while the 22kHz tone can be switched on or off. Throughout operation, current consumption is typically less than 400 mA.

AC Supply

In order to achieve proper power supply redundancy, the Rx 1+1 RXR requires two AC inputs, supplied through connectors J3 and J4. See [Figure 2.2](#) for connector location and description. The J3 connector feeds one AC/DC converter and the J4 connector feeds another AC/DC converter. The A: side power supply is then routed to a DC/DC converter that generates the voltage that supplies the A: side LNB while the B: side power supply is routed to a DC/DC converter that generates the voltage that supplies the B: side LNB. Both power supplies are routed to a DC/DC converter that generates the voltage that supplies all internal circuitry, see the block diagram provided in [Figure 2.3](#).

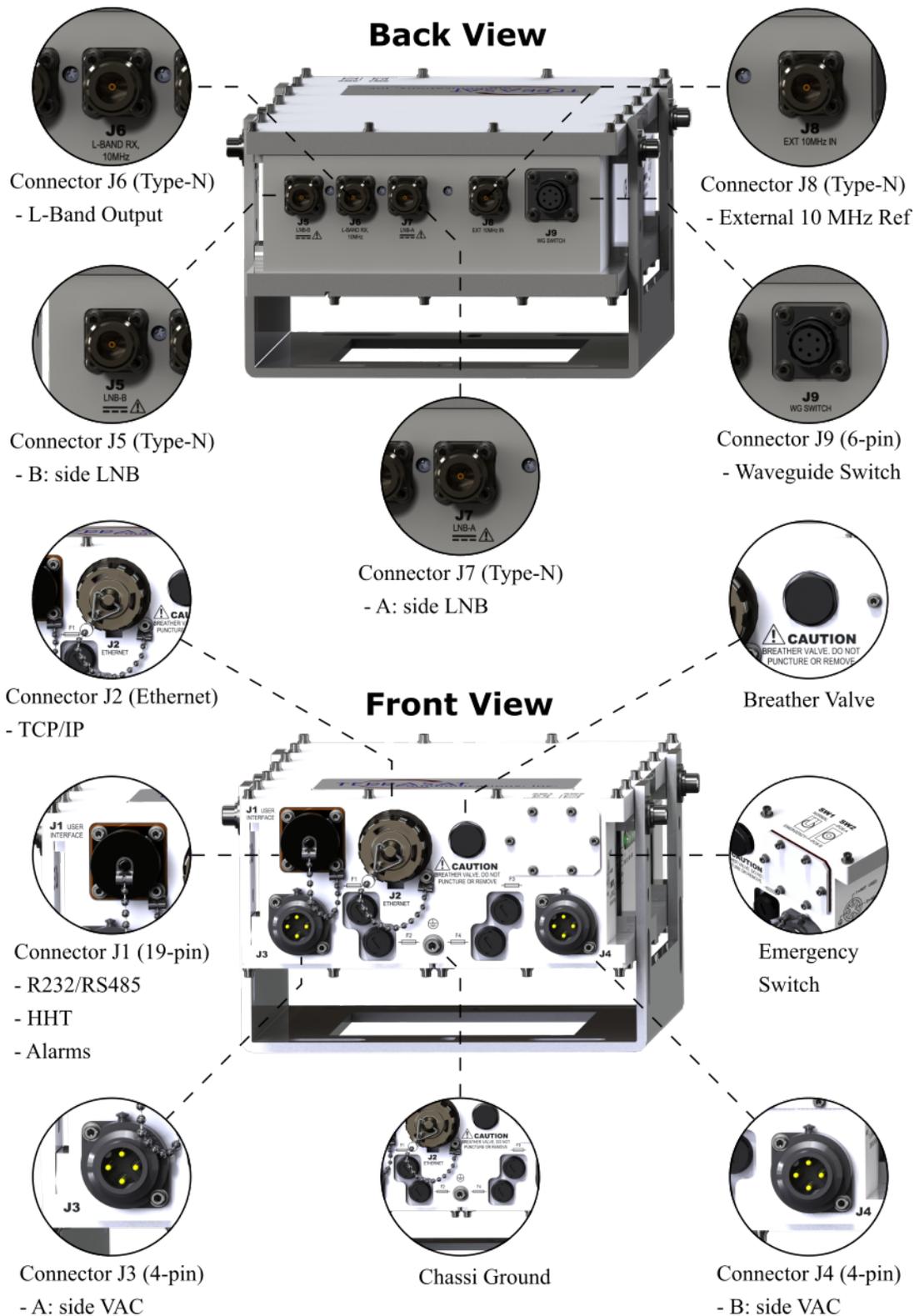


Figure 2.2 Front/Back Panel Connectors

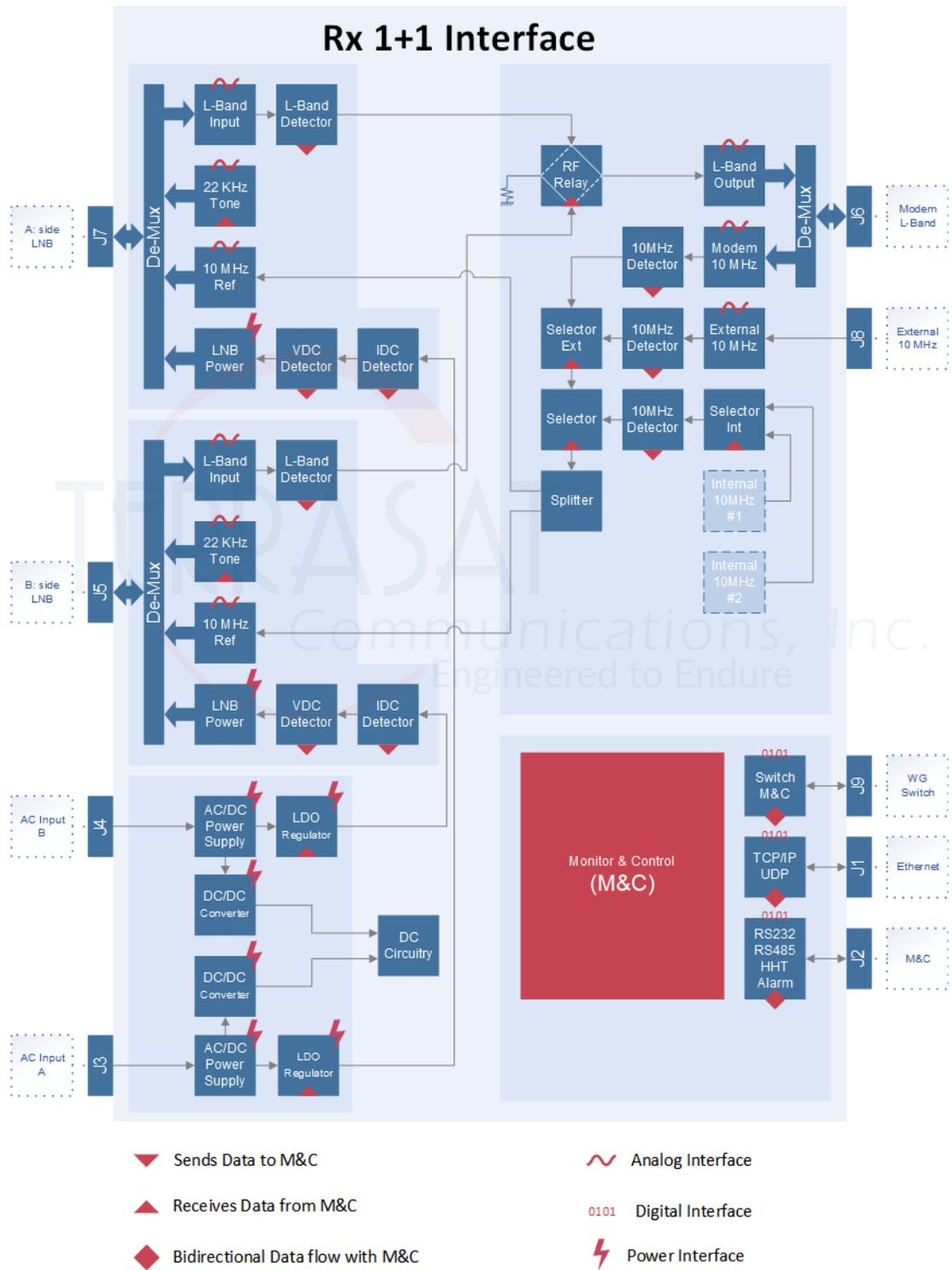


Figure 2.3 Rx 1+1 RXR Block Diagram (Two-Input AC System)

RF Signal Flow

L-band inputs are presented through input connectors J7 (for the A: side LNB) and J5 (for the B: side LNB). Samples of both inputs are detected and sent to the Monitor and Control (M&C) card for monitoring purposes. The online signal is selected through an RF switch relay and routed to connector J6 (L-band Rx output) through the mux/demux circuitry. Connectors J5 and J7 also route signals such as: LNB 22 kHz tone, LNB DC supply voltage and LNB 10 MHz reference.

The 10 MHz reference signal can be selected from up to four different sources: Modem, via connector J6; External Source, via connector J8; Internal Source #1 or Internal Source #2. All four signals are selected via switches and then detected. 10 MHz signal information is then sent to the M&C card for alarm processing and source selection.

The internally generated DC supply, 22 kHz tone, and 10 MHz reference signal are multiplexed to the L-band signal to feed both LNBs through the J7 and J5 connectors. Before multiplexing the DC voltages, the current and voltage that are fed to the LNBs are detected and the information is sent to the M&C card.

The M&C card also controls and monitors both waveguide and relay switches. The connection to the waveguide switch is through the J9 connector.

LED Indicators

The Rx 1+1 interface module has a bank of LEDs that provide quick visual indicators of system status. Indicators include power, Ethernet activity, system status, mode of operation and alarm status. The LEDs are identified in [Figure 5.2](#) on [page 5-3](#).

Emergency Switches

The Rx 1+1 RXR interface module offers two switches that enable you to switch from the A: side system to the B: side system when the M&C card is no longer able to control the switch. Use the SW1 switch to change the mode of operation from normal (controlled by the M&C card) to emergency (manually controlled by the user). Use the SW2 switch to change from the A: side unit to the B: side unit (or vice versa). You must first activate SW1 to be able to see the results of activating SW2.

Note: When in emergency mode, the LED labeled “Normal/Emergency” will turn from green to red. When you return to normal mode, the LED will turn back to green. The LED must be green in order to enable remote control of the waveguide switch. To access the switches, unscrew the small cover on the front panel, as shown in [Figure 2.4](#).

After utilization the user must close back the access panel in order to maintain unit seal.

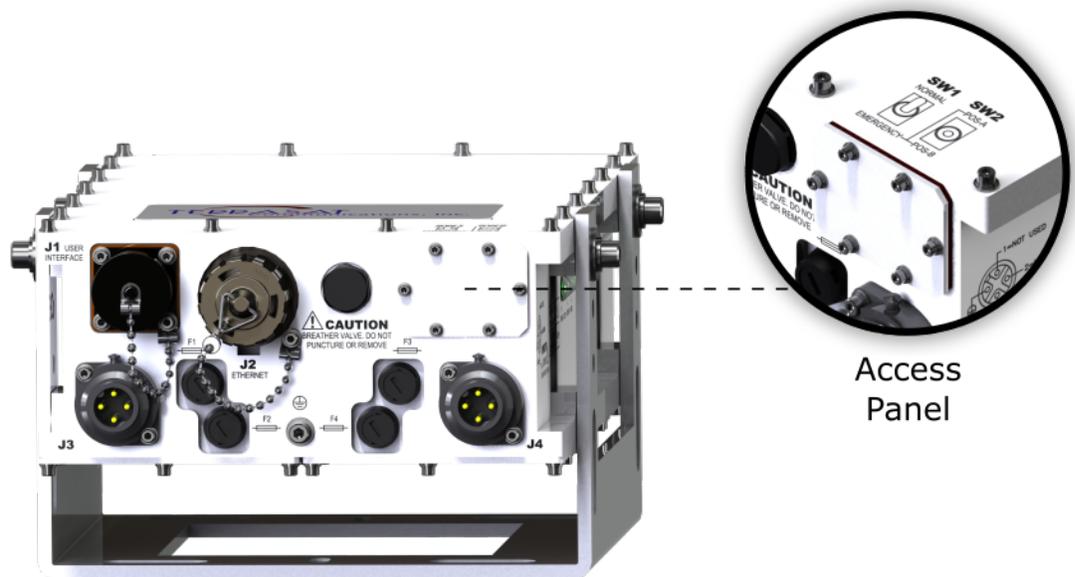


Figure 2.4 Access Panel Location

User Interfaces

The user is able to interface with the Rx 1+1 RXR system by using any of the following methods:

- Embedded Web pages via Web browser
- TCP/IP through a Telnet session
- UDP through SNMPv1 or SNMPv2c
- RS485
- Hand-held terminal
- RS232

All interfaces above are described in more detail in [Chapter 5, Monitor and Control Features](#).

System Features

The Rx 1+1 RXR system monitors and controls several parameters and presents several features that simplify installation and usage, as well as enhance system performance. Some of these key features include:

- **Monitor and Control**
Redundant systems can be monitored and controlled through RS232, RS485, TCP/IP, UDP or an optional Hand-held Terminal. See [Chapter 5, Monitor and Control Features](#), for a full description of these functions.
- **Rx Redundancy**
Both LNBS voltage, current and L-band composite input level are monitored, improving fault detection and reducing overall system downtime.
- **Simple Network Management Protocol (SNMP)**
Integrates unit M&C to existing network management systems.
- **Embedded Web Pages**
Embedded Web Pages provide management for small networks by using a Web browser.
- **Multiband LNB Support**
Both LNB DC supply voltage and 22 kHz tone can be controlled via any of the M&C interfaces, providing full support for multiband LNBS
- **Event History**
A log of events that occur is maintained. This can simplify troubleshooting of the system (especially when an intermittent problem occurs).
- **Redundant 10 MHz Operation**
Support for redundant 10 MHz operation, prioritizing external references over internal. For free running LNBS or externally fed LNBS the 10 MHz alarm will be activated. To facilitate Rx 1+1 monitoring, such alarm can be disabled.

System Configurations

[Figure 2.5](#) represents typical AC-powered system configuration for Two-Input AC-powered units. For most installations, the Rx 1+1 interface is mounted on the boom arm, while the LNBS and waveguide switch are mounted on the antenna feed. In general, the LNBS are located in close proximity (less than 10 ft / 3 m) to the Rx 1+1 interface. However, for installations that require a long cable run between the LNBS and the Rx 1+1 interface, contact Terrasat for additional information.

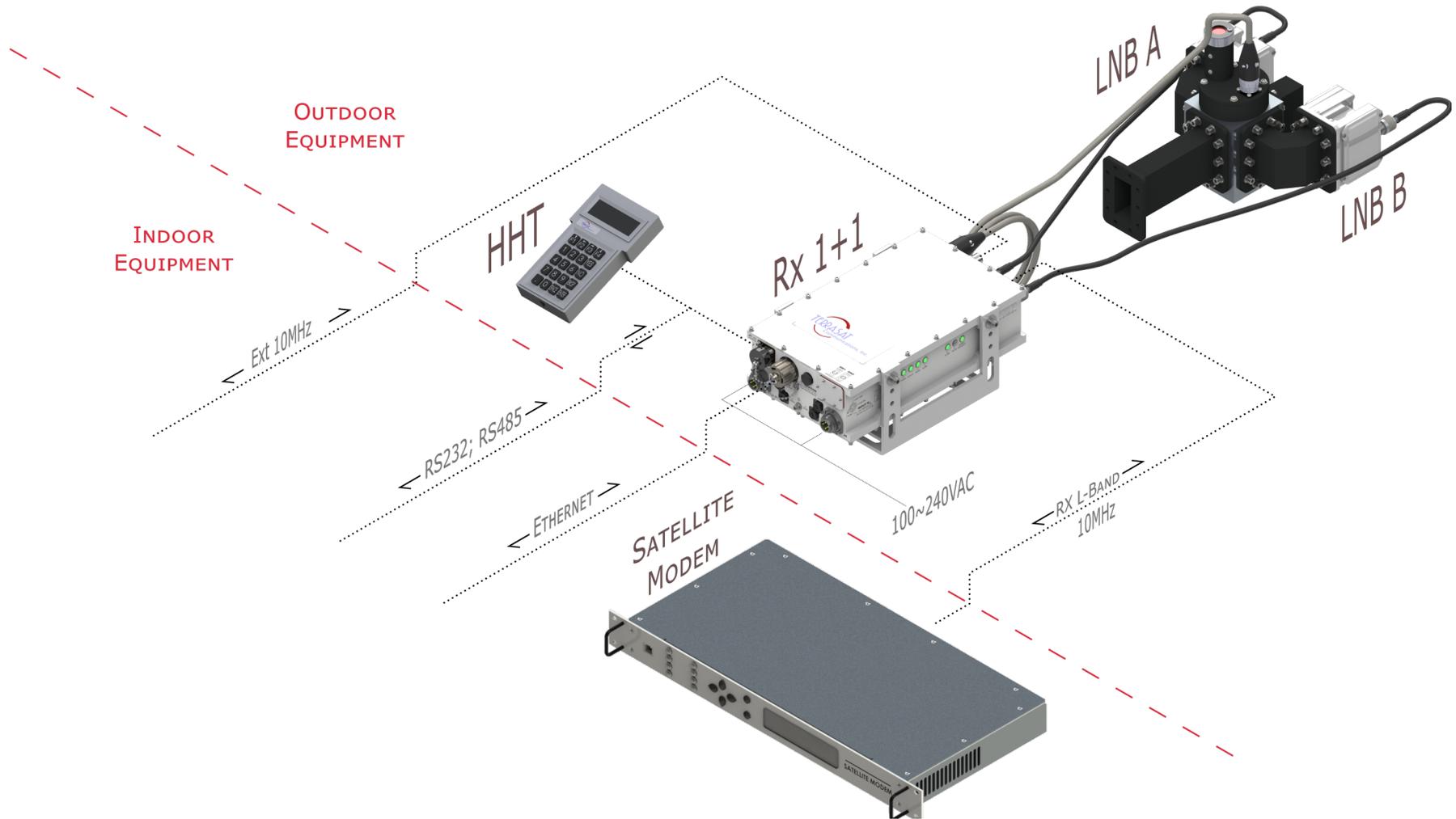


Figure 2.5 Two-Input AC-Powered Rx 1+1 RXR Redundant Systems

Storage Information

The Rx 1+1 RXR Receive Redundant System should be stored at temperatures ranging from -45 °C to +65 °C, and should not be exposed to excessive moisture.

INSTALLATION

This chapter contains the general requirements for installing the Terrasat Receive Redundant RXR System (Rx 1+1 RXR).

General Requirements



WARNING

For protection of personnel and equipment, use care when installing the antenna and whenever working on or around the system.

Follow standard safety precautions with hand or power tools.

Use care when working with high AC voltages and microwave emissions.

Unpacking

Check to make sure that the equipment has not been damaged in shipment. If there is any damage, contact the shipper before proceeding. If you need to declare any equipment as damaged during transit, save the original shipping cartons to ease inspection reporting.

Note: Terrasat recommends retaining and re-using all shipping cartons and foam forms if the equipment will be stored or reshipped. The cartons should be clearly marked to indicate that they contain fragile electronic equipment.

Compare the contents of the shipping container with the packing list to ensure that all items have been received. If any item is missing, contact Terrasat.

Furnished Items

The following list describes items that are furnished with Terrasat Communications, Inc. Rx 1+1 RXR System. Refer to [Figure 3.1](#) for visual representation of such items.

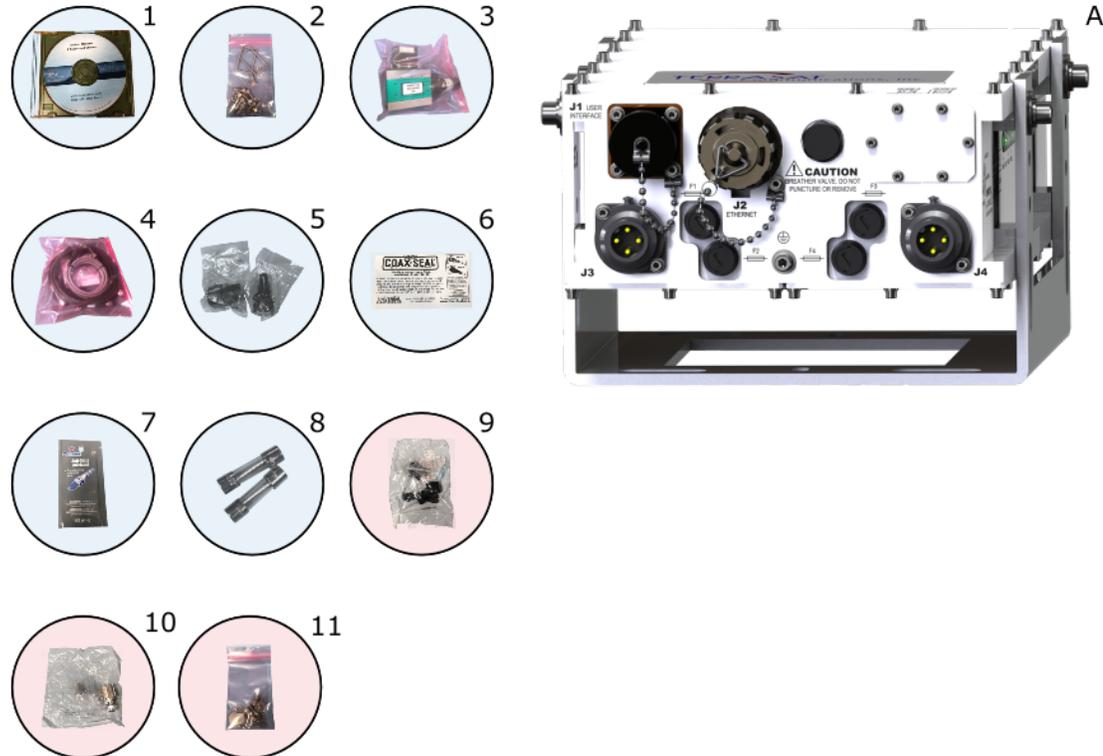


Figure 3.1 Furnished items with Receive Redundant (Rx 1+1 RXR) System

A. An Receive Redundant RXR System (Rx 1+1 RXR)

1. Product documentation in CD-ROM format
2. Waveguide gasket and associated hardware
3. Waveguide switch, termination, and waveguide pieces
4. L-band interface, LNB A/B interfaces and Switch cables
5. AC supply mating connector (for units with AC supply)

[Figure E.4](#) on [page E-5](#) contains information about fabricating your own AC supply cable.

6. 5 g pouch of Permatex anti-seize lubricant

The anti-seize lubricant is a heavy duty high-temperature lubricant that prevents galling (friction between metal parts that can weld the nut and bolt together and prevent removal), seizing, and corrosion of fasteners during assembly and aids the disassembly of parts exposed to heat or corrosive environments.

7. Sealing tape for Type-N connector
8. Fuses

The fuses are intended for 220 VAC operation and are only supplied with units that operate over the range of 100 VAC to 240 VAC.

9. [Optional] 19-pin monitor and control (M&C) mating connector
10. [Optional] IP67 industrial RJ45 mating connector
11. Mounting brackets and bolts. See [Figure 3.4](#) on [page 3-8](#).

Accessories

The following are optional accessories:

- A Hand-Held terminal and cable
- A waveguide Tx reject filter
- A four-way combiner/divider module
- A TCP/IP test cable
- IFL cables (for example, LMR-400)
- Installation kits

Note: Exact contents of the shipping carton vary according to the model and type of Rx 1+1.

Installing the Rx 1+1 RXR System

Consider the following when preparing to install the Rx 1+1 RXR System.

Tools

Have available a standard electrician’s toolkit and any tools listed in the antenna manufacturer’s installation instructions.

Test Equipment

Terrasat recommends the equipment or its equivalent listed in [Table 3.1](#) for installation and system alignment.

Table 3.1 Recommended Test Equipment

Equipment	Type
Digital Voltmeter	Fluke 8050
Assortment of cables, connectors and adapters (calibrated up to 15 GHz)	

Site Considerations

The Rx 1+1 System is designed to be mounted on or near the antenna. Locate and install the antenna according to instructions supplied by the antenna manufacturer. Choose an area that is free of interference from motors or other electrical equipment and that has a clear line of sight from the antenna to the satellite.

Use size 3/0 or 4/0 AWG (American Wire Gauge) stranded copper wire to ground the system to the antenna frame and to the lightning protection ground rod.

Mounting Considerations

Mounting brackets are available to aid mounting on most antennas. The ODU must be mounted such that:

- The Rx 1+1 RXR System has sufficient support to minimize the effects of antenna sway in strong winds.

Throughout installation and during any polarization, azimuth or elevation adjustment, ensure that cables and waveguide are not crimped or pinched. Ensure that there is adequate slack in the cable.

Power Requirements



WARNING

Installation and connection to the line power supply must be made in compliance with applicable wiring codes and regulations.

AC-powered systems are furnished with a detachable AC power connector that is used to connect and disconnect power. When connecting the AC connector to the AC power source, the wiring must include a 15 A or 20 A circuit breaker. A disconnect device (such as a circuit breaker or mains supply plug on the power supply cord) that is readily accessible must also be provided. Any outdoor AC connections should be made using suitable connectors or boxes with an IEC protection class of at least IP65.



WARNING

Ensure AC power is off when connecting or disconnecting the power supply unit's power cord. To turn off AC power to the unit, use the installed circuit breaker or a similar disconnecting device.

If a circuit breaker is not easily accessible as a disconnecting device, the input connector will be the disconnecting device. In this case, the socket-outlet must be installed near the equipment and must be easily accessible for pluggable equipment.

All AC-powered units are furnished with mating connectors for the AC mains power cable. To remain compliant with European Low Voltage Directive (EN 60950-1), use a power cable that meets IEC 60227 requirements such as HAR Cable Designation H03VV-F or H03VVH2-F and/or others with water resistance for outdoor applications. Power cable plugs must also comply with all applicable local and federal standards and regulations.

Note: AC transients and surges can cause data transmission errors and loss of synchronization in the modem and/or the ODU. Take proper precautions to ensure uninterrupted service.

Grounding

Terrasat recommends the following grounding and lightning protection:

- Cable Shielding
Shield currents can be eliminated with proper techniques. A grounding strap at the end of the coaxial and data cables should be connected to the ground lug at the antenna base with #4 gauge copper wire. This provides a path of least resistance prior to entering the equipment.
- AC
The best way to protect the equipment is to have two protectors. The first is the power mains protector that is mounted directly across the mains in the breaker box. The second should be mounted or grounded directly at the base or hub of the antenna or at the 19-in. rack.
- Data and Control Lines
The I/O lines can deliver surge current to the equipment and should also be protected.
- Electrical Grounding
Grounding of the Rx 1+1 RXR interface module is recommended to prevent possible damage from lightning or other induced electrical surges. Terrasat recommends using 3/0 or 4/0 AWG stranded copper wire for bonding the Rx 1+1 interface module to the earth ground (or grounding rod), using the shortest route.

Antenna Recommendations

Most antenna masts are encased in concrete. Typically, the mast pipe is submerged in a 4 ft to 5 ft (1.22 m to 1.53 m) deep augered hole. This provides a good Ufer ground. A Ufer ground encases grounding connectors in concrete. Concrete absorbs moisture quickly and loses that moisture slowly—as much 15 to 30 days after rain or snow melt). The mineral properties of concrete and their natural pH mean that concrete has a supply of ions to conduct current. The soil around concrete becomes “doped” by the concrete and, as a result, the pH of the soil rises. The moisture in the concrete in combination with the “doped” soil make a good connector of electrical energy. The concrete’s large volume and area of contact with the surrounding soil allow a good transfer to the ground. In the concrete base, a Ufer ground can be established by running #4 gauge solid wire or rebar and connecting to the base of the pedestal with pigtails.

The Ufer ground is only one step in proper grounding. The Ufer ground should be augmented with coupled pairs of 10 ft (3.05 m) ground rods placed 20 ft (6.1 m) into the ground, spaced 20 ft (6.1 m) apart. The first rod should be placed close to the antenna. The second rod should be placed towards the equipment enclosure. A #2 gauge wire should connect the rods and antenna mount. A ground rod should be placed at the equipment enclosure, as well. If it is virtually impossible to install the ground rods, then radials are needed. This can be accomplished by laying 10 or more lengths of 1½-in. (3.81 cm) copper strap at least 50 ft (15.24 m) long in a radial fashion around the antenna base. The straps should be buried, if possible. The hub must be interconnected to the utility ground.

The ground configuration can vary from one location to another. It is best to measure soil conductivity and design a 5 Ω or less ground system. To protect the system from a direct strike, a lightning rod placed 2 ft (61 cm) higher than the highest point of the dish should be interconnected to the Ufer ground with #2 gauge copper wire.

Antenna Mounting

The Rx 1+1 RXR system has a variety of mounting options: on the boom arm, the antenna back structure, or in the hub depending on the antenna type.

However, the LNBS and waveguide switch should be always be mounted at the focal point. See [Figure 3.2](#) as reference of actual installations.



Figure 3.2 Rx 1+1 System Field Installation

The Receive Redundant (Rx 1+1 RXR) System has mounting holes on both sides of the unit that can be used to attach it to the antenna. For the location of these mounting holes, see [Figure 3.3](#).

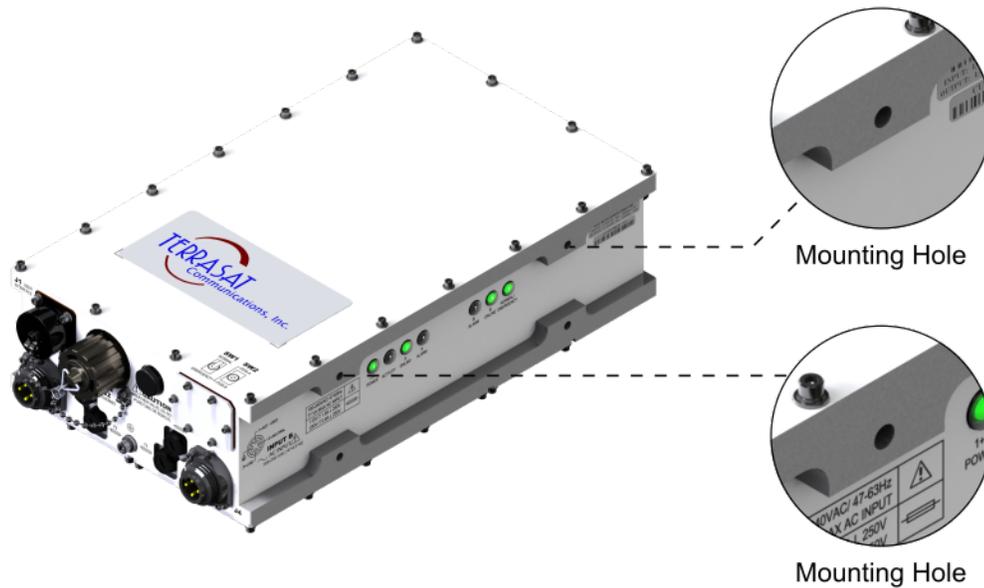


Figure 3.3 Location of Mounting Holes

Mounting brackets are available to aid in attachment to antennas. The mounting slots identified in [Figure 3.4](#) give you additional flexibility when attaching the Rx 1+1 RXR system to the antenna.

Note: Ensure that the threads of the bolts used for mounting the Rx 1+1 system has been dipped in the included Permatex anti-seize lubricant. This prevents galling, seizing, and corrosion of fasteners during assembly and will aid in future disassembly. For more information about applying the Permatex lubricant, see [page 3-14](#).

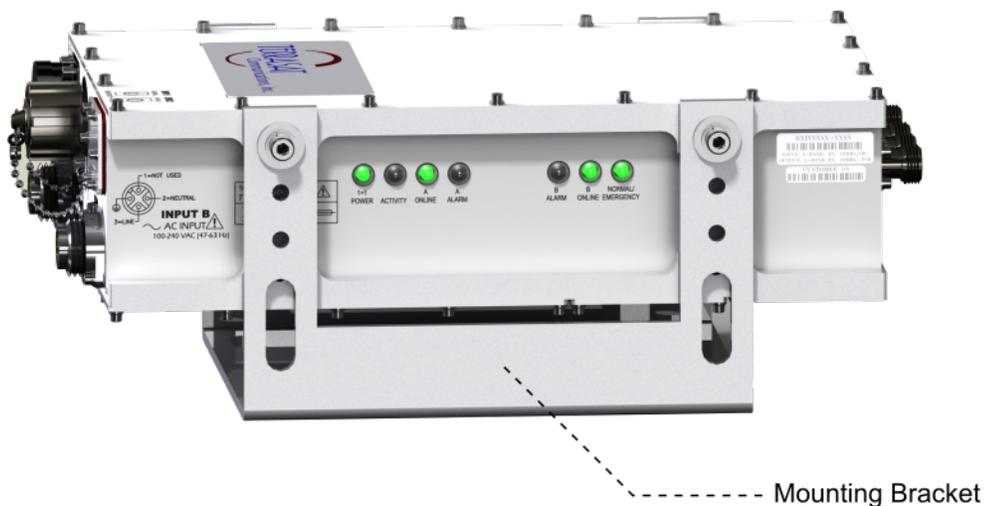


Figure 3.4 Location of Adjustment Slots on Optional Mounting Bracket

System Cabling Requirements

Cables and Connectors

Interface connectors for the Receive Redundant (Rx 1+1 RXR) System and their mates are listed in [Table 3.2](#). For additional reference see [Figure E.9](#) on [page E-10](#). Additional mating connectors and/or cables can be ordered from Terrasat at optional items.

Table 3.2 Interface Connector Schedule

Reference Designator	Function	Interface Connector	Interface Connector Mate
J1	M&C Interface	AMPHENOL CIRCULAR, BOX MOUNTING SOCKET, 19S (MS3122E14-19S)	AMPHENOL CIRCULAR, STRAIGHT PLUG, 19P (MS3116F14-19P)
J2 ¹	Ethernet	CONN, RJ45, RCPT, SHIELD WPCB JACK (CONEC TECH, 17-103794)	CONN, RJ45, PLUG KIT SHIELDED CAST (CONEC TECH, 17-101794)
J3, J4	AC Power	POWER CONNECTOR, MALE SOCKET, 3P+PE (AMPHENOL C016 20C003 100 12)	POWER CONNECTOR, FEMALE, PLUG, 3P+PE (AMPHENOL C016 20D003 110 12)
J5	LNB-B	TYPE-N SOCKET	TYPE-N PLUG
J6	Rx Output	TYPE-N SOCKET	TYPE-N PLUG
J7	LNB-A	TYPE-N SOCKET	TYPE-N PLUG
J8	External 10MHz Ref	TYPE-N SOCKET	TYPE-N PLUG
J9	WG Switch	AMPHENOL CYLINDRICAL, BOX MOUNTING SOCKET, 6S (MS3122E10-6S)	AMPHENOL CYLINDRICAL, STRAIGHT PLUG, 6P (MS3116F10-6P)

1. Ethernet port does **not** support PoE.

J1 – M&C Interface The M&C interface is a 19-pin circular socket connector used to enable remote monitoring and control of Rx 1+1 operating parameters. Pin assignments are shown in [Table 3.3](#). If the M&C port of the Rx 1+1 is going to be used, the cable should be a shielded multi-conductor cable. For more information about fabricating your own cable, see the IP cable drawing in [Appendix E](#). An optional pre-assembled IP test cable is available from Terrasat.

Table 3.3 Pin Assignments for M&C Interface Connector J1

Pin	Function	Pin	Function
A	RS485(+)	L	A: side LNB Alarm Output NO
B	RS485(-)	M	A: side LNB Alarm Output Common
C	Hand-Held Terminal Power (+)	N	A: side LNB Alarm Output NC
D	RS232 RXD	P	B: side LNB Alarm Output NO
E	RS232 TXD	R	B: side LNB Alarm Output Common
F	Hand-Held Terminal Power (-)	S	B: side LNB Alarm Output NC
G	Not Used	T	Not Used
H	Not Used	U	Not Used
J	Not Used	V	Not Used
K	Not Used		

J2 – Industrial Ethernet Connector The industrial Ethernet connector is an IP67-rated RJ45 Cat. 5e interface with a locking protective cover. The connector is configured as described in [Table 3.4](#).

Table 3.4 Pin Assignments for Ethernet Connector J2

Pin	Function	Pin	Function
1	TCP/IP Tx(+)	5	Not Used
2	TCP/IP Tx(-)	6	TCP/IP Rx(-)
3	TCP/IP Rx(+)	7	Not Used
4	Not Used	8	Not Used



WARNING

The Rx 1+1 Ethernet circuit does not support Power Over Ethernet (PoE) functionality. Routing PoE connection to port J4 might irreversibly damage Rx 1+1 unit.

J3 & J4 – AC Power AC Power is supplied to the through a 3-pin plus ground connector. The connector is configured as described in [Table 3.5](#).

Table 3.5 Pin Assignments for AC Power Connectors J3 & J4

Pin	Function	Pin	Function
1	N/C	3	Line
2	Neutral	4	Ground



CAUTION

For some countries 220V_{rms} is provided via Line-Line bus. If this is your setup, connect one of the Line leads to the Line Pin of the Rx 1+1 connector, and the other Line lead to the Neutral Pin of the connector.

In the case that 110V_{rms} is needed, or 220V_{rms} is provided via Line-Neutral bus connect power leads to their matching connector pins.

J5 & J7 – LNB Both LNB connectors J5 and J7 are Type-N socket connectors used to connect the IF at L-band from the LNBs to the Rx 1+1 interface module. 50Ω cables are supplied with the Rx 1+1 system. The Rx 1+1 interface module uses such connectors to supply the LNBs with the 10 MHz reference, VDC and 22 kHz tone.

J6 – RF Output The Rx output connector is an Type-N socket connector used to connect the IF at L-band to the modem. 50Ω cables should be used to connect to J6. The modem supplies a 10 MHz reference signal to the Rx 1+1 through this connector.

J8 – External 10 MHz Reference The External 10 MHz Reference connector is an Type-N socket connector that provides a 3rd source of 10 MHz reference for improved redundancy and system stability. 50Ω cables should be used to connect to J8.

J9 – WG Switch Control This connectors sends commands to physically move the waveguide switch from the A: side to the B side (and vice versa). The indicator then returns a response to the interface module to indicate the position of the switch. See [Table 3.6](#) for description of how to connector is configured.

Table 3.6 Pin Assignments for WG Switch Control Connector J9

Pin	Function	Pin	Function
A	Switch Position A Command	D	Switch Indicator A
B	Switch Position Common	E	Switch Indicator Common
C	Switch Position B Command	F	Switch Indicator B

Cable and Waveguide Connections



WARNING

Ensure that all power is disconnected prior to making any connections.

Waveguide Connections

When installing the cable and waveguide assemblies, ensure that all connections are weather tight. If an Tx reject filter is being used, attach it to the input waveguide switch. Use proper gasketing methods to prevent the entry of water.

The Rx 1+1 system uses a four-port rectangular waveguide switch. In the Rx path, the received RF signal is directed from the antenna port to one of the two LNBS. Any RF from the offline LNB is directed to a termination. The switch can either be controlled and tested by using the [Receive Configuration Tab](#) on [page C-8](#) of the Embedded Web Pages or the switch can be controlled manually via SW1 and SW2.

When installing the waveguide switch, ensure that the switch positions are set correctly. There are two possible switch combinations: A: side (1:2 and 3:4) or B: side (1:4 and 3:2). This is illustrated in [Figure E.7](#) on [page E-8](#).

Terrasat waveguide switch indicator are single-pole double-throw (SPDT) switches; that is, switches with one input and two outputs. The switch path is shown in [Figure 3.5](#).

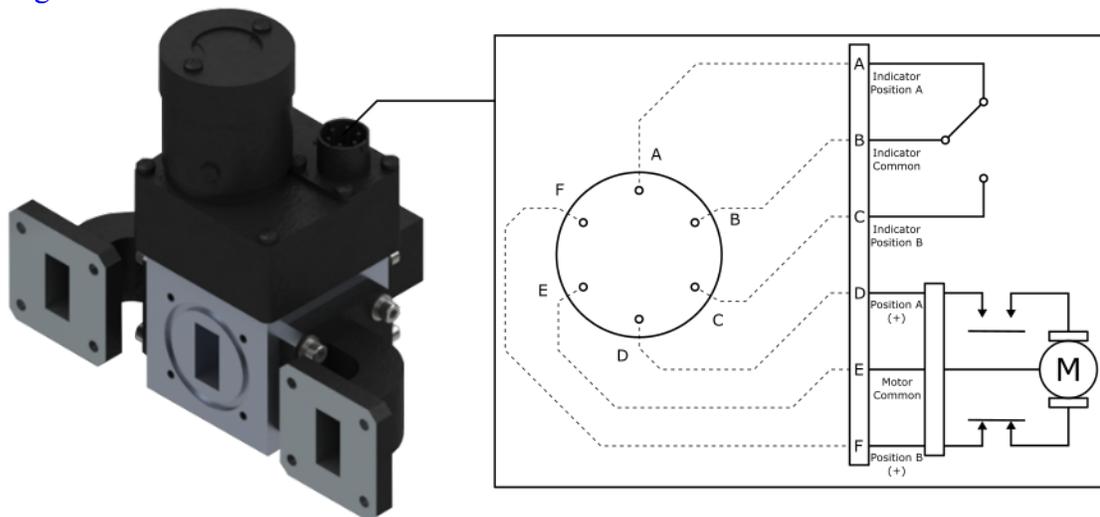


Figure 3.5 Waveguide Switch Latching

Note: During installation, be sure to remove the sticker shown in [Figure 3.6](#) that covers the waveguide flange. The sticker itself does not create a pressure window and will allow moisture to enter the waveguide. Also be sure to install the waveguide gasket into the channel identified in [Figure 3.6](#) to ensure a good seal between surfaces. Do not re-use old gaskets.



Figure 3.6 Waveguide Label and Channel for Gasket

Water-Resistant Wrap

Terrasat recommends applying water-resistant wrap (such as mastic tape) to all outdoor connectors to prevent the entry of water and subsequent water damage. Mastic tapes are designed to flow and self-heal if cut or punctured. When applied spirally with the proper tension, mastic tapes form a tight continuous coating that permits little or no moisture absorption or penetration. Terrasat provides water-resistant sealing tape for Type-F and Type-N connectors.

Apply the mastic tape, as follows:

1. Ensure that all connectors are firmly tightened, dry, and free from all grease, dust, and dirt.
2. Cut the mastic tape to the desired size. The tape should be long enough to cover the connector completely.
3. Center the tape on the connector to be sealed and wrap the tape in a tight spiral around the connector using a 50% overlap. Squeeze the tape tightly and ensure that both ends of the tape have formed around the connector and the cable with any gaps.

Apply the tape to all connectors that may be exposed to moisture.

Applying the Anti-Seize Lubricant

Terrasat recommends applying anti-seize lubricant to screws and bolts that could be exposed to weathering or corrosive environments. The lubricant prevents galling, seizing, and corrosion during assembly and aids in future disassembly. A 5 g pouch of Permatex anti-seize lubricant is included with the installation kit for this purpose.

To apply the anti-seize lubricant,

1. Wear appropriate person protection equipment to avoid contact with skin and eyes. This includes safety glasses, neoprene or nitrile gloves, and clothing sufficient to limit skin exposure.
2. Ensure that mating surfaces (screw holes) are clean, dry and free of dirt, debris, or loose surface rust.
3. Use a brush or lint-free cloth to apply a thin coat of anti-seize to the screws and bolts that require protection, as shown in [Figure 3.7](#). The anti-seize should be applied right down to the base of the threads.



Figure 3.7 Applying the Anti-Seize Lubricant

4. Spread the lubricant to a thin film without any lumps.
5. Reassemble the parts using normal torque values.
6. Wipe off any excess material with a disposable towel.

Final Checks

To ensure reliable operation, inspect the system for crimped or pinched cabling. Make sure that all connections are secure and sealed. Once the system has been aligned and is operating satisfactorily, the Rx 1+1 system will require infrequent maintenance.

OPERATIONS

This chapter describes general operation of the Receive Redundant (Rx 1+1) System.

Introduction

After the Rx 1+1 system has been mounted and connections verified, the Rx 1+1 system should be set for initial readings and the antenna must be aimed towards the appropriate satellite. Follow the antenna manufacturer's instructions, using the coordinates (azimuth, elevation, and polarity) provided by the satellite operator.

Start-up Checklist

The Rx 1+1 leaves the factory preconfigured for operation; however, the operator should fine-tune its settings for ones particular needs. Prior to start up, verify the following:

- Cable connections
Ensure that all of the external cables between the Rx 1+1 and other equipment are seated correctly and that there are no breaks or cracks, no sharp bends, pinch points nor flattened sections in the cables.
- Power
Ensure that the Rx 1+1 is receiving power from AC mains.
- 10 MHz reference signal
If your system relies on LNBS that do not need 10 MHz multiplexed via L-Band go to the next section.

If your system requires 10 MHz for operation, such signal can be provided either internally or via external connectors. To check whether your system is equipped with internal 10 MHz sources, see [Appendix A, Part Numbering Schema](#).

Alternatively, check if 10 MHz signal is provided via modem connection, or through the external 10 MHz reference connector J9.

Note: External 10 MHz sources are automatically prioritized by the systems M&C Card

Initial Readings

In order for the Rx 1+1 system to operate properly in automatic mode, it must be free of alarms. Use system initial reading to determine whether alarm thresholds should be modified or not.

1. Establish a connection with the Rx 1+1 system by using any of the available interfaces, described in [Chapter 5, Monitor and Control Features](#). In this chapter all M&C related operations are described using the Embedded Web Pages interface.
2. Navigate to the Sensor Tab, as shown in [page C-7](#).
3. Record the input power, supply voltage, and current consumption levels for both the A: side and B: side LNBS. Ensure such parameters are recorded with every possible LNB Bias Voltage and 22kHz tone configuration for better baseline determination. Because every band, system, and satellite is different, make a note of the smallest receive level measured from the LNBS when either is directly connected to the waveguide termination.

You will use these initial readings to determine input low threshold levels for your specific setup.

4. Select Voltage and Current given by the LNB manufacturer according to your operation schedule.
5. Navigate to the Alarm Tab, as shown on [Alarm Status Tab](#) on [page C-5](#).

If there are no alarms, skip to [Chapter 5, Monitor and Control Features](#).

If an alarm has occurred, record the alarm name and continue with the next section.

Configuring Alarm Thresholds

Alarms occur whenever a threshold level (high or low) has been exceeded. You can configure these threshold levels as well as the type of alarm (major, minor, or disabled) that is caused.

LNB Input Low Threshold

The Rx 1+1 interface monitors the input level (coming from the LNB output) to verify whether each LNB has proper gain. When the LNBS have proper gain, the interface module for the unit that is operating in Standby mode will detect the composite level at the input at the interface. This composite level is the noise at the input of that LNB which has been degraded, amplified, and converted by the LNB and integrated over the bandwidth of the LNB response.

If one stage of the internal low-noise amplifier (LNA) fails, you would expect to see a drop in the composite level.

To prevent an Rx input level low threshold alarm,

1. Navigate to the [Redundancy Configuration Tab](#) on [page C-17](#) and ensure that LNB A is selected as online.
2. Navigate to the [Rx Configuration Tab](#) on [page C-8](#) and record LNB Voltage and LNB Tone configurations.
3. Record the composite input levels on the [Sensor Tab](#) on [page C-7](#) of both LNBS.
4. If your system does not make usage of multiband LNBS jump to step 6. Otherwise, go to step 5.
5. Navigate to the [Rx Configuration Tab](#) on [page C-8](#) and change LNB Voltage and LNB Tone configurations. Repeat steps 2 through 5 until all possible Voltage and Tone configurations for your particular LNB unit are recorded.
6. Set the low threshold level to be lower than the composite level (for example, 10 dB lower).

When the Rx 1+1 system is installed, the online LNB is expected to measure a level higher than the unit operating in standby mode because it measures the composite noise plus all of the incoming carriers from the satellite. If your Rx Input level is lower than the Input Low Threshold, you might have lost a amplification stage of the LNB. or the cable is damaged.

LNB Voltage High/Low Threshold

If you are experiencing a Supply Voltage related alarm,

1. Check the levels on the [Sensor Tab](#) on [page C-7](#)
2. Ensure that the voltage level supplied to the LNB is compatible with its operation, specially in multiband LNB operation.
3. Compare the levels with the thresholds set by using the [Receive Configuration Tab](#) on [page C-8](#). If your supply levels indicate a lack of supply voltage,
 - Check to ensure that the unit is being supplied power via connectors J3 and J4
 - There could be a problem with the unit itself

In this case, contact Technical Support

LNB Current High/Low Threshold

If you are experiencing a Current Consumption related alarm,

1. Check the levels on the [Sensor Tab](#) on [page C-7](#)

2. Compare the levels with the thresholds set by using the [Receive Configuration Tab](#) on [page C-8](#)
3. Verify that the levels are consistent with specifications for the LNB.

Note: Multiband LNBs can present different current levels depending on which LNB Voltage / LNB Tone combination is used.

If levels are not consistent, you might have a problem with your LNB. Contact the LNB manufacturer for support.

Note: Remember that the Low-Noise Block converters (LNBs) consume in average 224 mA. Terrasat recommends that you set the higher threshold level to 10% higher than you current consumption levels and the lower threshold level to 10% lower.

10 MHz Low Alarm

The 10 MHz Low alarm occurs when the level of any of the 10 MHz reference sources is either low or not present. If the LNB that you are using has an internal 10 MHz signal, the modem or the unit will not supply one and you will need to disable the 10 MHz low alarm.

To disable a 10 MHz low alarm,

- Use one of these monitor and control (M&C) interfaces:
 - Web Page: Navigate to the [Alarm Configuration Tab](#) on [page C-14](#) and set the 10 MHz alarm setting to “Disable.”
 - Telnet: After initiating a Telnet session, type the command CTD=0 and press Enter.

Note: The Rx 1+1 RXR system is able to operate with redundant 10 MHz sources. In this case, external sources (any source via connector J8, modem multiplexed via connector J6) will be prioritized over internal sources (Internal #1, Internal #2) in this order.

Note: If internal 10 MHz source is in use, it can be further trimmed for enhanced system performance. A spectrum analyzer can be connected to connector J6 via a DC Block and trimming can be done via [Receive Configuration Tab](#) on [page C-8](#).

System Alignment

Ensure that the desired transponder is in operation.



WARNING

Ensure that all power is disconnected prior to making any connections.

To find the satellite and peak the receive signal,

1. Apply power to the LNB
2. Point the antenna at an empty sky in order to determine a noise floor reference for your equipment
3. Sweep the antenna as close to the satellite azimuth and elevation as possible

Note: This must be done very slowly in order to locate the desired satellite.

4. Begin scanning in 1° increments from left to right and from up to down until you maximize the receive level
5. Simultaneously monitor the receive signal level at the modem.

Wideband signal such as video carriers are easiest to find and should be used whenever possible. Look for a satellite beacon frequency (a stable signal used for tracking purposes).

6. Tune the antenna and adjust its polarization according to the antenna manufacturer's instructions until the desired satellite is located and the receive signal level is maximized.

MONITOR AND CONTROL FEATURES

This chapter describes the various monitor and control (M&C) features and functions that the Receive Redundant (Rx 1+1) System offers.

Introduction

You must first establish a communication link with the Rx 1+1 system to be able access any of the M&C interfaces.

M&C Interfaces

The Receive Redundant (Rx 1+1) System offers the following M&C interfaces:

- RS232
- Hand-Held Terminal (HHT)
- Multifunction LED
- RS485
- Ethernet
- Embedded Web Pages

RS232

No additional configuration of the Rx 1+1 is required for proper RS232 operation. The RS232 port uses ASCII protocol at a fixed baud rate of 9600, 8 stop bits, no parity, no flow control, and one stop bit for communication. To initiate an RS232 session,

1. Connect a 19-pin to DB9F cable between the computer and the Rx 1+1 system. [Figure E.1](#) on [page E-2](#) contains a drawing for fabricating a cable.
2. Activate a terminal emulation program such as PuTTY. See [Appendix F, Using PuTTY](#)

3. Configure Serial RS232 Session with matching baud rate, stop bits, parity, flow control and stop bit, as given above and connect to the Rx 1+1 unit.
4. Once connected, press **Enter**. If the connection process was successful a `RX1+1>` prompt should appear.
5. At this prompt type `CPE=<password>`. The default password from factory is 1234. This is the only configurable password in the system and it can be configured to assume values from 1 to 65535. Once configured, the user should use it to perform login to the unit.

At this point, one may enter commands from [Appendix D, ASCII Command/Response Structure](#).

Note: The RS232 port is shared with the Hand-Held Terminal.

Hand-Held Terminal

The Hand-Held Terminal (HHT) shown in [Figure 5.1](#) is an optional item that can be used to access the Rx 1+1 unit via the J1 connector for local monitor and control. No additional configuration of the Rx 1+1 system is necessary.

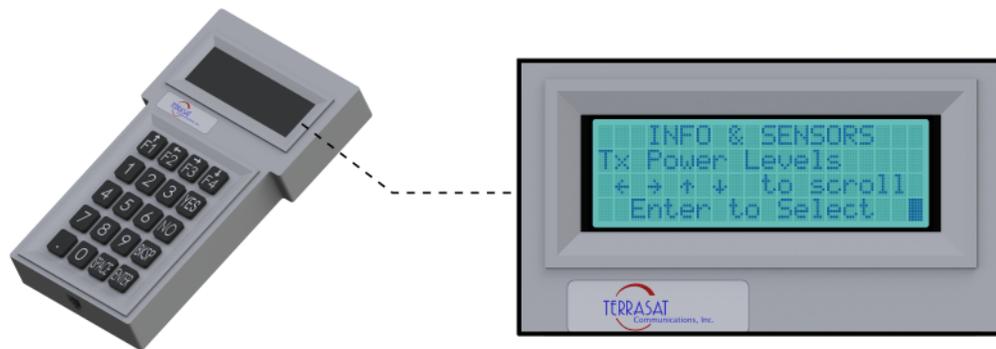


Figure 5.1 Hand-Held Terminal

To activate the HHT,

1. Connect the supplied cable to the J1 connector on the Rx 1+1 and plug the RJ-11 connector into the HHT
2. When a flashing cursor is seen in the upper left of the HHT screen, press the decimal key four times (that is “. . . .”)
3. Type the password.

The default password is 1234. If you have changed the password, type that value instead.

The HHT is now ready to accept commands.

Additional information about the HHT and it’s operation are further explained in [Appendix B, Hand-Held Terminal Menu Tree](#).

Multifunction LED

The Rx 1+1 system is equipped with seven LED (as seen in [Figure 5.2](#)), each providing visual status indication of the following parameters,



Figure 5.2 Side Panel of the Rx 1+1 system

- **1+1 Power** – Indicates whether power is being supplied to the unit through any of the methods available to the unit
- **Activity** – Indicates whether there is any Ethernet activity
- **A Online** – Indicates that A: side unit is receiving the signal from the antenna
- **A Alarm** – Indicates the A: side unit status
 - Green Light: Unit is operating within specification
 - Red Light: Major Alarm has occurred
- **B Alarm** – Indicates the B: side unit status
 - Green Light: Unit is operating within specification
 - Red Light: Major Alarm has occurred
- **B Online** – Indicates that B: side unit is receiving the signal from the antenna
- **Normal/Emergency** – Indicates the operation of the waveguide switch
 - Green Light: M&C Card has control over the waveguide switch
 - Red Light: Hardware override of the waveguide switch is active

Certain alarms are configurable, meaning that you define them as major or minor when thresholds you set are exceeded. Major alarms will cause switching between the LNBS. Alarms shown in [Table 5.1](#) are the factory default configuration. Thresholds for alarms that are user configurable can be set by any of the M&C interfaces.

Table 5.1 Default Alarm Configuration

	User Configurable	Alarm State		
		Major	Minor	None
Rx Alarms		Solid RED	Flashing Red	Log Only
A: Rx Input Level Low	Yes	X		
B: Rx Input Level Low	Yes	X		
A: Rx Simulated	No	X		
B: Rx Simulated	No	X		
10 MHz Reference Fault	Yes		X	
A: VDC Low Level	Yes		X	
B: VDC Low Level	Yes		X	
A: VDC High Level	Yes		X	
B: VDC High Level	Yes		X	
Switch Fault	No	X		X
A: Current Low Level	Yes	X		
B: Current Low Level	Yes	X		
A: Current High Level	Yes	X		
B: Current High Level	Yes	X		
Emergency Override Switch	No	X		X

RS485

The RS485 interface is intended primarily as a network management system (NMS) interface accessed by an NMS program. You can also access the RS485 interface with the host computer by using the host computer's on-board RS485 card or by using an external RS232 to RS485 adapter. You can communicate with the Rx 1+1 system across RS485 through ASCII.

The RS485 interface is a standard two-wire interface (DATA+ and DATA-). The baud rate is programmable to 1200, 2400, 4800, 9600, 19200, 38400, 57600, or 115200 baud. The data is transmitted asynchronously as 8 bits, no parity, no flow control, and one stop bit.

To configure RS485, you will need to set the following:

- RS485 Address
- RS485 Delay
- RS485 Baud rate

You can configure RS485 by using any of the M&C interfaces described in this chapter.

ASCII Mode

Communication requires an on-board RS485 card in the host computer. However, if an external interface converter box is used to convert RS232 to RS485, a terminal emulation program such as PuTTY will not function unless it has automatic line turnaround. In this case, a network management program is required to handle this handshaking requirement.

In PuTTY, type the password command, and then press Enter. For example, `<001/CPE=1234` where `<0001/` is the address of the Rx 1+1 system and `1234` is the default password. When the `>` prompt re-appears, the Rx 1+1 system is ready to accept commands.

ASCII Mode Command Format

[Table 5.2](#) lists the differences between SET and GET commands in ASCII Mode

Table 5.2 ASCII Mode Command Format

SET Commands	GET Commands
Start of Packet: < (ASCII code 60; 1 character)	Start of Packet: < (ASCII code 60; 1 character)
Target Address: (4 characters)	Target Address: (4 characters)
Address Delimiter: / (ASCII code 47; 1 character)	Address Delimiter: / (ASCII code 47; 1 character)
Instruction code ¹ : (n characters)	Instruction code ¹ : (n characters)
Code qualifier: = (ASCII code 61; 1 character)	End of Packet: CR (ASCII code 13; 1 character)
Arguments: (n characters)	-
End of Packet: CR (ASCII code 13; 1 character)	-

For GET Commands, the format is as follows:

```
<address/command[CR]
Example: <0001/COI[CR]
```

For SET Commands, the format is as follows:

```
<address/command=XXX[CR]
Example: <0001/CPE=1234[CR]
```

ASCII Mode Response Format

- Start of Packet: > (ASCII code 62; 1 character)
- Target Address: (4 characters)
- Address De-limiter: / (ASCII code 47; 1 character)
- Variable Length Data: (n characters)
- End of Packet:
 - Carriage Return (ASCII code 13; 1 character)
 - Line Feed (ASCII code 10; 1 character)

Example: >0001/{Variable Length Data} {CR}

Commands and values available in ASCII mode are shown in the command set in [Appendix D, ASCII Command/Response Structure](#).

Ethernet

Using Ethernet, you can communicate with the Receive Redundant (Rx 1+1) system through Telnet (ASCII), the on-board Web server (HTTP), or through SNMP. The Rx 1+1 uses a static IP addressing structure and does not support DHCP (Dynamic Host Control Protocol).

The Rx 1+1 is configured at the factory, as follows:

IP Address	192.168.1.254
IP Gateway	192.168.1.1
Subnet Mask	255.255.255.0
Telnet Port	23

Note: Your computer should have a static IP address on the same subnet as the Rx 1+1. Using a suitable cable, connect the computer to the J2 connector on the Rx 1+1.

Determining the IP Address of Your Rx 1+1 system

Due to the lack of support of DHCP, the Rx 1+1 IP address will not change after configuration. In the event that such IP address is not known by the user, it is recommended the usage of Wireshark® network packet analyzer for IP discovery.

Telnet

Telnet is a simple text-based program that enables you to connect to another computer by using the Internet. You can connect to the Rx 1+1 system using a Telnet client from the host PC. Telnet uses the ASCII command set listed in [Appendix D, ASCII Command/Response Structure](#). The default port for Telnet is 23. Characters are echoed back to the user. The response format varies depending on the message type.

If the verbose setting is used, the response contains formatting characters which display neatly to the user. If the terse setting is used, the response contains no formatting characters and is terminated with LF and CR. If verbose mode is used, the response is terminated with `RX1+1>`.

To initiate a Telnet session,

1. Activate a command prompt window from the host computer.
2. Type `Telnet 192.168.1.254`
3. A cursor should appear on the left of the screen.
4. Type the password command `CPE=1234`

The response will be `RX1+1>_`.

You can now use ASCII commands to access functionality. For more information about ASCII commands, see [Appendix D, ASCII Command/Response Structure](#).

Embedded Web Pages

You can access embedded Web pages that contain status and configuration information. To initiate a session,

1. Activate a Web browser window from the host computer
2. Type the Rx 1+1 system IP address, and then press Enter

A login page then appears. After login, you have a choice of nine Web pages with monitoring, control, and alarm information

More information about the embedded Web pages can be found in [Appendix C, Embedded Web Pages](#).

SNMP

The Rx 1+1 system supports both SNMPv1 & SNMPv2c protocols. The SNMP agent listens on Port 161 for messages and uses Port 162 for transmitting trap information. SNMP can be configured from the HHT, RS232, Telnet, Web pages, FSK and the RS485 interfaces (ASCII Mode required for RS845). The MIB-II system group is implemented.

The following commands configure SNMP operation on the Rx 1+1 system using the hand-held terminal (HHT),

1. Connect the HHT to the Rx 1+1 system by using the 19-pin connector
2. Press the decimal key four times (e.g: “. . . .”)

3. Type the password. The factory default password is 1234
4. Press the right arrow key to access the SNMP submenu
5. Press the up/down keys until the “Enable SNMP” selection appears and press **Enter** to configure “Enable SNMP” selection.
6. Press Yes to enable SNMP
7. Press the Bksp key
8. Press the up/down keys until the “Trap Host 1” selection appears and press **Enter** to configure it.
9. Press Yes to enable traps
10. Press the Bksp key
11. Press the up/down keys until the “Trap Host 1 IP Addr” selection appears and press **Enter** to configure it.
12. Type the trap host IP address

Note: Community strings cannot be set from the Hand-held terminal.

To configure SNMP from the Embedded Web pages,

1. Connect to the IBUC with a Web browser. The default IP address is <http://192.168.1.21>
2. Type the password. The default password from factory is 1234.
3. Select the Interface Configuration tab.
4. Enable SNMP, SNMP Trap, host trap IP, and set passwords, if desired. The default is public, private, and trap.
5. Press **submit**

MIBs

Management information bases (MIBs) are hierarchical virtual databases used to manage the devices in a communications network. The following MIBs are provided for the SNMP management station:

- TERRASAT-RX1PLUS1-MIB.MIB
- TERRASAT-SMI.MIB
- TERRASAT-TC-MIB.MIB

TROUBLESHOOTING

This chapter discusses basic troubleshooting procedures for the Terrasat Communications, Inc. line of Receive Redundant (Rx 1+1) Systems.

Maintenance

In general, Terrasat Rx 1+1 units are self-contained and require little maintenance. However, for optimum performance, Terrasat recommends that users inspect the mechanics of the system quarterly and perform the following:

- Clean the antenna feeds to keep them clear of obstructions.
- Check cables and connectors for signs of wear, damage, or loose connections.

Fault Isolation

Use the information in this section to assist in determining whether a Terrasat unit is faulty. The intent is to determine a “Go” or “No Go” situation based on alarms indicated through the M&C ports, as well as by measuring certain signals using test equipment.

Receive L-band Output Verification

If low or no Rx output power is detected, begin troubleshooting following the procedures below.

1. Look for interference by contacting the satellite controller or contact the distant end to check their transmit status.
2. Check the Rx 1+1 L-Band output cable with a spectrum analyzer. Always connect a DC block to the spectrum analyzers input before attaching the L-Band connector. If no signal or any interference is detected, try changing the cable.

3. Use any of the M&C interfaces and record the LNBS Input Level, Voltage Level and Current Level. Check whether such readings are consistent with your LNB specifications.
Try to switch LNB A connector cable with LNB B connector cable to check whether they were not installed correctly. **Do not forget** to switch back the cables in case no signal is detected.
4. Use any of the M&C interfaces to record the LNB Voltage and LNB Tone configuration. Check whether such configuration matches the desired LNB operation.
5. Remove any of the L-Band cables and ensure that the connector is not damaged or bent.

Power Supply Checks

Before beginning RF troubleshooting, verify that the proper voltage is being supplied to the Rx 1+1 system. Input AC voltage and current consumption data are available using any of the M&C interfaces. Verify that the values are within limits.

If M&C is not available, use a multimeter to verify that the appropriate mains voltage are present. Check the part number label of the Rx 1+1 system to determine the required voltage.

AC Power Problems/Conditioning

In today's electrical environment, there are many types of power-related problems that can prevent proper operation of sensitive electronic equipment. These problems or disturbances can be caused by things such as voltage induced by lightning, switching high-power electrical equipment On/Off, or utility company actions such as power factor correction. Serious problems can arise with the occurrence of transients and spikes which can cause random errors or even failure of the circuitry.

Whatever the origin of the transients, they can be classified into two simple categories:

- Common Mode

Noise voltage that appears equally and in phase from each signal conductor to ground. (The term "common" refers to the fact that identical noise appears on both the active and neutral wires.) Common-mode noise poses a threat because the noise attempts to dissipate its energy from neutral to ground or from active to ground.

- Normal Mode

Noise potential between the power line conductors. It adds to and subtracts from the power line sinusoidal voltage wave and is sometimes referred to as differential-mode noise or transverse-mode noise. Normal-mode noise attempts to dissipate its energy along any path from line to neutral. If the normal-mode noise has sufficient voltage (or energy), damage can occur.

Category A

At the wall outlets (and more than 30 ft. [9 m] from a distribution panel), the typical noise is a 0.5 μ s rise time up to 6 kV peak open circuit voltage, 100 kHz ring wave with 200 ampere short circuit current capability.

Category B

At the distribution panel, one can experience the 100 kHz ring wave listed previously but with 500 ampere current capability and a unidirectional impulse up to 6 kV potential rising in 1.2 μ s and decaying to half voltage in 50 μ s. Accompanying this can be a short circuit current up to 3000 amperes rising to peak in 8 μ s and decaying to half value in 20 μ s.

To ensure uninterrupted service, Terrasat recommends using a line conditioner or uninterruptible power supply (UPS) based on the expected AC power at the site.

Site-Related Problems

VSAT antennas are often fitted at the top of buildings. Avoid close proximity to elevator motors, and such. Ensure that the satellite signal path is free and clear of obstructions.

M&C Checks

When troubleshooting the Rx 1+1, the first level of troubleshooting should be to check the status through the M&C port. Events and an event history log are available with the Rx 1+1 M&C. For specific information about using the RS232, RS485, Ethernet, or Hand-Held Terminal ports, see [Chapter 5, Monitor and Control Features](#).

Common Problems

The following problems or occurrences have been noted during normal troubleshooting:

- Weather may cause interference in receive mode.
- The distant end may have weather that lowers their transmission power levels.
- The distant end may have lowered transmission power levels.

Damaged Cables

RF coaxial cable damaged due to improper handling (such as contact damage due to improper mating; cable insulation that is damaged, crushed, cut, or charred; cables were not discharged prior to connecting them; or conductors that are nicked, gouged, damaged, or severed) may impair system performance and reliability. Do not attempt to repair broken or damaged coaxial cables unless absolutely necessary. Replace the

entire cable whenever possible. Damaged cabling and incorrectly tightened connectors can leak RF energy, which may lead to excessive levels in their immediate vicinity.



CAUTION

Never disconnect RF cables or connectors associated with a transmitter in operation since this may result in an RF burn through direct contact with RF conductors.

LED is Red

A red LED indicates only that a fault (or alarm) has occurred and does not necessarily indicate that reception has stopped. A solid red light indicates a major alarm. You can communicate with the Rx 1+1 system to determine what is causing the fault, and then clear the fault condition.

1. Establish communication with the Rx 1+1 system by using any of the M&C interfaces.
2. View the [Alarm Status Tab](#) on [page C-5](#) to determine the current alarm.
3. View the [Sensor Tab](#) on [page C-7](#) to determine which sensor reading caused the alarm.
4. Compare your readings to the thresholds.
5. Adjust the threshold level to bring the reading within specifications and thus clear the fault.

When the fault is cleared, the LED should be solid green.

Moisture Migrated Into the Rx 1+1

Moisture can enter and damage the LNB & Rx 1+1 if waveguide gaskets are missing, there is a hole in the feed window, or there is a break in the coaxial connectors.

To prevent moisture from entering the LNB,

- Ensure that the paper label is removed from the waveguide prior to installation and operation.
 - Ensure that the rubber waveguide gasket is intact and fully seated in the grooved channel before making the connection.
 - Use water-resistant wrap (or mastic tape) on all outdoor connectors to ensure a water-tight seal. Mastic tapes are designed to flow and self-heal if cut or punctured
- For more information about applying water-resistant wrap, see [page 3-13](#).

- Avoid using damaged connectors (for example, scratched mating surfaces, eccentric or bent center conductors, and so on.).
- Seal all coaxial cable fittings with putty.

To prevent moisture from entering the Rx 1+1,

- Use water-resistant wrap (or mastic tape) on all outdoor connectors to ensure a water-tight seal. Mastic tapes are designed to flow and self-heal if cut or punctured
For more information about applying water-resistant wrap, see [page 3-13](#).
- Avoid using damaged connectors (for example, scratched mating surfaces, eccentric or bent center conductors, and so on.).
- Seal all coaxial cable fittings with putty.

Repair Policy

The Terrasat Receive Redundant (Rx 1+1) System are not field repairable.

In the event that a failure has been detected, it might be necessary to return the defective unit to the factory or a factory-authorized service center. The following section contains instructions for returning a defective unit to the factory for repair.

Returned Material Authorization (RMA)

If any equipment is determined to be defective:

- Have the following information available:
 - Unit serial number
 - Unit part number and description
 - Complete description of the failure
 - Designated contact name and phone number
 - Billing information
 - Shipping information
- Contact Terrasat Customer Service to request an RMA number.
 - Telephone: +1 408.782.5911
 - E-mail: techsupport@terrasatinc.com
- Properly package the defective equipment in its original container (if available and undamaged), and mark the RMA number on the outside of the shipping container.

Note: Do not return any equipment without an RMA number.

- Ship the equipment to the following address:

Terrasat Communications, Inc.
315 Digital Drive
Morgan Hill, CA 95037
U.S.A.

- After the unit is received at Terrasat, an initial evaluation will be performed.
 - If the unit is found to be in-warranty, the unit will be repaired and returned at no charge.
 - If the unit is found to be out-of-warranty, Terrasat Customer Service will contact the designated contact for authorization to proceed with the repair.
- Authorization in the form of a purchase order will be required.
- Once authorization is received, the unit will be repaired and returned.



PART NUMBERING SCHEMA

The charts in this appendix illustrate the part numbering schema used for Terrasat Communications, Inc. Products.

Identifying the Part and Serial Numbers

Figure A.1 illustrates the difference between the unit's part number and serial number.



Figure A.1 Identifying the Part and Serial Numbers

Decoding the Part Number

Use the charts on the following pages to help determine the information contained in the part number about your specific unit.

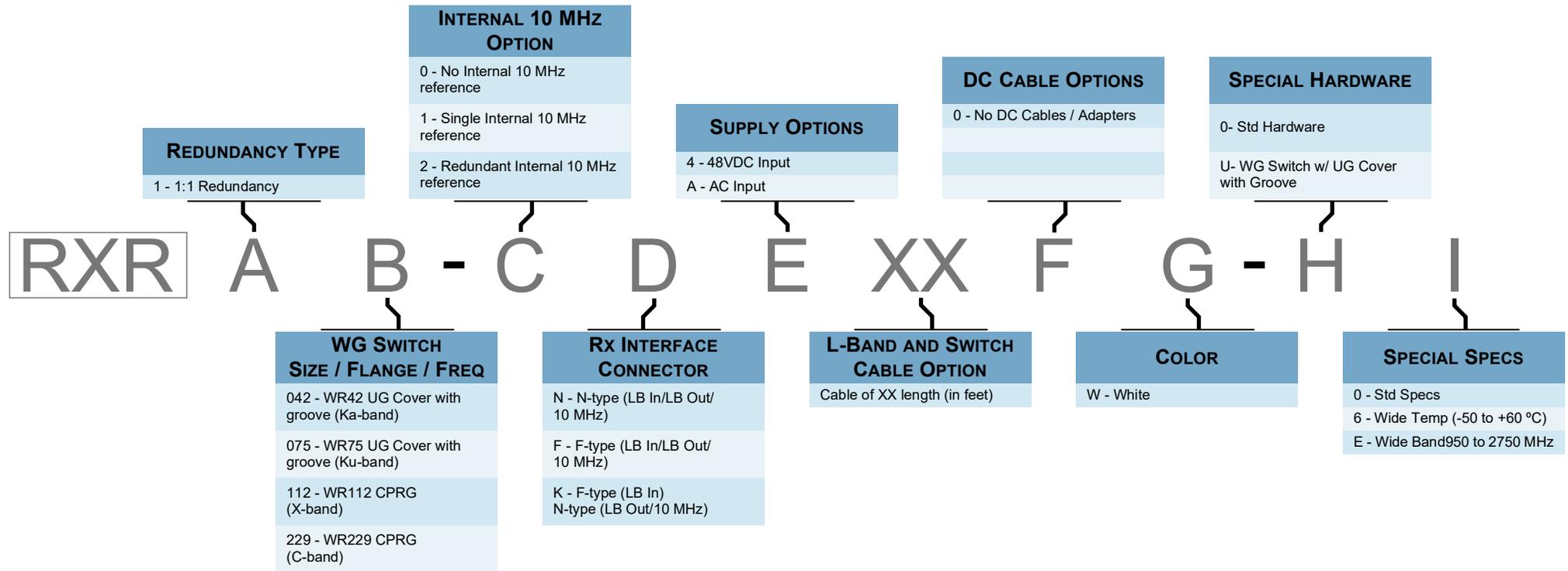


Figure A.2 Part Numbering Schema for Receive Redundant (Rx 1+1) Systems

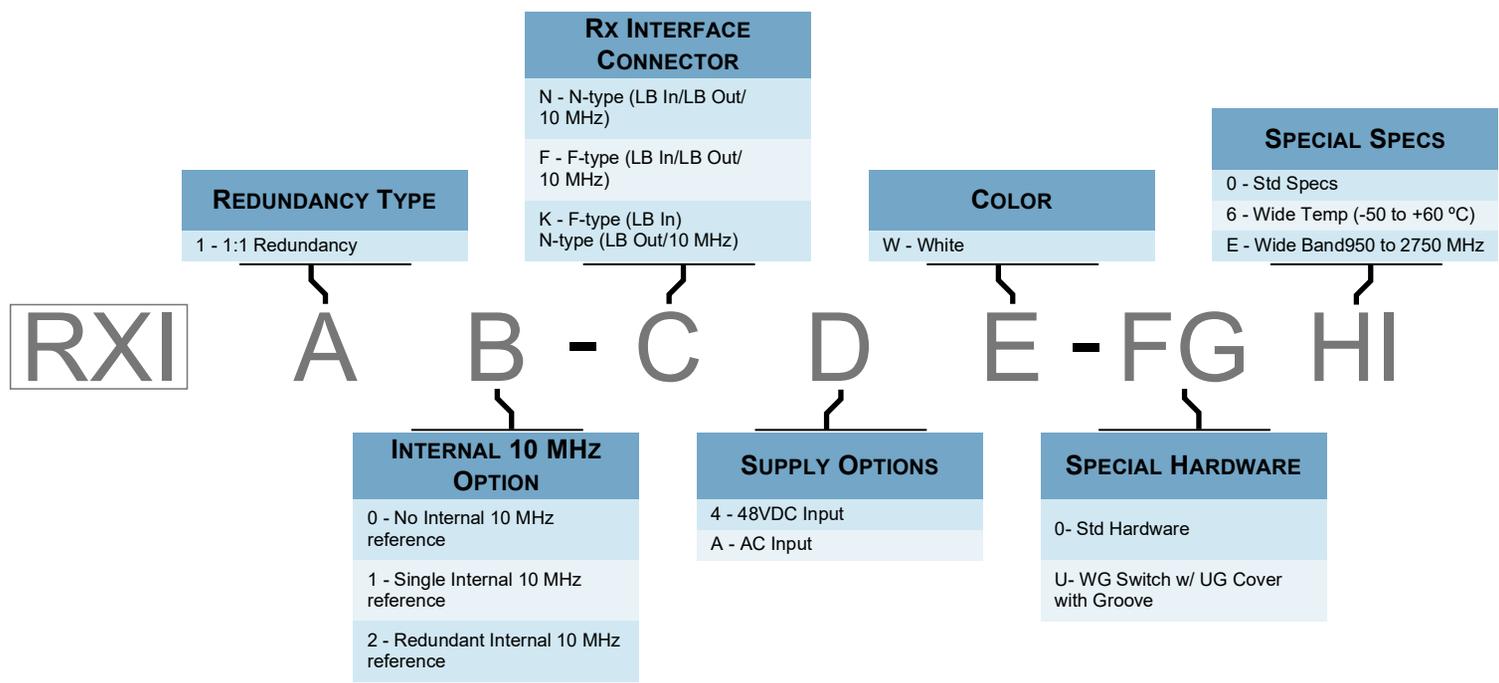


Figure A.3 Part Numbering Schema for Receive Redundant (Rx 1+1) Interface

HAND-HELD TERMINAL MENU TREE

The Receive Redundant (Rx 1+1) System, as many other Terrasat Inc., offers an optional hand-held terminal (HHT) that enables you to access monitor and control functions from a simple menu system. These functions include:

- Display parameters such as temperature, serial number, power level, and sensor feedback
- Set parameters such as gain, transmit state, and alarm thresholds
- Display alarm status

The HHT obtains power from the Rx 1+1 system and does not require its own power source.

Menu Options

[Figure B.3](#) on [page B-3](#) illustrates the updated menu tree and the available options when using the hand-held terminal (HHT). Those options are described in this appendix. To enable the HHT,

6. Connect the supplied cable to the J1 connector on the Rx 1+1 and plug the RJ-11 connector into the HHT.
7. When the connection is made and the HHT is receiving power, a blinking cursor appears in the upper left of the HHT display.
8. Type “. . . .” by using the decimal key on the HHT keypad.

The screen now displays the Rx 1+1 model number and serial number which are shown in [Figure B.1](#), and the system requests a password.



Figure B.1 Sample HHT Display

9. Type the password by using the number keys on the HHT.
The default password is 1234.
10. The “Info & Sensors” menu shown in [Figure B.2](#) appears.

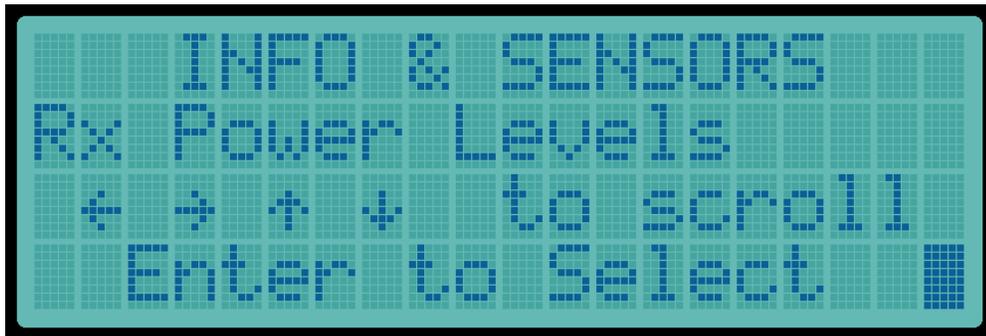


Figure B.2 Sample Info & Sensors Menu

11. The unit is now ready to receive input.

Note: The HHT now offers “adaptive learning” – that is, you no longer need to scroll up and down through all of the menu options during a single session. For example, if a user repeatedly uses the IP Address and Clear Alarm Log options, after the first time accessing those options by using the up and down arrow keys to access the submenus, the user can now use the right and left arrows to move between submenu branches because the system “learns” to access those two options. You can continue lateral movement by using the → and ← keys.

There is no need to logout from the HHT once the session is complete. However, once the HHT is disconnected from the system or the session ends, all of the previous menu movements are lost.

The HHT has eight menus and these menus are shown in [Figure B.3](#) and the items in each menu are discussed in [page B-3](#) through [page B-6](#).

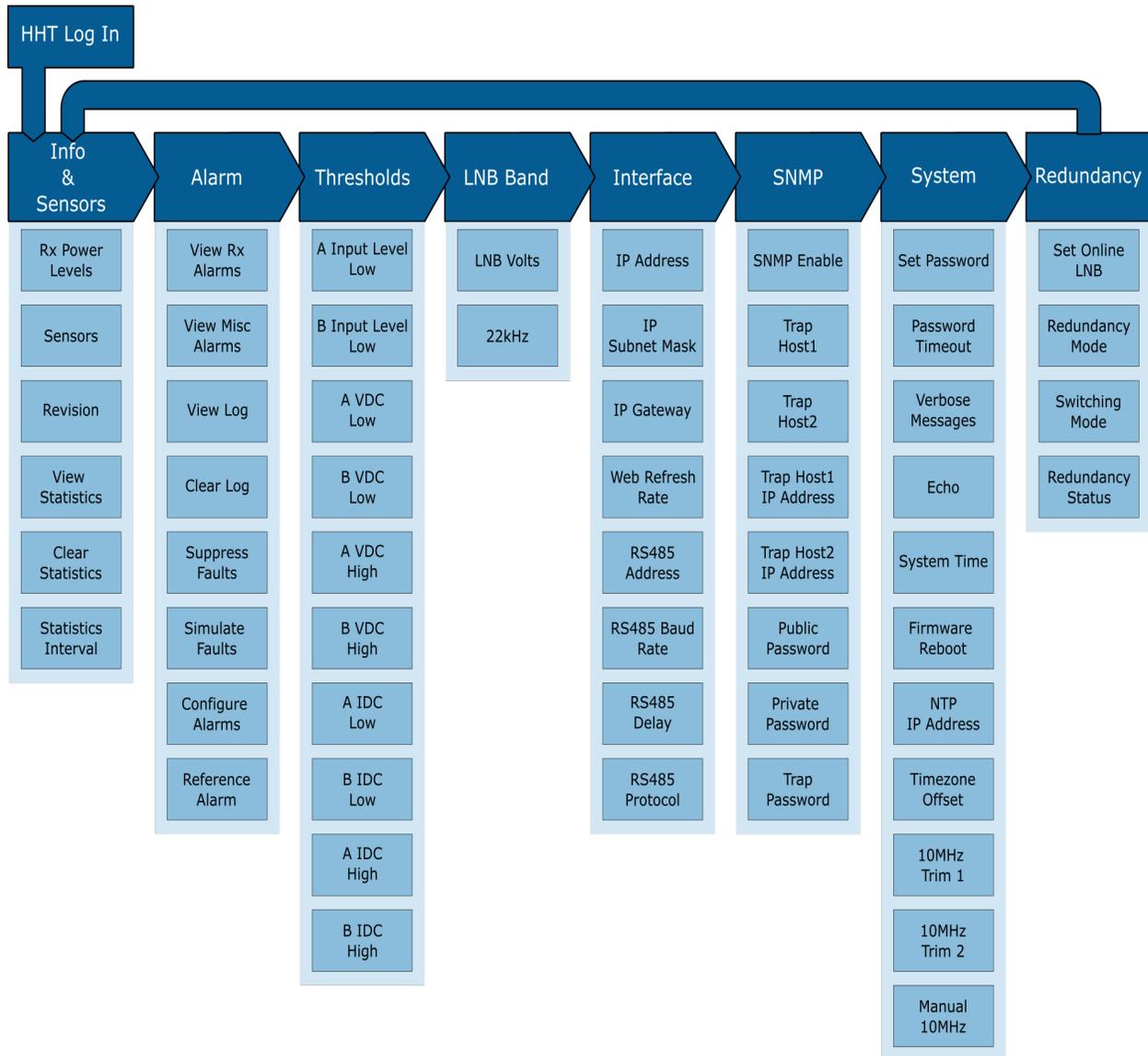


Figure B.3 Hand-held Terminal Menu Tree

Info & Sensors

SECTION	DESCRIPTION
Rx Power Levels	Displays the input LNB power levels
Sensors	Displays unit power supply voltage and current
Revisions	Displays firmware and hardware revision strings
View Statistics	Displays the latest unit statistic history entries
Clear Statistics	Clears the unit statistic history entries
Statistics Interval	Displays or sets the data collection period for statistics

Alarm

SECTION	DESCRIPTION
View Rx Alarms	Displays current transmitter alarms
View Misc Alarms	Displays current miscellaneous alarms
View Log	Displays the unit alarm log
Clear Log	Clears the unit alarm log
Suppress Faults	Displays or sets whether alarms configured for suppression are suppressed
Simulate Faults	Displays or sets a major receive alarm (used for troubleshooting)
Configure Alarms	Displays or sets whether individual alarms cause a major/minor/no alarm and if the alarm is suppressible
10 MHz Reference Alarm	Disables the 10 MHz reference alarm

Thresholds

SECTION	DESCRIPTION
A: Input Level Low	Displays or sets the input power low threshold
B: Input Level Low	Displays or sets the input power low threshold
A: Supply Voltage Level Low	Displays or sets the LNB supply voltage low threshold
B: Supply Voltage Level Low	Displays or sets the LNB supply voltage low threshold
A: Supply Voltage Level High	Displays or sets the LNB supply voltage high threshold
B: Supply Voltage Level High	Displays or sets the LNB supply voltage high threshold
A: Supply Current Level Low	Displays or sets the LNB supply current low threshold
B: Supply Current Level Low	Displays or sets the LNB supply current low threshold
A: Supply Current Level High	Displays or sets the LNB supply current high threshold
B: Supply Current Level High	Displays or sets the LNB supply current high threshold

LNB Band

SECTION	DESCRIPTION
LNB Volts	Displays or sets the LNB supply voltage
22kHz	Displays or sets the LNB 22kHz tone

Interface

SECTION	DESCRIPTION
IP Address	Displays or sets the IP address of the unit
IP Subnet Mask	Displays or sets the subnet mask of the unit
IP Gateway	Displays or sets the IP gateway of the unit
Web Refresh Rate	Displays or sets the rate at which the Embedded Web Pages will request updates
RS485 Address	Displays or sets the address used for both the RS485 interfaces
RS485 Baud Rate	Displays or sets the RS485 Baud Rate
RS485 Delay	Displays or sets the amount of time the unit delays sending a response to a command
RS485 Protocol	Displays or sets whether the unit communicates with ASCII or Binary protocols on both RS485 interfaces

SNMP

SECTION	DESCRIPTION
SNMP Enable	Displays or sets whether: SNMPv1.0 is enabled; SNMPv2.0c is enabled: or if the SNMP interface is disabled for the unit
Trap Host1	Displays or sets whether the unit will generate traps for SNMPv1.0, SNMPv2.0c or if the Trap service is disabled for Host 1
Trap Host2	Displays or sets whether the unit will generate traps for SNMPv1.0, SNMPv2.0c or if the Trap service is disabled for Host 2
Trap Host1 IP Address	Displays or sets the IP address that Traps directed to Host 1 should be directed to
Trap Host2 IP Address	Displays or sets the IP address that Traps directed to Host 2 should be directed to
Public Password	Displays or sets the SNMP Public password
Private Password	Displays or sets the SNMP Private password
Trap Password	Displays or sets the SNMP Trap password

System

SECTION	DESCRIPTION
Set Password	Changes the password for the unit. Affects all modes of access
Password Timeout	Displays or sets the inactivity time before the unit automatically logs the user off
Verbose Messages	Displays or sets the format of the replies to commands on all interfaces
Echo	Displays or sets whether the unit responds to SET commands
System Time	Displays or sets the current system real time clock
Firmware Reboot	Causes the firmware to reboot
NTP IP Address	Displays or sets the NTP Server IP Address
Timezone Offset	Displays or sets the NTP Server timezone offset. Such offset can be set from -12h to +14h
10MHz Trim 1	Displays or sets the internal #1 reference trim values
10MHz Trim 2	Displays or sets the internal #2 reference trim values
Manual 10MHz	Displays or sets the manual internal 10 MHz reference for troubleshooting or reference trimming

Redundancy

SECTION	DESCRIPTION
Set Online LNB	Displays or sets the currently online LNB receiver
Redundancy Mode	Displays or sets whether the unit is free to switch once or multiple times on a failure event
Switching Type	Displays or sets whether the unit switches manually or due to unit alarms
Redundancy Status	Displays or sets the current unit redundancy status



EMBEDDED WEB PAGES

The embedded Web pages shown in this appendix are a user-friendly way to access the various monitor and control (M&C) features offered by the RXR Series of Receive Redundant (Rx1+1) Systems.

Introduction

To access the embedded Web pages,

1. Connect the host computer to the Rx 1+1 unit.

Note: Steps 2 through 8 will guide the user on how to setup the host PC for the first access to the Rx 1+1 embedded web pages. Despite this process being shown on a Windows machine, the process can be achieved on other Operating Systems

2. On Windows Operational Systems, open the Start Menu by pressing the Windows icon and then search for “Control Panel” in the search bar.
3. Navigate to “Network Connections > Network and Sharing Center > Change Adapter Settings”.
4. Right Click on Ethernet Connection Icon and select “Properties”.

The Local Area Connection Status window shown in [Figure C.1](#) appears.

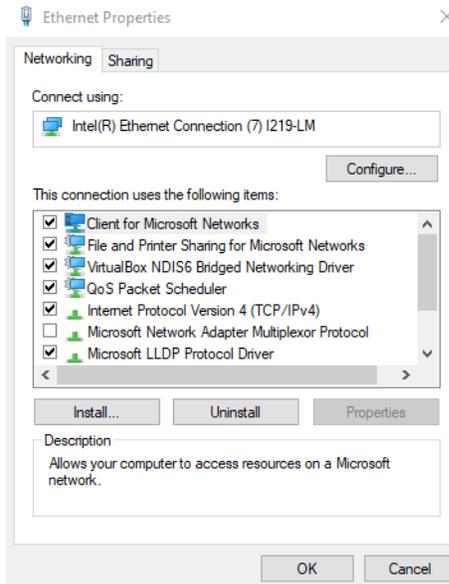


Figure C.1 Ethernet Properties Window

5. In the dialog window, scroll down until “Internet Protocol Version 4 (TCP/IPv4)” becomes visible and select it.

6. Click Properties.

The window shown in [Figure C.2](#) appears

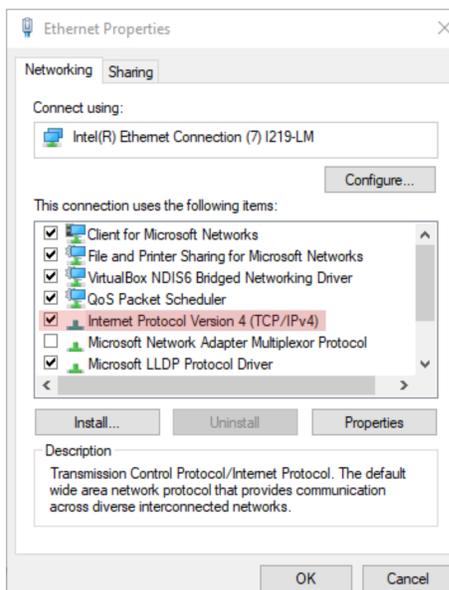


Figure C.2 Choosing the Internet Protocol (TCP/IP) Properties

7. Select “Use the following IP address”, set the IP Address to 192.168.1.254 and any appropriate gateway.

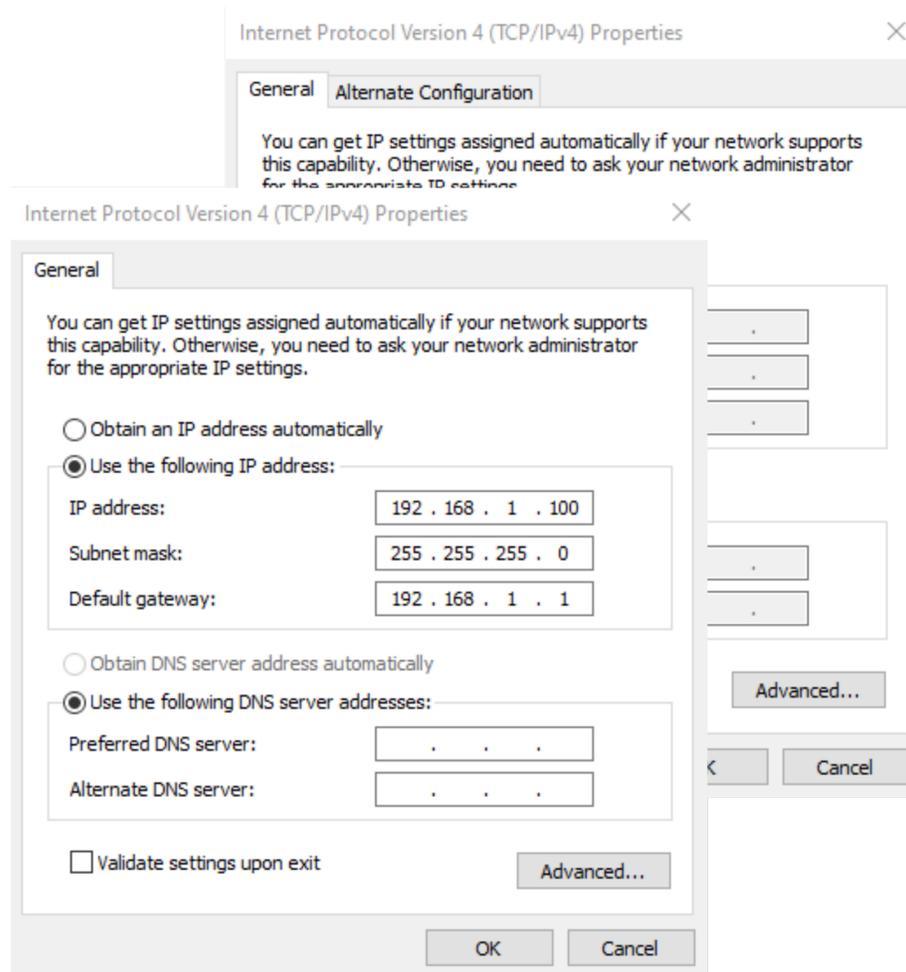


Figure C.3 Typing the IP Address

8. Click OK
9. Using the host computer, activate a Web Browser window.
10. The IP address of the Rx 1+1 RXR was assigned at the factory and is shown in the test data that accompanies the unit.
 http://192.168.1.254
11. Within a few seconds, the Login page shown in [Figure C.4](#) on [page C-4](#) will appear.

Screen Shots

Log In

This page appears to prompt you to log in to the Receive Redundant (Rx 1+1) System. You can log in or log out from any of the tabs shown in [Figure C.4](#). Type your password in the dialog box, and then click Login. The default value is 1234. If the login password that you entered is accepted, the page of the highlighted tab appears. In [Figure C.4](#), the Info tab is highlighted; thus, the Info tab will appear upon successful login. If the login password entered is incorrect, the screen remains unchanged.



Figure C.4 Login Tab

Information Tab

Use this tab to view read-only data such as the model number, serial number and revisions for the Rx 1+1 system.



Figure C.5 Information Tab

From this page, you can view the following parameters:

- **Model Number**
 Displays the model number of the unit. More information about the data contained within the part number is found in [Appendix A, Part Numbering Schema](#).
- **Serial Number**
 Displays the unique serial number of the unit.
- **Firmware Version**
 Displays the firmware version number of the system. This number is used mainly by Terrasat Technical Support personnel.

- **Hardware Version**
Displays the version number of the hardware.

Note: The hardware version can be updated only when the unit is returned to the factory.

- **Supply Voltage Range**
Displays the power supply voltage range for which the unit was designed. The Supply Voltage Range is based on the configuration of your Rx 1+1 system.

Alarm Status Tab

Use this tab to verify the alarm status of the unit. Alarm status is indicated with color and text: a green background indicates that parameter is operating within specifications and no faults have occurred, a yellow background indicates a minor fault, and a red background indicates a major fault. [Table 5.1](#) on [page 5-4](#) contains the default configuration and lists which alarms are available for user configuration.

For information about how to configure these alarms, see the [Alarm Configuration Tab](#) on [page C-14](#).



Figure C.6 Alarm Status Tab

From this page, you can view the following parameters:

- **LNB Input Low Threshold A/B**
Indicates whether the A/B Rx Input level is operating below a minimum threshold. Options include:
 - OK (Green)
 - Major (Red)
 - Minor (Yellow)

- **Simulated Alarm A/B**

Indicates whether a simulated alarm has been issued in unit A/B. A simulated alarm is used mainly for testing purposes. Options include:

 - OK (Green)
 - Major (Red)
 - **LNB Voltage Low Threshold A/B**

Indicates whether the VDC (DC voltage) level in unit A/B is operating below a minimum threshold. Options include:

 - OK (Green)
 - Major (Red)
 - Minor (Yellow)
 - **LNB Voltage High Threshold A/B**

Indicates whether the VDC (DC voltage) level in unit A/B is operating above a maximum threshold. Options include:

 - OK (Green)
 - Major (Red)
 - Minor (Yellow)
- Note: A change in VDC level indicates that the LNA is not amplifying the signal as it should
- **LNB Current Low Threshold A/B**

Indicates whether the IDC (DC current) level in unit A/B is operating below a minimum threshold. Options include:

 - OK (Green)
 - Major (Red)
 - Minor (Yellow)
 - **LNB Current High Threshold A/B**

Indicates whether the IDC (DC current) level in unit A/B is operating above a maximum threshold. Options include:

 - OK (Green)
 - Major (Red)
 - Minor (Yellow)
 - **10 MHz Detector (Source)**

Indicates whether the 10 MHz reference signal is present. Options include:

 - OK (Green)(10 MHz signal is functioning properly)
 - Minor (Yellow) (10 MHz signal is low or missing)

- Internal 10MHz #1 Level

Indicates whether the 10 MHz #1 reference signal is present. This alarm only appears for the user when reference #2 is active and reference #1 is missing or low. Options include:

- Minor (Yellow)(10 MHz signal is low or missing)

- Switch Fault

Indicates whether the waveguide switch is operating properly. This alarm is not available for user configuration. Options include:

- OK (Green)(switch functioning properly)
- Major (Red)(there is a problem with the waveguide switch)

- Emergency Override Switch

Indicates whether the Emergency Override Switch is enabled, and the system software commands are override or not. Options include:

- OK (Green)(M&C has full control over the waveguide switch)
- Major (Red) (M&C is override and waveguide switch can be change positions manually via SW2, see [Figure 2.4](#) on [page 2-6](#))

Sensor Tab

Use this tab to view real-time voltage, current, and power levels for the Rx 1+1 system. For each parameter described in this page, the user is able to click in **View** and see up to 1000 statistic entries for it.

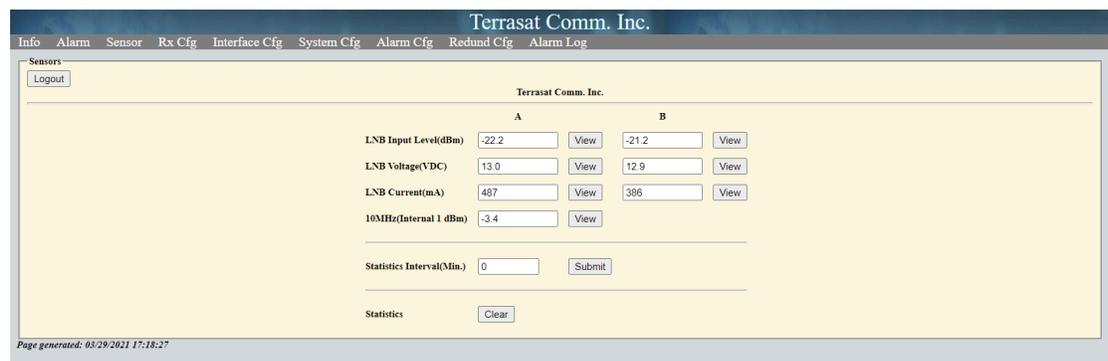


Figure C.7 Sensor Tab

From this page, you can view the following parameters:

- LNB Input Level A/B

Displays the actual Rx input level (in dBm) of both the A: side and the B: side LNBS

- LNB Voltage A/B

Indicates the actual supply voltage level (in VDC) of both the A: side and the B: side LNBS

- **LNB Current A/B**
Displays the current draw at the input (in mA) of both the A: side and the B: side LNBs.
- **10 MHz**
Displays the current 10 MHz source reference level in dBm.
- **Statistics Interval**
Displays the interval (in minutes) in which core system statistics are taken.

Receive Configuration Tab

Use this tab to configure transmission operating parameters for the Rx 1+1 system. Click **Submit** when you have completed entering data to ensure that your changes are saved and then implemented.

	A	B
LNB Input Low Threshold(dBm)	-30.0	-30.0
LNB Voltage High Threshold(VDC)	25.0	25.0
LNB Voltage Low Threshold(VDC)	10.0	10.0
LNB Current High Threshold(mA)	500	500
LNB Current Low Threshold(mA)	100	100
LNB Band Select Volts	18	
LNB Band Select 22KHz	On	
Internal 10MHz #1 Trim	2048	
Internal 10MHz #2 Trim	2048	
Internal 10MHz Manual Enable	Auto	
Update Settings	Submit	

Page generated: 06/10/2021 06:31:29

Figure C.8 Rx Configuration Tab

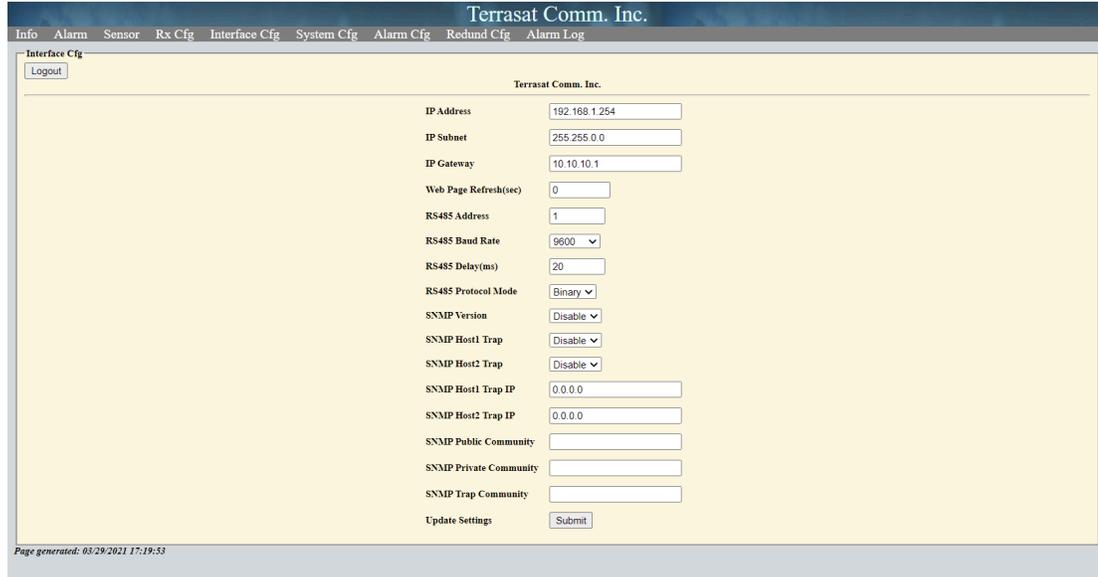
From this page you can configure the following parameters:

- **LNB Input Low Threshold A/B**
Sets the lowest permitted receive input level (in dBm), down to -40, for both A/B: side units.
- **LNB Voltage High Threshold A/B**
Sets the highest supply voltage input level (in VDC), up to 25, for both A/B: side units
- **LNB Voltage Low Threshold A/B**
Sets the lowest supply voltage input level (in VDC), down to 10, for both A/B: side units

- LNB Current High Threshold A/B
Sets the highest supply current input level (in mA), up to 600, for both A/B: side units
- LNB Current Low Threshold A/B
Sets the lowest supply current input level (in mA), down to 100, for both A/B: side units
- LNB Band Select Voltage
Sets the LNB supply voltage level in VDC. Options include:
 - 13 VDC
 - 15 VDC
 - 18 VDC
 - 24 VDC
- LNB Band Select Tone
Sets the LNB 22 kHz enable state. Options include:
 - On
 - Off
- Internal 10 MHz #1 Trim
Specify a frequency trimming value for Rx 1+1 optional internal 10 MHz #1 reference signal
Valid values: 0 – 4095
- Internal 10 MHz #2 Trim
Specify a frequency trimming value for Rx 1+1 optional internal 10 MHz #2 reference signal
Valid values: 0 – 4095
- Internal 10 MHz Manual Enable
Sets the manual internal 10MHz source switch. This command should be used for troubleshooting or trimming purposes only. When maintenance is complete, source selection should be turned back to automatic.
 - Automatic Selection
 - Internal 10 MHz #1
 - Internal 10 MHz #2

Interface Configuration Tab

Use this tab to configure the interfaces (TCP/IP or RS485) for the Receive Redundant (Rx 1+1) System. You can also specify SNMP settings. Click **Submit** when you have completed entering data to ensure that your changes are saved and then implemented.



The screenshot shows the 'Interface Cfg' tab in the Terasat Comm. Inc. web interface. The page contains the following configuration fields:

- IP Address: 192.168.1.254
- IP Subnet: 255.255.0.0
- IP Gateway: 10.10.10.1
- Web Page Refresh(sec): 0
- RS485 Address: 1
- RS485 Baud Rate: 9600
- RS485 Delay(ms): 20
- RS485 Protocol Mode: Binary
- SNMP Version: Disable
- SNMP Host1 Trap: Disable
- SNMP Host2 Trap: Disable
- SNMP Host1 Trap IP: 0.0.0.0
- SNMP Host2 Trap IP: 0.0.0.0
- SNMP Public Community: (empty)
- SNMP Private Community: (empty)
- SNMP Trap Community: (empty)

At the bottom of the form is an 'Update Settings' button labeled 'Submit'. A footer note reads: 'Page generated: 03/29/2021 17:19:53'.

Figure C.9 Interface Configuration Tab

From this page you can configure the following parameters:

- **IP Address**
Valid values range from (but do not include) 1.0.0.0 through 224.0.0.0. Network and broadcast addresses are excluded by default. The only way to know them is by applying the netmask.
- **IP Subnet**
Sets the IP netmask. Valid values range from 8 through 30 representing the number of ones in the netmask. This corresponds to 255.0.0.0 to 255.255.255.252.
- **IP Gateway**
Sets the IP Gateway Address which is the address that the Rx 1+1 unit will send to if the requested IP address does not reside on the local LAN segment.
Note: This address cannot be the same as the IP address of the unit.
- **Web Server Refresh**
Sets the rate in seconds in which the Web page refreshes. The default is 0.
Valid values: 0 to 3600
Note: When set to 0 sec (the factory default), the Web page will not refresh.
- **RS485 Address**
Sets a unique designator for the unit.
Valid values for ASCII: 1 to 254

- **RS485 Baud Rate**
Sets the baud rate at which data is sent. The default is 9600 baud.
Valid values include: 1200, 2400, 4800, 9600, 38400, 57600, or 115200.
- **RS485 Delay**
Sets the delay in milliseconds between the end of one transmission and the beginning of reception in half-duplex mode.
Valid values include 1 to 255. and the default value is 20.
- **RS485 Protocol Mode**
Sets the transmission protocol. Options include:
 - ASCII
 - Binary Mode (default)
- **SNMP Version**
Selects which version of the SNMP protocol should be used to perform communications. Options include:
 - Disabled
 - SNMPv1
 - SNMPv2c
- **SNMP Host 1 Traps**
Sets the generation of SNMP traps for Host 1. SNMP traps are one-way messages that are initiated by a network element to indicate status changes and sent to the network management system. After receiving the message, the manager displays it and can choose to take an action based on the event. Options include:
 - Disabled
 - SNMPv1
 - SNMPv2c
- **SNMP Host 2 Traps**
Sets the generation of SNMP traps for Host 2. Options include:
 - Disabled
 - SNMPv1
 - SNMPv2c
- **SNMP Host1 Trap IP**
Sets the IP address to which the network management system sends traps that are intended for Host 1.
- **SNMP Host2 Trap IP**
Sets the IP address to which the network management system sends traps that are intended for Host 2.

- **SNMP Public Community String**
The SNMP public community string is used for requesting information from the Rx 1+1 unit. The password cannot exceed 32 alphanumeric characters.
- **SNMP Private Community String**
The SNMP private community string is used for making changes to the Rx 1+1 unit. The password cannot exceed 32 alphanumeric characters.
- **SNMP Trap Community String**
Sets the password for the trap manager. The community String cannot exceed 32 alphanumeric characters.

System Configuration Tab

Use this tab to set the system password and the password timeout. You can also reset (reboot) the controller card from here. Additionally, you can set the system time here. Click **Submit** when you have completed entering data to ensure that your changes are saved and then implemented.

The screenshot displays the 'System Cfg' tab of the Terrasat Comm. Inc. web interface. The page title is 'Terrasat Comm. Inc.' and the navigation menu includes 'Info', 'Alarm', 'Sensor', 'Rx Cfg', 'Interface Cfg', 'System Cfg', 'Alarm Cfg', 'Redund Cfg', and 'Alarm Log'. The 'System Cfg' tab is active, showing a 'Logout' button and a 'Terrasat Comm. Inc.' header. The configuration fields are as follows:

System Password	<input type="text"/>
Password Timeout(min)	<input type="text" value="0"/>
Verbose Messages	<input type="button" value="Enable"/> ▾
Echo	<input type="button" value="Enable"/> ▾
Time (mm-dd/yyyy)	<input type="text" value="01/01/2012 06:30:01"/>
NTP Server Address	<input type="text" value="0.0.0.0"/>
NTP Timezone Offset	<input type="text" value="+00:00"/>
Web Page Title	<input type="text" value="Terrasat Comm. Inc."/>
Reboot Firmware	<input type="button" value="Select"/> ▾
Update Settings	<input type="button" value="Submit"/>

Page generated: 03/29/2021 17:20:38

Figure C.10 System Configuration Tab

From this page you can configure the following parameters:

- **System Password**
To change the system password, type a numerical value between 1 and 65535.

Note: The default password is 1234.

- **Password Timeout**
Changes the time period during which you can log in to the system. Options include:
 - 0 = No password timeout
 - 1 to 65535 = Number of minutes before system timeout
- **Verbose Message**
Sets whether responses of the serial and TCP connections are terse (for computers to read) or verbose (for people to read).
 - Enabled = Terse
 - Disabled = Verbose
- **Echo**
Sets whether the system responds back to SET commands or remains silent.
Options include:
 - Enabled
 - Disabled
- **Time**
Sets the system time of the Rx 1+1 in a [mm/dd/yyyy hh:mm:ss] format.
- **NTP Server Address**
Sets the address for the NTP server used to update time and date settings. The address can only be filled out with its IP address (such as 68.233.45.146).
- **NTP Timezone Offset**
Sets the timezone offset used to update time and date settings. Only values between GMT-12:00 and GMT+14:00 are considered valid entries.
- **Web Page Title**
Use this 32-character alphanumeric field to create a customized label for each system. Use information that will help you to identify the Rx 1+1 system, such as company name, location of each unit, and so on.
- **Reboot Firmware**
When selected, this causes a momentary muting of the transmitter and should be used with caution. A dialog box appears and you are asked to confirm your selection.

Alarm Configuration Tab

Use this tab to configure alarms as Minor, Major, or None. Major alarms cause a summary alarm (relay closure) with the Form-C relay and will cause switch overs between LNB units. You can also configure the alarms as suppressible. Suppressible alarms will be suppressed only when the “Suppress Faults” option is enabled. Click **Submit** when you have completed entering data to ensure that your changes are saved and then implemented.

	A	B
LNB Input Low Threshold	Major	Major
LNB Voltage High Threshold	Minor	Minor
LNB Voltage Low Threshold	Minor	Minor
LNB Current High Threshold	Major	Major
LNB Current Low Threshold	Major	Major
LNB Input Low Threshold Suppressible	Enable	Enable
LNB Voltage High Threshold Suppressible	Enable	Enable
LNB Voltage Low Threshold Suppressible	Enable	Enable
LNB Current High Threshold Suppressible	Enable	Enable
LNB Current Low Threshold Suppressible	Enable	Enable
Suppress Faults	Disable	Disable
Simulate Fault	Disable	Disable
10 MHz Alarm	Enable	
Update Settings	Submit	

Page generated: 03/29/2021 17:21:16

Figure C.11 Alarm Configuration Tab

From this page you can configure the following alarms:

- LNB Input Low Threshold A/B
Sets the type of alarm produced when the lower input threshold has been exceeded. Options include:
 - Disable
 - Minor
 - Major
- LNB Voltage High Threshold A/B
Sets the type of alarm produced when the upper VDC threshold level has been exceeded. Options include:
 - Disable
 - Minor
 - Major

- **LNB Voltage Low Threshold A/B**
Sets the type of alarm produced when the upper VDC threshold level has been exceeded. Options include:
 - Disable
 - Minor
 - Major
- **LNB Current High Threshold A/B**
Sets the type of alarm produced when the upper IDC threshold level has been exceeded. Options include:
 - Disable
 - Minor
 - Major
- **LNB Current Low Threshold A/B**
Sets the type of alarm produced when the upper IDC threshold level has been exceeded. Options include:
 - Disable
 - Minor
 - Major
- **LNB Input Low Suppressible A/B**
Sets whether the temperature alarm is suppressible. When suppressed (enabled), a temperature alarm will not appear as an event in the Alarm Log. Options include:
 - Disable
 - Enable
- **LNB Voltage High Threshold Suppressible A/B**
Sets whether the VDC high threshold alarm is suppressible. When suppressed (enabled), an input high alarm will not appear as an event in the Alarm Log. Options include:
 - Disable
 - Enable
- **LNB Voltage Low Threshold Suppressible A/B**
Sets whether the VDC low threshold alarm is suppressible. When suppressed (enabled), an input low alarm will not appear as an event in the Alarm Log. Options include:
 - Disable
 - Enable

- **LNB Current High Threshold Suppressible A/B**

Sets whether the IDC high threshold alarm is suppressible. When suppressed (enabled), an input high alarm will not appear as an event in the Alarm Log. Options include:

 - Disable
 - Enable
- **LNB Current Low Threshold Suppressible A/B**

Sets whether the IDC low threshold alarm is suppressible. When suppressed (enabled), an input low alarm will not appear as an event in the Alarm Log. Options include:

 - Disable
 - Enable
- **Suppress faults A/B**

Sets whether the unit will suppress all alarms that are configured as suppressible. Options include:

 - Disable
 - Enable
- **Simulate faults A/B**

When enabled, a simulated alarm is issued that does not affect transmission status or traffic. Options include:

 - Disable
 - Enable

Use this alarm to determine whether your alarm settings are functional. It is most useful for redundant systems to test whether a major alarm will successfully trigger a switchover to the standby unit.
- **10 MHz Alarm**

Sets whether an alarm will be issued if the 10 MHz signal from any of the available sources is low or not present. This configuration is intended to prevent constant 10 MHz alarms when using LNBS that are equipped with internal 10 MHz oscillators or when the 10MHz signal is provided directly to the LNBS. Options include:

 - Disable
 - Enable

Note: When disabled, all references to any 10 MHz signal will not be shown in the web pages.

Redundancy Configuration Tab

Use this tab to configure redundancy settings for Receive Redundant (Rx 1+1) System. Only the online unit can control the redundancy mode, redundancy switching type, and auto clone settings. Click **Submit** when you have completed entering data to ensure that your changes are saved and then implemented.



Figure C.12 Redundancy Configuration Tab

From this page you can configure the following parameters:

- Set Online LNB
Specifies which LNB is online. Options include:
 - A
 - B
- Redundancy Mode
Sets the redundancy switching mode of operation. When configured for reverting, the units can switch between each other multiple times when a fault occurs unless both units are faulted. In non-reverting mode, when the A: side unit faults, a switch to the B: side unit will occur. However, once operation has switched to the B: side unit no additional switches will occur without user intervention. This item can be changed only from the unit designated as Online (Master). Options include:
 - Reverting
 - Non-reverting
- Redundancy Switching Type
Sets the switching type. Options include
 - Automatic
 - Manual

Note: In Automatic Mode, if the standby unit is faulty, the online LNB will not switch to the standby unit. However, you can force this switch when in Manual Mode.

D

ASCII COMMAND/RESPONSE STRUCTURE

Command Set

This command set is used with RS232 and Telnet interfaces.

- Parameters are delimited by “< >” for clarity and are not part of the actual query or command. Single quotes delimit an exact string used for a parameter.
- It is expected that both commands and responses are terminated by using <LF><CR>, where

<LF> = 0x0A. (Line Feed)

<CR>= 0x0D. (Carriage Return)

Be sure to configure the Telnet or RS232 client accordingly.

[Table D.1](#) shows the alarm mask that is used with the following commands: CAS; CM1; CM2; CMS.

Table D.1 Receive Alarm Mask

Receive Alarm Mask		Receive Alarm Mask	
0x0001	A: side Rx Input Level Low Alarm	0x0100	B: side VDC High Threshold Alarm
0x0002	B: side Rx Input Level Low Alarm	0x0200	Waveguide Switch Fault
0x0004	A: side Simulated Alarm	0x0400	A: side IDC Low Threshold Alarm
0x0008	B: side Simulated Alarm	0x0800	A: side IDC High Threshold Alarm
0x0010	10 MHz Reference Alarm	0x1000	B: side IDC Low Threshold Alarm
0x0020	A: side VDC Low Threshold Alarm	0x2000	B: side IDC High Threshold Alarm
0x0040	A: side VDC High Threshold Alarm	0x4000	Emergency Override Switch On
0x0080	B: side VDC Low Threshold Alarm	0x8000	Internal 10MHz #1

Table D.2 lists miscellaneous alarm flags. Miscellaneous alarms do not involve the actual reception of data. Instead, they are primarily informational.

Table D.2 Miscellaneous Alarm Flags

Miscellaneous Alarm Flags		Miscellaneous Alarm Flags	
0x0001	Not Used	0x0010	Reboot Alarm ¹
0x0002	Configuration Reset	0x0020	Not Used
0x0004	Firmware Download ¹	0x0040	Not Used
0x0008	Not Used	0x0080	Not Used

In some cases users may type queries/commands with structures that differ from what is expected. In this case one should receive an “Error Response” from the Rx 1+1 unit. In such cases, refer to Table D.3 for a more detailed explanation about such errors.

Table D.3 Error Response Table

Code	Error Message	Description
1	error = invalid value	This is not a valid value for this command.
2	error = bad command	This command is not in the command set.
3	error = func not yet done	This command has not been implemented.
4	error = bad format in command	One of the parameters is formatted incorrectly.
5	error = error accessing config storage	Unable to access EEPROM.
6	error = ODU fault	Cannot switch, target unit has a major fault.
7	error = Please enter valid password	Incorrect password has been entered.
8	error = Switch Fault	The waveguide switch is faulted.
9	error = ODU Comm Fault	Binary packet checksum is invalid.
10	error = Timeout waiting for packet	UDP has timed out waiting for response packet.
11	error = Not master	The slave cannot perform the requested command.
12	error = Turn on Tx first	Cannot engage AGC/ALC because Tx Output is muted.
13	error = Tx Alarms present	Cannot engage AGC/ALC because DRO is out of lock.
14	error = Burst Not Detected	AGC/ALC time out waiting for a valid burst (15 seconds).
15	error = AGC/ALC Targets OOR	The ALC target power is outside the valid power range of the unit. The AGC target gain is outside the range of the unit.
16	error = Gain Control OOR	When engaging AGC/ALC mode, the gain control is outside preset limits.
17	error = Redund not enabled	This unit is not part of a redundant pair.
18	error = Invalid IP for subnet	The IP subnet selected is invalid for the configured IP address.
19	SET is not valid with <command>	You can only query this parameter.
20	GET is not valid with <command>	You can only change this parameter.

BAM

Description: Displays or sets the redundancy switching mode of operation. When configured for reverting, the units can switch between each other when a fault occurs multiple times unless both units are faulted. In non-reverting operation, when the A: side unit faults, a switch to the B: side unit will occur unless the B: side unit has faulted. Once on the B: side unit, no additional switches can occur without user intervention. This item can be changed only from the Online/Master unit.

Q Query: BAM
Response: BAM=<Mode>
Error Response: 1, 7, 17

C Command: BAM=<Mode>
Response: BAM=<Mode>
Error Response: 1, 7, 17

Parameters:

- <Mode> = 0 (Default)
- 0 - Reverting
- 1 - Non-Reverting

BSM

Description: Displays or sets the switching type. When configured for manual switching, the units will not switch due to a fault and the user is able to switch between units at will by using the BSW command regardless of any faults. When configured for automatic operation, a switch will occur if a major fault occurs on the online unit unless the standby is also faulted. If both units are not faulted, you can switch between the A: side and the B: side by using the BSW command described on [page D-5](#).

Q Query: BSM
Response: BSM=<Mode>
Error Response: 1, 7, 17

C Command: BSM=<Mode>
Response: BSM=<Mode>
Error Response: 1, 7, 17

Parameters:

<Mode> = 1 (Default)
0 - Manual
1 - Automatic

BST

Description: Display system status for a redundant pair.

Q Query: BST
 Response: BST=<A: Mode>,<A: Online>,<B: Mode>,<B: Online>,<Switch>
 Error Response: 7, 17, 19

Parameters:

- <A: Mode>/<B: Mode>
 - Auto
 - Manual
- <A: Online>/<B: Online>
 - Online
 - Standby
- <Switch>
 - A: side
 - B: side

BSW

Description: Display or configure the online status of a redundant pair. This command controls which unit is online by physically changing the waveguide switch position.

Q Query: BSW
 Response: BSW=<Status>
 Error Response: 1, 7, 8, 17

C Command: BSW=<Status>
 Response: BSW=<Status>
 Error Response: 1, 7, 8, 17

Parameters:

- <Status>
 - 0 - A: side
 - 1 - B: side

C10

Description: Display the current state of the external 10 MHz source. When no external 10 MHz source is configured the <State> parameter will always be read as '1=10MHz within Range'.

Q Query: C10
Response: <State>
Error Responses: 7, 19

Parameters:

<State>
1 = 10MHz within Range / 0 = 10MHz out of range

C13

Description: Display or configure the Low Noise Block (LNB) input voltage. When using multiband LNBS, band selection is made through selected voltage and presence of 22 kHz tone. Check your specific multiband LNB manual and verify which combination of such parameters will result in the desired band.

Note: See command C22 on page [page D-7](#) for more information on how to toggle presence of 22 kHz tone

Q Query: C13
Response: C13=<Voltage>
Error Response:1, 7

C Command: C13=<Voltage>
Response: C13=<Voltage>
Error Response:1, 7

Parameters:

<Voltage> = 1 (Default)
0 - 24 VDC
1 - 18 VDC
2 - 15 VDC
3 - 13 VDC

C22

Description: Display or configure the LNB 22KHz tone. When using multiband LNBS, band selection is made through selected voltage and presence of 22 kHz tone. Check your specific multiband LNB manual and verify which combination of such parameters will result in the desired band.

Note: See command C13 on page [page D-6](#) for more information on how to select LNB supply voltage

Q Query: C22
 Response: C22=<Status>
 Error Response: 1, 7

C Command: C22=<Status>
 Response: C22=<Status>
 Error Response: 1, 7

Parameters:

<Status> = 0 (Default)
 0 - On / 1- Off

C4A

Description: Displays or sets the RS485 address. If the address is changed, both communication links are affected. The new address is used for the response.

Q Query: C4A
 Response: C4A=<Address>
 Error Response: 1, 7

C Command: C4A=<Address>
 Response: C4A=<Address>
 Error Response: 1, 7

Parameters:

<Address> = 1 (Default)
 If C4M=1, address is a decimal number [1 to 15]
 If C4M=0, address is a decimal number [1 to 254]

C4D

Description: Display or sets the delay in milliseconds before a response is returned on the RS485 link.

Q Query: C4D
Response: C4D=<Delay>
Error Response: 7, 19

C Command: C4D=<Delay>
Response: C4D=<Delay>
Error Response: 7, 19

Parameters:

<Delay> = 20 (Default)
Decimal number in milliseconds [1-255]

C4M

Description: Description: Displays or sets the RS485 messaging protocol.

Q Query: C4M
Response: C4M=<Mode>
Error Response: 1, 7

C Command: C4M=<Mode>
Response: C4M=<Mode>
Error Response: 1, 7

Parameters:

<Mode> = 0 (Default)
0 - ASCII Mode
1 - Binary Mode

C4R

Description: Displays or sets the RS485 baud rate.

Q Query: C4R
Response: C4R=<Baud>
Error Response: 7, 19

C Command: C4R=<Baud>
Response: C4R=<Baud>
Error Response: 7, 19

Parameters:

<Status>

Decimal number from predefined list [1200; 2400; 4800; 9600; 19200; 38400; 57600; or 115200]

C4V

Description: Displays or sets the message response mode. Terse mode is used for computers where the response items are separated by commas and the message is terminated with <LF><CR>. Verbose is better suited for use with terminal emulations programs, such as Telnet or HyperTerminal. Output is formatted for easier viewing by the user. This is a global command affecting all interfaces operating in ASCII mode.

Q Query: C4V
Response: C4V=<Mode>
Error Response: 1, 7

C Command: C4V=<Mode>
Response: C4V=<Mode>
Error Response: 1, 7

Parameters:

<Mode> = 1 (Default)

0 - Terse Mode / 1- Verbose Mode

CAS

Description: Displays the current active alarms. Use the CAS command to display hexadecimal values that represent the Receive and Miscellaneous alarms. See [Table D.1](#) and [Table D.2](#) for the meaning of the individual alarms or to use CAS=1 to display the alarm strings.

Q Query: CAS
Response: CAS=R0xhhhh,M0xhhhh
Error Response: 1, 7

Q Query: CAS=1
Response:
Verbose alarm report
Rx alarms: 0xhhhh
<Tx alarm strings>
Misc alarms: 0xhhhh
<misc alarm strings>

Parameter:

<Tx alarm strings>
verbose strings of each alarm that is active.
<misc alarm strings>
verbose strings of each alarm that is active.

CCM

Description: Displays the model number and serial number of the Rx 1+1 unit.

Q Query: CCM
Response Values: CCM=<Model Number>, <Serial Number>
Error Response: 1, 7, 19

Parameters:

<Model number>
Model number variable string [up to 20 characters]
<Serial Number>
Serial number variable string [up to 10 characters]

CCS

Description: Displays the M&C firmware version level. This is a read-only command.

Q Query: CCS
 Response: CCS=FW IBB v<mm>.<nn>, <date> <time>
 Error Response: 1, 7

Parameters:

<mm>
 Major revision number [0 to 99]
 <nn>
 Minor revision number [0 to 99]

CIA

Description: Displays or sets the IP address of the unit. Valid values range from (but do not include) 1.0.0.0 through 223.255.255.254..

Q Query: CIA
 Response: CIA=<IP Address>
 Error Responses: 1, 4, 7, 18

C Command: CIA=<IP Address>
 Response: CIA=<IP Address>
 Error Responses: 1, 4, 7, 18

Parameters:

<IP Address>
 IP address of the unit [1.0.0.0 to 223.255.255.254]

Note: Typical usage of this command to set up network is,

```
RX1+1> CIA=192.168.1.200
RX1+1> CIM=255.255.255.0
RX1+1> CIG=192.168.1.1
```

For CIM and CIG commands descriptions, see [CIM](#) on [page D-14](#) and [CIG](#) on [page D-12](#).

CID

Description: Displays the current consumption by the Rx 1+1 system.

Q Query: CID
Response:
AC Current=<Value> Amps
or
DC Current=<Value> Amps
Error Response: 1, 20

Parameter:

<Value>

Decimal number indicating current consumption in Amperes [0.0 to 25.0]

CIG

Description: Displays or configures the Rx 1+1 network gateway address. This address will be sent to if the requested IP address does not reside on the local LAN segment.

Q Query: CIG
Response: CIG=<Gateway IP>
Error Response: 1, 4, 7

C Command: CIG=<Gateway IP>
Response: CIG=<Gateway IP>
Error Response: 1, 4, 7

Parameter:

<Gateway IP> = 192.168.1.1 (Default)

Network Gateway Address [1.0.0.0 to 223.255.255.254]

CIH1

Description: Sets or displays SNMP Trap Target IP Address 1.

Q Query: CIH1
Response: CIH1=<IP Address>

C Command: CIH1=<IP Address>
Response: CIH1=<IP Address>

Parameter:

<IP Address>
Trap Target IP Address [1.0.0.0 to 223.255.255.254]

CIH2

Description: Sets or displays SNMP Trap Target IP Address 2.

Q Query: CIH2
Response: CIH2=<IP Address>

C Command: CIH2=<IP Address>
Response: CIH2=<IP Address>

Parameter:

<IP Address>
Trap Target IP Address [1.0.0.0 to 223.255.255.254]

CIM

Description: Displays or sets the Network Mask..

Q Query: CIM
Response: CIM=<Netmask>
Error Responses: 1, 2, 7, 18

C Command: CIM=<Netmask>
Response: CIM=<Netmask>
Error Responses: 1, 2, 7, 18

Parameter:

<Netmask> = 255.255.255.0 (Default)
Network Mask [255.0.0.0 to 255.255.255.252]

CIS

Description: Displays, enables or disables SNMP interface.

Q Query: CIS
Response: CIS=<Mode>
Error Response: 1, 4, 7

C Command: CIS=<Mode>
Response: CIS=<Mode>
Error Response: 1, 4, 7

Parameters:

<Mode>
0 - Disable SNMP
1 - Enable SNMPv1
2 - Enable SNMPv2c

CIT1

Description: Displays, enables or disables SNMP Trap service for Host 1.

Q

Query: CIT1

Response: CIT1=<Mode>

Error Response: 1, 4, 7

C

Command: CIT1=<Mode>

Response: CIT1=<Mode>

Error Response: 1, 4, 7

Parameter:

<State>

0 - Disable Traps

1 - Enable SNMPv1 Traps

2 - Enable SNMPv2c Traps

CIT2

Description: Displays, enables or disables SNMP Trap service for Host 2.

Q

Query: CIT2

Response: CIT2=<Mode>

Error Response: 1, 4, 7

C

Command: CIT2=<Mode>

Response: CIT2=<Mode>

Error Response: 1, 4, 7

Parameter:

<State>

0 - Disable Traps

1 - Enable SNMPv1 Traps

2 - Enable SNMPv2c Traps

CM1

Description: Displays or sets the minor alarm mask of the unit. This is a hexadecimal value. See [Table D.1](#) on [page D-1](#) for available hexadecimal values..

Q Query: CM1
Response: CM1=<Hex Mask>
Error Response: 1, 4, 7

C Command: CM1=<Hex Mask>
Response: CM1=<Hex Mask>
Error Response: 1, 4, 7

Parameter:

<Hex Mask> 0x00E0 (Default)
Minor alarm mask [Hexadecimal value. See [Table D.1](#) on [page D-1](#) for available hexadecimal values.

CM2

Description: Displays or sets the major alarm mask of the unit. This is a hexadecimal value.

Q Query: CM2
Response: CM2=<Hex Mask>
Error Response: 1, 4, 7

C Command: CM2=<Hex Mask>
Response: CM1=<Hex Mask>
Error Response: 1, 4, 7

Parameter:

<Hex Mask> = 0x0018 (Default)
Major alarm mask [Hexadecimal value]. See [Table D.1](#) on [page D-1](#) for available hexadecimal values.

CMS

Description: Display or configure the alarm suppression mask. This command does not suppress alarms. You must set TAZ=1 to enable suppression..

Q Query: CMS
 Response: CMS=<Hex Mask>
 Error Response: 1, 4, 7

C Command: CMS=<Hex Mask>
 Example: CMS=0x0001 will set the A: side Rx Input Level Low Alarm to suppressible.
 Response: CMS=<Hex Mask>
 Error Response: 1, 4, 7

Parameter:

<Hex Mask> = 0x0078 (Default)

Alarm suppression mask [Hexadecimal value]. See [Table D.1](#) on [page D-1](#) for available hexadecimal values.

Note: To suppress alarms in A: side unit,

```
Rx 1+1> CMS=<Hex Mask>
Rx 1+1> RAZ=1
```

COI

Description: Displays general information about the Rx 1+1. This is a read-only command.

Q Query: COI
 Response:
 Error Response: 1, 7

CPE

Description: Logs the user into the unit..

C Query: CPE=<Value>
Response: CPE=<Value>
Error Response: 1, 7, 20

Parameter:

<Value>

Decimal value corresponding to the user password [1 - 65535]

Note: CPE command can access both Read-Write and Read-Only user. The Read-Write user password can be changed [1 - 65535] while the Read-Only password is always 1111.

CPL

Description: Displays the private label string of the unit..

Q Query: CPL
Response: <Manufacturer>
Error Response: 1, 7, 20

Parameter:

<Manufacturer>

String representing the manufacturer of the Rx 1+1 [Up to 20 character String]

CPS

Description: Sets the password for the user who is logged in. The password does not take effect until the next login.

C Command: CPS=<New Password>
Response: CPS=<New Password>
Error Response: 1, 7, 20

Parameter:

<New Password> = 1234 (Default)

Decimal number [1 - 65535]

CPT

Description: Displays or sets the login timeout. After the configured time period elapses with no user interaction, the session is dropped (ends).

Q Query: CPT
Response: CPT=<Timeout>
Error Response: 1, 7

C Command: CPT=<Timeout>
Response: CPT=<Timeout>
Error Response: 1, 7

Parameters:

<Timeout> = 0 (Default)

Decimal value in minutes [0 - 65535]. If 0 is selected, no timeout is configured.

CRT1

Description: Display or configure the internal 10 MHz source #1. When the Rx 1+1 is equipped with one or two internal 10 MHz sources, the user can trim its frequency output. Depending upon the LNB frequency band, the incremental frequency movement at the output of the Rx 1+1 will vary.

Q Query: CRT1
Response: CRT1=<Value>
Error Response: 1, 7

C Command: CRT1=<Value>
Response: CRT1=<Value>
Error Response: 1, 7

Parameters:

<Value>

Internal 10 MHz source #1 trim value [0 to 4095]

CRT2

Description: Display or configure the internal 10 MHz source #2. When the Rx 1+1 is equipped with two internal 10 MHz sources, the user can trim frequency source output. Depending upon the LNB frequency band, the incremental frequency movement at the output of the Rx 1+1 will vary.

Q Query: CRT2
Response: CRT2=<Value>
Error Response: 1, 7

C Command: CRT2=<Value>
Response: CRT2=<Value>
Error Response: 1, 7

Parameters:

<Value>
Internal 10 MHz source #2 trim value [0 to 4095]

CTD

Description: Displays or sets the 10 MHz reference alarm enable state.

Q Query: CTD
Response: CTD=<State>
Error Response: 1, 2, 4, 5, 7

C Command: CTD=<State>
Response: CTD=<State>
Error Response: 1, 2, 4, 5, 7

Parameters:

<State> = 1 (Default)
0 - Disabled / 1 - Enabled

CTM

Description: Display or configure the Rx 1+1 real time clock. If NTP is not used this command provides a way of manually setting the system clock. The Rx 1+1 will maintain time up to a week during power losses. It is preferable to use NTP to avoid having to reset the system time..

Q

Query: CTM

Response: CTM=<Date> <Time>

Error Response: 1, 2, 4, 7

C

Command: CTM=<Date> <Time>

Response: CTM=<Date> <Time>

Error Response: 1, 2, 4, 7

Parameters:

<Date>

Date used by Rx 1+1 unit [mm/dd/yyyy] (e.g.: 07/02/2020)

<Time>

Time used by Rx 1+1 unit [hh:mm:ss] (e.g.: 15:40:27)

CVD

Description: Displays the current LNB power supply voltage.

Q

Query: CVD

Response: CVD=<LNB A> Volts, <LNB B> Volts

Error Response: 1, 7, 20

Parameters:

<LNB A>

A: side LNB power supply voltage in VDC [0.0 - 60.0]

<LNB B>

B: side LNB power supply voltage in VDC [0.0 - 60.0]

CWR

Description: Displays or sets the rate at which the Web page automatically refreshes.

Q Query: CWR
Response: CWR=<Refresh Rate>
Error Response: 1, 7

C Command: CWR=<Refresh Rate>
Response: CWR=<Refresh Rate>
Error Response: 1, 7

Parameters:

<Refresh Rate> = 0 (Default)

Decimal number representing Refresh Rate in seconds [0 - 3600]. If 0 is chosen, the Embedded Web Pages will not refresh automatically.

CZZ

Description: Reboots the Rx 1+1 unit and/or resets all parameters to their default values.

C Command: CZZ
Response: None

C Command: CZZ=1
Response: None

Note: Issuing the command CZZ=1 will prompt the Rx 1+1 to reset all internal parameters to their default and then reboot the unit.

DCN

Description: This command allows an administrator to delete another user from the system..

C Command: DCN
 Response: None
 Error Response: None

EHI

Description: Display up to 25 Rx 1+1 event history entries. Each subsequent call to this command displays up to 25 more entries. Once the history end is reached, the ‘No New Events’ string will appear. Issuing the command EHI=0 will reset the index of the event log, allowing the user to see the log from the beginning.

Q Query: EHI
 Response: <Date> <Time> <Event String>
 Error Response:7, 19

C Command: EHI
 Response: <Date> <Time> <Event String>
 Error Response:7, 19

Parameters:

- <Date>
Date in which the event was issued [mm/dd/yyyy]
- <Time>
Time in which the event was issued [hh:mm:ss]
- <Event String>
String that corresponds to the issued command [String]

EHZ

Description: Clear the event history of the Rx 1+1.

C Command: EHZ
Response: Event log cleared
Error Responses: 7, 19

EKO

Description: Displays or sets whether the unit responds to commands. If EKO is disabled, you will receive no response to commands. However, responses are always returned to queries. This does not affect characters being echoed to the terminal during Telnet sessions.

Q Query: EKO
Response: EKO=<Mode>
Error Response: 1, 7

C Command: EKO=<Mode>
Response: EKO=<Mode>
Error Response: 1, 7

Parameters:

- <Mode> = 1 (Default)
- 0 - No command response
- 1 - Respond to commands

HLP

Description: Display the available list of commands.

Q Query: HLP
Response: None
Error Response: None

IAH

Description: Displays or sets the current alarm high threshold for the A: side LNB.

Q Query: IAH
Response: IAH=<Threshold>
Error Response: 1, 7

C Command: IAH=<Threshold>
Response: IAH=<Threshold>
Error Response: 1, 7

Parameters:

<Threshold> = 500 (Default)
Current alarm high threshold value in milliampere (mA) [100 to 600]. Must be greater than the current low threshold alarm value.

IAL

Description: Displays or sets the current alarm low threshold for the A: side LNB.

Q Query: IAL
Response: IAL=<Threshold>
Error Response: 1, 7

C Command: IAL=<Threshold>
Response: IAL=<Threshold>
Error Response: 1, 7

Parameters:

<Threshold> = 250 (Default)
Current alarm low threshold value in milliampere (mA) [100 to 600]. Must be less than the current high threshold alarm value.

IBH

Description: Displays or sets the current alarm high threshold for the B: side LNB.

Q Query: IBH
Response: IBH=<Threshold>
Error Response: 1, 7

C Command: IBH=<Threshold>
Response: IBH=<Threshold>
Error Response: 1, 7

Parameters:

<Threshold> = 500 (Default)

Current alarm high threshold value in milliampere (mA) [100 to 600]. Must be greater than the current low threshold alarm value.

IBL

Description: Displays or sets the current alarm low threshold for the B: side LNB.

Q Query: IBL
Response: IBL=<Threshold>
Error Response: 1, 7

C Command: IBL=<Threshold>
Response: IBL=<Threshold>
Error Response: 1, 7

Parameters:

<Threshold> = 250 (Default)

Current alarm low threshold value in milliampere (mA) [100 to 600]. Must be less than the current high threshold alarm value.

NTP

Description: Displays or configures the NTP Server IP address.

Q Query: NTP
Response: NTP=<IP Address>
Error Response: 1, 7

C Command: NTP=<IP Address>
Response: NTP=<IP Address>
Error Response: 1, 7

Parameters:

<IP Address>

NTP Server IP address [1.0.0.0 to 223.255.255.254]

PGM

Description: Displays or configures the Firmware Upgrade stored file. In rare specific cases the user is able to use FTP to transfer binary files to the unit. Use the PGM command to specify the filename, check the binary integrity and set internal parameters for actual firmware upgrade.

Q Query: PGM
Response: PGM=<filename>
Error Response: 1, 7

C Command: PGM=<filename>
Response: PGM=<filename>
Error Response: 1, 7

Parameters:

<filename> = None (Default)

Case sensitive file name used for firmware upgrade [String]

RAL

Description: Displays or sets the input low power level threshold for the A: side.

Q Query: RAL
Response: RAL=<Threshold>
Error Response: 1, 7

C Command: RAL=<Threshold>
Response: RAL=<Threshold>
Error Response: 1, 7

Parameters:

<Threshold> = -40.0 (Default)
Input low power level threshold value in dBm

RAS

Description: Displays or sets the receive alarm simulation for the A: side unit. Places alarm relay into “faulted” state and sets bit in alarm byte.

Q Query: RAS
Response: RAS=<State>
Error Response: 1, 7

C Command: RAS=<State>
Response: RAS=<State>
Error Response: 1, 7

Parameters:

<State> = 0 (Default)
0 - Off / 1 - On

RAZ

Description: Displays or sets receive alarm suppression for the A: side unit. If suppression is enabled, any alarms configured for suppression by using the CMS command will not cause a major alarm.

Q

Query: RAZ

Response: RAZ=<State>

Error Response: 1, 7

C

Command: RAZ=<State>

Response: RAZ=<State>

Error Response: 1, 7

Parameters:

<State> = 0 (Default)

0 - Off / 1 - On

RBL

Description: Displays or sets the input low power level threshold for the B: side.

Q

Query: RBL

Response: RBL=<Threshold>

Error Response: 1, 7

C

Command: RBL=<Threshold>

Response: RBL=<Threshold>

Error Response: 1, 7

Parameters:

<Threshold> = -40.0 (Default)

Input low power level threshold value in dBm

RBS

Description: Displays or sets the receive alarm simulation for the B: side unit. Places alarm relay into “faulted” state and sets bit in alarm byte.

Q Query: RBS
Response: RBS=<State>
Error Response: 1, 7

C Command: RBS=<State>
Response: RBS=<State>
Error Response: 1, 7

Parameters:

<State> = 0 (Default)
0 - Off / 1 - On

RAZ

Description: Displays or sets receive alarm suppression for the B: side unit. If suppression is enabled, any alarms configured for suppression by using the CMS command will not cause a major alarm.

Q Query: RBZ
Response: RBZ=<State>
Error Response: 1, 7

C Command: RBZ=<State>
Response: RBZ=<State>
Error Response: 1, 7

Parameters:

<State> = 0 (Default)
0 - Off / 1 - On

RDT

Description: Displays the current input L-band power level

Q

Query: RDT

Response: RDT=<Level A><Level B>

Error Response: 1, 7

Parameters:

<Level A/B>

A/B: side unit L-band input power level in dBm [none]

SHL

Description: Display up to 25 Rx 1+1 statistic history entries. Each subsequent call displays up to 25 more entries. Once history end is reached the ‘No New Stats’ string will appear. Issuing the command SHL=0 will reset the statistics log index to the beginning.

Q Query: SHL
 Response: <LNB A Voltage><LNB A Current><LNB B Voltage>
 <LNB B Current><LNB A Power><LNB B Power><10 MHz Level>
 Error Response: 1, 7

C Command: SHL=0
 Response: <LNB A Voltage><LNB A Current><LNB B Voltage>
 <LNB B Current><LNB A Power><LNB B Power><10 MHz Level>Error
 Response: 1, 7

Parameters:

<LNB A Voltage>
 A: side LNB supply voltage
 <LNB A Current>
 A: side LNB supply current
 <LNB B Voltage>
 B: side LNB supply voltage
 <LNB B Current>
 B: side LNB supply current
 <LNB A Power>
 A: side LNB input power
 <LNB B Power>
 B: side LNB input power
 <10 MHz Level>
 Current 10 MHz source level

SHP

Description: Display or configure the data collection period for statistics.

Q Query: SHP
Response: SHP=<Period>
Error Response: 1, 7

C Command: SHP=<Period>
Response: SHP=<Period>
Error Response: 1, 7

Parameters:

<Period>

Period of data collection [1 to 1440 minutes] If Period is selected to be 0 statistic collection will be disabled.

SHZ

Description: Clear the statistics history of the unit.

C Command: SHZ
Response: stat log cleared
Error Response: None

VAH

Description: Display or configure the high voltage threshold for the A: side unit.

Q Query: VAH
Response: VAH=<Threshold>
Error Response: 1, 7

C Command: VAH=<Threshold>
Response: VAH=<Threshold>
Error Response: 1, 7

Parameters:

<Threshold> = 24 (Default)

Input high voltage threshold value in VDC [10.0 to 25.0]. This value must be greater than the input voltage low threshold value.

VAL

Description: Display or configure low voltage threshold for the A: side unit.

Q Query: VAL
Response: VAL=<Threshold>
Error Response: 1, 7

C Command: VAL=<Threshold>
Response: VAL=<Threshold>
Error Response: 1, 7

Parameters:

<Threshold> = 15 (Default)

Input low voltage threshold value in VDC [10.0 to 25.0]. This value must be less than the input voltage high threshold value.

VBH

Description: Display or configure the high voltage threshold for the B: side unit.

Q Query: VBH
Response: VBH=<Threshold>
Error Response: 1, 7

C Command: VBH=<Threshold>
Response: VBH=<Threshold>
Error Response: 1, 7

Parameters:

<Threshold> = 24 (Default)

Input high voltage threshold value in VDC [10.0 to 25.0]. This value must be greater than the input voltage low threshold value.

VBL

Description: Display or configure low voltage threshold for the B: side unit.

Q Query: VBL
Response: VBL=<Threshold>
Error Response: 1, 7

C Command: VBL=<Threshold>
Response: VBL=<Threshold>
Error Response: 1, 7

Parameters:

<Threshold> = 15 (Default)

Input low voltage threshold value in VDC [10.0 to 25.0]. This value must be less than the input voltage high threshold value.

TME

Description: Displays or configures the manual internal 10MHz source switch. This command should be used for troubleshooting or trimming purposes only. When maintenance is complete, source selection should be turned back to automatic by issuing a TME=0 command.

Q Query: TME
Response: TME=<Mode>
Error Responses: 1, 7

C Command: TME=<Mode>
Response: TME=<Mode>
Error Responses: 1, 7

Parameter:

- <Mode> = 0 (Default)
- 0 - Automatic Selection
- 1 - Internal 10 MHz #1
- 2 - Internal 10 MHz #2

TML

Description: Displays the current 10 MHz source level.

Q Query: TZO
Response: TZO= <Source>, <Level>

Parameter:

- <Source> = Modem (Default)
Current active 10 MHz source. Can be (Modem, External, Internal1, Internal2)
- <Level> = None (Default)
Measured reference level in dBm

TZO

Description: Displays or configures the time zone offset. TZO can be set from -12 to 14 hours.

Q Query: TZO
Response: TZO=<±hh:mm>
Error Responses: 1, 7

C Command: TZO=<±hh:mm>
Response: TZO=<±hh:mm>
Error Responses: 1, 7

Parameter:

<±hh:mm>

Time zone offset [hh = hours, mm = minutes]. This parameter can assume positive or negative values.

A P P E N D I X

E

COMPONENT SPECIFICATIONS AND REFERENCE DRAWINGS

This chapter contains component specifications and outline drawings for the Terrasat Communications, Inc. line of RXR Series Receive Redundant (Rx 1+1) Systems.

Reference Drawings

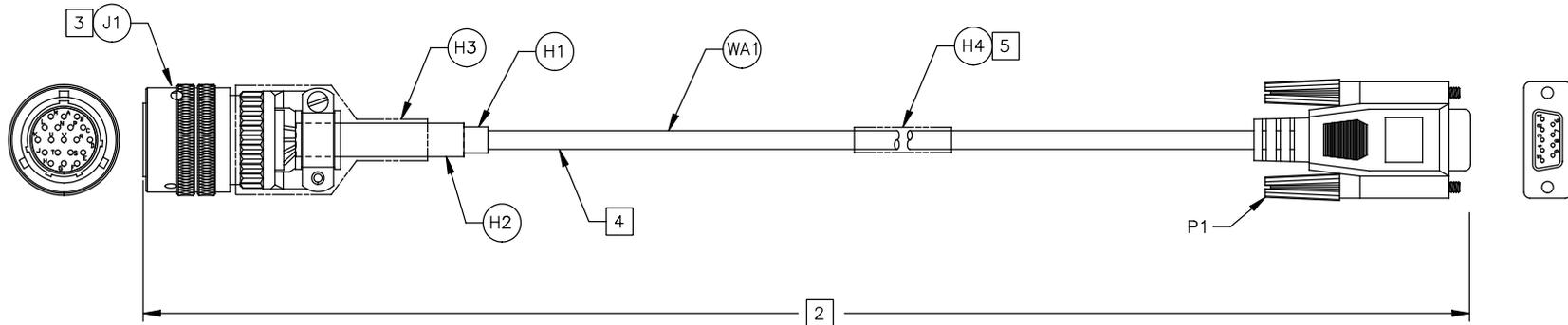
Outline drawings are subject to change without notice. To ensure that the latest information is available, contact Terrasat.

DWG.# SH REV.

REVISIONS

REV.	DESCRIPTION	DATE	APPROVED
A	RELEASE PER ECO# 11970	12/05/06	J. HECHT

WIRING SCHEDULE	
FROM (WA1, P1)	TO (J1)
PIN-2	PIN-E
PIN-3	PIN-D
PIN-5	PIN-F



NOTES: (UNLESS OTHERWISE SPECIFIED)

1. FOR ALL ITEMS, USE PART NUMBER INDICATED OR EQUIVALENT.

2 DASH NUMBER EQUALS CABLE LENGTH IN FEET.

3 J1, PINS (A-C & G-V) ARE NOT USED.

4 CUT THE DB9 CONNECTOR AT THIS END AND STRIP THE CABLE OUTER JACKET TO THE DESIRED LENGTH AND CUT THE WIRES FROM PIN 1, PIN 4, PIN 6, PIN 7, PIN 8 & PIN 9.

5 IDENTIFY CABLE WITH TERRASAT COMMUNICATION INC PART NUMBER AND CURRENT REVISION LEVEL ON LABEL (H4) AND WRAP LABEL AROUND CABLE APPROXIMATELY WHERE SHOWN.

6. FINISHED PART MUST BE RoHS COMPLIANT.

ITEM#	QTY	TERRASAT PART#	DESCRIPTION	MANUF. PART#
H4	1	395-10893-0001	LABEL, SELFFLAMINATING, 1.0 X 2.25 X 0.75	TYCO/RAYCHEM, SB100225WE5
H3	2.00"	557-10662-0003	TUBING, HEAT SHRINK, POLYOLEFIN, BLACK, 1.25	DABURN, DAFLEX SM278
H2	1.75"	557-10662-0004	TUBING, HEAT SHRINK, POLYOLEFIN, BLACK, 0.75	DABURN, DAFLEX SM278
H1	2.00"	557-10662-0002	TUBING, HEAT SHRINK, POLYOLEFIN, BLACK, 5/16	DABURN, DAFLEX SM278
WA1	1	550-10883-XXXX	CABLE ASSY, DB9 FEMALE TO DB9 FEMALE	ASSMANN AKXXX-X-R
J1	1	533-20740-0001	CONN, CIRC, STRAIGHT PLUG, SHELL SIZE 14, 19P	AMPHENOL, PT06E-14-19P(476)

PARTS LIST

MATERIAL	SEE NOTES	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES	TERRASAT COMMUNICATIONS, INC.	
FINISH	SEE NOTES	TOLERANCES ARE: XX ±.01, XXX ±.005	FABRICATION DRAWING, CABLE ASSY, 19P STRAIGHT PLUG TO DB9F	
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		APPROVED BY: J. HECHT	DATE: 12/05/06	
		CHANGED BY:	DATE:	
		CHECKED BY:	DATE:	
		DD NOT SCALE DRAWING	SCALE: 1:1	
		FILE: 210121A	DR# FBD-21012-XXXX	SHEET 1 OF 1

Figure E.1 Fabrication Drawing, FBD-21012-XXXX, Rev A

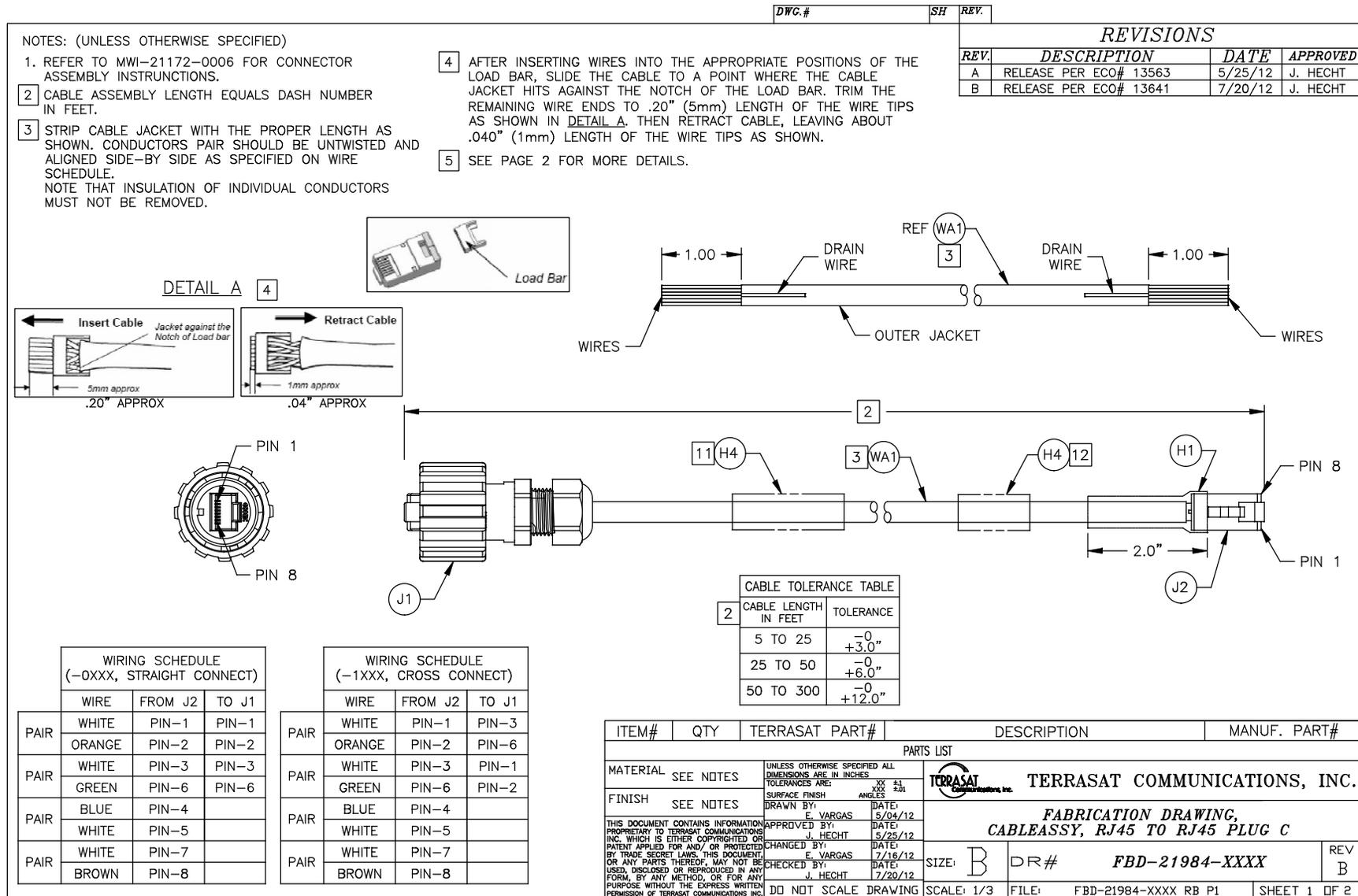


Figure E.2 Fabrication Drawing, FBD-21984-XXXX, Rev B, page 1 of 2

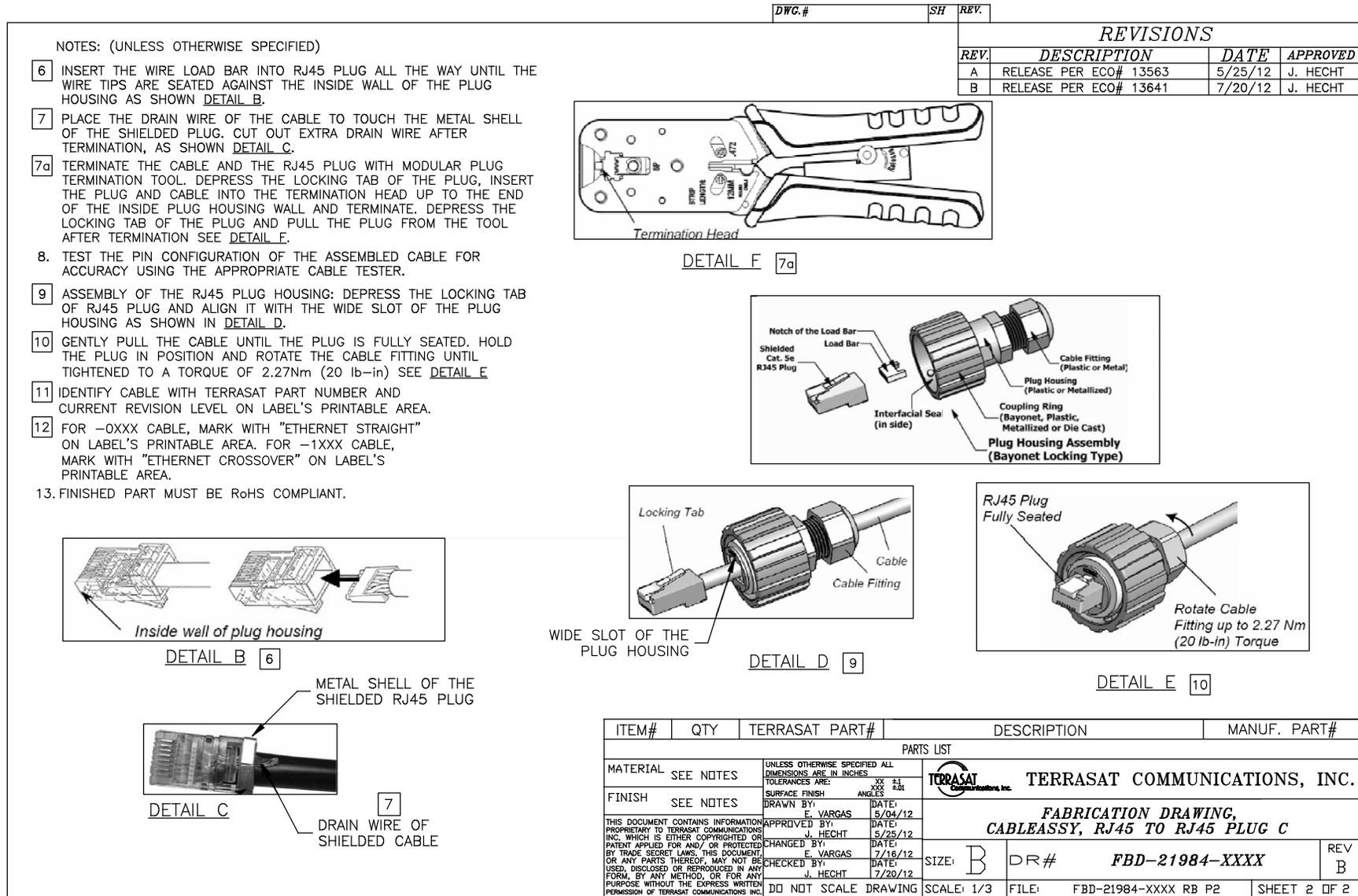


Figure E.3 Fabrication Drawing, FBD-21984-XXXX, Rev B, page 2of 2

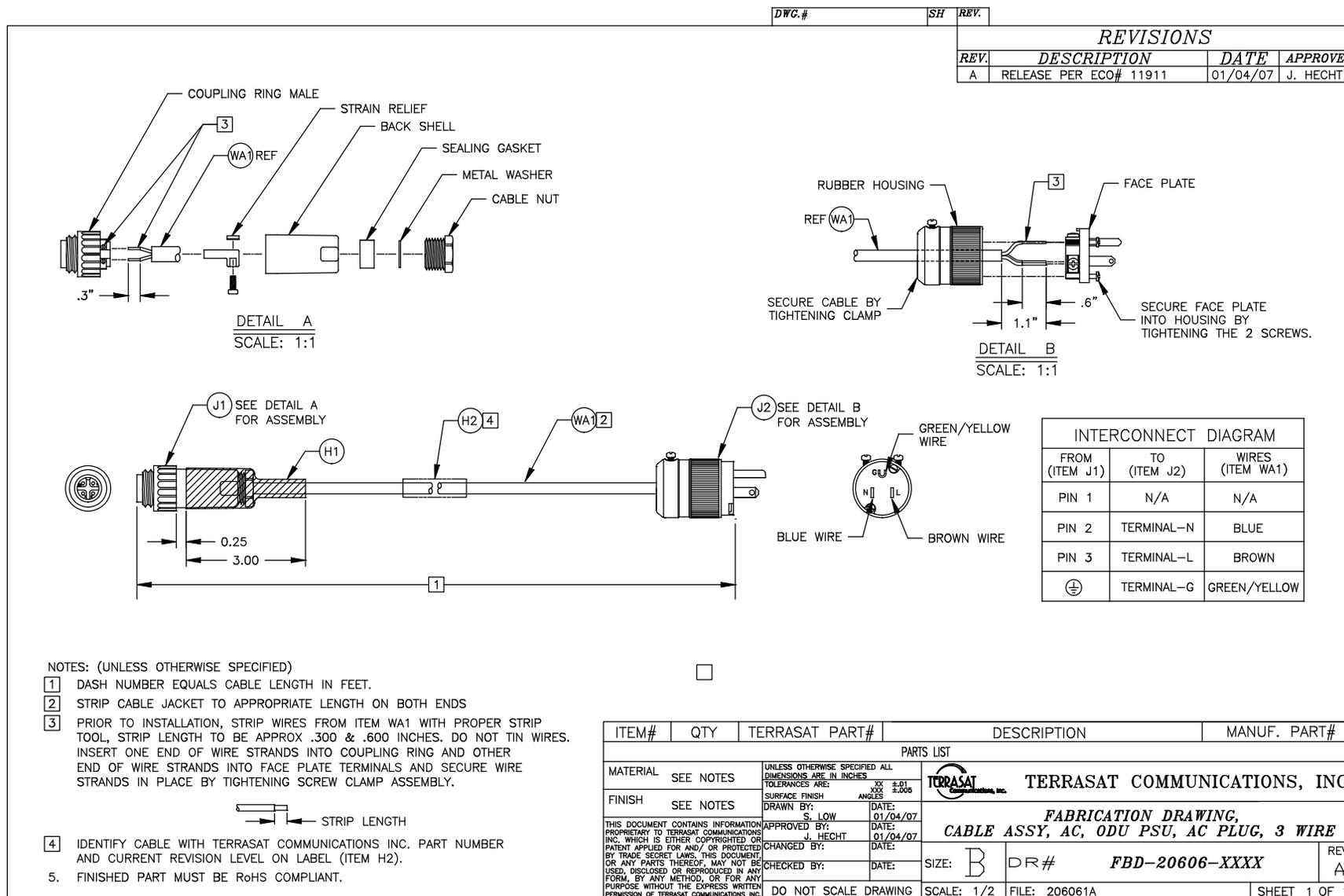


Figure E.4 Fabrication Drawing, FBD-20606-XXXX, Rev A

DWG.# SH REV.

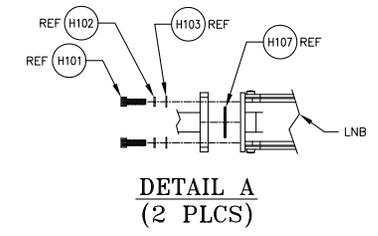
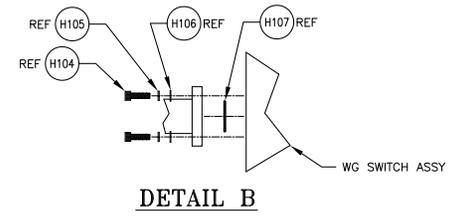
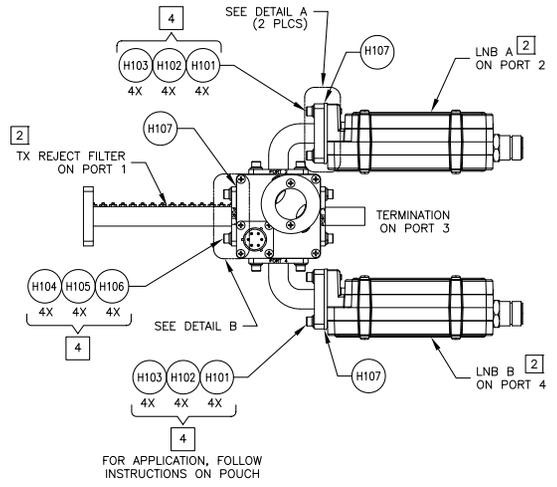
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	RELEASED PER ECO# 17230	3/10/21	J. HECHT
B	RELEASED PER ECO# 17419	7/2/21	J. HECHT

- NOTES: (UNLESS OTHERWISE SPECIFIED)
- ITEM NUMBERS ON THIS DRAWING ARE EQUAL TO REFERENCE DESIGNATORS ON BILL OF MATERIAL.
 - WG SWITCH ASSY, LNB's AND REJECT FILTER ARE SHOWN FOR REFERENCE ONLY. THEY ARE NOT PART OF THE ACCESSORY KIT.
 - INSTALLATION PROCEDURES:
 - STEP 1. INSTALL LNB's TO WG SWITCH ASSY WITH HARDWARE (H101, H102 & H103) AS SHOWN. MAKE SURE TO INSTALL O-RING (H107) AS SHOWN IN DETAIL A BEFORE INSTALLING THE LNB's.
 - STEP 2. INSTALL TX REJECT FILTER IF USED OR WAVEGUIDE COMPONENT IF USED TO IBUC WAVEGUIDE OUTPUT WITH HARDWARE (H104, H105 & H106). MAKE SURE TO INSTALL THE O-RING (H107) BEFORE INSTALLING THE TX REJECT FILTER OR WAVEGUIDE COMPONENT.
 - STEP 3. SEAL THE N-TYPE CONNECTIONS ON THE INTERFACE BOX AND LNB's WITH THE PROVIDED SEALANT (H108). FOR APPLICATION, FOLLOW THE INSTRUCTIONS ON THE ENVELOPE. SEE SHEET 2 FOR DETAIL.
 - LUBRICATE HARDWARE WITH THE PROVIDED ANTI-SEIZE, LUBRICANT (H115). FOR APPLICATION, FOLLOW THE INSTRUCTIONS ON THE POUCH. THE LOCATION OF THE HARDWARE IS ON SHEET 1.

PARTS LIST

- ⊙ H101 SCREW, M4 X 0.7MM, PHIL PH, 12MM, SS (9X)
- ⊙ H102 LOCK WASHER, SS, M4 (9X)
- ⊙ H103 FLAT WASHER, SS, M4 (9X)
- ⊙ H104 SCREW, SOCKET CAP, #6-32 X 1/2", SS (5X)
- ⊙ H105 LOCK WASHER, SS, .141 X.239 X.025 (5X)
- ⊙ H106 FLAT WASHER, #6, .143 X .267 X .016 ,SS (5X)
- H107 GASKET, WAVEGUIDE, WR229, HALF (3X)
- H108 CONNECTOR SEALANT, 10" STRIP IN ENVELOPE (5X)
- H109 CDROM, IBUC MANUAL (1X)
- H115 ANTI-SEIZE LUBRICANT 4g, POUCH





ITEM#	QTY	TERRASAT PART#	DESCRIPTION	MANUF. PART#
PARTS LIST				
MATERIAL	SEE NOTES	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN INCHES	TERRASAT COMMUNICATIONS, INC.	
FINISH	SEE NOTES	TOLERANCES ARE: .XX ANGLES SURFACE FINISH: ✓		
DRAWN BY: E. VARGAS		DATE: 3/06/21	INSTALLATION DRAWING, Kit, RXR, Accessory, 1:1, Ku	
APPROVED BY: J. HECHT		DATE: 3/10/21		
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		CHECKED BY: J. HECHT	DATE: 7/2/21	
DO NOT SCALE DRAWING			SCALE: NONE	FILE: IND-23290-0002 RB P1
				DR# IND-23290-0002
				REV B
				SHEET 1 OF 2

Figure E.5 Example Installation Drawing, IND-23290-0002, Rev A, page 1 of 2

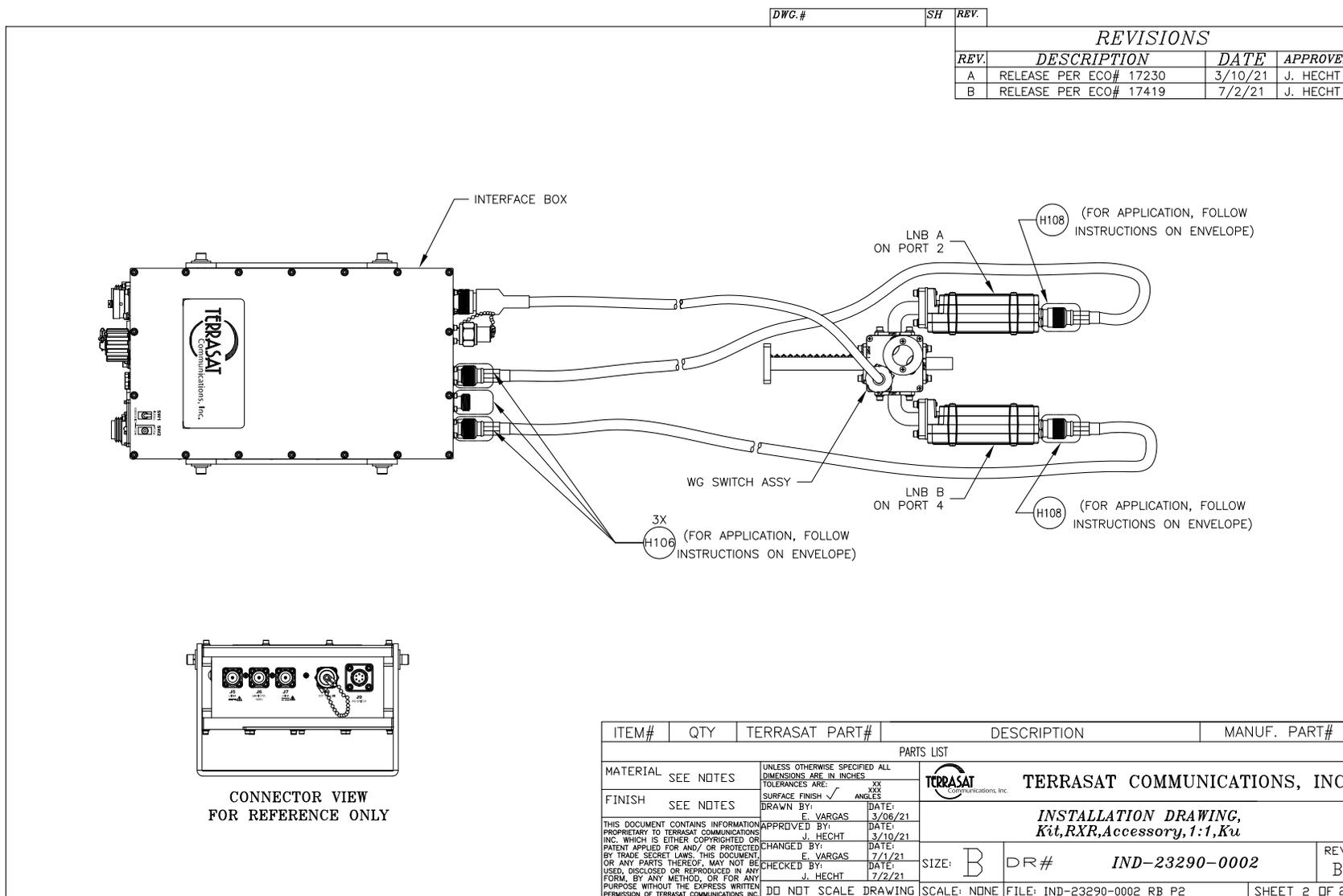


Figure E.6 Example Installation Drawing, IND-23290-0002, Rev A, page 2 of 2

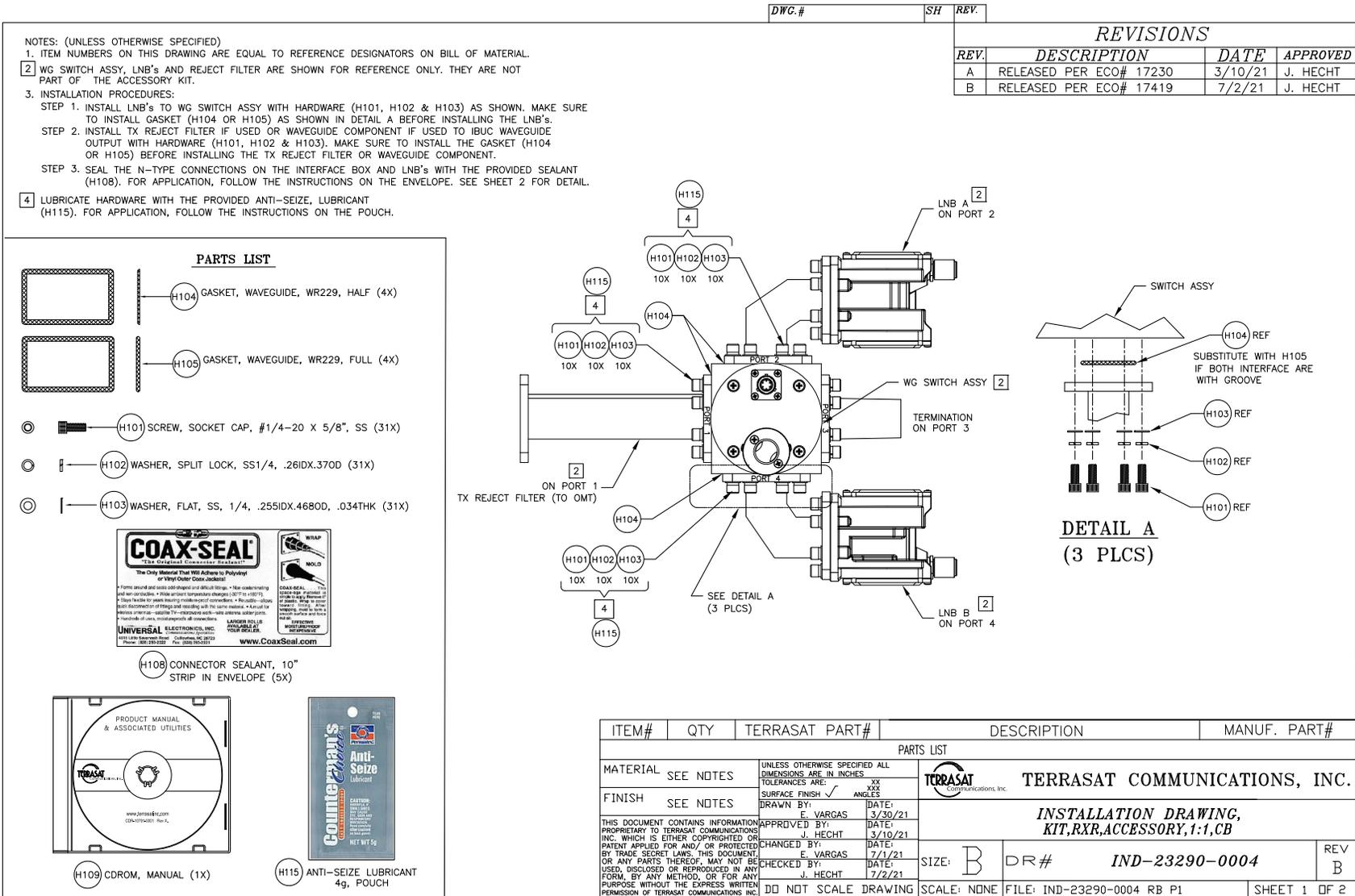


Figure E.7 Example Installation Drawing, IND-23290-0004, Rev A, page 1 of 2

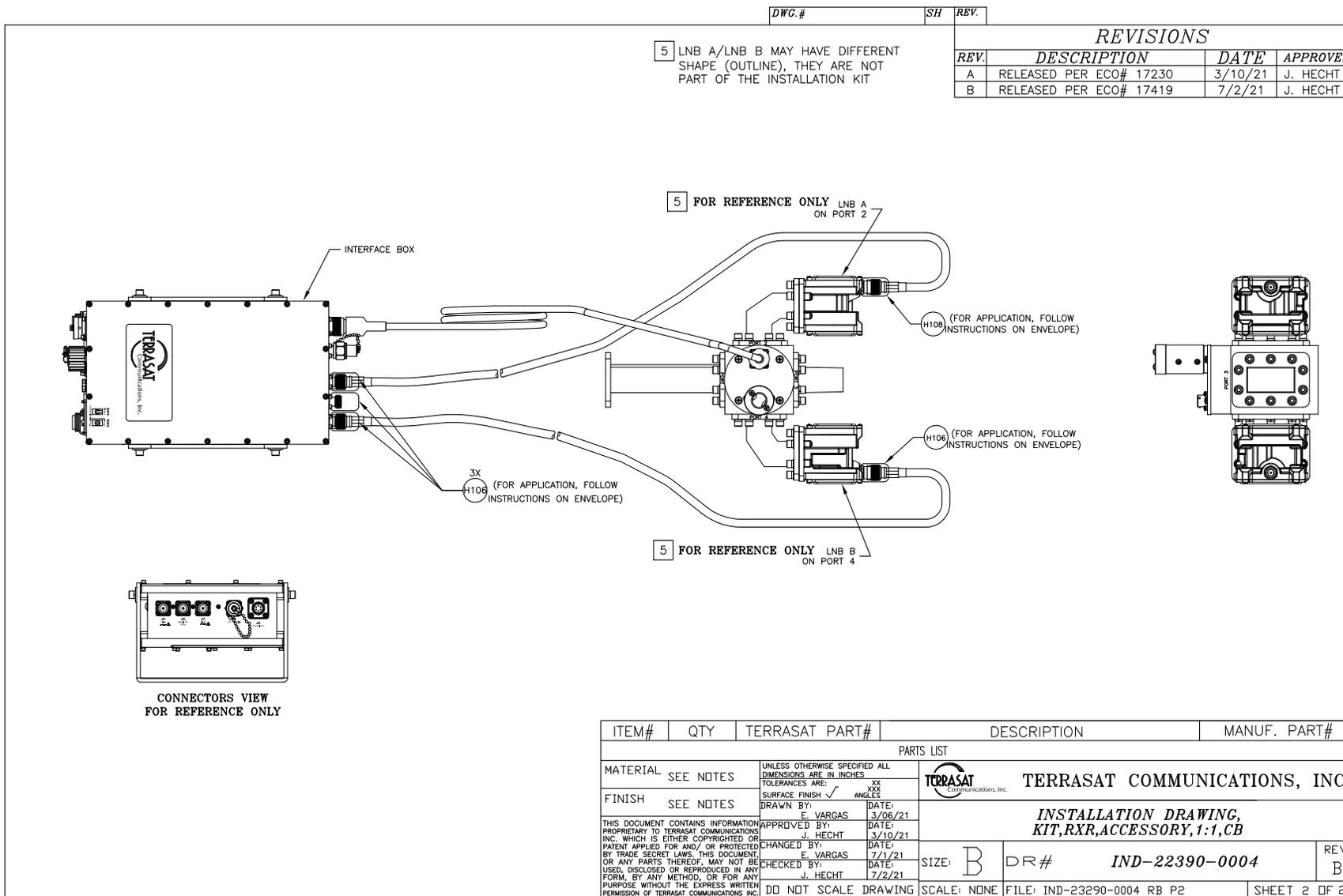


Figure E.8 Example Installation Drawing, IND-23290-0004, Rev A, page 2 of 2

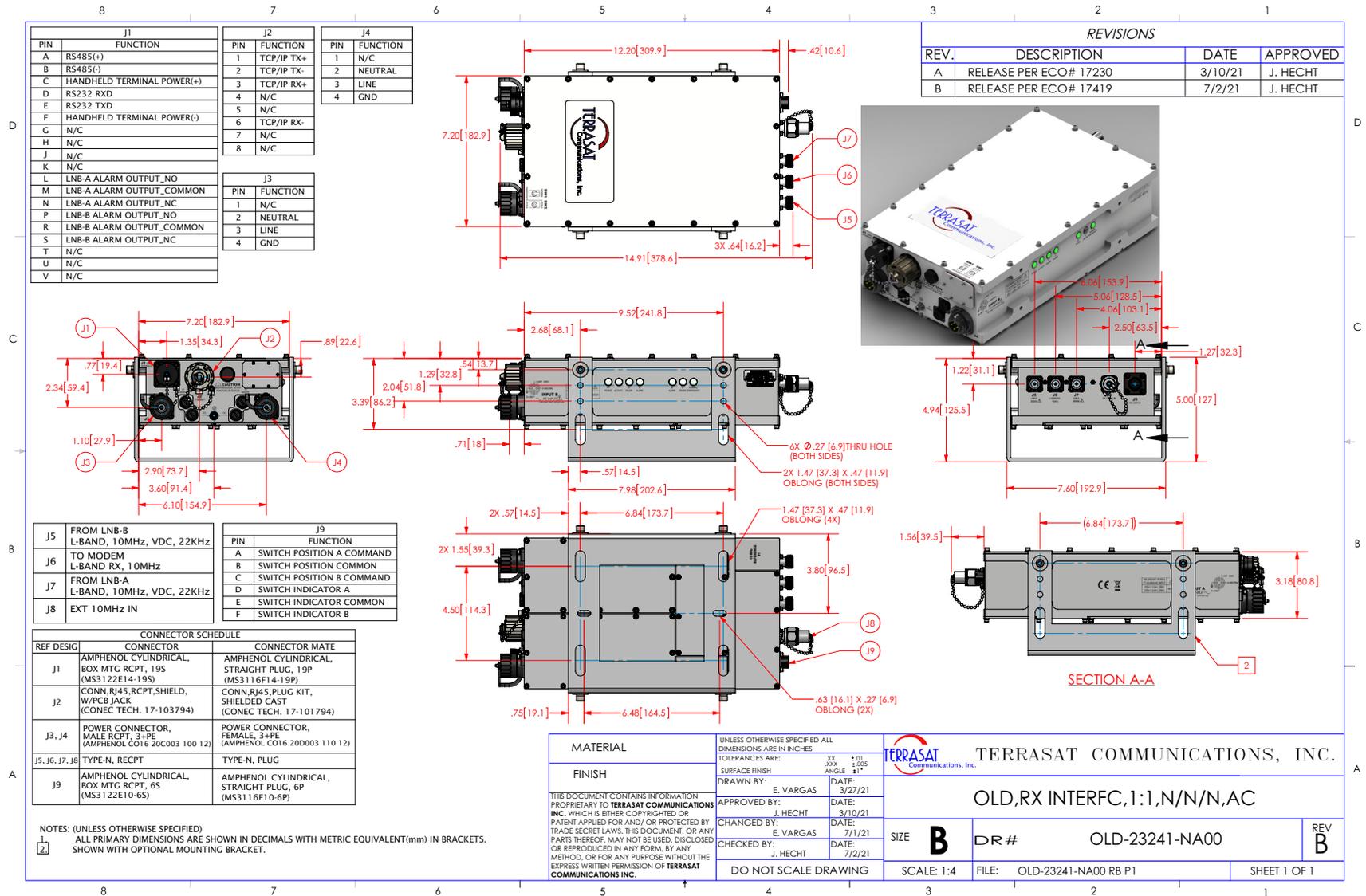


Figure E.9 Outline Drawing, OLD-23241-NA00, Rev A

Data Sheets

Refer to the datasheets in Terrasat, Inc. web site: www.terrasatinc.com.

Product specifications are subject to change without notice. To ensure that the latest information is available, contact Terrasat.

F

USING PuTTY

This appendix describes how to use an RS232 connection and PuTTY to communicate with your Terrasat, Inc. unit or system.

Establishing a PuTTY Session

To communicate with the unit using an RS232 connection and PuTTY,

12. Connect a cable to a serial port of a PC and the M&C connector of the unit.

Refer to the fabrication drawing in [Figure E.1](#) on [page E-2](#) for information about making a 19-in to DB9F cable.

13. From the Windows Start menu, search for PuTTY in the search bar.

A PuTTY session configuration window will appear, as shown in [Figure F.1](#). In this initial window the user can configure various types of connections. For RS232 interface select **Serial** from the “Connection Type” radio buttons.

Note: Observe in [Figure F.1](#) that multiple session configurations can be saved and/or loaded to facilitate user interaction with multiple systems.

- To save a configured session simply type any appropriate name into the “Saved Sessions” string box and then click **Save**.
- To load a previously configured session, select any saved session from the available options and click Load. Now all configurations for this session are loaded into PuTTY and the user should simply click **Open**, to open a new session.

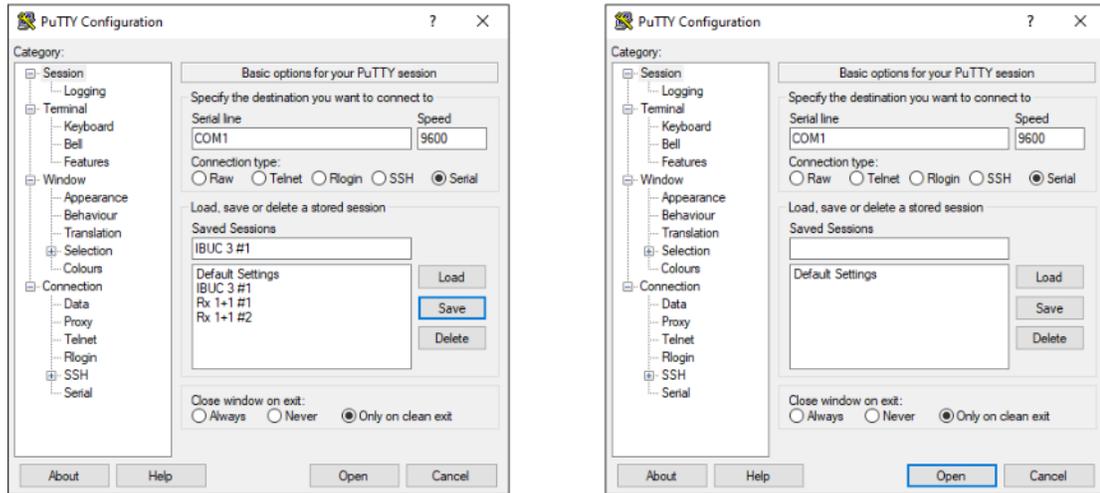


Figure F.1 New Session Window

14. Once **Serial** connection type is selected, navigate through the side bar to the **Terminal** menu.
15. In the “Line discipline” section select **Force on** to both “Local echo” and “Local line editing” options as shown in [Figure F.2](#)

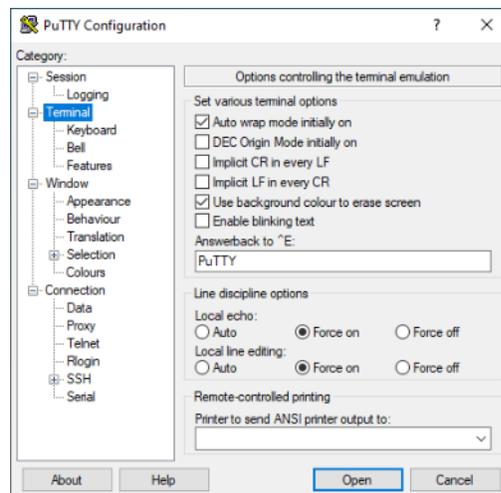


Figure F.2 Terminal Options Window

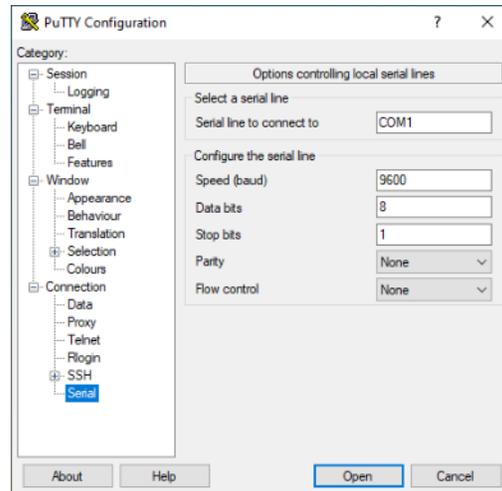


Figure F.3 Serial Options Window

16. Once more, through the side bar, navigate to the **Serial** menu. Configure the Serial interface to match your units parameters, see [Figure F.3](#).

17. Default options for Terrasat units are as follows,

- Bits per second: 9600
- Data bits: 8
- Parity: None
- Stop bits: 1
- Flow control: None

18. Once all parameters are configured, click Open to open a new session with all of the previous configurations.

19. In PuTTY’s session window, a blinking cursor indicates that the session is active.

Test the connection by pressing Enter. You should receive an “error=Please enter valid password” message and the `RX1+1>` prompt as shown in [Figure F.4](#).

Note:

The format of the responses will vary according to whether the message response mode is set to verbose (the default) or terse. The figures in this document show verbose mode (indicated by the `RX1+1>` prompt). In verbose mode, the output is formatted for easier viewing. To change to terse mode, type `C4V=0` at the command line. To return to verbose mode, type `C4V=1` at the command line.

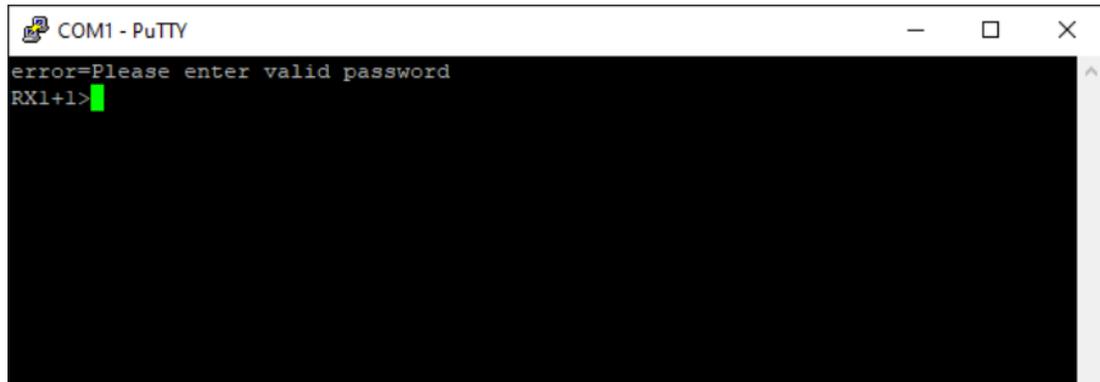


Figure F.4 Invalid Password Error Message

20. At the `RX1+1>` prompt, type `CPE=1234` and press Enter. This command logs you in to the Rx 1+1.
If you have changed the password from the default 1234, type that password instead.
21. Your login was successful if you receive a blinking prompt in the session window. If you receive an “Error=invalid value” message such as the one in [Figure F.5](#), your login was not successful. Check the password value and try again.

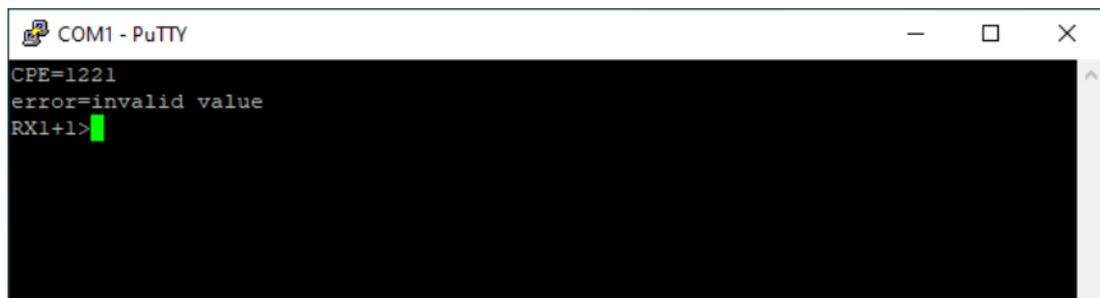
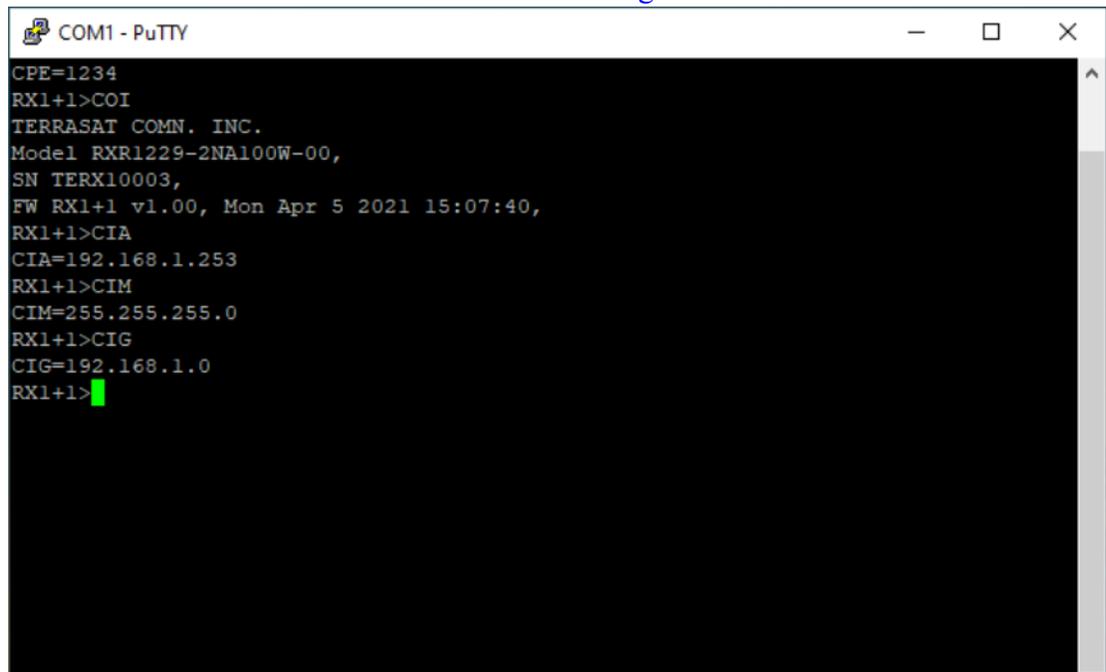


Figure F.5 Invalid Value Error Message

22. The Rx 1+1 is now ready to accept commands. An example session begins with [Step 23](#).
23. Type `COI` and then press Enter.
This command displays general information about the Rx 1+1 such as the serial number and firmware version level.
24. Type `CIA` and then press Enter.
This command displays the IP address of the unit.
25. Type `CIM` and then press Enter.
This command displays the IP netmask.
26. Type `CIG` and then press Enter.
This command displays the IP Gateway address of the unit.

Your screen should resemble the one shown in [Figure F.6](#).



```
COM1 - PuTTY
CPE=1234
RX1+1>COI
TERRASAT COMN. INC.
Model RXR1229-2NA100W-00,
SN TERX10003,
FW RX1+1 v1.00, Mon Apr 5 2021 15:07:40,
RX1+1>CIA
CIA=192.168.1.253
RX1+1>CIM
CIM=255.255.255.0
RX1+1>CIG
CIG=192.168.1.0
RX1+1>
```

Figure F.6 Active PuTTY session Window

27. To end the PuTTY session, simply close the session window.

The system will prompt you to confirm that you want to end the session. If this is correct, click **Ok**. If not, click **Cancel**.

G

GLOSSARY

Glossary of Terms

The following acronyms are used in Terrasat Communications, Inc. documentation:

° C	Degrees Celsius
° K	Degrees Kelvin
1RU	One Rack Unit (1.75 in.)
µs	Microsecond
AC	Alternating Current
AGC	Automatic Gain Control
ALC	Automatic Level Control
AWG	American Wire Gauge
ATE	Automated Test Equipment
ATP	Acceptance Test Procedure
BER	Bit Error Rate
BUC	Block Upconverter
CSM	Continuous Signal Mode
CW	Continuous Wave
DAB	Digital Audio Broadcasting
dB	Decibel
dB/oct	Decibel per Octave
dBc	Decibel Below Carrier
dBm	Decibel referenced to 1 milliwatt
DC	Direct Current

DCE	Data Communication Equipment
DRO	Dielectric Resonator Oscillator
DTE	Data Terminal Equipment
DVM	Digital voltmeter
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
ERM	<u>E</u> lectromagnetic Compatibility and <u>R</u> adio Spectrum <u>M</u> atters
fr	Frequency
FSK	Frequency Shift Keying
FSS	Fixed Satellite Services
F/W	Firmware
g	Gravity
GHz	Gigahertz
GUI	Graphical User Interface
HHT	Hand-held Terminal
HPA	High-Power Amplifier
HPC	High-Power Converter
HTTP	Hypertext Transfer Protocol
Hz	Hertz
I/O	Input/Output
IBUC	Intelligent Block Upconverter
IDU	Indoor Unit
IF	Intermediate Frequency
IFL	Interfacility Link
IP	Internet Protocol
kg	Kilogram
LNB	Low Noise Block Converter
LO	Local Oscillator
M&C	Monitor and Control
max	Maximum
MCPC	Multiple Carrier Per Channel
MHz	Megahertz
MIB	Management Information Base

min	Minimum
ms	Millisecond
MTBF	Mean Time Between Failure
MUC	Microwave Upconverter
ns	Nanosecond
OCXO	Oven-controlled Quartz Oscillator
ODU	Outdoor Unit
OMT	Orthogonal Mode Transducer
p-p	Peak to Peak
P1dB	Power at the 1dB Compression Point
PFC	Power Factor Corrected
PLDRO	Phase-Locked Dielectric Resonator Oscillator
PLL	Phase-Locked Loop
PLLNBC	Phase-Locked Low-Noise Block Converter
PLO	Phase Locked Oscillator
ppb	Parts Per Billion
ppm	Parts Per Million
PSUI	Power Supply Unit
Pwr	Power
QTP	Qualification Test Procedure
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
RFT	Radio Frequency Transceiver
RH	Relative Humidity
RMS	Root Mean Square
RTC	Real Time Clock
RTS/CTS	Request to Send/Clear to Send
Rx	Receive
s	Second
SCPC	Single Carrier Per Channel
SNG	Satellite News Gathering
SNMP	Simple Network Management Protocol
SSB	Single Side Band

SSPA	Solid-State Power Amplifier
TCP/IP	Transfer Control Protocol/Internet Protocol
TRF	Transmit Reject Filter
Tx	Transmit
UDP	User Datagram Protocol
UPC	Upconverter
UPS	Uninterruptible Power Supply
VAC	Volts Alternating Current
VDC	Volts Direct Current
VSAT	Very Small Aperture Terminal
VSWR	Voltage Standing Wave Ratio
VVA	Variable Voltage Attenuator
W	watts
WG	Waveguide

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