



LPOD-R

Outdoor Amplifier / Block Up Converter (BUC)

LPOD-R PS .5

(Running FW-0020841 firmware only – see MN-LPODR Rev. 0 for
LPOD-R PS .5 running FW-0020765 firmware)

LPOD-R PS 1, PS 1.5

(Running FW-0020880 firmware)

Installation and Operation Manual

Part Number MN-LPODR / CD-LPODR
Revision 3

IMPORTANT NOTE: The information contained in this document supersedes all previously published information regarding this product. Product specifications are subject to change without prior notice.

Part Number MN-LPODR / CD-LPODR Revision 3

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Errata A for MN-LPODR Rev 3

Comtech EF Data Documentation Update

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LPOD-R PS 1, PS 1.5

(Running FW-0020880 firmware)

Installation and Operation Manual

Part Number MN-LPODR / CD-LPODR

Revision 3

Subject: Chapter 1, Section 1.4.4, Power Supply, 2nd Bullet

Errata Part Number: ER-LPODR-EA3 *(Errata documents are not subject to revision.)*

Comments: The new information will be included in the next released revision of the manual.

Section 1.4.4 Power Supply

The LPOD-R features a power supply that is power factor corrected. It supplies several voltages necessary for the unit to operate:

- The 10V power supply output state is controlled by circuitry within the RF module. If the RF module does not have the –5.8V supply for any reason, it will not allow the 10V power supply to turn on. This protects the power transistors within the RF module from failure due to improper power supply sequencing.
- The +24V output powers the cooling fans and is the source of power for waveguide switching when the SSPA is used in redundant configurations.
- The +5.8V, -5.8V, +7.8V and +13.5V outputs are used to operate the M&C board and other overhead functions.

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PREFACE

About this Manual

This manual provides installation and operation information for the Comtech EF Data LPOD-R family of Outdoor Amplifiers / Block Up Converter (BUCs):

- LPOD-R PS .5 running Firmware FW-0020841;
- LPOD-R PS 1 or PS 1.5 running Firmware FW-0020880.



The LPOD-R PS .5 running Firmware FW-0020765 is documented in Revision 0 of this manual.

This document is intended for the persons responsible for the operation and maintenance of the LPOD-R.

Related Documents

- Comtech EF Data CLC-10 Handheld Terminal M&C Accessory for LPOD or SPOD User's Guide (CEFD P/N MN-CLC10)
- Comtech EF Data LPOD*net* M&C Netbook Accessory for LPOD or SPOD Operation Manual (CEFD P/N MN-LPODNET)
- Comtech EF Data RF Control – Transceiver/Amplifier M&C Utility User's Guide (CEFD P/N MN-CRFC)

Disclaimer

Comtech EF Data has reviewed this manual thoroughly in order to provide an easy-to-use guide to this equipment. All statements, technical information, and recommendations in this manual and in any guides or related documents are believed reliable, but the accuracy and completeness thereof are not guaranteed

or warranted, and they are not intended to be, nor should they be understood to be, representations or warranties concerning the products described. Further, Comtech EF Data reserves the right to make changes in the specifications of the products described in this manual at any time without notice and without obligation to notify any person of such changes.

If there are any questions regarding this equipment or the information in this manual, please contact Comtech EF Data Product Support.

Conventions and References

Patents and Trademarks

See all of Comtech EF Data's Patents and Patents Pending at <http://patents.comtechedata.com>.

Comtech EF Data acknowledges that all trademarks are the property of the trademark owners.

Warnings, Cautions, Notes, and References



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



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



A **NOTE:** gives you important information about a task or the equipment.



A **REFERENCE** directs you to important operational information or details furnished elsewhere, either in the manual or in adjunct Comtech EF Data publications.

Examples of Multi-Hazard Notices



Recommended Standard Designations

Electronic Industries Association (EIA) designations supersede Recommended Standard (RS) designations. Reference to the old RS designations may appear where it might concern actual text (e.g., RS-232) displayed on the product panels and on screens or pages in the Serial Remote or HTTP (Web Server) Interfaces. All other references in the manual refer to EIA designations.



CAUTION

It is important that you review and understand the Safety and Compliance information that follows.

Safety and Compliance

Electrical Safety and Compliance



CAUTION

NEUTRAL FUSING – DOUBLE POLE/NEUTRAL FUSING IS USED ON THE PRIME POWER SUPPLY INPUT.

This equipment has been designed to minimize exposure of personnel to hazards. For further information, contact Comtech EF Data Product Support. The operators and technicians must:

- Know how to work around, with, and on high voltage equipment.
- Exercise every precaution to ensure personnel safety.

- Exercise extreme care when working near high voltages.
- Be familiar with the warnings presented in this manual.

Installation Guidelines Regarding Power Line Quality



Comtech EF Data has become familiar with the varying quality of the AC power grid around the world. Observing the following installation guidelines should help ensure a reliable installation.

- **Surge suppression** – High voltage surges can cause failure of the power supply. These surges are typically caused by circuit switching on the main AC power grid, erratic generator operation, and also by lightning strikes. While the LPOD-R does have built in surge suppression, if the unit is to be installed in a location with questionable power grid quality, Comtech EF Data recommends installation of additional power conditioning/surge suppression at the power junction box.
- **Grounding** – The LPOD-R provides a grounding terminal. This is provided to allow you to ground the LPOD-R to the antenna's grounding network. All components installed at the antenna should be grounded to a common grounding point at the antenna.
- **Electrical welding** – If welding needs to take place at the antenna, disconnect all cables from the LPOD-R except for the ground wire. Cap all RF connections with terminations. This will prevent damage to the input/output circuitry of the LPOD.
- **Lightning** – Lightning strikes on or around the antenna will generate extremely high voltages on all cables connected to the LPOD. Depending on the severity of the strike, the LPOD's internal surge protection combined with the recommended external suppression may protect the LPOD's power supply. However, if the installation will be in an area with a high probability of lightning strikes, Comtech EF Data recommends the installation of surge suppression on the RF and IF cables. One source of these suppressors is PolyPhaser (www.polyphaser.com).

Product Support

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

Comtech EF Data Headquarters

<http://www.comtechefdata.com>

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Warranty Policy

Comtech EF Data products are warranted against defects in material and workmanship for a specific period from the date of shipment, and this period varies by product. In most cases, the warranty period is two years. During the warranty period, Comtech EF Data will, at its option, repair or replace products that prove to be defective. Repairs are warranted for the remainder of the original warranty or a 90 day extended warranty, whichever is longer. Contact Comtech EF Data for the warranty period specific to the product purchased.

For equipment under warranty, the owner is responsible for freight to Comtech EF Data and all related customs, taxes, tariffs, insurance, etc. Comtech EF Data is responsible for the freight charges only for return of the equipment from the factory to the owner. Comtech EF Data will return the equipment by the same method (i.e., Air, Express, Surface) as the equipment was sent to Comtech EF Data.

All equipment returned for warranty repair must have a valid RMA number issued prior to return and be marked clearly on the return packaging. Comtech

EF Data strongly recommends all equipment be returned in its original packaging.

Comtech EF Data Corporation's obligations under this warranty are limited to repair or replacement of failed parts, and the return shipment to the buyer of the repaired or replaced parts.

Limitations of Warranty

The warranty does not apply to any part of a product that has been installed, altered, repaired, or misused in any way that, in the opinion of Comtech EF Data Corporation, would affect the reliability or detracts from the performance of any part of the product, or is damaged as the result of use in a way or with equipment that had not been previously approved by Comtech EF Data Corporation.

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

The warranty does not cover damage or loss incurred in transportation of the product. The warranty does not cover replacement or repair necessitated by loss or damage from any cause beyond the control of Comtech EF Data Corporation, such as lightning or other natural and weather related events or wartime environments.

The warranty does not cover any labor involved in the removal and or reinstallation of warranted equipment or parts on site, or any labor required to diagnose the necessity for repair or replacement.

The warranty excludes any responsibility by Comtech EF Data Corporation for incidental or consequential damages arising from the use of the equipment or products, or for any inability to use them either separate from or in combination with any other equipment or products.

A fixed charge established for each product will be imposed for all equipment returned for warranty repair where Comtech EF Data Corporation cannot identify the cause of the reported failure.

Exclusive Remedies

Comtech EF Data Corporation's warranty, as stated is in lieu of all other warranties, expressed, implied, or statutory, including those of merchantability and fitness for a particular purpose. The buyer shall pass on to any purchaser, lessee, or other user of Comtech EF Data Corporation's products, the aforementioned warranty, and shall indemnify and hold harmless Comtech EF Data Corporation from any claims or liability of such purchaser, lessee, or user based upon allegations that the buyer, its agents, or employees have made additional warranties or representations as to product preference or use.

The remedies provided herein are the buyer's sole and exclusive remedies. Comtech EF Data shall not be liable for any direct, indirect, special, incidental, or consequential damages, whether based on contract, tort, or any other legal theory.

Chapter 1. INTRODUCTION

1.1 Overview

Comtech EF Data's LPOD-R family of Outdoor Amplifiers / Block Up Converters (BUCs) – referred to collectively throughout this manual as the **LPOD-R** – deliver their rated power, guaranteed, to the transmit waveguide flange at the 1 dB compression point. The LPOD-R provides a cost effective to the LPOD, where the full LPOD-R's support of internal 10 M Hz and redundancy is not required.



Figure 1-1. Comtech EF Data LPOD-R Outdoor Amplifiers / BUCs

1.2 Functional Description

The LPOD-R serves as a more reliable replacement for Traveling Wave Tube (TWT) amplifiers in satellite communications. The compact size and weight of the LPOD-R lends itself to any installation with limited available mounting space. These include ship-borne antenna systems, small “flyaway” systems, and Satellite News Gathering (SNG) installations.

As shown in **Figure 1-1**, Comtech EF Data's LPOD-R is available in three models: the PS .5, the PS 1, and the PS 1.5. Each LPOD-R consists of a CEFD SSPA module

with the **Monitor/Control Processor (MCP)**, a power supply, and a fan assembly. The amplifier features a Comtech EF Data low loss combining technique and MCP-based temperature-versus-gain compensation.

1.3 Features

1.3.1 The Solid-State Advantage

The LPOD-R is constructed with highly reliable gallium arsenide field-effect transistors (GaAs FETs). With third-order intermodulation products that are 4 to 6 dB better than TWT ratings, the CEFD unit replaces TWTs with saturated power levels of up to twice the LPOD-R's rated output. The LPOD-Rs also provide mean time between failures (MTBF) that is four to five times greater than the typical TWT MTBF.

1.3.2 “Smart BUC” Functionality

The LPOD-R offers full 13.75 to 14.5 GHz Ku-Band and 5850 to 6725 MHz C-Band coverage while supporting industry standard FSK modem/BUC communications, as well as Comtech EF Data proprietary commands.

1.3.3 Enhanced Standard Features

The LPOD-R comes equipped with useful features that other manufacturers offer only as options. Included in the base price are temperature compensation, power monitor, power factor corrected supply, and full remote monitor and control (M&C) capabilities (including Ethernet, FSK, and Comtech's proprietary Advanced FSK).

1.3.3.1 Advanced FSK

The LPOD-R, when used with Comtech EF Data modems, provides enhanced functionality utilizing the industry standard FSK communications channel. Advanced FSK offers full control of single thread and, where applicable, redundant systems from the modem front panel, without additional cabling or cost. Additionally, access the LPOD-R via the Ethernet M&C port of the modem, and control it via Embedded Distant-end Monitor and Control (EDMAC).

1.3.3.2 Data Logging Capability

To enhance system maintainability, the LPOD-R includes a built-in data logging capability. By recording critical operational parameters such as temperature, output power, mute status, etc. at time stamped intervals, you can quickly gather intelligence about not only the unit itself but also the unit's operational environment.

1.3.3.3 Hand-Held Controller Devices

The LPOD-R accommodates a variety of hand-held controller devices. These include the LPOD*net* M&C Accessory Kit and the CLC-10 M&C Accessory Kit. Both are designed to access the monitor and control functionality of the LPOD-R.

1.4 Theory of Operation

1.4.1 SSPA Block Diagrams

See **Figure 1-2** for a typical LPOD-R block diagram.

The major components of an LPOD-R unit are:

- The SSPA Module
- The Cooling system
- The Power Factor Corrected Power Supply (PS 1 and PS 1.5 units)
- Monitor & Control (M&C)

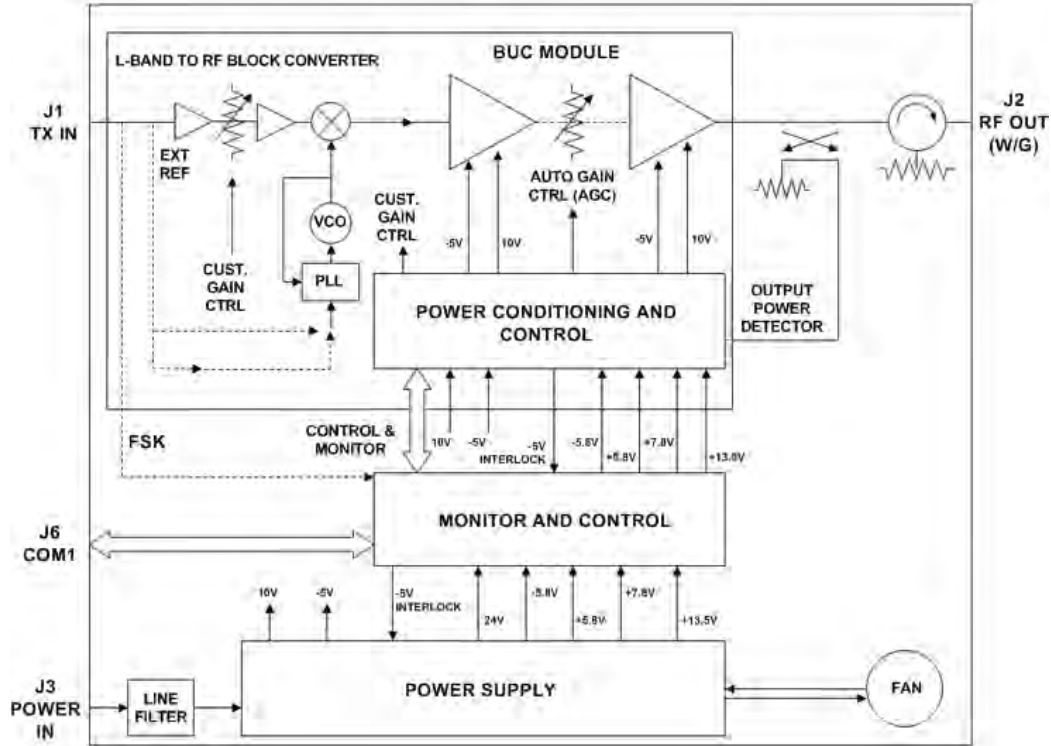


Figure 1-2. LPOD-R Typical Block Diagram

1.4.2 SSPA Module

The amplifier module performs the core function of the unit. An isolator is at the RF input to ensure good voltage standing wave ratio (VSWR). The RF signal then passes through an electronically controlled attenuator that adjusts the overall attenuation according to the user input. After some amplification, a second attenuator is automatically controlled via a look-up table to maintain the amplifier gain at a constant level over temperature variations.

The RF signal is then amplified by a multi-stage design that utilizes proprietary combining techniques to meet the rated power requirements. The output circuitry contains a coupler to provide a sampled signal for monitoring purposes. A power detector circuit also is included and the reading can be accessed via remote communication. A high power circulator and load is located at the output to provide good VSWR and protection from external mismatch.

1.4.3 Cooling System

- The PS .5 contains a single fan that is always enabled.
- The PS 1 contains one temperature-controlled fan.
- The PS 1.5 contains two temperature-controlled fans.

1.4.4 Power Supply

The LPOD-R features a power supply that is power factor corrected. It supplies several voltages necessary for the unit to operate:

- The 10V power supply output state is controlled by circuitry within the RF module. If the RF module does not have the $-5.8V$ supply for any reason, it will not allow the 10V power supply to turn on. This protects the power transistors within the RF module from failure due to improper power supply sequencing.
- The +24V output powers the cooling fans, is the source of power for waveguide switching when the SSPA is used in redundant configurations, and is dropped to +22V for LNB bias.
- The +5.8V, -5.8V, +7.8V and +13.5V outputs are used to operate the M&C board and other overhead functions.

1.4.5 Block Up Converter (BUC) Input

The LPOD-R translates an L-Band input carrier to the desired output frequency (C-, X-, or Ku-Band). LO frequencies are as follows:

BUC C-, X-, Ku-Band LO Frequencies			
Band	Frequency	LO Frequency	Inverting
C-Band	5850 to 6650 MHz	4900 MHz	No
	5950 to 6700 MHz	5000 MHz	No
Insat C-Band	6725 to 7025 MHz	5760 MHz	No
X-Band	7900 to 8400 MHz	6950 MHz	No
Ku-Band	14.00 to 14.50 GHz	13.050 GHz	No
Ku-Band-W	13.75 to 14.50 GHz	12.800 GHz	No

1.4.6 Monitor and Control (M&C)

The LPOD-R includes a microprocessor-based system that provides monitoring and control of the essential parameters of the unit. You interface with the unit through the M&C system via the remote control/discrete communications port.

The unit is capable of Ethernet remote communication, while EIA-232/485 is optional on the PS 1 and PS 1.5 packages. A discrete mute control and relay status output is also available on the PS 1 and PS 1.5 packages.

The M&C system monitors the fan speed, unit temperature, all power supply voltages, power transistor currents, output power, etc. Should a critical monitored parameter fail, the unit will mute the RF signal and report a fault. The details of the fault can be accessed via remote communication.

The LPOD-R PS .5 features a Light-Emitting Diode (LED) Indicator. **Figure 1-3** shows the location of this feature, on the signal output side of the LPOD-R PS .5 housing, next to the ground lug. This LED provides you with visual cues to the operational, online, and offline status of the system. See Chapter 2 for complete details about interpreting LED operation.



Figure 1-3. LPOD-R PS .5 LED Indicator

1.5 Summary of Specifications

1.5.1 Characteristics

IF Input Frequency ^{Note 1}		RF Output Frequency	
950 – 1525 MHz		5.850 – 6.425 GHz	
950 – 1750 MHz		5.850 – 6.650 GHz (optional)	
950 – 1825 MHz		5.850 – 6.725 GHz (optional)	
965 – 1265 MHz		6.725 – 7.025 GHz	
950 – 1450 MHz		7.900 – 8.400 GHz	
950 – 1450 MHz		14.00 – 14.50 GHz	
950 – 1750 MHz		13.75 – 14.50 GHz (optional)	
Model		Psat (Typical)	P1dB (Guaranteed) ^{Note 1}
Ku-Band Units	PS.5-10Ku	40 dBm (10 W)	39 dBm (8 W)
	PS.5-15Ku	41 dBm (15 W)	40 dBm (10 W)
	PS.5-20Ku	43 dBm (20 W)	42 dBm (16 W)
	PS1-20Ku	43 dBm (20 W)	42 dBm (16 W)
	PS1-32Ku	45 dBm (32 W)	44 dBm (25 W)
	PS1-40Ku	46 dBm (40 W)	45 dBm (32 W)
	PS1.5-50Ku	47 dBm (50 W)	46 dBm (40 W)
	PS1.5-60Ku	48 dBm (60 W)	47 dBm (50 W)
C-Band and/or X-Band Units	PS.5-15C	41 dBm (15 W)	40 dBm (10 W)
	PS1-25C,X	44 dBm (25 W)	43 dBm (20 W)
	PS1-32C,X	45 dBm (32 W)	44 dBm (25 W)
	PS1-40C,X	46 dBm (40 W)	45 dBm (32 W)
	PS1-50C,X	47 dBm (50 W)	46 dBm (40 W)
	PS1-60 C,X	48 dBm (60 W)	47 dBm (50 W)
	PS1.5-75 C,X	48.6 dBm (75 W)	48 dBm (60 W)
	PS1.5-80 C,X	49 dBm (80 W)	48.5 dBm (70 W)
	PS1.5-100 C,X	50 dBm (100 W)	49 dBm (80 W)
	PS1.5-110 C,X	50.4 dBm (110 W)	49.5 dBm (90 W)
	PS1.5-125 C,X	51 dBm (125 W)	50 dBm (100 W)

Notes:

1. Allow 1 dB degradation from 13.75 to 14.0 GHz and 6425 to 6725 MHz.

Gain Min (Typical)	PS .5	60 (65 dB)	
	PS 1, 1.5	70 (75dB)	
Input Power Supply Requirements		90-264 VAC, 47-63 Hz, Power Factor Corrected, .96 (PS 1, 1.5 only)(48 VDC optional)	
Max IF Input level (No Damage)		+10 dBm	
Gain Adjust	PS .5	10 dB in 0.25 dB steps	
	PS 1, 1.5	20 dB in 0.25 dB steps	
Gain Flatness		±1.5 dB full band (optional ±2.0 dB full band (-50° to +55°C)) ±0.40 dB per 40 MHz (optional ±0.50 dB per 40 MHz (-50° to +55°C))	
Gain Variation Over Temp		±1.5 dB max, -40° to +55°C (optional ±2.0 dB max (-50° to +55°C))	
Input Return Loss		14 dB (1.5:1 VSWR)	
Output Return Loss		17.7 dB (1.3:1 VSWR)	
Noise Figure		15 dB typical, 20 dB max @ min attenuation	
RF Mute Isolation		-60 dBc min	
AM/PM Conversion		2° typical, 3.5° max @ Rated P1dB output power	
Third-order Intermodulation Level (2 tones, @ -3 dB Total Backoff from P1 dB (-6 dBc SCL), Δ 1MHz)		-30 dBc typ., -25 dBc Guaranteed	
Spurious Level	Harmonics	-50 dBc @ Prated – 3 dB	
	Carrier Related In-band	-60 dBc min @ P1dB	
	Non-Carrier Related In-band	-60 dBm max (Input Terminated)	
	LO Leakage	-25 dBm max	
Group Delay Variation	Linear	± 0.03 ns/MHz	
	Parabolic	±0 .003 ns/MHz ²	
	Ripple	± 1.0 ns pk-pk	
Data Logging Parameters		Non-Volatile RAM: Capacity 30 days @ 90-minute intervals. Includes: <ul style="list-style-type: none"> • RF Output Power • Mute Status • Heatsink Temperature 	
Phase Noise (dBc/Hz) (with optional internal or equivalent performance external reference)		Typical (C/X/Ku) dBc/Hz	Spec (C/X/Ku) dBc/Hz
Offset	100 Hz	-65	-62
	1 KHz	-75	-72
	10 KHz	-85	-82
	100 KHz	-95	-92
	1 MHz	-105	-102

1.5.2 Environmental

Temperature	Operating	Standard	-40° to 131°F (-40° to 55°C)°
		Optional	-58° to 131°F (-50° to 55°C) or -40° to 140°F (-40° to 60°C)
	Storage		-67° to 167°F (-55° to 75°C)
Humidity			100% condensing rain 2" per hour
Altitude			10,000 AMSL
Shock			Normal commercial shipping and handling

1.5.3 Physical

Weight	PS .5		5 lbs. (2.3 kg) Nominal
	PS 1		17 lbs. (9.1 kg) Nominal
	PS1.5		
Dimensions excluding connectors (See Section 1.6)	PS .5		7.21 x 4.65 x 3.34 in. (183.1 x 118.1 x 84.8 mm)
	PS 1		12.60 x 6.31 x 6.05 in. (320.0 x 160.3 x 153.7 mm)
	PS 1.5		12.78 x 6.14 x 6.47 in. (324.6 x 155.9 x 164.3 mm)
Connectors	IF/RF Input		Type 'N' Female
	RF Output	PS .5	C-Band: CPR137G Ku-Band: WR75G (8W unit), WR75 (16W unit)
		PS 1	C-Band: Type 'N' Female (optional CPR137G) X-Band: CPR112G Ku-Band: WR75
		PS 1.5	C-Band: CPR137G X-Band: CPR112G Ku-Band: WR75
	M&C (Ethernet)	PS .5	Weatherized RJ-45
		PS 1	Optional 19-pin MS style (single integrated cable assembly available, dependent upon configuration)
		PS 1.5	

1.6 Dimensional Envelopes



Typical for all figures in each subsection, all dimensions are in inches. Bracketed dimensions, where shown, are in metric units (mm). All figures depict a waveguide output unless otherwise noted.

1.6.1 LPOD-R PS .5 Dimensional Envelopes

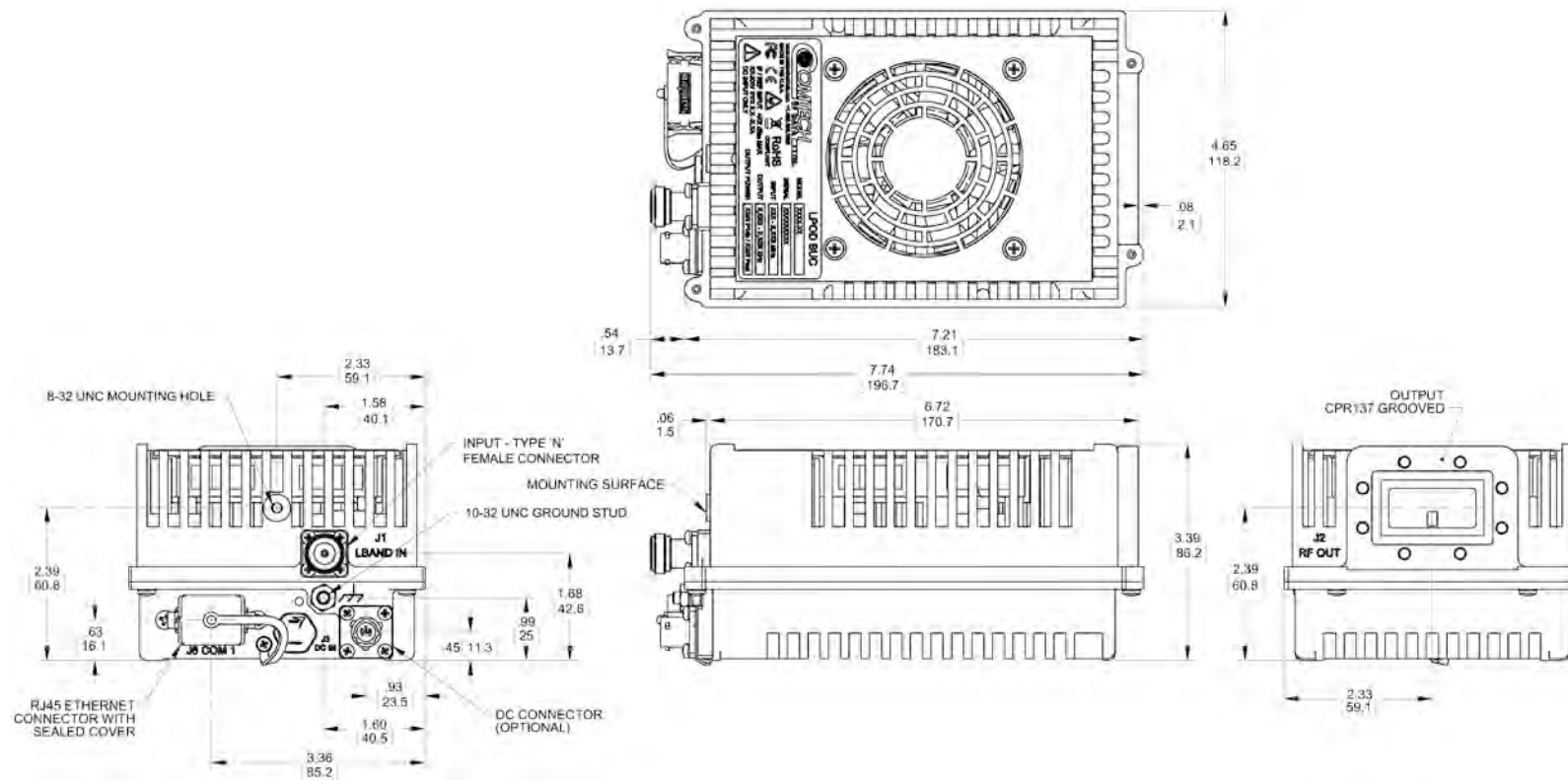


Figure 1-4. LPOD-R PS .5 C-Band 10W Unit

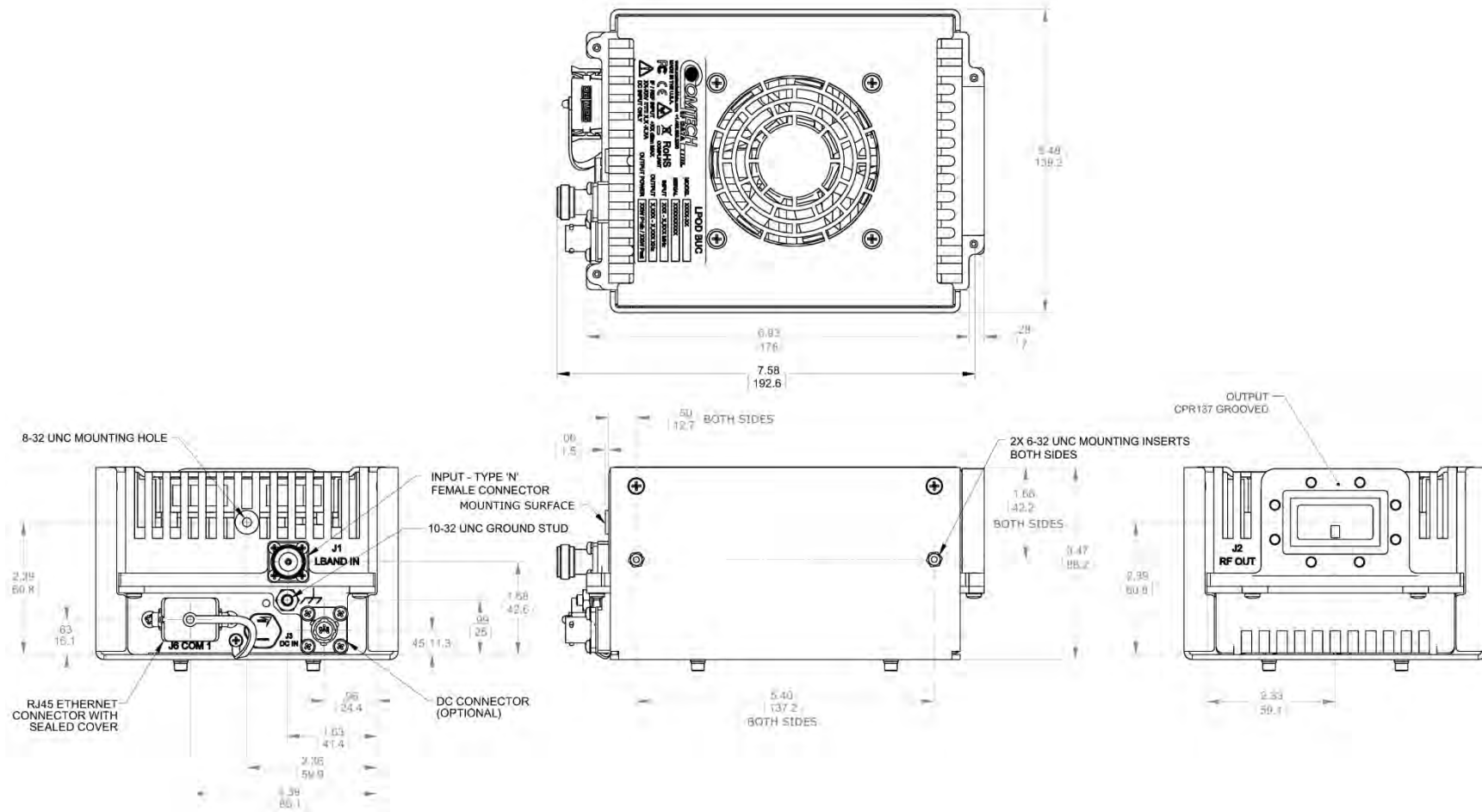


Figure 1-5. LPOD-R PS .5 C-Band 20W Unit

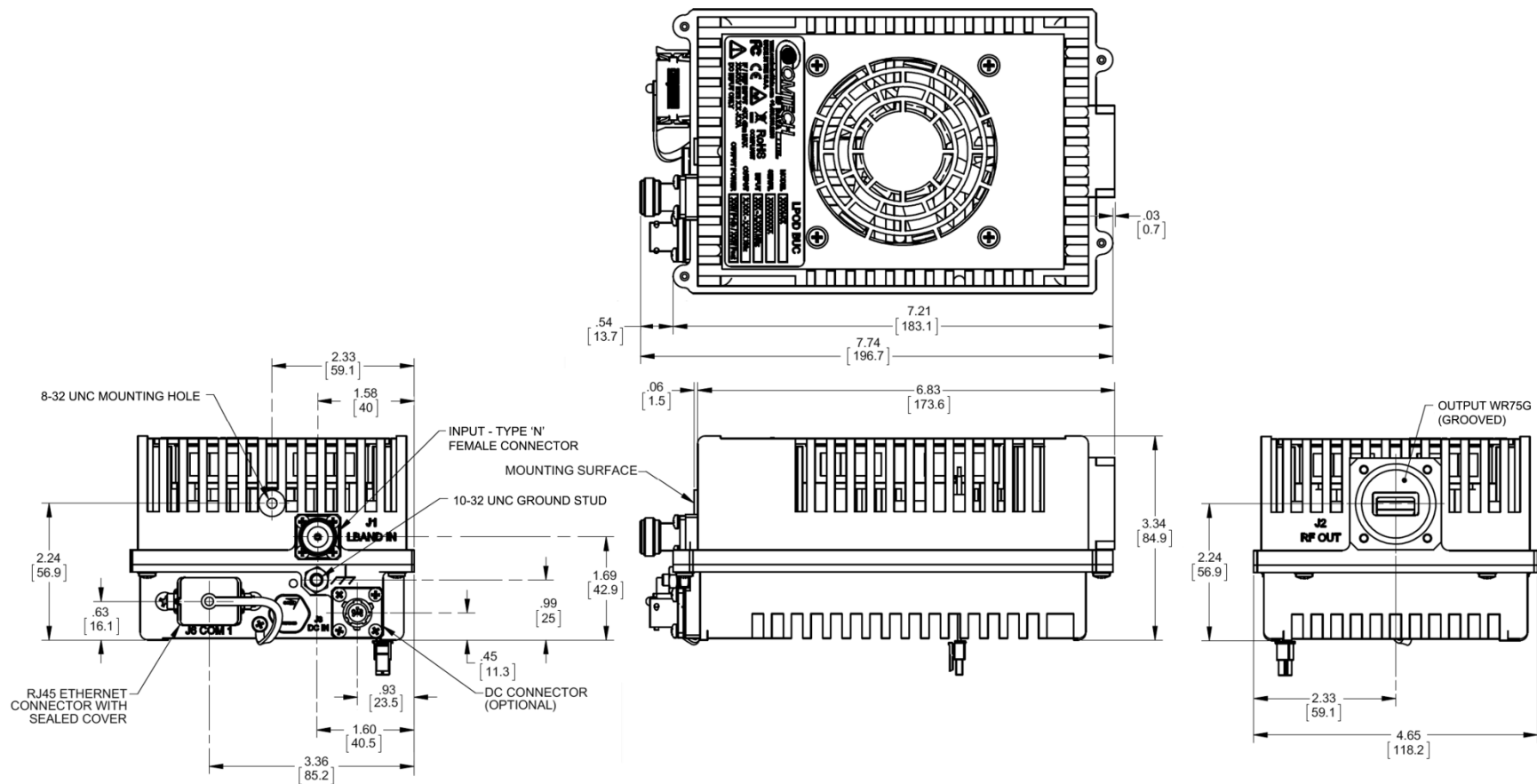


Figure 1-6. LPOD-R PS .5 Ku-Band 8W Unit

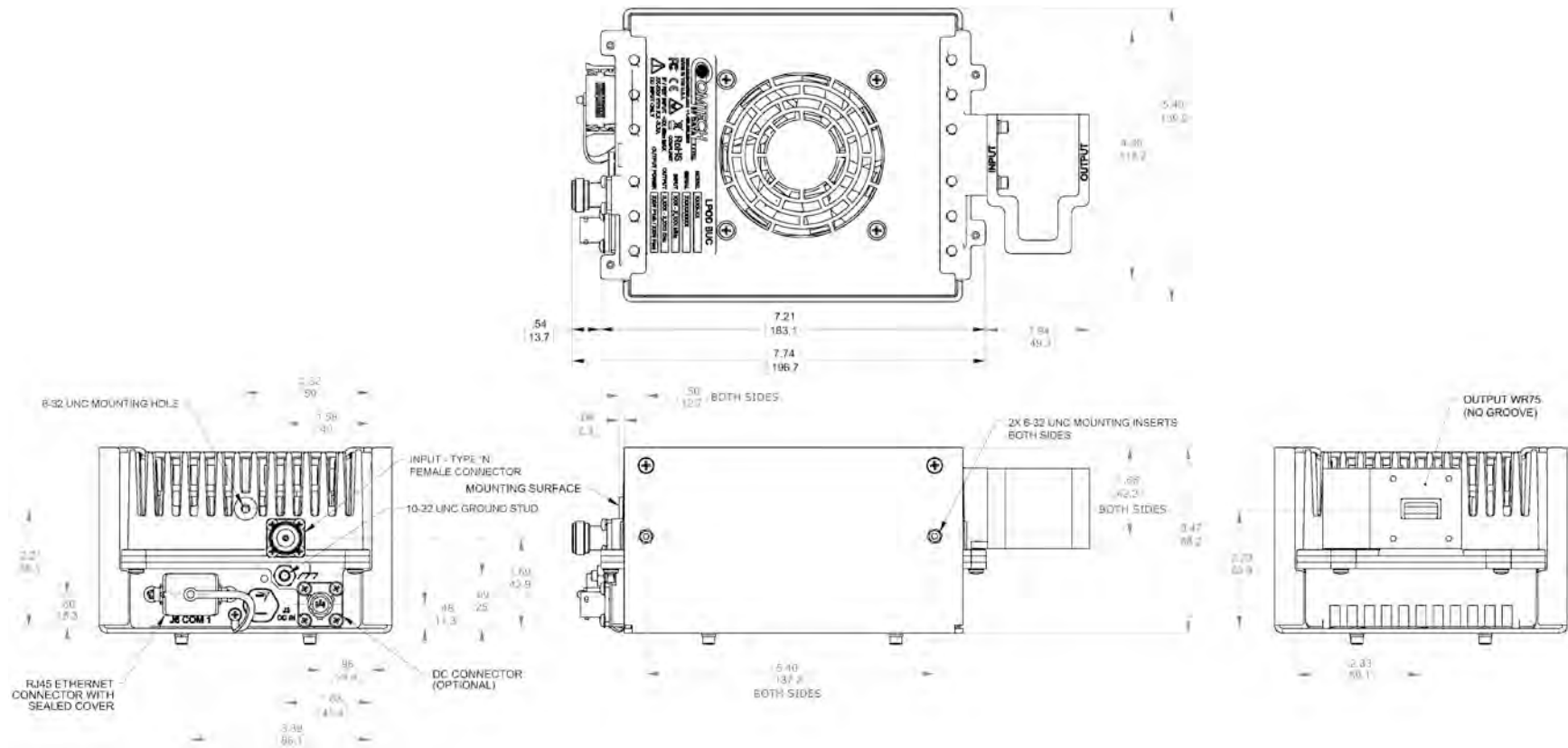


Figure 1-7. LPOD-R PS .5 Ku-Band 16W Unit

1.6.2 LPOD-R PS 1 Dimensional Envelopes

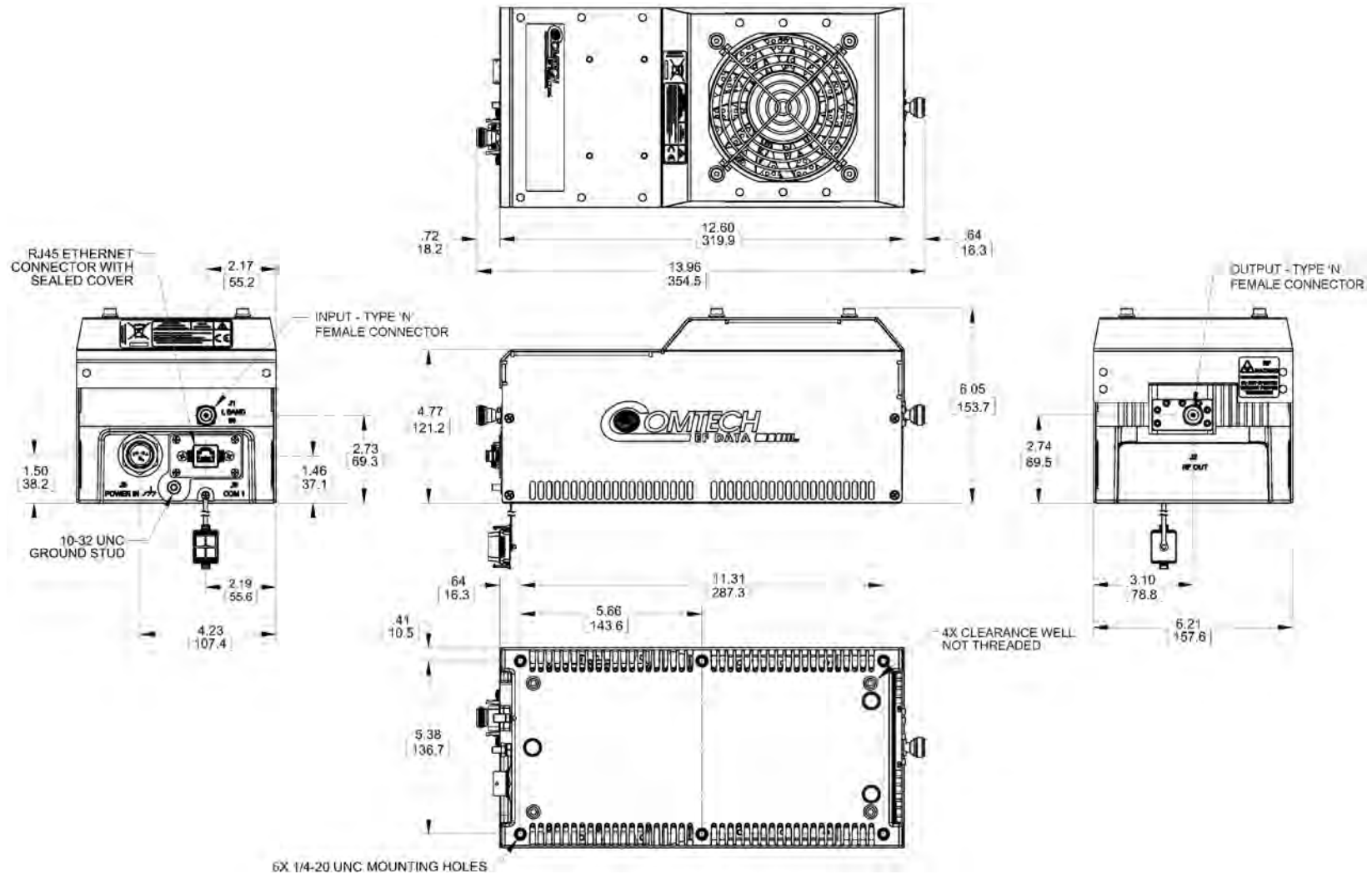


Figure 1-8. LPOD-R PS 1 C-Band Unit – Coaxial Output

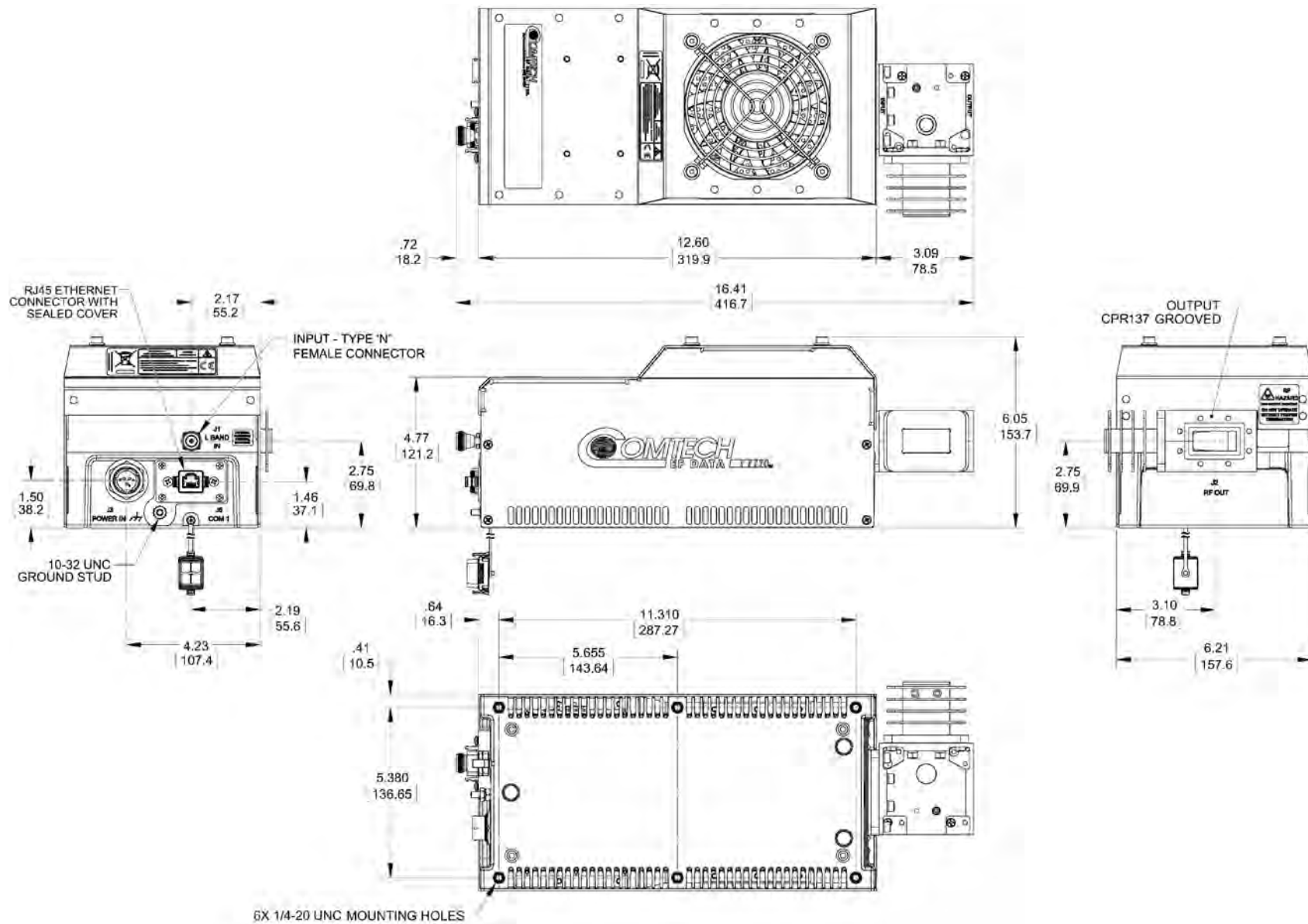


Figure 1-9. LPOD-R PS 1 C-Band Unit

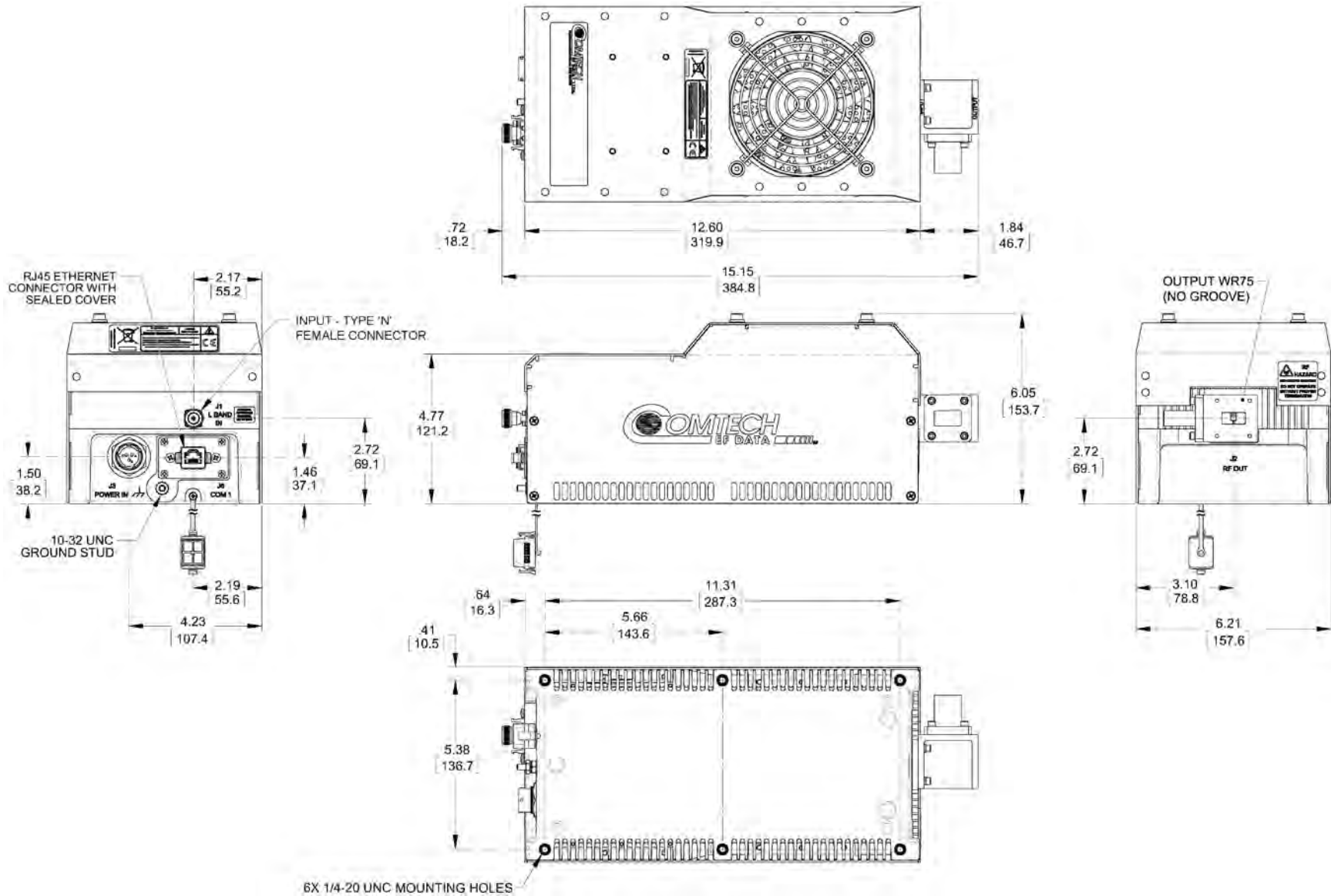


Figure 1-10. LPOD-R PS 1 Ku-Band Unit

1.6.3 LPOD-R PS 1.5 Dimensional Envelopes

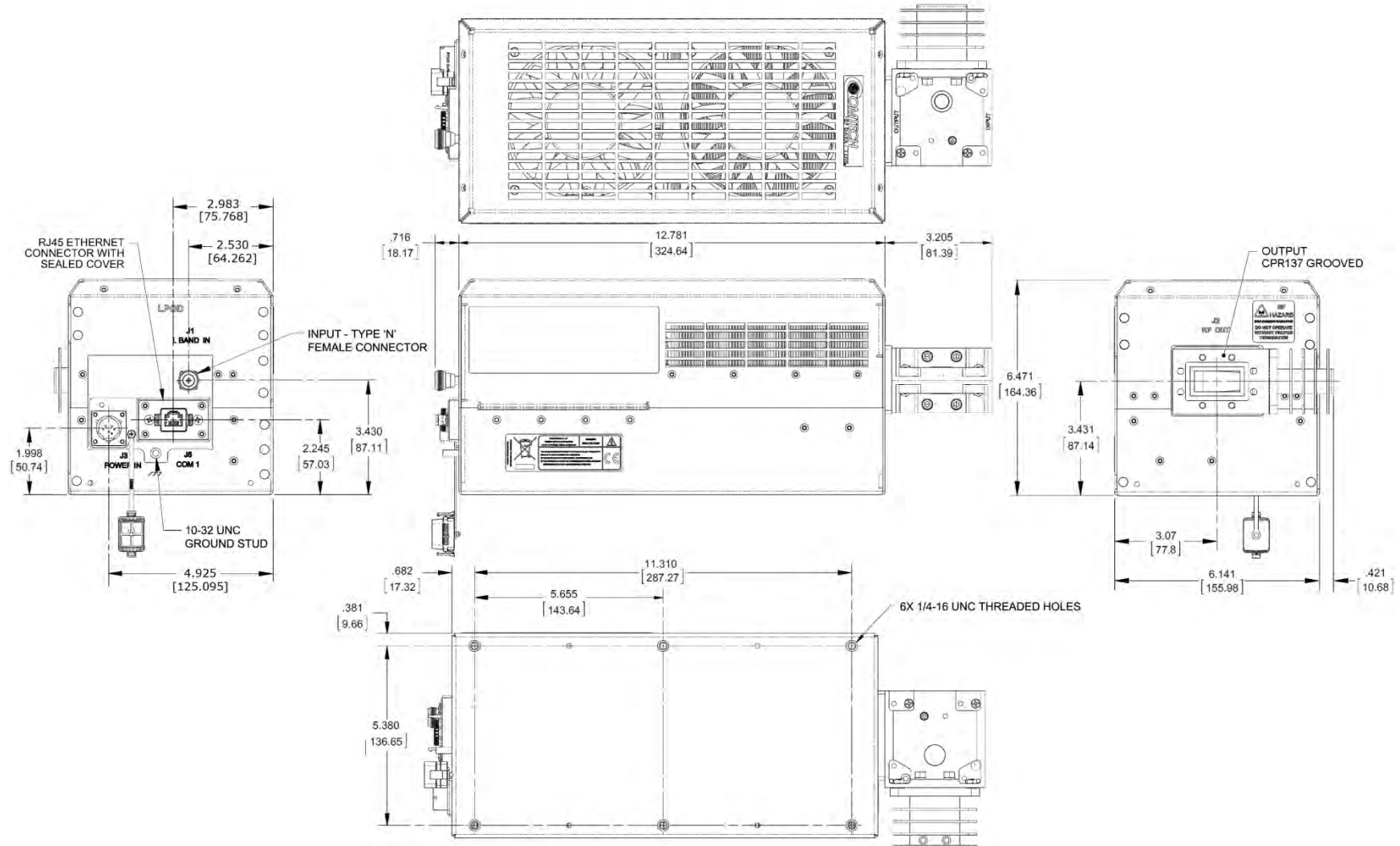


Figure 1-11. LPOD-R PS 1.5 C-Band Unit

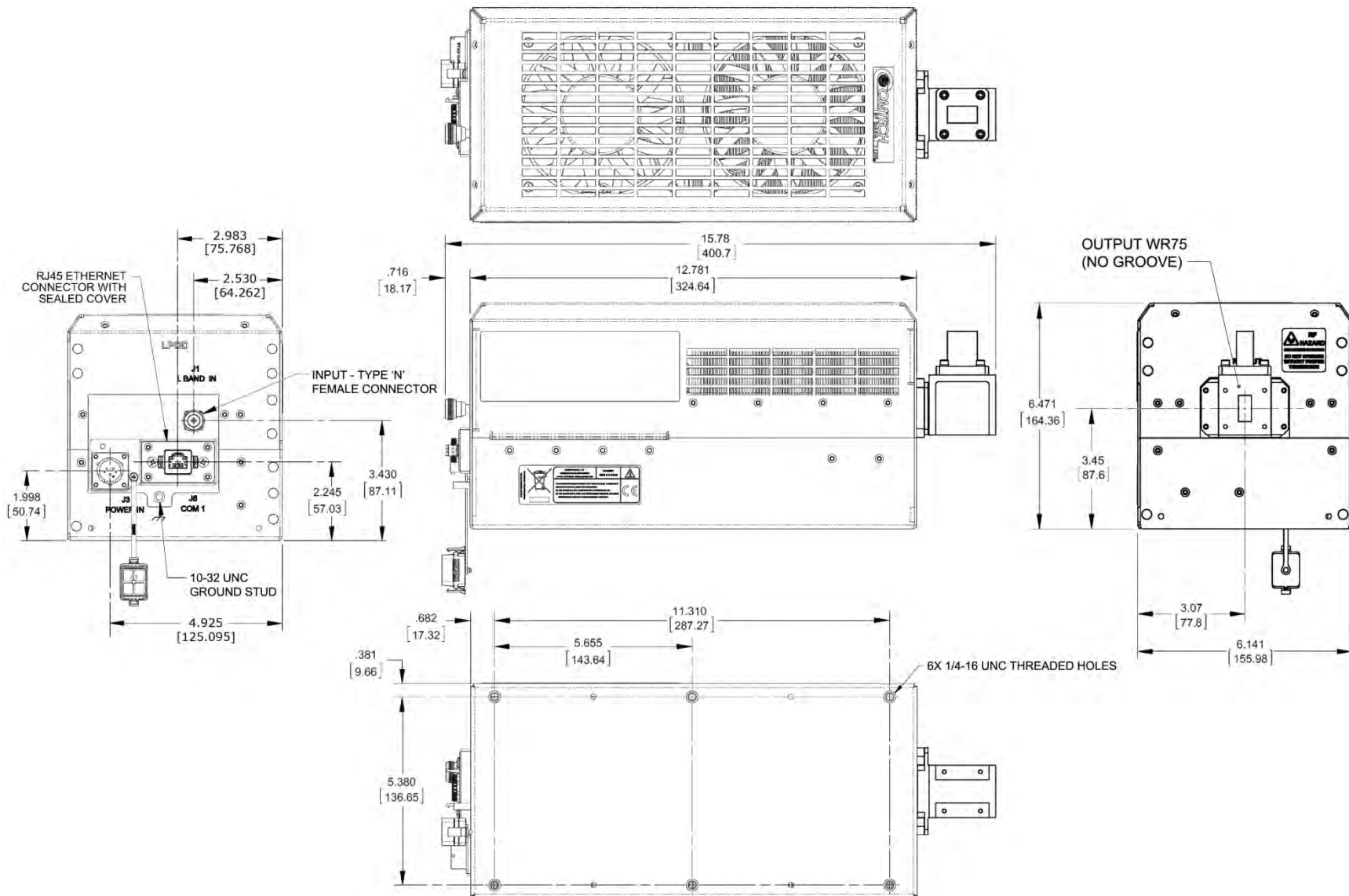


Figure 1-12. LPOD-R PS 1.5 Ku-Band Unit

Chapter 2. SYSTEM CONNECTORS, INSTALLATION, AND STARTUP

2.1 Overview



- See **Chapter 4. ETHERNET INTERFACE OPERATION** for information about using the LPOD-R's remote Ethernet M&C functionality.
- See **Chapter 5. OPTIONAL SERIAL INTERFACE OPERATION (PS 1, PS 1.5 ONLY)** for information about using the LPOD-R's optional serial-based remote commands and queries.

This chapter provides user reference to the following:

- The LPOD-R connectors for signal input, signal output; monitor and control (M&C) of the unit; and grounding of the unit to the antenna's grounding network;
- Available standalone installation kits;
- Instructions for installation, startup, and troubleshooting user M&C access.

2.2 Water Tight Sealing



CAUTION

All external cable assemblies for the outdoor equipment **MUST** be properly sealed to prevent water intrusion. Failure to achieve water tight sealing will result in possible performance degradation and even product failure.

IMPORTANT: To maintain your product warranty, you must follow these guidelines and recommendations during equipment installation:

- Ensure all external connections to the equipment are hand-tightened and wrapped with a self-amalgamating tape such as **3M Type 23 Scotch Self-Amalgamating Tape** (or equivalent). The sealing must cover the external connector housing and extend beyond the end of the heatshrink that covers the connector termination of the cable assembly.
- Squeeze the self-amalgamating tape tightly and make sure both ends of the tape have formed around the connector and cable to create a water tight seal.
- ALL unused external connectors **MUST** be covered with caps and sealed. Make sure to inspect the connector cap rubber seal for cracks before using.

2.2.1 Customer Cable Assemblies



CAUTION

Should you receive an accessory kit that contains only the mating cable connectors, or if you (the end-user) choose to supply your own cables and connectors, Comtech EF Data strongly recommends that you use an adhesive lined heatshrink such as **TE Connectivity #ATUM-24/6-0** (or equivalent) to cover the connector strain-relief area. Your sealed, water tight cable ends should appear as per this example:



2.3 LPOD-R Interface Connectors

The LPOD-R external connectors provide all necessary connections between the LPOD-R PS .5 (Figure 2-1), PS 1 (Figure 2-2), or PS 1.5 (Figure 2-3) unit and other equipment.



Figure 2-1. LPOD-R PS .5 Connectors

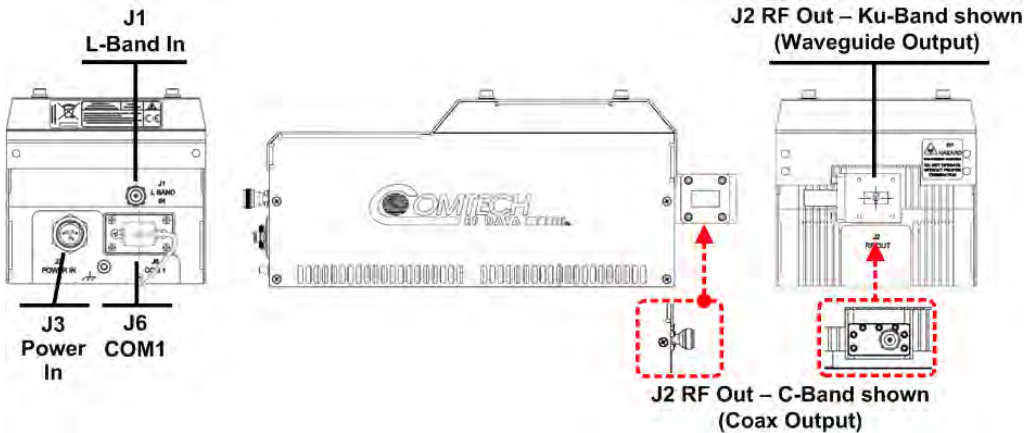


Figure 2-2. LPOD-R PS 1 Connectors

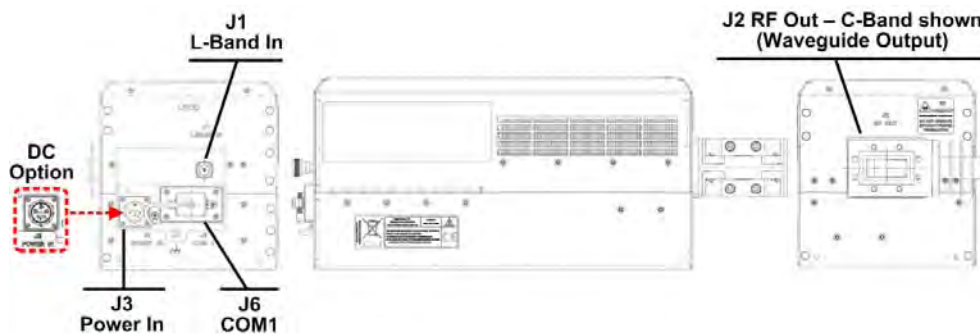


Figure 2-3. LPOD-R PS 1.5 Connectors

2.3.1 'J1 | LBAND IN' Signal Input Port



The 'J1 | LBAND IN' RF input connector is a Type 'N' female connector. Typical input levels (-30 dBm) depend on desired output power and unit attenuation. To prevent damage to the LPOD-R, RF input levels must not exceed +15 dBm.

2.3.2 'J2 | RF OUT' Signal Output Interface



WARNING!
FOR SAFETY REASONS, NEVER LOOK DIRECTLY INTO THE WAVEGUIDE OUTPUT.

The 'J2 | RF OUT' connector may be a waveguide or coaxial interface – this depends on the LPOD-R model and/or frequency range of the unit. See **Figure 2-1** through **Figure 2-3** and **Table 2-1**.

Table 2-1. 'J2 | RF OUT' Interface Type

Unit	Frequency / Output Type	See...
PS .5	C-Band: CPR137G (Grooved) Ku-Band: WR75G (Grooved) – 8W unit -OR- WR75 (No Groove) – 16W unit	Figure 2-1
PS 1	C-Band: Type 'N' Female (optional CPR137G, Grooved) X-Band: CPR112G (Grooved) Ku-Band: WR75 (No Groove)	Figure 2-2
PS 1.5	C-Band: CPR137G (Grooved) X-Band: CPR112G (Grooved) Ku-Band: WR75 (No Groove)	Figure 2-3

2.3.3 'J3 | POWER IN' AC Power Main (PS 1, PS 1.5 ONLY)



WARNING!

- 1) The LPOD PS .5 is available only as a DC unit.
- 2) For safety reasons, you must use the correct pin assignments. Incorrect use of pin assignments can result in product damage or personal injury.



The mating connector specification and pin assignments specific to the LPOD-R PS 1 and PS 1.5 standard AC power interfaces are as follows:

Mating Connector:

CEFD P/N CN/MS-STPG03F02 (ITT Cannon KPT06B-12-35)

Table 2-2. LPOD-R PS 1, PS 1.5 'J3 | POWER IN' Pin Assignments

Pin	Description
A	LINE (L1)
B	NEUTRAL (L2)
C	GND

The prime power input requirement for the LPOD-R PS 1 and PS 1.5 is as follows:

- 90-264V AC
- 47-63 Hz

The power supply is power factor corrected. The total power required from the prime power supply depends on the model used. See **Sect. 1.5 Summary of Specifications** for more information.

2.3.4 'J3 | POWER IN' Standard or Optional DC Power Mains



WARNING!

For safety reasons, make sure you know that the 'J3 | POWER IN' DC power connection pin assignments are DIFFERENT for each LPOD unit. You must use the correct pin assignments. Incorrect use of pin assignments can result in product damage or personal injury.

For all LPOD-R models, the prime power input requirement is 38-72V DC. The total power required from the prime power supply depends on the model in use. See **Sect. 1.5 Summary of Specifications** for more information.

2.3.4.1 'J3 | POWER IN' – PS .5 Standard DC Power Main



The mating connector specification and the pin assignments specific to the LPOD-R PS .5 standard DC power interface are as follows:

Mating Connector:
CEFD P/N CN-0020708 (SOURIAU UTS6JC8E33S)

Table 2-3. LPOD-R PS .5 'J3 | POWER IN' Pin Assignments

Pin	LPOD-R PS 1 Assignment
A	V+
B	V-
C	GND

2.3.4.2 'J3 | POWER IN' – PS 1 Optional DC Power Main



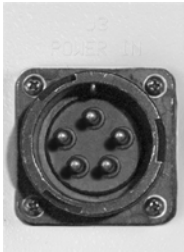
The mating connector specification and the pin assignments specific to the LPOD-R PS 1 optional DC power interface are as follows:

Mating Connector:
CEFD P/N CN/STPG04F01 (Glenair IPT06E-12-4-SSR-F7)

Table 2-4. LPOD-R PS 1 'J3 | POWER IN' Pin Assignments

Pin	LPOD-R PS 1 Assignment
A	V+
B	GND
C	V-
D	NO CONNECT

2.3.4.3 'J3 | POWER IN' – PS 1.5 Optional DC Power Main



The mating connector specification and the pin assignments specific to the LPOD-R PS 1.5 optional DC power interface are as follows:

Mating Connector:
CEFD P/N CN-0020517
(MS3116E-14-5S(476), Amphenol PT06E-14-5S(476)).

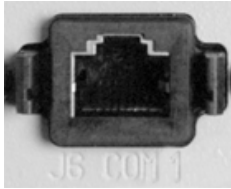
Table 2-5. LPOD-R PS 1.5 'J3 | POWER IN' Pin Assignments

Pin	LPOD-R PS 1.5 Assignment
A	+48V
B	+48V
C	-48V
D	-48V
E	GND

2.3.5 'J6 | COM1' Ethernet Communications Port



See Chapter 4. ETHERNET INTERFACE OPERATION for information about using the LPOD-R's remote Ethernet M&C functionality.



Connector Type	Ref Des Name	Direction
Weatherproof RJ-45 female modular jack (Samtec USA Corp. P/N RPBE-01)	J6 COM 1	In/Out



CAUTION

For permanent Ethernet connections, you **MUST** use the appropriate mating connector on your supplied Ethernet cable to ensure a weatherproof installation. See **Sect. 2.3.5.1** and **Figure 2-4**.

This interface operates at 10/100/1000 Mbps, half and full duplex, auto-negotiating.

The maximum Ethernet packet size is 1522 bytes (including Ethernet headers and CRC).

2.3.5.1 Fabricating a Weatherproof Ethernet Cable

Comtech EF Data offers two mating connector kits:

- Use CEFD P/N KT-0020707 for 5.00-5.75 mm jacket OD Ethernet cables.
- Use CEFD P/N KT-0020708 for 5.75-6.50 mm jacket OD Ethernet cables.

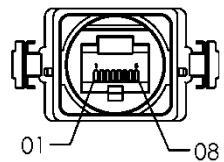
Do these steps to assemble a weatherproof cable (see **Figure 2-4**):

1. Thread the user-supplied RJ-45 CAT5e Ethernet cable (Item 1) through the Item 2 components (Items 2.3 through 2.6). Be sure to note the order and orientation of all kit items before final assembly of the components.
2. Crimp the RJ-45 modular plug (Item 2.1) onto Item 1. Be sure to maintain the cable wiring per the Note 3 wiring table.
3. Snap Item 2.1 into the Ethernet Shroud (Item 2.2). Then, snap Item 2.2 into the Latched Housing (Item 2.3).
4. Slide the Sealing Gland (Item 2.4) into its seated position in Item 2.3.
5. Slide the Compression Cage (Item 2.5) onto Item 2.4.
6. Screw the Cable Nut (Item 2.6) into assembled position against Item 2.3. (Be sure the mating surfaces of the Latched Housing and Cable Nut are touching.) **DO NOT OVERTIGHTEN.**



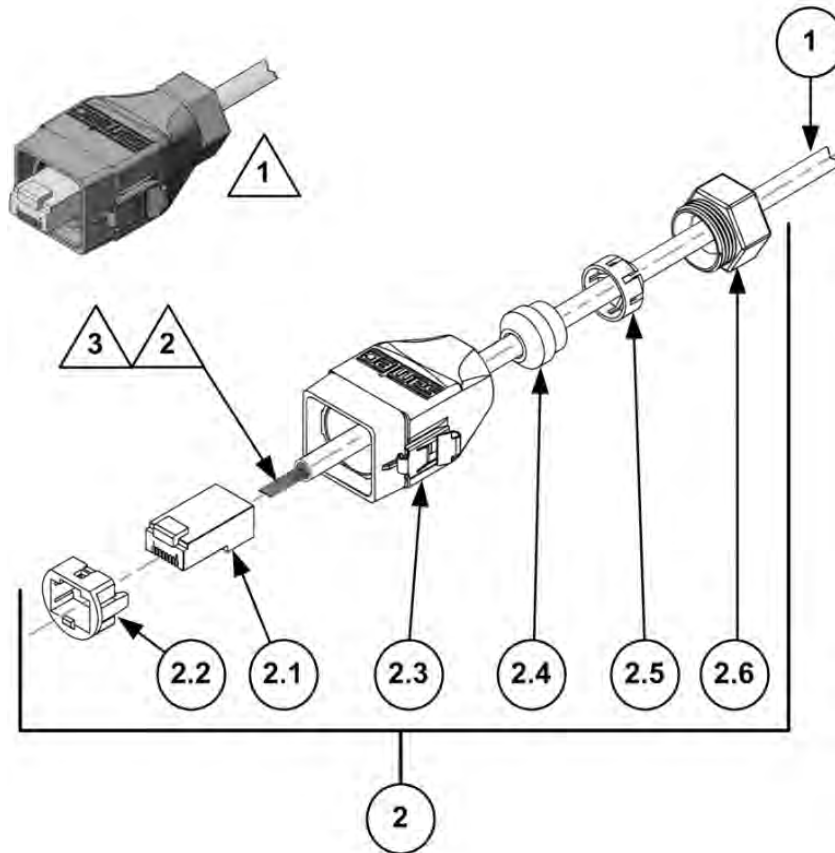
Figure 2-4 Assembly Notes

- 1) Cable end is shown as assembled.
- 2) Be sure to strip Item 1 to a 15mm length.
- 3) Be sure to maintain Item 1-to-Item 2.1 wiring as follows:



Connector End View

POS	COLOR	WIRE
01	WHITE/ORANGE	TWISTING
02	ORANGE	
03	WHITE/GREEN	TWISTING
04	BLUE	
05	WHITE/BLUE	TWISTING
06	GREEN	
07	WHITE/BROWN	TWISTING
08	BROWN	



Assembly Detail Source: Samtec USA Corporation)				
ITEM	CEFD KIT / QTY REQ'D		SAMTEC PART NO.	DESCRIPTION
	KT-0020707	KT-0020708		
1	LENGTH A/R	–	N/A – BY USER (not part of kit)	5.6mm OD 8-wire CAT5e Ethernet Cable
	–	LENGTH A/R	N/A – BY USER (not part of kit)	6.5mm OD 8-wire CAT5e Ethernet Cable
2	1	–	RCEF-G-01	Samtec Weatherproof Connector Assembly (Items 2.1-2.6)
	–	1	RCEF-G-02	
2.1	1	1	SUB-MODP-01-8P8C-S-01	RJ-45 Modular Ethernet Plug
2.2	1	1	RCEF-B-02	Ethernet Shroud, Nylon
2.3	1	1	RCEF-B-01	Latched Housing, Nylon
2.4	1	–	SG-17-01	Sealing Gland, Neoprene (for 5.0-5.75mm OD Cable)
	–	1	SG-17-02	Sealing Gland, Neoprene (for 5.75-6.5mm OD Cable)
2.5	1	1	NCC-17-01	Compression Cage, Nylon
2.6	1	1	SCN-17-02	Cable Nut, Nylon

Figure 2-4. LPOD-R Ethernet Connector Field Termination Kit Assembly

2.3.6 'J6 | COM1' Remote Communications and Discrete Control Port (OPTIONAL)



See CHAPTER 5. OPTIONAL SERIAL INTERFACE OPERATION (PS 1, PS 1.5 ONLY) for information about using the optional serial-based remote commands and queries.



Original versions of the LPOD-R PS 1 and PS 1.5 were shipped with a discrete control connector as the primary input for controlling and monitoring the LPOD-R. 'J6 | COM 1' on these units was a 19-pin circular connector, type MS3112E14-19S. This is now an optional configuration.

Mating connector:

MS3116J14-19P or ITT KPT06J14-19P

Table 2-6. LPOD-R 'J6 | COM1' (OPTIONAL) Pin Assignments

Pin	Name	Description
A	RS485_+RX	
B	RS485_-RX	
C	RS485_+TX	
D	RS485_-TX	
E	RS232_RD	Pin 3 of DB9 female connector
F	Ethernet TX+	Pin 3 of RJ-45 female connector
G	RS232_TD	Pin 2 of DB9 female connector
H	Ethernet TX-	Pin 6 of RJ-45 female connector
J	TX/RX Switch Drive 1 Pos	Not for customer use
K	GND	Ground (also Pin 5 of DB-9F connector)
L	SUMFLT In	Open when faulted, else +5VDC
M	SUMFLT Out	When faulted, tied to Pin K, else open
N	TX Switch Pos 1 Ind	Online/Offline indication
P	RX Switch Pos 1 Ind	Not for customer use
R	+24V	Not for customer use
S	System Mute Control	When AUX=1 , unit is muted until this pin is tied to ground (Pin K). When tied to ground, the unit unmutes. See the AUX remote command in Chapter 5. OPTIONAL SERIAL INTERFACE OPERATION (PS 1, PS 1.5 ONLY) .
T	Switch Common	GND reference for Pin N
U	Ethernet RX-	Pin 2 of RJ-45 female connector
V	Ethernet RX+	Pin 1 of RJ-45 female connector

2.3.6.1 About Circular Connectors

Circular connector pairs (**Figure 2-5**) feature a sleeve lock configuration, with an array of pins (male side) coupled to mating sockets (female side).

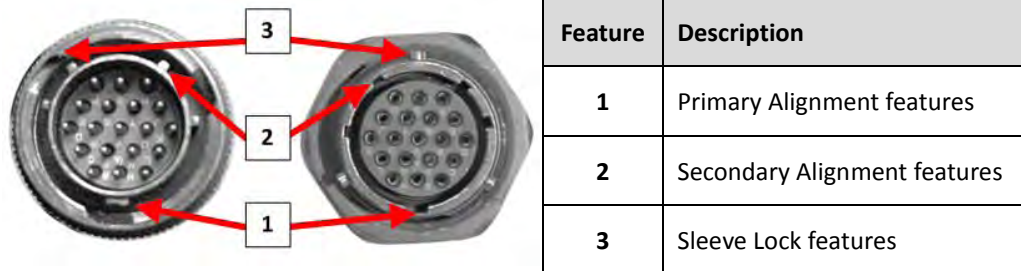
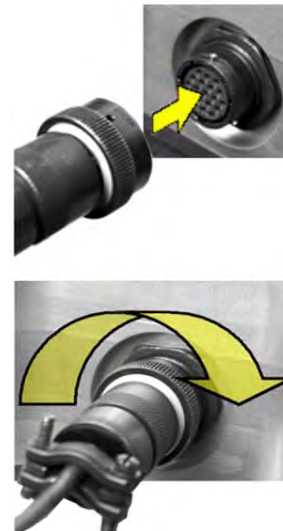


Figure 2-5. Circular Connector Example

Connection Instructions – Engage all of the alignment and lock features between the male connector (on the interconnection cable) and female socket. To install the male connector into the female connector, do these steps:

1. Engage the primary and secondary alignment tabs on the male connector with the mating cutouts on the female socket.
2. Push the male connector into the female socket.
3. Turn the male connector sleeve clockwise until the sleeve lock cutouts engage fully with the female socket tabs and you hear a “click” sound.



2.3.7 Ground Connector



Use this #10-32 stud, available where shown in **Figure 2-6**, to connect a common chassis ground among equipment.

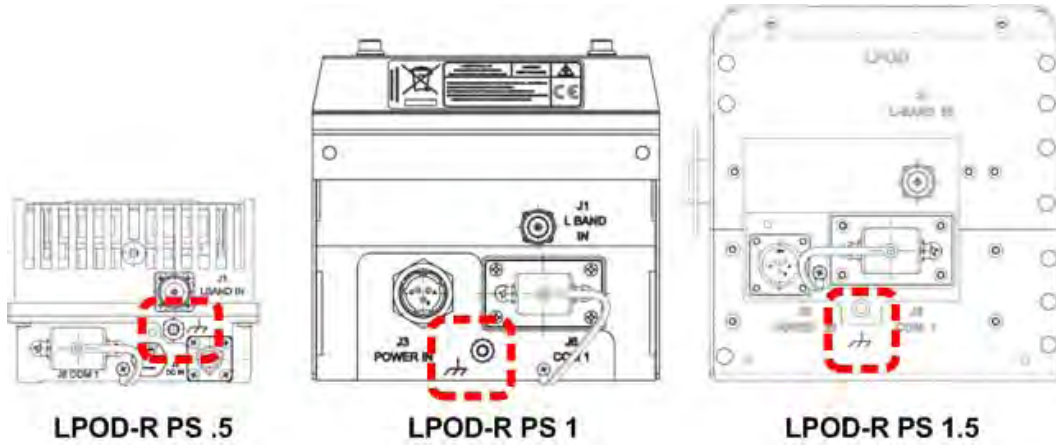


Figure 2-6. LPOD-R Ground Connector Locations

2.4 LPOD-R Standalone (Single-Thread) Installations



- See **Section 2.2 Water Tight Sealing** in this chapter for important outdoor installation considerations.
- See **Appendix A. CABLE DRAWINGS** for information about the cables that are available for use with the LPOD-R in standalone operation.

The terms “standalone” or “single-thread” refer to applications that use a single (1) LPOD-R unit.

Several kits are available from Comtech EF Data to mount and install standalone LPOD-Rs, depending on the LPOD-R unit ordered:

- See **Sect. 2.4.3** for standalone assembly and installation information for pole-mounted LPOD-R configurations.
- See **Sect. 2.4.4** for standalone assembly and installation for spar-mounted LPOD-R configurations.
- See **Sect. 2.4.5** for standalone assembly and installation for orthomode transducer (OMT) mounted LPOD-R configurations.

2.4.1 Installation Manpower Recommendation

Comtech EF Data recommends that, at a minimum, two technicians are employed to install any LPOD-R PS 1 or PS 1.5 Standalone System.

2.4.2 Typical Required Installation Tools

Comtech EF Data recommends that, at a minimum, you use these tools to install any LPOD-R Standalone System:

- Adjustable wrench;
- English *and* Metric unit box or socket wrenches (hex nuts and hex head bolts are used);
- Medium Phillips™ screwdriver (Phillips head screws are used);
- Tin snips.

2.4.3 Pole Mount Installations (PS 1, PS 1.5)

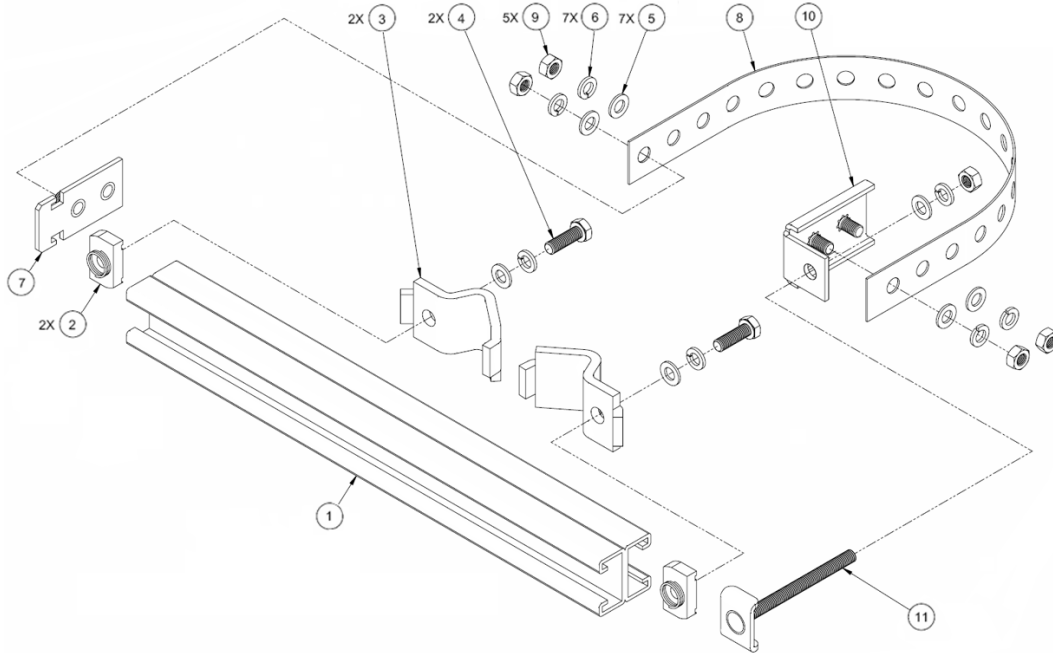
The Universal Pole Mount Kit PL/12319-1 is used in combination with pole-mounted standalone installation kits. For purpose of brevity, all subsequent mention of this kit's usage refers you back to this chapter section.

CHAPTER SECT.	CEFD PART NO.	DESCRIPTION	See...
2.4.3.1	PL/12319-1	Universal Pole Mounting Kit	Figure 2-7 Figure 2-8
2.4.3.2	KT-0000095	LPOD-R PS 1, PS 1.5 Single Unit Mounting Kit	Figure 2-9

2.4.3.1 PL/12319 Universal Pole Mounting Kit



This kit accommodates a pole diameter of up to 13.00" (33.02 cm) OD maximum.



ITEM	QTY	CEFD PART NO.	DESCRIPTION
1	1	N/A	DUAL CHANNEL UNISTRUT (SHOWN FOR CLARITY ONLY – P/O LPOD-R MOUNTING KIT)
2	2	HW/M8SPRING NUT	SPRING NUT, M8
3	2	HW/BLK-PIPE2-8	PIPE BLOCK
4	2	HW/M8X1.25X25HEXSS	SS HEX HEAD BOLT, M8, 25MM LG
5	7	HW/M8FLATSS	SS FLAT WASHER, M8
6	7	HW/M8LOCKSS	SS LOCK WASHER, M8
7	1	FP/BR0069	FLOATING STRAP BRACKET
8	1	FP/BR0071	PIPE STRAP (TRIM TO REQUIRED LENGTH)
9	5	HW/M8X1.25MMHEXNUTSS	SS HEX NUT, M8
10	1	FP/BR0070	FIXED STRAP BRACKET AND STRAP
11	1	FP/BR0072	STRAP TENSIONER BOLT

Figure 2-7. PL/12319-1 Universal Pole Mounting Kit

Use this kit in combination with a product-specific LPOD-R mounting kit to secure the LPOD-R standalone configuration to a standard satellite dish support pole. The number of kits used depends on the weight of the unit.

Do these steps to install each kit:

1. Place the Unistrut (Item 1, part of the LPOD-R Mounting Kit) on a flat surface.
2. Slide both spring nuts (Item 2) into the Unistrut channel. Make sure to seat the springs against the interior wall of the channel.
3. Loosely fasten the Pipe Blocks (Item 3) to the spring nuts using (2X each) M8 hex bolts (Item 4), flat washers (Item 5), and lock washers (Item 6).
4. Position the semi-assembled Unistrut and Pipe Blocks against the mounting pole, then slide the Pipe Blocks until they contact either side of the mounting pole. Make sure that the Pipe Blocks are centered within the Unistrut. Tighten the mounting hardware.
5. Slide the Floating Strap Bracket (Item 7) into the Unistrut channel. Make sure that the bracket studs face outward.
6. Loosely assemble the Floating Strap Bracket to the Pipe Strap (Item 8) with (2X each) M8 flat washers (Item 5), lock washers (Item 6), and hex nuts (Item 9).
7. Do the following:
 - a. Holding the kit subassembly in place against the mounting pole, slide the Fixed Strap Bracket (Item 10) into the Unistrut channel until it abuts the adjacent Pipe Block.
 - b. Wrap the Pipe Strap around the pole, fitting the strap onto the Fixed Strap Bracket studs as snugly as possible. Score or otherwise mark a trim line on the Pipe Strap then, using the tin snips, trim the Pipe Strap to suit as shown in the side view provided in **Figure 2-8**.
8. Do the following:
 - a. Remove the Fixed Strap Bracket (Item 10) from the Unistrut channel, and assemble the Strap Tensioner Bolt (Item 11) to the Fixed Strap Bracket (the bolt head will abut the interior wall of the channel).
 - b. Slide this subassembly back into the Unistrut channel until it abuts the adjacent Pipe Block.
9. Secure the Pipe Strap (Item 8) using the Fixed Strap Bracket (Item 10), with (2X each) M8 hex nuts (Item 9), flat washers (Item 5), and lock washers (Item 6).
10. As shown in the side view provided in **Figure 2-8**, secure the Fixed Strap Bracket (Item 10) in place using the Strap Tensioner Bolt (Item 11) with (1X each) M8 flat washer (Item 5), lock washer (Item 6), and hex nut (Item 9); tighten as needed.

The assembled kit appears as shown in the top and side view example shown in **Figure 2-8**. Depending on the application, you may proceed to the next phase of installation.

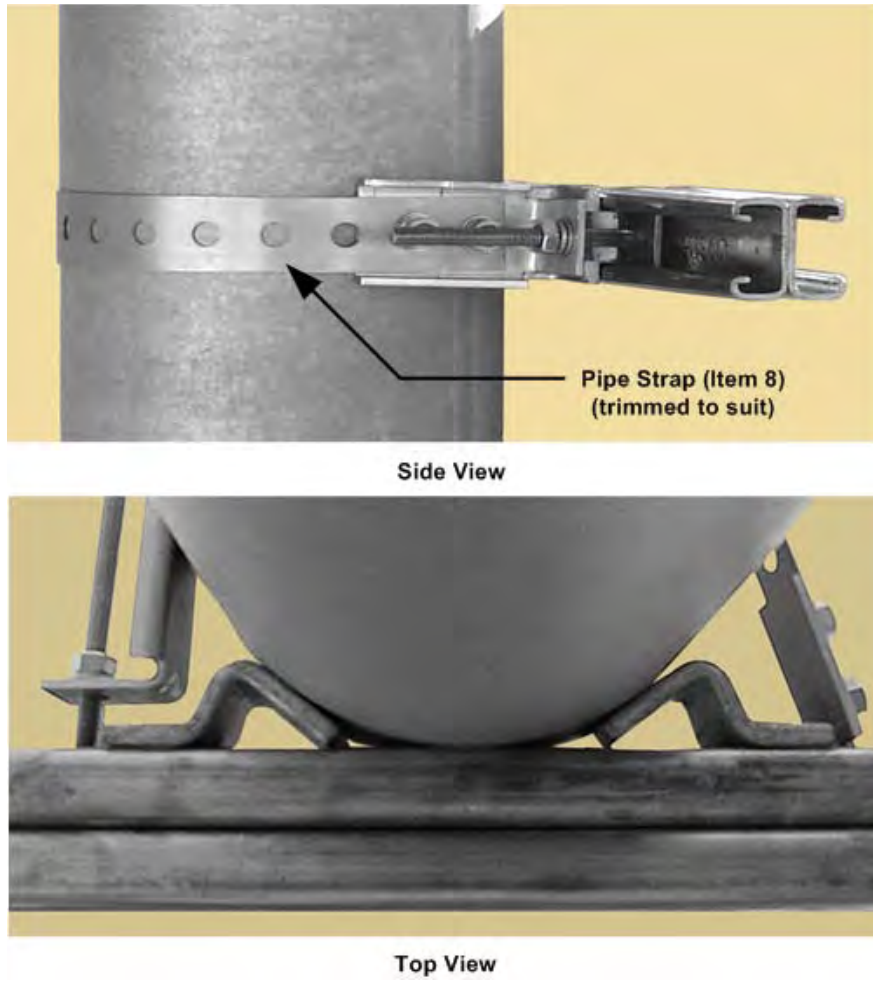
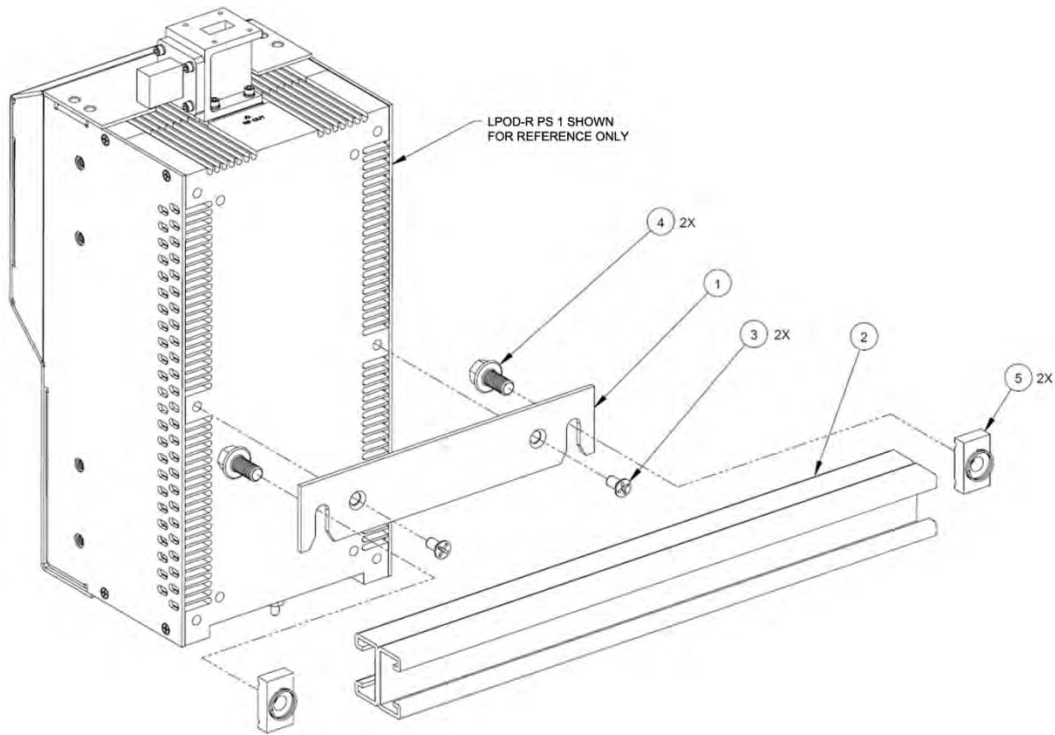


Figure 2-8. Universal Pole Mounting Kit – Final Assembly

2.4.3.2 KT-000095 Single Unit Mounting Kit (PS 1, PS 1.5)

Use this kit in combination with the PL/12319-1 Universal Pole Mounting Kit.



ITEM	QTY	CEFD PART NO.	DESCRIPTION
1	1	FP-0000534	BRACKET, MOUNTING
2	1	FP/BR0078	UNISTRUT, DUAL CHANNEL
3	2	HW/1/4-20X1/2FH	SCREW, 82° FLAT HEAD, PHILLIPS, 1/4-20 x 1/2 LG, SS
4	2	HW-0000070	SCREW, HEX, SERRATED FLANGE HEAD, 3/8-16 x 3/4 LG, SS
5	2	HW/3/8SPRINGNUT	SPRINGNUT, SHORT SPRING, 3/8-16, SS (P3300)

Figure 2-9. KT-000095 LPOD-R PS 1, PS 1.5 Single Unit Mounting Kit

2.4.4 Spar Mount Installation (PS 1, PS 1.5)

LPOD-R PS 1 and PS 1.5 standalone configurations, in addition to satellite dish support pole mounted installations, may be installed on the antenna spar. **Figure 2-10** shows a typical Comtech EF Data spar mount SSPA installation.

The kit that is required for the installation of your LPOD-R system (**Figure 2-11**) is determined by the spar that is used by the antenna's manufacturer.

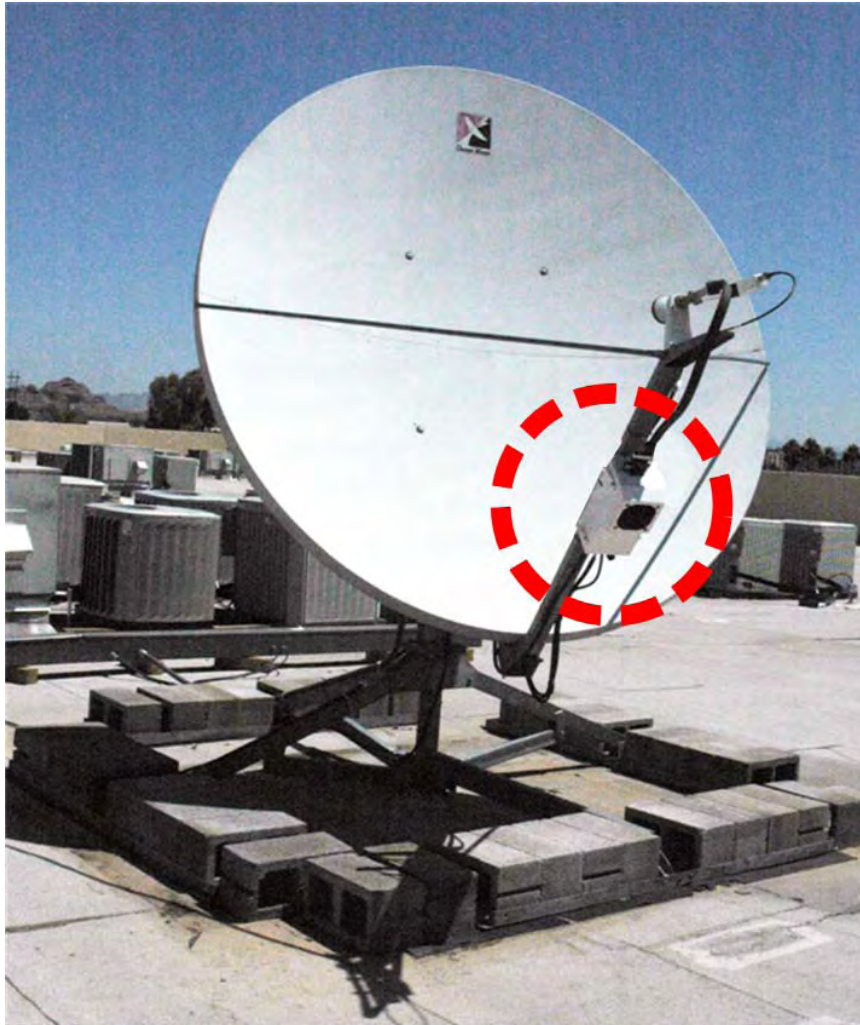
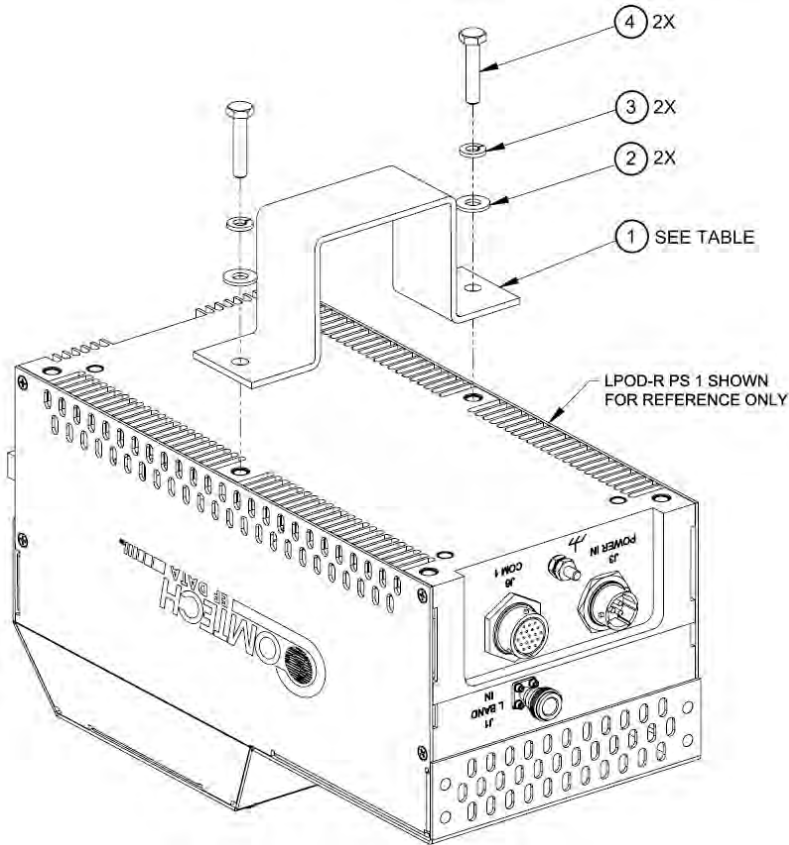


Figure 2-10. SSPA Spar Mount Installation Example

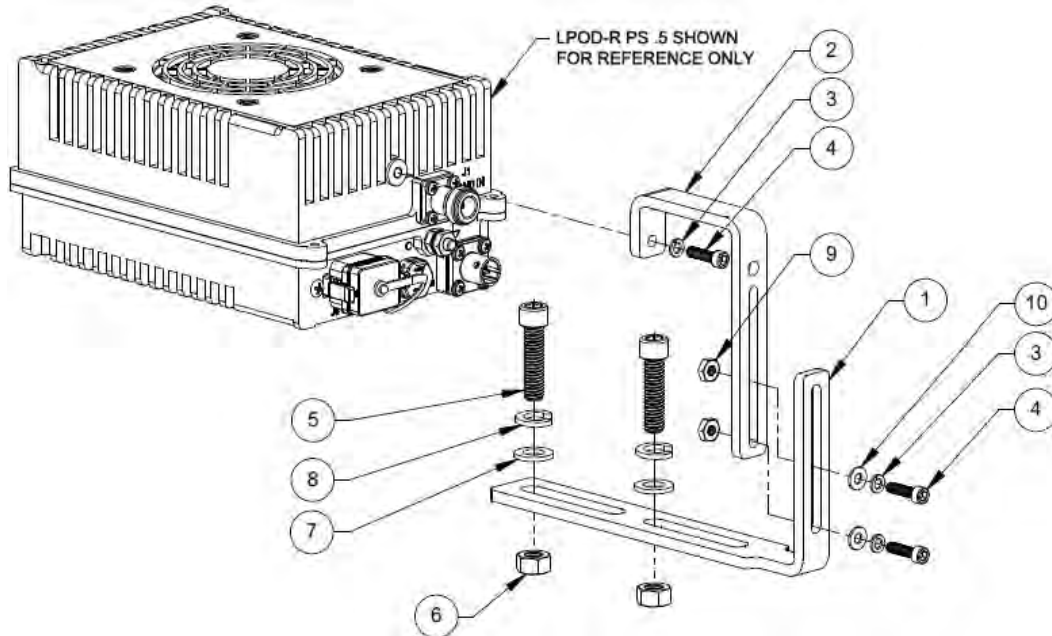


ITEM	CEFD KIT / QTY REQ'D				CEFD PART NO.	DESCRIPTION [dims in mm]
	KT-0000083	KT-0000084	KT-0000085	KT-0000289		
1	1	-	-	-	FP-0000547	BRACKET, MOUNTING, 1.5" x 2.0" [38.1 X 50.8] SPAR
	-	1	-	-	FP-0000546	BRACKET, MOUNTING, 1.75" x 4.0" [44.4 X 101.6] SPAR
	-	-	1	-	FP-0000545	BRACKET, MOUNTING, 1.0" x 2.5" [25.4 X 63.5] SPAR
	-	-	-	1	FP-0001330	BRACKET, MOUNTING, 72mm x 72mm SPAR
2	2	2	2	2	HW/1/4-FLT	FLAT WASHER, 1/4
3	2	2	2	2	HW/1/4-SPLIT	LOCK WASHER, SPLIT, 1/4
4	2	2	2	2	HW/1/4-20X1-1/4HEX	BOLT, HEX HEAD 1/4-20 x 1-1/4" LG

Figure 2-11. LPOD-R PS 1, PS 1.5 Spar Mount Installation Kits

2.4.5 KT-0020987 OMT-Mount Installation (PS .5)

Use this kit to install your LPOD-R PS .5 standalone configuration on the antenna orthomode transducer (OMT).



ITEM	QTY	CEFD PART NO.	DESCRIPTION
1	1	FP-0021719	BRACKET, LOWER
2	1	FP-0021720	BRACKET, UPPER
3	3	HW/8-SPLIT	LOCK WASHER, SPLIT, #8
4	3	HW/832X5/8SHCS	SOCKET HEAD CAP SCREW, 8-32 X 5/8 LG
5	2	HW/5/16-18X1.25	BOLT, HEX HEAD, 5/16-18 X 1.25 LG
6	2	HW/5/16-18HEXNT	HEX NUT, 5/16-18
7	2	HW/5/16-FLT	FLAT WASHER, 5/16
8	2	HW/5/16-SPLIT	LOCK WASHER, SPLIT, 5/16
9	2	HW/8-32HEXNUT	HEX NUT, #8-32
10	2	HW/8-FLT	FLAT WASHER, #8

Figure 2-12. KT-0020987 LPOD-R PS .5 OMT-Mount Installation Kit

2.5 LPOD-R Startup

2.5.1 Set the LPOD-R Power ON



WARNING!

FOR SAFETY REASONS, NEVER TURN THE UNIT ON WITHOUT PROPER WAVEGUIDE TERMINATION ON THE 'J2 | RF OUT' PORT. INDIVIDUALS CAN BE EXPOSED TO DANGEROUSLY HIGH ELECTROMAGNETIC LEVELS.

The LPOD-R does not have a 'Power On/Off' switch. You may power ON the unit by connecting the 'J3 | POWER IN' connector to the appropriate prime power source. The Mute or Transmit status of the unit automatically comes up in the last stored state (factory default = Transmit on, not muted).

2.5.2 Monitoring LPOD-R Operation with the LED Indicator (PS .5 ONLY)

The LPOD-R PS .5 unit features a multi-color Light-Emitting Diode (LED) Indicator. This LED is located on the signal output side of the LPOD-R PS .5 housing, next to the ground lug. See **Figure 2-13**.

Upon power-up of the unit, this LED provides visual cues as to the operational status and LO setting for the system. See **Table 2-7** for details.



Figure 2-13. LPOD-R PS .5 LED Indicator

Table 2-7. LPOD-R PS .5 LED Operation

OPERATING STATUS	LED COLOR	UNIT STATE
Standard 14.0-14.5 GHz Uplink Frequency	Green	Unmuted, 13.05 GHz LO
	Yellow	Muted, 13.05 GHz LO
	Red	Faulted, 13.05 GHz LO
13.75-14.5 GHz Tx Frequency Operation	Green (blinking)	Unmuted, 12.8 GHz LO
	Yellow (blinking)	Muted, 12.8 GHz LO
	Red (blinking)	Faulted, 12.8 GHz LO

2.5.3 Recovering the User Interface Access



The 'J6 | COM1' RJ-45 Ethernet port is the only means of M&C access for the current production version of the LPOD-R units (i.e., those models having the weatherproof RJ-45 'J6 | COM1' connector). Loss of the unit's Management IP Address or the interface access credentials (i.e., the username/password and SNMP communities) prohibits M&C of the LPOD-R.

You can reset the access credentials for the LPOD-R to the factory default settings. To do this, issue a ping command to the default Management IP Address (169.254.1.1) within the first 10 seconds of power cycle/reset of the unit.

2.5.3.1 Recovery Steps Using a Windows PC

Do these steps:

1. Change the IP Address of the User PC NIC (the Network Interface Card that controls the Ethernet port connected to the LPOD-R) to 169.254.1.10:
 - a. On the Windows taskbar, Click 'Start' and then click 'Control Panel'.
 - b. From the Control Panel window, click the 'Network and Sharing Center' icon.
 - c. Look for the 'View your active networks' section of the 'Network and Sharing Center' window.
 - d. Click the 'Local Area Connection' hyperlink (e.g., 'Local Area Connection 2') to select the targeted NIC.
 - e. In the 'Interface Status' window, click 'Properties'.
 - f. If necessary, click the 'Network' tab.

- g. In the 'This connection uses the following items:' window, select 'Internet Protocol Version TCP/IPv4'.
-  **IMPORTANT:** Make sure that you do not uncheck the checkbox.
- h. Click 'Properties'.
- i. Enter the IP address into the address fields: 169 | 254 | 1 | 10
-  **IMPORTANT:** Make sure that you do not deselect the 'Use the following IP address:' radio button.
- j. Click 'OK' to save the change.
2. If you have not already done so, connect a user-supplied Ethernet cable from the 'J6 | COM1' RJ-45 Ethernet port on the LPOD-R directly to the Ethernet port of the User PC.
3. Use Windows Command-line to ping the actively running LPOD-R:
 - a. Type "ping -t 169.254.1.1" to begin repeatedly pinging the LPOD-R.
 - b. Cycle the LPOD-R power as the User PC continues to ping the unit.
 - c. Continue to observe the ping responses in the Windows Command-line window.
4. Wait for one successful ping reply, followed by an unsuccessful ping – once the LPOD-R receives a ping on IP address 169.254.1.1 within the first 10 seconds of the unit's power-up or reset, it restores the interface access factory default values:
 - DEFAULT MANAGEMENT IP ADDRESS/RANGE – 192.168.1.4/24
 - DEFAULT HTTP INTERFACE USERNAME – comtech
 - DEFAULT HTTP INTERFACE PASSWORD – comtech
5. As per Step 1, change the IP address of the User PC's assigned Ethernet port to an address within the 192.168.1.XXX subnet (i.e., assign a Management IP Address to the LPOD-R from 192.168.1.001 through 192.168.1.255).

The LPOD-R management interface is now accessible and ready for M&C of the unit.

Chapter 3. FIRMWARE UPDATE

3.1 Firmware Overview



Make sure to operate the LPOD-R with its latest available firmware.

Comtech EF Data's LPOD-R family of Outdoor Amplifiers / Block Up Converters (BUCs) are factory-shipped with the latest version of operating firmware. If you need to update the firmware, you can apply the update to the LPOD-R without having to remove it from operation. You may directly acquire the download from Comtech EF Data's web site (www.comtechefdata.com), or receive the archive file by e-mail from Comtech EF Data Product Support.

3.1.1 LPOD-R Firmware Update Procedure Summary

1. Download the firmware update archive file to a user-supplied PC. The PC must be Microsoft Windows® compatible. Comtech EF Data's optional LPODnet is available for Ethernet-based remote monitor and control (M&C) of the LPOD-R.
2. Connect a user-supplied Ethernet cable from the User PC to the '**J6 | COM1**' RJ-45 Ethernet port.



The original versions of the LPOD-R PS 1 and PS 1.5 were shipped with a 19-pin '**J6 | COM1**' port. This allowed use of Comtech EF Data's optional CLC-10 Handheld Terminal M&C Accessory Kit (CEFD Kit KT-0020518) for optional serial-based M&C of the LPOD-R PS 1 or PS 1.5.

3. Extract the firmware update files from the archive download file. You may then use Comtech's "CReflash" utility. (This utility is only provided in the LPOD-R PS .5 firmware archive download, but it may also be used for the PS1 and PS1.5 firmware update procedures.) Otherwise, you must use the LPOD-R Management IP Address to connect the FTP client to an FTP server, and then FTP-transfer the files from the User PC to the LPOD-R.

3.1.2 About Firmware Numbers, File Versions, and Formats



The Comtech EF Data Web site catalogues its firmware update archive files by product type (e.g., router, modem, etc.), the specific model, and optional hardware configurations. The LPOD-R files are provided under "Home | Support | Software Downloads | Amplifier Software Downloads | LPOD-R Software Downloads":

- The LPOD-R PS .5 firmware download hyperlink appears as F0020841x_V####.
- The LPOD-R PS 1 and PS 1.5 firmware download hyperlink appears as F0020880x_V####.

Typical for either hyperlink, 'x' is the firmware revision letter, and '####' represents the firmware version number (e.g., V123 = Version 1.2.3).

Comtech EF Data provides its archive download files in two compressed formats – *.exe (self-extracting) and *.zip (compressed):

- The self-extracting *.exe file does not require use of a third-party utility program.
- Some firewalls do not allow the download of self-extracting *.exe files. You must instead download the *.zip file, and extract the firmware files from the download with a user-supplied third-party file archiver and compression utility program such as PKZIP for Windows, WinZip, ZipCentral, etc. (PKZIP for DOS is not supported due to file naming conventions). Comtech EF Data does not provide this utility program.

For detailed information on handling archived files, read your utility program's Help documentation.

3.2 Prepare for the Firmware Download

3.2.1 Required User-supplied Items

You will need a Microsoft Windows-based PC equipped with available serial and Ethernet ports, a compatible Web browser (e.g., Internet Explorer), and a terminal emulator program (e.g., Tera Term or HyperTerminal).

3.2.1.1 LPOD-R Connections for All Current Production Units

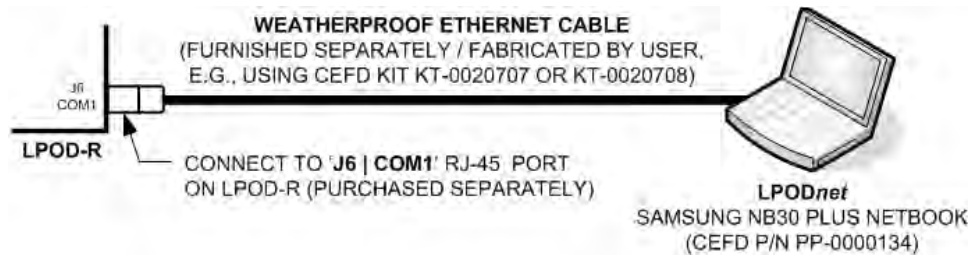


Figure 3-1. M&C Utilities Available from Comtech EF Data (All Current LPOD-R Models)

See **Figure 3-1**:

You can use Comtech's optional LPODnet (part of CEFD KT-0000203 M&C Netbook Accessory Kit) for Ethernet-based M&C of the LPOD-R. The LPOD-R features a weatherproof 'J6 | COM1' RJ-45 modular port for the M&C interface. Use a CAT5e Ethernet cable to connect the LPOD-R directly to the Ethernet port of the User PC.



CAUTION

For permanent Ethernet connections, you **MUST** use the appropriate mating connector on your supplied Ethernet cable to ensure a weatherproof installation. You may fabricate this cable using CEFD connector kit KT-0020707 or KT-0020708. See Figure 3-1, and Section 2.2.5.1 and Figure 2-4 in Chapter 2 for details.

3.2.1.2 LPOD-R Connections for Earlier PS 1 or PS 1.5 Units

If you are using a user-supplied terminal emulator program – you can use a user-fabricated 9 pin-to-19 pin adapter cable to directly connect the PC serial port to the LPOD-R PS 1 or PS 1.5 19-pin 'J6 | COM1' port.

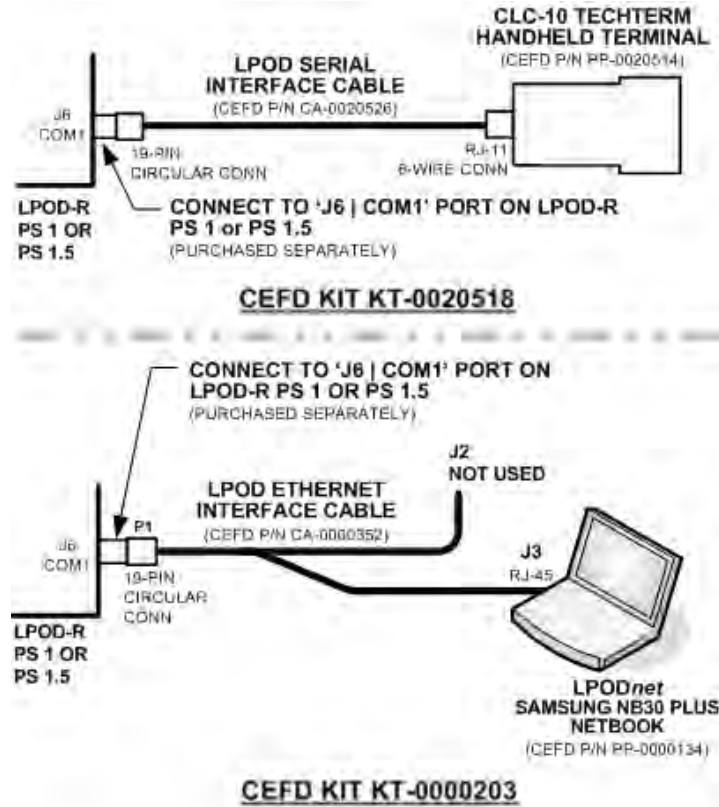


Figure 3-2. M&C Utilities Available from Comtech EF Data (Earlier LPOD-R PS1 or PS 1.5 Models)

See Figure 3-2:

- You can use Comtech EF Data's optional CLC-10 Handheld Terminal (part of CEFD M&C Accessory Kit KT-0020518) for serial-based monitor and control of the LPOD-R PS 1 or PS 1.5 (when the optional EIA-232/485 serial interface is available).

This kit provides an adapter cable (CEFD P/N CA-0020526) to connect the CLC-10 to the LPOD-R PS 1 or PS 1.5 19-pin 'J6 | COM1' port.



The CLC-10 is not supported for use with the current LPOD-R production models.

- Use the 19 pin-to-RJ-45 adapter cable (CEFD P/N CA-0000352) that is part of the KT-0000203 LPODnet Netbook Accessory Kit to connect the LPODnet or the User PC to the LPOD-R PS 1 or PS 1.5 19-pin '**J6 | COM1**' port.

3.2.2 Configure the Terminal Emulator Program

On the User PC – Open the terminal emulator program, and then configure the program's serial port communication and terminal display operation:

- Baud Rate = 38400 bps
- Data Bits = 8
- Stop bits = 1
- Parity = NO
- Local Echo = ON
- Port Flow Control = NONE
- Display New Line Rx/Tx = CR



- 1) Read your terminal emulator program user guide or HELP feature for operating and configuration instructions.
- 2) The CLC-10 Handheld Terminal may be used in place of a PC-based Terminal Emulator for LPOD-R PS 1 or PS 1.5 units that were originally shipped with the 19-pin '**J6 | COM1**' 19-pin port.

3.2.3 Get the LPOD-R Management IP Address and Firmware Information

1. On the LPOD-R – Apply power to the unit. Your power connection varies depending on your ordered unit.



See Section 2.2.3 or Section 2.2.4 in Chapter 2. SYSTEM CONNECTORS, INSTALLATION, AND STARTUP in this manual to identify your specific power connector.

2. Identify your default Management IP Address. You will not be able to access the LPOD-R HTTP Interface without this information.



If needed, see Section 2.4.3 in Chapter 2. SYSTEM CONNECTORS, INSTALLATION, AND STARTUP in this manual to execute the LPOD-R User Interface Access recovery procedure.

3. Get the firmware information using either of these methods:
 - To use the HTTP (Web Server) Interface, see Section 3.2.3.1.
 - To use the optional serial remote control, see Section 3.2.3.2.

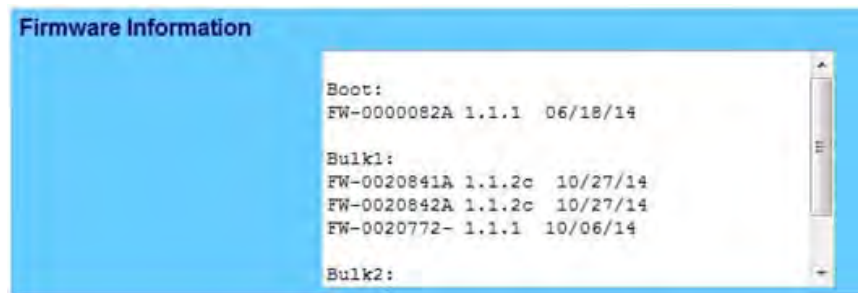
3.2.3.1 Use the HTTP Interface to Find the Firmware Information



Chapter 4. ETHERNET INTERFACE OPERATION

Do these steps:

1. Go to one of these pages to review the firmware information:
 - The 'Firmware Information' section of the 'Config | Utility' page provides the firmware details as Boot, Bulk1, and Bulk2, as shown in this example:



- The 'Summary' section of the 'Status | Summary' page provides the firmware details as "FW Revision", "Active Software Image", and "Next Reboot Image", as shown in this example:



2. Write down your firmware information for further reference or to provide to Comtech EF Data Product support.

3.2.3.2 Use the Optional Serial Interface to Find the Firmware Information



Chapter 5. OPTIONAL SERIAL INTERFACE OPERATION (PS 1, PS 1.5 ONLY)

Use your terminal emulator program or CLC-10 to execute remote queries with the LPOD-R. Use either of these remote queries to find the firmware information:

- Condensed : **<0/SWR?[cr]**
(returns the firmware version numbers running under Boot, Bulk1, and Bulk2, in the form B.B.BB)
- Detailed : **<0/FRW?[cr]**
(returns the complete information of the firmwares running under Boot, Bulk1, and Bulk2 in the form FW-AAAAAAA B.B.BB DD/MM/YY, where:
 - FW-AAAAAAA = the firmware part number
 - B.B.BB = the firmware version number
 - DD/MM/YY = the firmware release date (Day/Month/Year)

3.2.4 Make a Temporary Folder (Subdirectory) on the User PC

The temporary folder is where you store the firmware archive download. There are several ways you can make a temporary folder on a Windows PC:

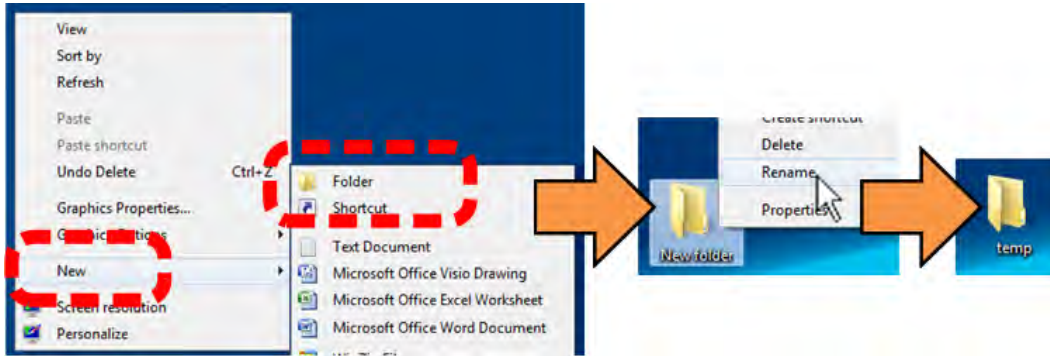
- To use the Windows Desktop, see Section 3.2.4.1.
- To use Windows Explorer, see Section 3.2.4.2.
- To use the Run and Browse windows, see Section 3.2.4.3.
- To use Windows Command-line or the Command Prompt, see Section 3.2.4.4.



- 1) These examples specify drive letter “**c:**”. You can use any valid, writable drive letter.
- 2) Typical for many of the tasks that follow, type the command as instructed and then press **Enter**.

After you make the temporary folder, proceed to Section 3.3 to download and extract the firmware files.

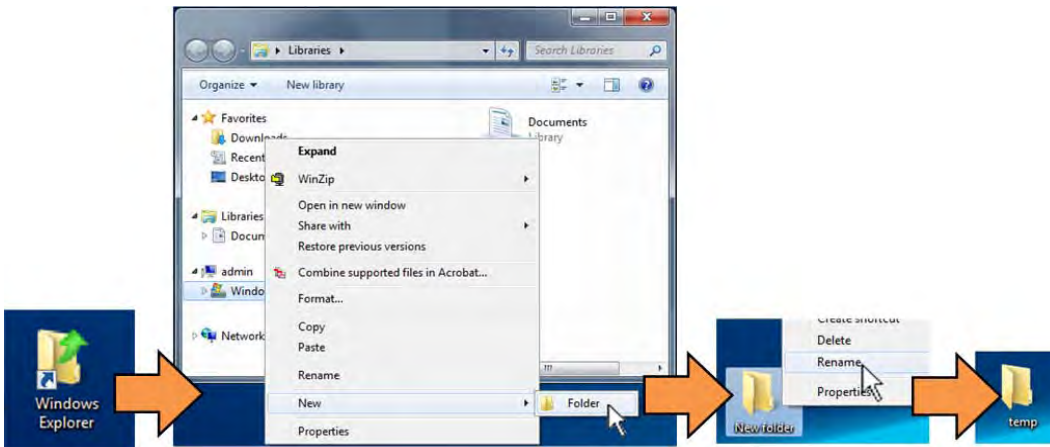
3.2.4.1 Use Windows Desktop to Make a Folder



Do these steps:

1. Right-click anywhere on the desktop to open the popup submenu.
2. Select **New > Folder** to make the new, temporary folder on the desktop.
3. Right-click on the new folder and then select **Rename** from the popup submenu. Rename this folder to “temp” or some other convenient, unused name.

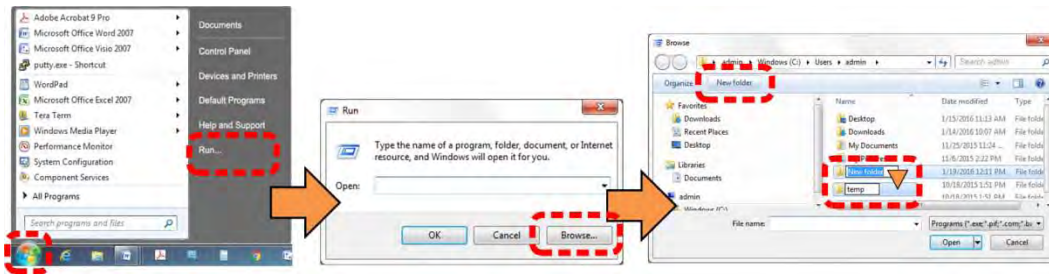
3.2.4.2 Use Windows Explorer to Make a Folder



Do these steps:

1. Left-double-click the Windows Explorer icon on the Windows Desktop.
2. Depending in your Windows OS version: select **File > New > Folder**, or click your Folder Destination (e.g., **Windows (C:)**) and then **New Folder** to make the new, temporary folder in the active location.
3. Right-click the **New Folder** folder name, and then **Rename** this folder to “temp” or some other convenient, unused name.

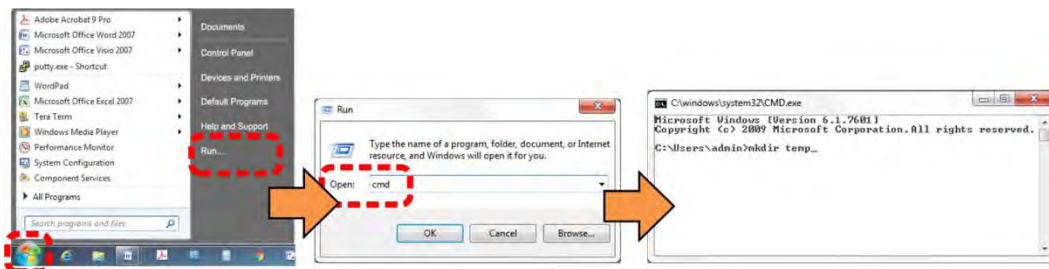
3.2.4.3 Use the Run and Browse Windows to Make a Folder



Select **Start** on the Windows taskbar and then do these steps:

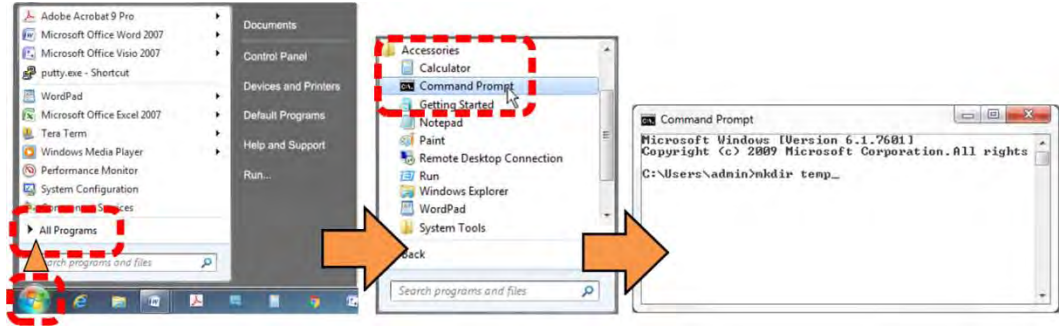
1. Click **Run...** to open the **Run** window.
2. Click **Browse...** to open the **Browse** window.
3. Click **New Folder**. This can be an icon or a text label, depending on the Windows OS version.
4. Right-click the **New Folder** folder name, and then **Rename** this folder to “temp” or some other convenient, unused name.

3.2.4.4 Use Windows Command-line or Command Prompt to Make a Folder



Select **Start** on the Windows taskbar and then do these steps:

1. Click **Run...** to open the **Run** window (or, depending on Windows OS version prior to Windows 95, click the **MS-DOS Prompt** icon from the Main Menu).
2. Open a Command-line window:
 - For Windows 95 or Windows 98 – type “command”.
 - For any Windows OS versions later than Windows 98 – type “cmd” or “command”.
 - Alternately, from **Start**, select the **All Programs > Accessories** popup submenu, and then select **Command Prompt**:



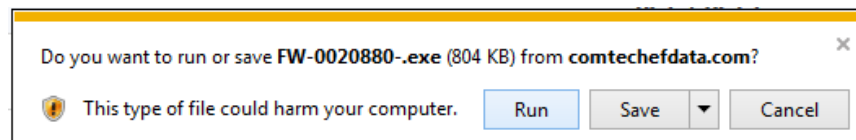
3. From the c:\> prompt, type either “mkdir temp” or “md temp” (both “mkdir” and “md” mean “make directory”), and then press **Enter**.

There will now be a “temp” folder created and available for placement of the firmware file download.

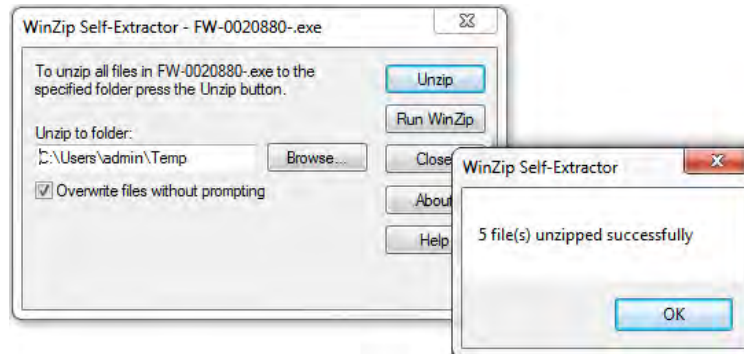
3.3 Download and Extract the Firmware Update Files

Do these steps:

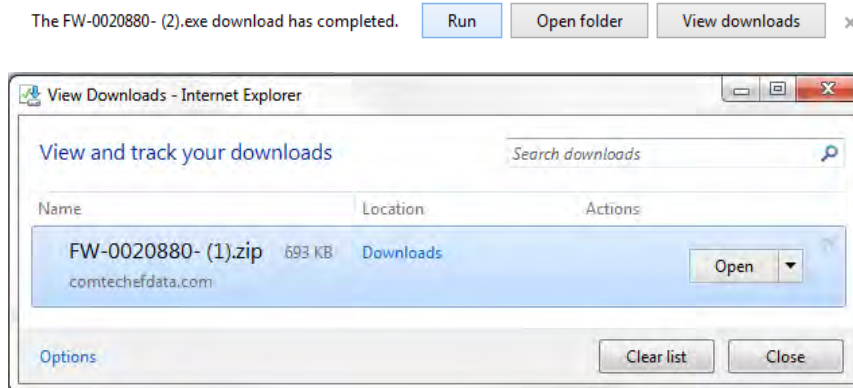
1. Go online to www.comtechefdata.com.
2. On the Main page – Under **Support Information** or the **Support** tab, select the **Software Downloads** hyperlink.
3. On the **Software Downloads** page – Click **Download Flash and Software Update Files**.
4. On the **Flash Updates Index** page – Select the **(Select a Product Line) Amplifiers** hyperlink.
5. On the **Amplifiers** product page – Select the **LPOD-R** product hyperlink;
6. Select the appropriate firmware archive EXE or ZIP file download hyperlink.
7. Once you select the EXE or ZIP hyperlink, the **File Download** dialogue opens on your browser and prompts an action. You may otherwise click **[Cancel]** to quit the file download process. Note the following:
 - For EXE files:



- Click **[Run]** to open the self-extractor dialogue window. Use **[Browse]** to select your destination folder. Click **[Unzip]** to extract the files. Your results display as per this example – click **[OK]** to close. Your files are now available for transfer to the LPOD-R.



- Click **[Save]** to download the EXE file to your Downloads folder. Once the download is complete the dialogue prompts you to either **[Run]** the self-extracting file, or to open or view the Windows Downloads folder for further action.



- For ZIP files:



- Click **[Open]** to open the archive file. Use the WinZip features to select the files for extraction to your destination folder.
- Click **[Save]** to download the ZIP file to your Windows Downloads folder. Once the download is complete the dialogue prompts you to either **[Open]** the archive file, or to

open or view the Windows Downloads folder for further action.

8. If not already done with **File Download > Open**, you must extract, at a minimum, these files (filenames are subject to change):

- FOR THE LPOD-R PS .5:
 - FW-0020841X_###.bin – The Firmware Bulk image file
 - ReleaseNotes_FW-0020841x_v#_#_#.pdf – The Firmware Release Notes PDF file
 - CReflash.exe –The Firmware Update Utility program
- FOR THE LPOD-R PS 1 OR PS 1.5:
 - FW-0020880X_V###.bin – The Firmware Bulk image file
 - ReleaseNotes_FW-0020880X_V###.pdf – The Firmware Release Notes PDF file



WHERE: 'X' is the firmware revision letter, and '#_#_#' or '###' is the firmware version (e.g., FW Ver. 1.2.3 = "1_2_3" or "123")

9. Confirm availability of the firmware files in the temporary folder. There are several ways you can view the contents of the temporary folder on a Windows-based PC:
 - To use the Windows Desktop, see Section 3.3.1.1.
 - To use Windows Command-line or Command Prompt, see Section 3.3.1.2.

After you confirm the firmware files are in the folder, proceed to Section 3.4 to upload the firmware update to the LPOD-R.

3.3.1.1 Use Windows Desktop to View Folder Contents

From the Windows Desktop:

1. Double-left-click the Windows Explorer icon, and then double-left-click as needed to locate, and then open, the "temp" folder (directory) created earlier on the Windows Desktop.
2. Use the **Browse** window (**Start > ...Run > Browse**) to locate, and then double-click to open, the "temp" folder.

3.3.1.2 Use Windows Command-line to View Folder Contents

Using Command-line or Command Prompt:

1. Type “**cd c:\temp**” at the Windows Command-line prompt to change to the temporary folder (directory) created earlier using Command-line.
2. Type “**dir**” to list the files extracted to the temporary folder from the downloaded archive file.

3.4 Upload the Firmware Files and Update the LPOD-R Unit

3.4.1 Important Considerations

Before you proceed with the firmware update, make sure that:

- You connect the LPOD-R ‘**J6 | COM1**’ port to a Windows-based PC Ethernet port with a CAT5e Ethernet cable.
- Your PC is running a terminal emulation program for operation of the LPOD-R Ethernet Telnet or the optional serial interfaces.
- You have noted your LPOD-R Management IP Address.
- Your PC is running a compatible Web browser for operation of the LPOD-R HTTP Interface.
- You download or otherwise have Comtech’s latest firmware files and the “CReflash” utility available on the User PC in an accessible temporary folder.

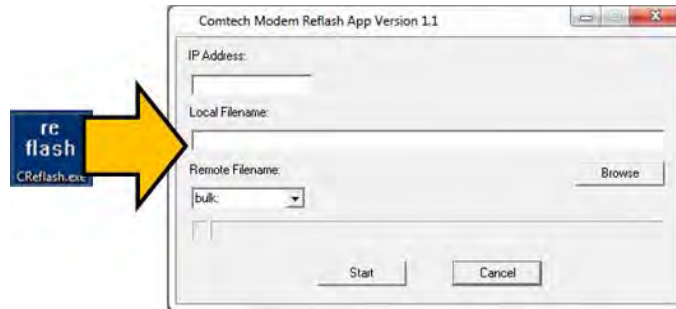
3.4.2 Steps to “CReflash” Upload the Firmware Files (All LPOD-R Models)



The “CReflash” utility is provided with the LPD-R PS .5 firmware download. This application may also be used for the LPOD-R PS 1 or PS 1.5 firmware update procedures.

Do these steps:

1. From the temporary folder – Locate, and then double-click, the “CReflash” filename or icon. The CReflash utility opens:




2. Enter your upload parameters information into CReflash:
 - a. Left-click in the “IP Address:” text box, and enter the default Management IP Address (e.g., 192.168.1.4).
 - b. Left-click in the “Local Filename:” text box. Then, click **[Browse]** and navigate to the temporary folder created earlier. Click on the firmware “BIN” filename, and then click **[Open]**. The filename will appear in the “Local Filename:” text box.
 - c. Make sure the drop-down list remains set to “**bulk:**”.
 - d. Click **[Start]** to begin the upload process. If the information was correctly entered into CReflash, the utility displays an animated progress bar at the bottom of the window, along with a series of messages:
 - “Opening FTP”
 - “Sending data file to modem:”
 - “Writing FLASH: # of #”
 - “Success!”
3. When done, click **[Cancel]** to exit CReflash.

3.4.3 Steps to FTP Upload the Firmware Files



- 1) Typical for all steps: “xxx.xxx.xxx.xxx” represents the assigned unit Management IP Address.
 - 2) Type all commands without quotes, and press Enter to execute.
1. To proceed, you should already have noted the Management IP Address for the LPOD-R as instructed in Section 3.2.3.
 2. Use Windows Command-line to send a ping command. To ping the unit, type “ping xxx.xxx.xxx.xxx” at the Windows Command-line prompt. The response should confirm whether the unit is connected and communicating correctly with the User PC.

3. Use Windows Command-line to transfer the files from the User PC to the LPOD-R unit via FTP:
 - a. Type “ftp xxx.xxx.xxx.xxx” to open the FTP session.
 - b. Type “bin” to set the binary transfer mode.
 - c. Type “prompt”.
 - d. Type “hash”.
 - e. To begin the file transfer:
 - For the LPOD-R PS .5 only, type “put FW-0020841X.bin a:\bulk.bin:”
or
 - For the LPOD-R PS 1 or 1.5, type “put FW-0020880X.bin a:\bulk.bin:”
 -  The destination “a:\bulk.bin:” must be all lower-case.
 - Wait for the file transfer to end.
 - f. Type “bye” to close the FTP session.
 - g. Close the Windows Command-line window.
4. To verify that the PC-to-unit FTP file transfer was successful, find the current firmware information via the HTTP or optional serial interfaces (see Sections 3.3.1.1 or 3.3.1.2).

3.4.4 Steps to Update the LPOD-R Unit



Chapter 4. ETHERNET INTERFACE OPERATION

Use the LPOD-R HTTP Interface to select the new firmware and soft-reboot the unit. Go to the ‘Config | Utility’ page and do these steps:

1. Select the preferred Current Active Firmware Image:
 - a. Use the ‘Next Reboot Image’ drop-down list to select Image 1 or 2.
 - b. Click [Submit].



2. Soft-reboot the LPOD-R:
 - a. In the ‘Perform Soft Reboot’ section, click [Reboot Now].



- b. Wait while the LPOD-R reboots with the Current Active Firmware Image.
3. To load a second image, repeat Steps 1 and 2.

4. After the unit has rebooted with the new firmware, if the optional serial interface is available you may clear the trending data. Use the terminal emulator or CLC-10 Handheld Terminal to enter serial remote command **<0/CTD=1[cr]**.

The LPOD-R is now operating with its latest firmware. The firmware update process is complete.

Chapter 4. ETHERNET INTERFACE OPERATION

4.1 Overview

Ethernet remote monitor and control (M&C) of the LPOD-R is available through its 100BaseT/10BaseTx Ethernet Management Interface by connecting the User PC Ethernet port to the 'J6 | COM1' RJ-45 port on the LPOD-R.

Three protocols are available to use for Ethernet remote M&C. Operate these protocols separately.

- Simple Network Management Protocol (SNMP). This requires a user-supplied Network Monitoring System (NMS) and a user-supplied Management Information Base (MIB) File Browser.



CAUTION

Comtech EF Data recommends use of the Ethernet-based SNMP interface for advanced users only. All other users are strongly encouraged to use the LPOD-R HTTP Interface for remote Monitor and Control (M&C) of the LPOD-R.

- Telnet Interface. When the optional EIA-232/485 serial interface is available, you may use the serial remote control protocol via this interface. This requires use of the User PC's Command line interface, or a user-supplied terminal emulation program, such as HyperTerminal.
- HTTP (Web Server) Interface. This requires a compatible user-supplied web browser such as Internet Explorer.

4.1.1 Prerequisites

Before you proceed with Ethernet remote product management, make sure the following is true:

- The LPOD-R is operating with the latest version firmware files.
- The User PC is running a terminal emulation program for operation of the LPOD-R Telnet Interface.
- The User PC is running a compatible web browser for operation of the LPOD-R HTTP Interface.
- The user-supplied Windows PC is connected to the LPOD-R as applicable:
 - The '**J6 | COM1**' port on the unit connects to the User PC Ethernet port with a user-provided Ethernet cable that has the available weatherproof connector kit (CEFD P/N KT-0020707 or KT-0020708).
 - Older versions of the LPOD-R PS 1 and PS 1.5 feature a 19-pin '**J6 | COM1**' port. The unit connects to the User PC Ethernet port with the available CA-0000352 Ethernet Interface Cable (part of CEFD Kit KT-0000203).
- You have recorded the LPOD-R's Management IP Address.

4.2 SNMP Interface

SNMP is an Internet-standard protocol for managing devices over IP networks. An SNMP-managed network has three key components:

- The managed device. This includes the LPOD-R.
- The SNMP Agent. This software runs on the LPOD-R. The LPOD-R SNMP Agent supports both SNMPv1 and SNMPv2c.
- The user-supplied Network Management System (NMS). This software runs on the User PC.

4.2.1 Management Information Base (MIB) Files

An MIB file is used for SNMP remote management of a unique device, and consist of a tree of nodes called Object Identifiers (OIDs). Each OID provides remote management of a particular function. These MIB files should be compiled in a user-supplied MIB Browser or SNMP Network Monitoring System server.

In these LPOD-R MIB file names, the letter x represents the revision of the file.

4.2.1.1 ComtechEFData Root MIB file

- FW-0000291x.mib
- ComtechEFData MIB file gives the root tree for all Comtech EF Data LPOD-R products (PSx) and consists of only the following OID:
 - Name: comtechEFData
 - Type: MODULE-IDENTITY
 - OID: 1.3.6.1.4.1.6247
 - Full path:
iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).comtechEFData(6247) Module: ComtechEFData

4.2.1.2 LPOD-R MIB file

- FW-0000289x.mib
- MIB file consists of all of the OID's for management of the LPOD-R functions

4.2.1.3 LPOD-R Traps MIB file

- FW-0000290x.mib
- Trap MIB file provides SNMPv1 traps common for LPOD-R.

4.2.2 SNMP Community Strings



CAUTION

In SNMP v1/v2c, the SNMP Community String is sent unencrypted in the SNMP packets. Caution must be taken by the network administrator to ensure that SNMP packets travel only over a secure and private network if security is a concern.

The LPOD-R uses Community Strings as a password scheme that provides authentication before gaining access to the router agent's MIBs. They are used to authenticate users and determine access privileges to the SNMP agent. The LPOD-R defines three Community Strings for SNMP access:

- Read Community default = public
- Write Community default = private
- Trap Community default = comtech

Type the SNMP Community String into the user-supplied MIB Browser or Network Node Management software.



For correct SNMP operation, the LPOD-R MIB files must be used with the associated version of the LPOD-R M&C. See the LPOD-R FW Release Notes for information on the required FW/SW compatibility.

4.3 Telnet Interface



Chapter 5. OPTIONAL SERIAL INTERFACE OPERATION (PS 1, PS 1.5 ONLY)

The LPOD-R has a Telnet interface for the purpose of equipment M&C via the optional Serial Remote Control protocol. The Telnet interface requires user login at the **Administrator** level and **Read/Write** level. Once logged into the Telnet interface as the Administrator, you have access to the optional serial-based Remote Control Interface. An example of the login process and remote control operation is shown here:

```
ca. Telnet 192.168.1.4
COMTECH EF DATA TELNET INTERFACE
You must have an account to use this interface.
Please see your administrator.
Enter name: contech
Enter password: contech
Name and Password accepted. Please review your
SSPA manual for command syntax.
<Q=Quit> Telnet--><0001/NUE?
>0001/NUE=015
```

Figure 4-1. Telnet Interface Example – Windows Command-line

4.3.1 Using HyperTerminal for Telnet Remote Control Operation

There is a disadvantage when using Windows Command line as a Telnet client with the optional Remote Control protocol. For the messages coming from the Telnet Server, Command line cannot translate a carriage return command (**\r**) to a carriage return + line feed command (**\r\n**). Therefore, any multi-line Target-to-Controller response (e.g., the response to the FRW? query) shows as one line, with the latter lines overwriting the previous lines.

To see the full response messages, you can use the HyperTerminal terminal emulation program configured as a Telnet client. An example of the login process and remote control operation, when using HyperTerminal as the interface, is shown here:

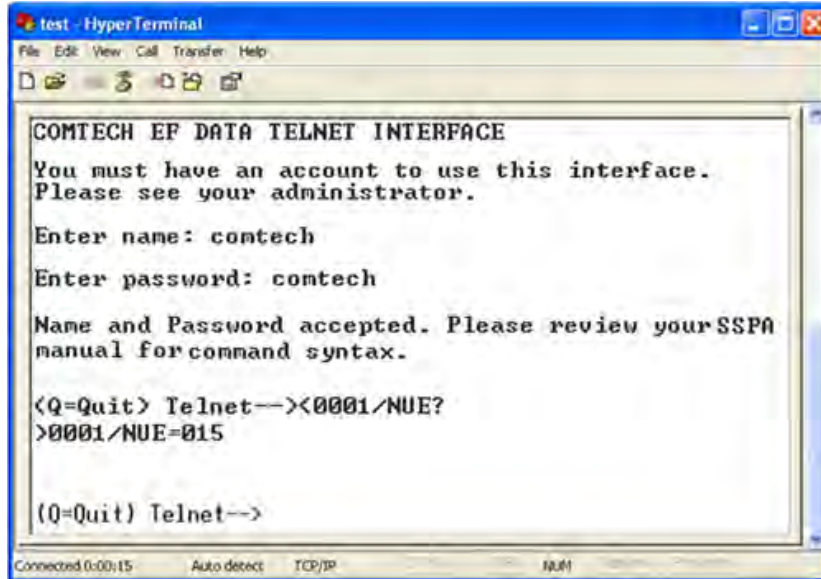


Figure 4-2. Telnet Interface Example – HyperTerminal

4.3.1.1 Configure HyperTerminal for Telnet Remote Control Operation

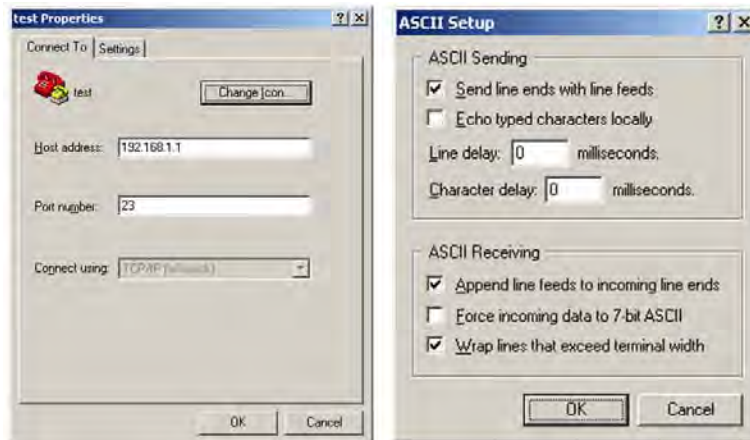


Figure 4-3. Configure HyperTerminal

See Figure 4-3. Do these steps:

1. Make sure to define the Connect To Telnet connection properties correctly (File → Properties)(Figure 4-3, left):
 - a. Enter the LPOD-R's Traffic/Management IP Address as the "Host address" (e.g., 192.168.1.1).
 - b. Enter TCP Port 23 as the "Port number".
 - c. Set "Connect using" to TCP/IP (Winsock) instead of COM1 or COM2.
 - d. Click [OK] to save your settings.
2. For ASCII Setup (File → Properties → Settings → ASCII Setup)(Figure 4-3, right):
 - a. Check the "Send line ends with line feeds" option in the 'ASCII Sending' section.
 - b. Check the "Append line feeds to incoming line ends" option in the 'ASCII Receiving' section.
 - c. Click [OK] to save your settings.

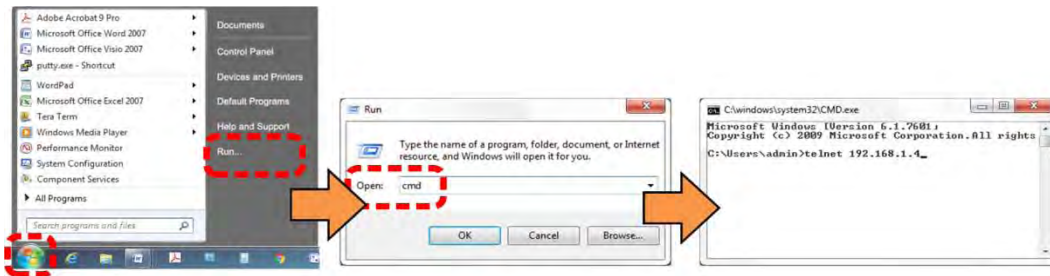
4.4 HTTP (Web Server) Interface

A user-supplied web browser allows the full M&C of the LPOD-R through its HTTP Interface. This embedded web application is designed for use with Microsoft's Internet Explorer Version 5.5 or higher. It is a non-secure web application.

4.4.1 Set Up Access to the HTTP Interface

Do these steps to set up access the HTTP Interface:

1. Use Windows Command-line: Select **Start**, then **Run**, then type **cmd**.
2. Click **OK** to open the Command-line window.
3. Start a Telnet session with the unit at the default IP Address (e.g., 192.168.1.4).



4. Enter the username and password. The default for both parameters is "comtech".

5. Use the command `IPA=xxx.xxx.xxx.xxx.yy`, where “xxx.xxx.xxx.xxx” is a valid IP Address on the network where the unit is to be installed, and “yy” is the subnet range (typically, yy = 24).



- 1) You must assign a unique IP Address for each unit on the network before connecting to an existing network. The IP Address may need to be changed from the factory default setting.
- 2) Changing the IPA value requires that you cycle power on the unit, and then start a new Telnet session using the new IP Address.
- 3) Loss of the unit’s Management IP Address or the interface access credentials (i.e., the username/password and SNMP communities) prohibits M&C of the LPOD-R. Follow the procedures described in Sect. 2.4.3 Recovering the User Interface Access (in Chapter 2. SYSTEM CONNECTORS, INSTALLATION, AND STARTUP) to restore the factory default M&C interface access settings.

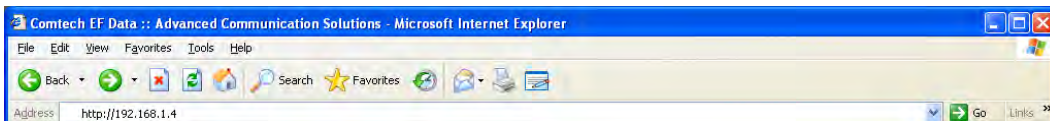


See the table of Remote Commands and Queries in **Chapter 5. OPTIONAL SERIAL INTERFACE OPERATION (PS 1, PS 1.5 ONLY)** for detailed operational information.

4.4.2 HTTP Interface User Login

Do these steps:

1. From the PC, enter the default IP Address for the LPOD-R (e.g., **http://192.168.1.4**) into the **Address** area of the browser.



2. In the Login window, type the **User name** and **Password**, and then click **OK**. The default User Name and Password are both **comtech**.



Once the valid User Name and Password is accepted, the LPOD-R HTTP Interface splash page shows (Figure 4-4). The unit and firmware version in this example will differ from your setup.

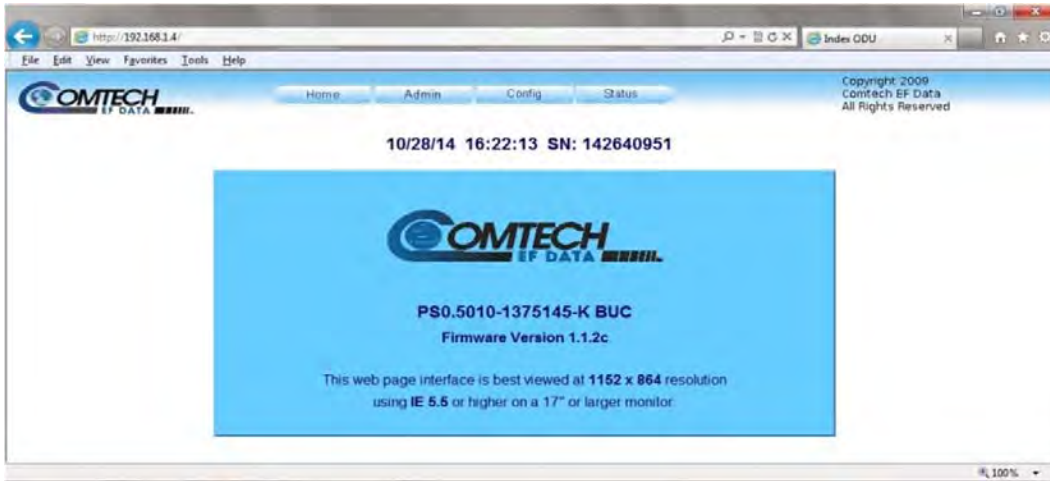


Figure 4-4. LPOD-R HTTP Interface “Splash” Page (PS .5 Unit Example Shown)

4.4.3 HTTP Interface Features

4.4.3.1 Menu Tree

Figure 4-5 shows the menus and pages in the LPOD-R HTTP Interface. This interface has four top level navigation tabs, shown in blue. Each top level tab has page hyperlinks (grey). These hyperlinks open individual nested Web pages.

Home	Admin	Config	Status
Home	Access	Amplifier	Summary
Contact	SNMP	Utility	Status
Support			MOP
			Events
			Statistics
			Trending Graphs

Figure 4-5. LPOD-R HTTP Interface Menu Tree

4.4.3.2 Page Navigation

The HTTP Interface has four navigation tabs at the top of each page. Click a navigation tab to see its page hyperlinks. Click a page hyperlink to open a page.



This manual uses a convention for all web pages to show you how to navigate to the featured page: Navigation Tab | Page Hyperlink.

For example, “Home | Home” instructs you to click the ‘Home’ navigation tab, and then click the ‘Home’ page hyperlink.

4.4.3.3 Page Sections

Each page has one or more sections. The title at the upper-left corner of each page or section describes its operational features. Each section can have editable fields, action buttons and read-only displays for a specific function.



This manual explains the purpose and operation for each Web page and its sections.

4.4.3.4 Action Buttons

Action buttons are important in the LPOD-R HTTP Interface. Click an action button to do one of these tasks:



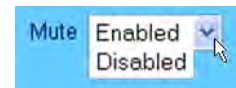
- Refresh the page to see the latest data.
- Reset changed parameters to remove **unsaved** changes.
- **Submit** (save) changes.



If you change any parameters, make sure to click the related action button before you leave the page. If you go to another page without first clicking the action button, your changes are not saved.

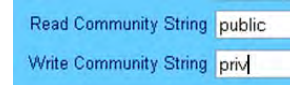
4.4.3.5 Drop-down Lists

A drop-down list lets you choose from a list of selections. Left-click the drop-down button to open the list. Then, left-click on an item to select that choice.



4.4.3.6 Text or Data Entry

Text boxes let you type data into a field. An action button can be associated with a single text box, or a group of text boxes. For any text box, left-click anywhere inside the box and type the desired data into that field. Make sure to press **ENTER** when done typing.



Click the related action button to save the data.

4.5 HTTP Interface Page Examples and Descriptions

4.5.1 Home Pages

4.5.1.1 Home | Home

Use this page to identify the product. Click the **Home** navigation tab or the page hyperlink to return to this page from anywhere in the HTTP Interface.



Figure 4-6. LPOD-R Home Page (PS .5 Unit Example Shown)

4.5.1.2 Home | Contact / Home | Support pages

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

4.5.2 Admin Pages



The Admin pages are available only to users who have logged in using the Administrator Name and Password.

Use these administrator pages to set up user access. Click **Access** or **SNMP** to continue.

4.5.2.1 Admin | Access

Refresh the page to see the latest data.

The screenshot shows the 'Admin | Access' page of the OMTECH web interface. At the top, there are navigation tabs for 'Home', 'Admin', 'Config', and 'Status'. The 'Admin' tab is selected, and sub-tabs for 'Access' and 'SNMP' are visible. The page displays the date and time '10/28/14 16:27:35' and the serial number 'SN: 142640951'. The main content area is divided into four sections: 'Network Maintenance' with fields for IP Gateway (192.168.001.005), IP Address/Range (192.168.001.004.24), and MAC Address (00-06-B0-1A-2D-3B); 'System Account Access Information' with fields for Read Only Name (monitor), Read/Write Name (opcenter), Admin Name (comtech), Read Only Password (1234), Read/Write Password (1234), and Admin Password (comtech); 'Webpage Timeout' set to 8 hours; and 'SNMP' with Server IP Address (192.168.001.001) and State (Enabled). Each section has a 'Change' or 'Submit Access' button.

Figure 4-7. Admin | Access Page

Network Maintenance

- **IP Gateway, IP Address/Range** – Enter the desired IP Gateway Address and IP Address/ Range in these text boxes.
- **MAC Address** (read-only) – The MAC is set at the factory to a guaranteed unique address that you cannot modify.

Click **Change IP Address** to save any changes.

System Account Access Information

Name fields can be any alphanumeric combination with a maximum length of 10 characters.

Password fields can be any alphanumeric combination with a maximum length of 10 characters.

- **Admin, Read/Write, and Read Only Names and Passwords** – The factory defaults for these names/passwords are:
 - **Admin** comtech/comtech
 - **Read/Write** opcenter/1234
 - **Read Only** monitor/1234

Click **Submit Access** to save any changes.

Webpage Timeout

The Webpage Timeout sets the time period that can pass before the HTTP Interface pages time out.

- Use the drop-down list to select **5 minutes** (default) or **8 hours**.
- Click **Submit**.



The **Status | Status** page automatically refreshes once every ten seconds, and resets the timeout counter.

SNTP

- **Server IP Address** – Specify the SNTP server IP Address.
- **State** - Use the drop-down list to select **Enable** or **Disable**.

Click **Change SNTP Params** to save these settings.

4.5.2.2 Admin | SNMP

The Administrator must use this page to manage LPOD-R SNMP (Simple Network Management Protocol) settings. Refresh the page to see the latest data.

The screenshot shows the 'Admin | SNMP' configuration page. At the top, there is a navigation bar with 'Home', 'Admin', 'Config', and 'Status' buttons. Below the navigation bar, there is a date and time display '10/28/14 16:28:38 SN: 142640951'. The main configuration area is a light blue box containing several fields: 'Simple Network Management' (Enabled), 'Read Community String' (public), 'Write Community String' (private), 'SNMP Contact', 'SNMP Name', 'SNMP Location', 'Enable Authentication Trap' (Enabled), 'Trap IP 1' (192.168.001.002), 'Trap IP 2' (192.168.001.001), 'Trap Version' (SNMPv1), and 'Trap Community String' (comtech). A 'Submit SNMP' button is located at the bottom of the configuration area.

Figure 4-8. Admin | SNMP Page

- **Simple Network Management** – Use the drop-down list to select Enabled or Disabled.
- The **Read Community String** and **Write Community String** fields can be any combination of characters and a length of 0 to 20 characters.
 - **Read Community String** factory default is “public”.
 - **Write Community String** factory default is “private”.
- **SNMP Contact** – Enter the contact data.
- **SNMP Name** – Enter the name.
- **SNMP Location** – Enter the location.
- **Enable Authentication Trap** – Use the drop-down list to select Enabled or Disabled.
- The Administrator can assign up to two **SNMP Trap IP Addresses**.
- **Trap Version** – Use the drop-down list to select the version.
- The **SNMP Trap Community String** field can be any combination of characters and a length of 0 to 20 characters. The factory default for the SNMP Trap Community String is “comtech”.

Click **Submit SNMP** to save any changes.

4.5.3 Config Pages

Use the **Configuration** pages to configure all operating parameters for the LPOD-R. Click **Amplifier** or **Utility** to continue,

4.5.3.1 Config | Amplifier

Use this page to configure the communications, operations and alarms/faults handling for the amplifier. Refresh the page to see the latest data.

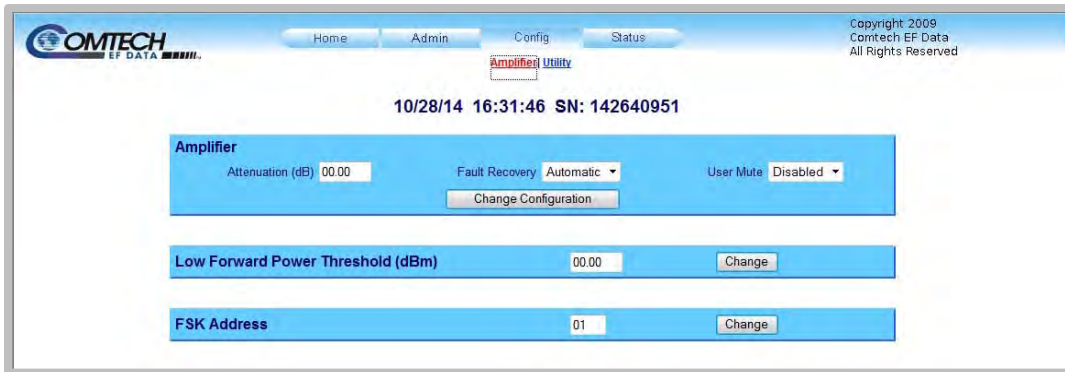


Figure 4-9. Config | Amplifier Page

Amplifier

- **Attenuation (dB)** – Enter a valid attenuation level (**00.00** to **20.00** dB) in 0.25 dB steps.
- **Fault Recovery** – Use the drop-down list to select **Automatic** or **Manual**.
- **User Mute** – Use the drop-down list to select **Enabled** or **Disabled**.

Click **Change Configuration** to save any changes.

Low Forward Power Threshold (dBm)

Set the threshold value, in dBm, for the low forward power alarm/fault.

When the forward power monitor is set to **Alarm** or **Fault** instead of the factory default of **Mask**, and the forward power drops below the specified value, the alarm/fault occurs.

To disable the threshold, set this parameter to the default value of 00.00.

Click **Change** to save any changes.

FSK Address

Set the FSK (Frequency Shift Keying) Address from **01** to **15**.

Click **Change** to save any changes.

4.5.3.2 Config | Utility

Use this page to configure additional LPOD-R operating parameters. Refresh the page to see the latest data.

The screenshot displays the 'Config | Utility' page of the LPOD-R web interface. At the top, there is a navigation bar with 'Home', 'Admin', 'Config', and 'Status' tabs. The 'Config' tab is active, and a sub-tab 'Amplifier Utility' is selected. The page header includes the OMTECH logo and copyright information: 'Copyright 2009 Comtech EF Data All Rights Reserved'. The main content area shows the following configuration options:

- Date (MM/DD/YY):** 10/28/14. **Time (HH:MM:SS):** 16:32:35. A 'Change Date/Time' button is present.
- Circuit ID:** this is a test unit!!!. A 'Change CID' button is present.
- Current Active Firmware Image:** 1. **Next Reboot Image:** 1. A 'Submit' button is present.
- Perform Soft Reboot:** A 'Reboot Now' button is present.
- Firmware Information:** A text area displaying the following information:

```
Boot:
FW-000082A 1.1.1 06/18/14
Bulk1:
FW-0020841A 1.1.2c 10/27/14
FW-0020842A 1.1.2c 10/27/14
FW-0020772- 1.1.1 10/06/14
Bulk2:
```
- Part Number:** A text input field with the label 'PART_NUM'.

Figure 4-10. Config | Utility Page

Date and Time

- Enter a date using international format in the form DD/MM/YY (where DD = day [01 to 31], MM = month [01 to 12], and YY = year [00 to 99]).
- Enter a time using HH:MM:SS format (where HH = hour [00 to 23], MM = minutes [00 to 59], and SS = seconds [00 to 59]).

Click **Change Date/Time** to save the changes.

Circuit ID

Enter a **Circuit ID** string of up to 48 characters. This is the identification label for the unit.

Click **Change CID** to save the change.

Current Active Firmware Image # (read-only)

The selected **Current Active Firmware Image** is shown here. In this example, **Image 1** is the **Current Active Firmware Image**.

Next Reboot Image

Use the drop-down list to select the Next Reboot Image as **Image 1** or **2**. Click **Submit** to save the change.

Perform Soft Reboot

Click **Reboot Now** to reboot the LPOD-R using the **Current Active Firmware Image**.

Firmware Information (read-only)

This **read-only** window shows information about the currently loaded Bootrom. For the complete Bulk1 and Bulk2 information, scroll through all the constituent firmware blocks that make up the bulk.

Part Number (read-only)

This **read-only** window shows part number information for the unit.

4.5.4 Status Pages

Use these pages to see the unit's operational status, logged alarm and statistics windows. Click **Summary**, **Status**, **MOP**, **Events**, **Statistics**, or **Trending Graphs** to continue.

4.5.4.1 Status | Summary

This read-only page shows a summary of information about the LPOD-R unit and its current operating state. Refresh the page to see the latest data.

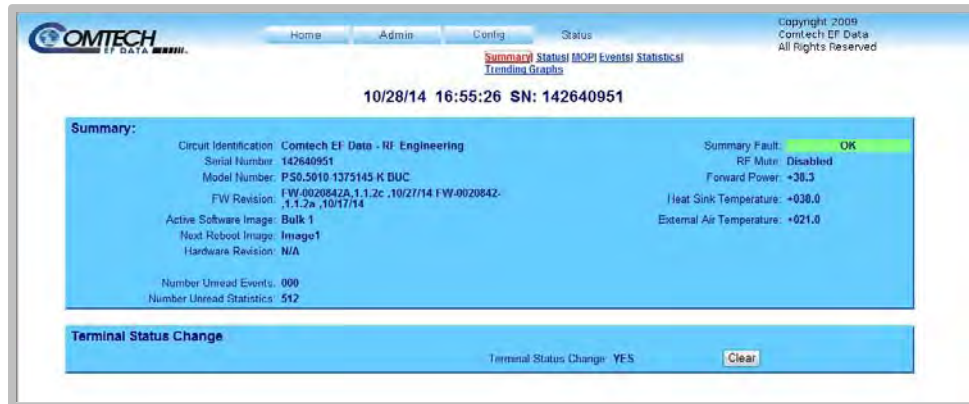


Figure 4-11. Status | Summary Page

Summary (read only)

The **Summary Fault** message shows **OK** on a green background if no faults are present. If a fault exists, the message changes to **FAULT** on a red background. Should this occur, look at the logged faults and alarms on the **Status | Events** page.

Terminal Status Change

If **Terminal Status Change** shows **NO**, there have been no changes in the unit's configuration since the last time the **Terminal Status Change** status was cleared.

If **Terminal Status Change** shows **YES**, a status change had occurred for one or more of these reasons:

- An operating parameter changed, (e.g., when a command changes an operational value)
- A fault condition occurs
- A redundant switchover occurs

To reset the **Terminal Status Change** from **YES** to **NO**, click **Clear**.

4.5.4.2 Status | Status

Use this read-only page see general status data for the LPOD-R.



Unlike the pages that you must refresh manually, the **Status | Status** page updates automatically once every 10 seconds. You can still refresh the page manually, if desired.

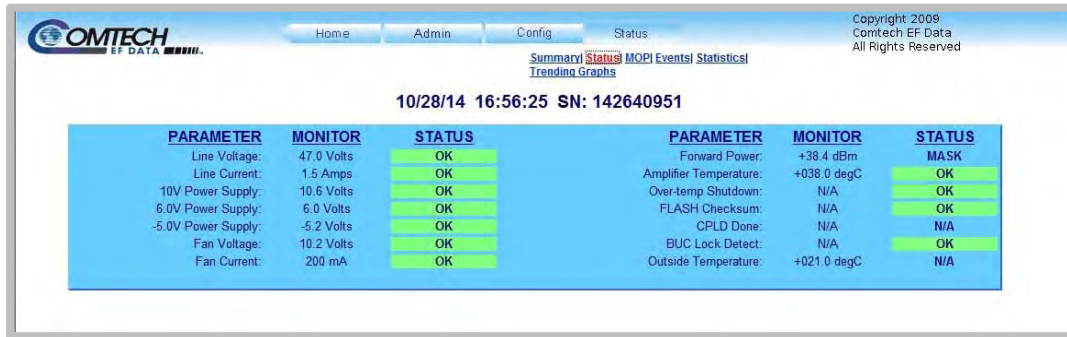


Figure 4-12. Status | Status Page

4.5.4.3 Status | MOP

Use this read-only page to see details of the unit's **Maximum Operating Point** (MOP) data. Refresh the page to see the latest data.

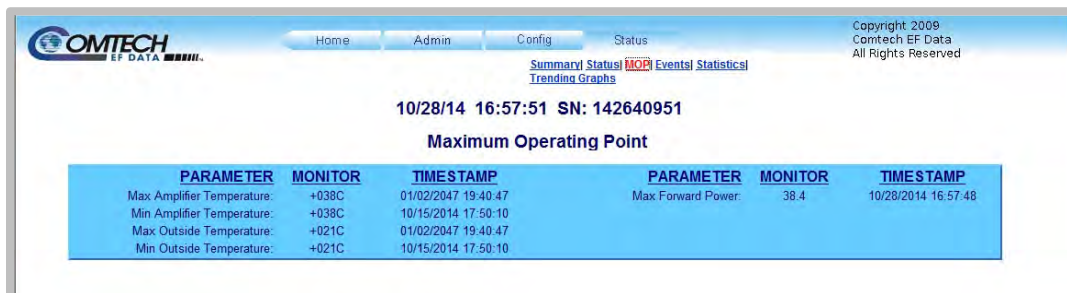


Figure 4-13. Status | MOP Page

4.5.4.4 Status | Events

Use this page to see stored events data. Additionally, use it to set the parameters for how the LPOD-R triggers events and alarms. Refresh the page to see the latest data.

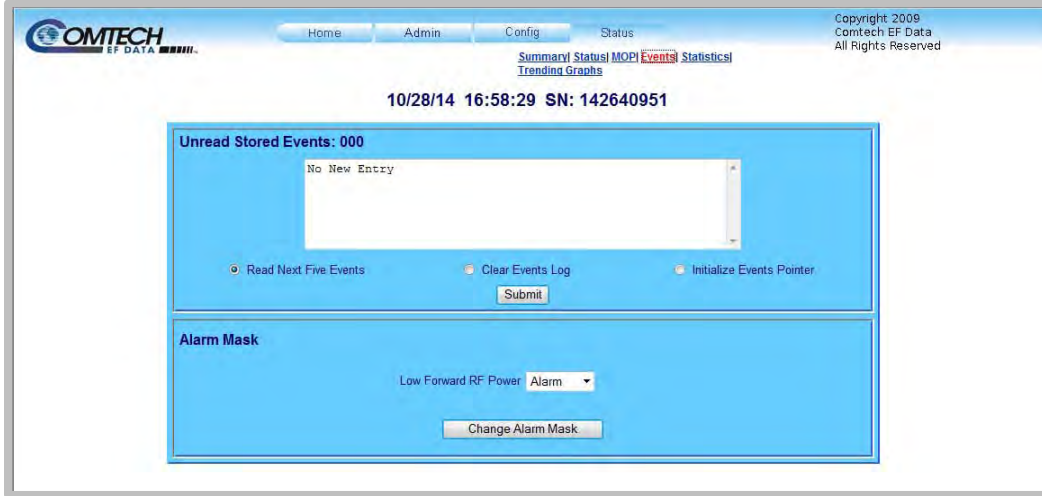


Figure 4-14. Status | Events Page

Unread Stored Events

This window shows the unread stored events log in sequential, date-stamped format. The unit shows the five oldest stored events in the alarm log. A running tally of the number of unread stored events shows in the window header. All events that are read from the log are removed from the log automatically.

- Select **Read Next Five Events** to show the next five unread stored events in the log.
- Select **Clear Events Log** to clear all stored events from the log.
- Select **Initialize Events Pointer** to reset the internal pointer to allow queries to start at the beginning of the stored events log.

Click **Submit** to update the window according to your selection.

Alarm Mask

Use the drop-down list to select the **Low Forward RF Power** alarm as **Fault**, **Alarm**, or **Masked**.

Click **Change Alarm Mask** to save these settings.

4.5.4.5 Status | Statistics

This page shows all unread, stored statistics. Use it to configure how the LPOD-R handles and shows statistics. Refresh the page to see the latest data.

Date	Time	OpTemp	AmpTem	Power	ATT	MUT
10/25/14	04:27:54	010.0C	027.0C	24.00dBm	00.00dB	On
10/25/14	04:37:54	011.0C	028.0C	24.00dBm	00.00dB	On
10/25/14	04:47:55	011.0C	028.0C	24.00dBm	00.00dB	On
10/25/14	04:57:54	010.0C	027.0C	24.00dBm	00.00dB	On
10/25/14	05:07:55	011.0C	028.0C	24.00dBm	00.00dB	On

Figure 4-15. Status | Statistics Page

Unread Stored Statistics:

This window shows the unread stored statistics log in sequential, date-stamped format. This page shows a running tally of the number of unread stored statistics in the window header. The unit shows the five oldest stored statistics. All events that are read from the log are removed from the log automatically.

- Select **Read Next Five Statistics** to cause the unit to return the oldest five unread stored statistics that remain unread in the log. If fewer than five events are available for retrieval, the remaining positions are padded with zeros. If there are no new events, the counter in the header reads **000**.

- Select **Initialize Statistics Pointer** to reset the internal pointer to allow queries to start at the beginning of the statistics log.

Click **Submit** to update the window according to your selection.

Statistics Configuration

- **Statistics Interval** – Enter the interval at which statistics are logged. The interval is set in minutes. Minimum resolution is 1 minute (001); maximum is 99 minutes (099). Default is 90 minutes (090).
- **Statistics Averaging** – Select **Enable** or **Disable** to set the **Statistics Averaging** function:
 - If **Enabled**, statistics data is averaged at a rate of once per second for 10 seconds.
 - If **Disabled**, burst values are logged instead of averaged values.

Click **Submit** to save the changes.

4.5.4.6 Status | Trending Graphs

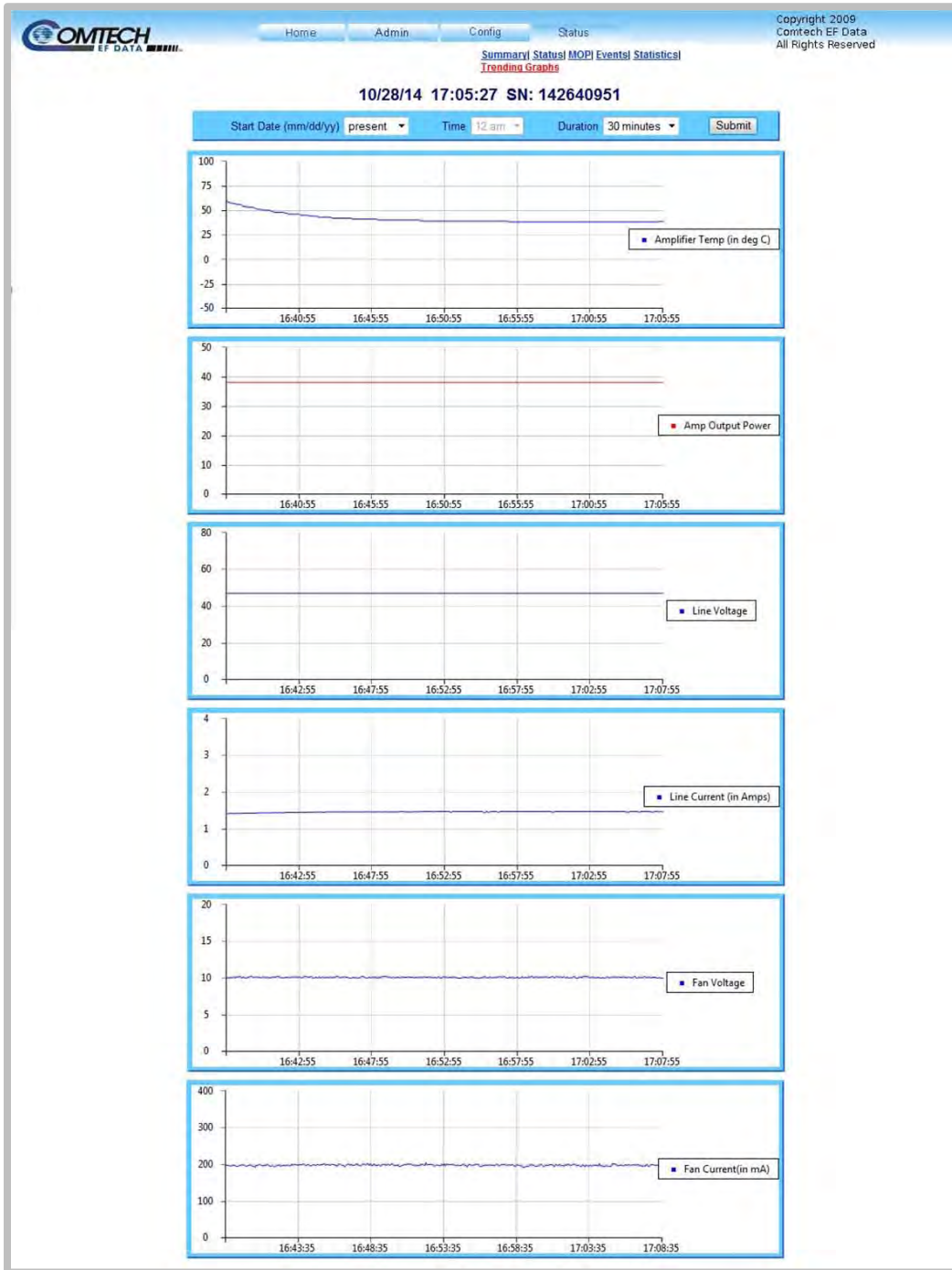


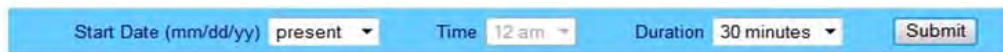
Figure 4-16. Status | Trending Graphs Page Example

This scrolling page provides graphs that show trends over time for the following operating parameters:

- Amplifier Temperature
- Amplifier Output Power
- Line Voltage
- Line Current (Amp)
- Fan Voltage
- Fan Current (mA)

Refresh the page to see the latest data.

Trending Graph Time Settings



Use these controls to define the refresh intervals for the graphs.

- **Start Date (mm/dd/yy)** – Use the drop-down list to select **present** or a specific date.
- **Time** – If the **Start Date** is a specified date, select the starting **Time** for that date.
- **Duration** – Use the drop-down list to select a duration period for the graph statistics.

Click **Submit** to save the new settings. Once you refresh the page, the graphs will update to reflect the current time settings format.

Chapter 5. OPTIONAL SERIAL INTERFACE OPERATION (PS 1, PS 1.5 ONLY)



To achieve optimal performance and to access the most current remote control commands and queries, make sure to operate the LPOD-R PS 1 or PS 1.5 SSPA/BUC with its latest available firmware.

5.1 Overview

This chapter summarizes key parameters and procedures and their associated remote commands and queries, and provides detailed instructions for use of the optional serial remote control commands and queries interface.

Optional serial-based remote management of Comtech EF Data's LPOD-R PS 1 and PS 1.5 Outdoor Amplifiers / Block Up Converters (SSPAs/BUCs) is available using the '**J6 | COM1**' port. Original production units featured a 19-pin circular connector; current production units feature a weatherproof RJ-45 Ethernet port.



The optional Serial Interface is not available with the LPOD-R PS .5 unit.

5.2 Key Operational Parameters / Common Commands and Queries

5.2.1 RF Input Level

The required RF input level to reach the full rated output power of the SSPA is determined by the individual amplifier temperature compensated gain and specified power rating. For example, if the test data of an SSPA rated for 250W (54 dBm) indicated a temperature compensated gain of 75 dB, then a signal of **54 dBm – 75 dB = -21 dBm** would yield the approximate rated output power. Increasing input power beyond this level would result in an output signal with increasingly higher levels of distortion. Of course, if the SSPA/BUC attenuation control is utilized, a higher level input signal level can be accommodated. The maximum input level should never exceed 10 dBm, or permanent damage to the unit may occur.

5.2.2 Attenuator Control

The SSPA/BUC gain can be attenuated over its specified range by exercising the “ATT” command. The details for the format of this command are found later in this section.

5.2.3 Mute Control

The SSPA/BUC may be muted via software. If you wish to completely turn off the bias to the entire amplifier, you should execute both the MUT=1 and AMP=0 commands. The MUT command provides over 75 dB of RF on/off isolation. However, it only turns off the first few low power stages of the amplifier while the high power stages remain on. By allowing the higher power transistors to stay on, the SSPA/BUC remains in a more thermally stable state should the mute condition be removed.

For normal transmit operation, MUT=0 and AMP=1 are required

5.2.4 Faults

The M&C system monitors certain key functions of the SSPA/BUC for proper operation. Should any of these parameters exceed predetermined limits, the M&C system will declare a fault. The conditions that trigger a fault are:

- Any power supply outside its nominal value window
- A fan running at less than 25% of maximum speed
- I2C internal bus communications fault

- Thermal Shutdown in accordance with SP-0020556.

5.2.5 Power Detector

A power detector is provided to monitor the output power. It has a useful range of over 20 dB, referenced to the unit's rated P1dB point. Its value can be read by executing the RMS query. The test data supplied with each unit gives an indication of the accuracy and flatness of the power monitor over the frequency band of operation.

5.2.6 Some Common Queries

The most common queries are listed here. Full details for each of these are listed in Section 5.4.

- RMS (Retrieve Maintenance Status): Displays voltages, fan speeds, heatsink temperature, output power monitor reading, etc.
- RCS (Retrieve Configuration Status): Displays current status of attenuation, mute, amplifier, online, etc.
- RAS (Retrieve Alarm Status): Displays current alarm or fault status.

5.3 Remote Control Protocol and Structure

The LPOD-R SSPA/BUC supports the command protocol over a Telnet session through the use of a 10/100Base-T Ethernet connection to the product. The Ethernet communications interface also supports SNMP protocol, and provides an HTTP (Web Server) Interface that can be accessed using a web browser.

The SSPA/BUC also supports a Comtech EF Data FSK link that allows one of Comtech EF Data's modem products to control the SSPA/BUC remotely through the L-Band RF cable.

5.3.1 Basic Protocol

All data is transmitted in framed packets. The host controller is assumed to be a PC or ASCII dumb terminal, which is in charge of the process of monitor and control. The controller is the only device that is permitted to initiate, at will, the transmission of data. Targets are only permitted to transmit when they have been specifically instructed to do so by the controller.

All bytes within a packet are printable ASCII characters, less than ASCII code 127. In this context, the Carriage Return and Line Feed characters are considered printable.

All messages from controller to target require a response (with one exception). This will be either to return data that has been requested by the controller, or to acknowledge reception of an instruction to change the configuration of the target.

5.3.2 Packet Structure

Controller-to-Target						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
< ASCII code 60 (1 character)	0-9 ASCII codes 48-57 (4 characters)	/ ASCII code 47 (1 character)	A-Z, a-z ASCII codes 65-90, 97-122 (3 characters)	= or ? ASCII codes 61 or 63 (1 character)	 (n characters)	Carriage Return {CR} ASCII code 13 (1 character)

Example: <0123/MUT=1{CR}

Target-to-Controller						
Start of Packet	Target Address	Address Delimiter	Instruction Code	Code Qualifier	Optional Arguments	End of Packet
> ASCII code 62 (1 character)	0-9 ASCII codes 48-57 (4 characters)	/ ASCII code 47 (1 character)	A-Z, a-z ASCII codes 65-90, 97-122 (3 characters)	=, ?, !, or * ASCII codes 61,63,33, or 42 (1 character)	 (From 0 to n characters)	Carriage Return {CR}, Line Feed {LF} ASCII codes 13,10 (2 characters)

Example: >0123/MUT=1{CR}{LF}

5.3.2.1 Start of Packet

These characters are used to provide a reliable indication of the start of packet. They must not appear anywhere else in the body of the message:

- Controller-to-Target: < (ASCII code 60)
- Target-to-Controller: > (ASCII code 62)

5.3.2.2 Target Address



The Controller sends a packet with the address of a Target – the destination of the packet. When the Target responds, the address used is the same address, to indicate to the Controller the source of the packet. The Controller does not have its own address.

5.3.2.3 Address Delimiter

This is the forward slash character: / (ASCII code 47)

5.3.2.4 Instruction Code

This three-character alphabetic sequence is intended to be a mnemonic of its operational function. This aids in the readability of the message, should you display it in its raw ASCII form. For example, “GAC” means “Global Amplifier Configuration”; “IPA” means “IP Address”, etc. Both upper case and lower case alphabetic characters may be used (A-Z *and* a-z, ASCII codes 65-90 *and* 97-122).

5.3.2.5 Instruction Code Qualifier

This single character further qualifies the preceding instruction code. Instruction Code Qualifiers obey specific rules.

5.3.2.6 Controller-to-Target Rules

From Controller-to-Target, the permitted qualifiers are = or ? (ASCII codes 61 or 63):

= (ASCII code 61)

The “=” qualifier is the Assignment Operator (AO). It means that the parameter defined by the preceding byte should be set to the value of the argument(s) that follow it. For example: MUT=1 means “set the Mute function to Enabled”.

? (ASCII code 63)

The “?” qualifier is the Query Operator (QO). It means that the Target should return the value of the parameter(s) defined by the preceding byte. For example: SWR? means “return the firmwares installed in the Active and Standby images”.

5.3.2.7 Target-to-Controller Rules

From Target-to-Controller, the symbol =, ?, !, *, or # (ASCII codes 61, 63, 33, 42, or 35) is transmitted by the Target device to the Controller:

= (ASCII code 61)

“=” displays in two ways:

1. If the Controller sends a command to set a parameter's value, and the value is valid, the Target accepts the command by replying with no message arguments. For example: >0001/MUT={CR}{LF}
2. If the Controller sends a query to a Target, the Target responds with the configured setting. For example, the query MUT? means "is Muting enabled or disabled?"; the Target responds with >0001/MUT=x{CR}{LF} (where 'x' represents the configured state – '1' being 'enabled' and '0' being 'disabled').

? (ASCII code 63)

"?" displays when the Controller sends a command to set a parameter's value, and the value is not valid. The Target rejects the message by echoing the valid instruction, followed by this character. For example: >0001/MUT=?{CR}{LF}

! (ASCII code 33)

!" displays when the Controller sends an instruction code that the Target does not recognize. The Target rejects the message by echoing the invalid instruction, followed by this character. For example: >0001/XYZ!{CR}{LF}

*** (ASCII code 42)**

**" displays when the Controller sends a command to set a parameter's value, and the value is valid but the Target cannot permit that parameter to be changed at that time. The Target rejects the command by echoing the prohibited instruction, followed by this character with no message arguments. For example: >0001/MUT*{CR}{LF} (with message arguments).

(ASCII code 35)

"#" displays only if the Controller sends an instruction code that the Target cannot currently perform due to hardware resource issues – specifically, if you issue two or more 'hardware configuration' type commands without allowing adequate time, between commands, for the hardware to be configured. If this happens, the Target rejects the instruction code and responds to the error by echoing the invalid instruction, followed by the # character. For example, if you issue commands to change both the frequency (FRQ=) and the attenuation (ATT=) with less than 100 milliseconds between the commands, and the Target responds with >0001/ATT#{CR}{LF}, this means that the attenuation command was rejected and you must resend that command.

5.3.2.8 Optional Message Arguments

Arguments are not required for all messages. Arguments include these ASCII codes:

- Characters “0” through “9” (ASCII codes 48 through 57)
- Period “.” (ASCII code 46)
- Comma “,” (ASCII code 44)

5.3.2.9 End of Packet

- Controller-to-Target: This is the Carriage Return character {CR} (ASCII code 13).
- Target-to-Controller: This is the two-character sequence of Carriage Return and Line Feed {CR}{LF} (ASCII codes 13 and 10). This pairing shows the valid end of a packet.

5.4 Remote Commands and Queries

Certain commands and queries are marked as End-of-Life (EOL). These features (noted with * in the Parameter Type field) are fully supported in this product; however, Comtech EF Data strongly recommends that you use the equivalent new command or query for new implementations. The “Description of Arguments” section of the replacement command or query notes its status for the affected EOL feature.

Attenuation, 5–9	Number of Unread Statistics, 5–17	Set RTC Time, 5–24
Auto Fault Recovery, 5–9	Part Number, 5–17	SNMP Authentication Trap Enable, 5–22
Circuit Identification, 5–11	Reboot Command, 5–18	SNMP Enable, 5–23
Clear All Stored Alarms, 5–9	Remote Address, 5–23	SNMP Read Community, 5–23
Clear All Stored Events, 5–9	Retrieve Alarm Status, 5–17	SNMP System Contact, 5–23
Clear Trending Data, 5–12	Retrieve Configuration Status, 5–18	SNMP System Location, 5–23
Concise Alarm Status, 5–10	Retrieve Equipment Type, 5–18	SNMP Trap Destination IP Address 1, 5–23
Concise Configuration Status, 5–11	Retrieve Firmware Number, 5–13	SNMP Trap Destination IP Address 2, 5–24
Concise Maintenance Status, 5–12	Retrieve Maintenance Status, 5–20	SNMP Trap Version, 5–24
Concise RF Power FET Current Status, 5–11	Retrieve Next 5 Events, 5–21	SNMP Unit Name, 5–23
FSK Address, 5–22	Retrieve Next 5 Statistics, 5–22	SNMP Write Community, 5–24
Gateway IP Address, 5–15	Retrieve next 5 unread Stored Alarms, 5–15	Software Image Selection, 5–14
Global Amplifier Configuration, 5–14	Retrieve Number of unread Stored Alarms*, 5–24	Software Revision, 5–24
Heatsink Temperature, 5–24	RF Power Amplifier State, 5–9	Statistics Averaging, 5–13
Initialize Events Pointer, 5–14	RF Power FET Current status, 5–19	Statistics Interval, 5–23
Initialize Statistics Pointer, 5–15	Serial Number, 5–22	Summary Fault Status, 5–22
Low Forward Power Threshold, 5–16	Serial Number*, 5–23	Terminal Status Change, 5–25
MAC Address, 5–16	Set Physical (remote) Address, 5–23	Time Protocol Enable, 5–25
Management IP Address, 5–15	Set RTC Date (by Day), 5–12	Time Protocol Serve, 5–25
Mute State, 5–16	Set RTC Date (by Month)*, 5–12	Unit Alarm Mask, 5–16
Number of Unread Events, 5–16		

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Auto Fault Recovery	AFR=	AFR?	1 byte	Command or Query. Sets or returns automatic fault recovery in the form x, where: x = 1 (DEFAULT) NOTE: The LPOD output automatically mute if the BUC Lock Detect fault condition occurs. If auto fault recovery is enabled, it will cause the output return to its pre-fault mute condition if all faults are cleared. If disabled, the output will remain muted even if all faults are cleared COMMAND EXAMPLE: <0001/AFR=1{CR}	AFR= AFR? AFR*	AFR=x
RF Power Amplifier State	AMP=	AMP?	1 byte	Command or Query. Sets (turns ON or OFF) or returns the RF power amplifiers status in the form x, where: 0 = Off (DEFAULT) 1 = On NOTE: Turning the amplifier off disables the +10V supply, and masks it during fault checking. COMMAND EXAMPLE: <0001/AMP=1{CR}	AMP= AMP? AMP*	AMP=x
Attenuation	ATT=	ATT?	5 bytes	Command or Query. Sets or returns the valid attenuation level, in dB, in 0.25 dB steps as factory default in the form xx.xx where: xx.xx = 00.00 to 20.00 (Default Value = 10.00) COMMAND EXAMPLE: <0001/ATT=12.25{CR}	ATT= ATT? ATT*	ATT=xx.xx
Clear All Stored Alarms	CAA=	N/A	None	Command only. Instructs the unit to Clear All stored Alarms. This command takes no arguments. EXAMPLE: <0001/CAA={CR}	CAA= CAA*	N/A
Clear All Stored Events	CAE=	N/A	None	Command only. Instructs the SSPA to Clear All stored Events. This command takes no arguments. EXAMPLE: <0001/CAE={CR}	CAE= CAE*	N/A

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Concise Alarm Status	N/A	CAS?	44 bytes	Query only. Returns the Alarm status of the unit, response is semicolon delimited, in the form a;b;c;d;e;f;g;h;i;j;k;l;m;n;o;p;q;r;s;t;u;v;w;x;y;z where: a thru z = 0, 1, 2, 3, 4, or 5 0 = FT, 1 = OK, 2 = AL, 3 = NO, 4 = YS, 5 = MS a = +24V Power Supply b = +24V Power Supply (NOT USED) c = +13/18V LNB Power Supply (NOT USED) d = +13.5V Power Supply e = +10V Power Supply f = +10V1 RF Amplifier Power Supply g = +10V2 RF Amplifier Power Supply (NOT USED) h = +7.8V Power Supply i = +5.8V Power Supply j = +2.5V Power Supply k = +1.2V Power Supply l = -5.8V Power Supply m = Fan#1 State n = Fan#2 State (PS 1.5 ONLY) o = Heatsink Temp p = Overtemp Shutdown q = IIC Status r = Forward Power Alarm s = Flash Checksum t = FPGA Done u = BUC Lock Detect (NOT USED) v = External Ref Lock Detect (NOT USED) w = LNB Current (NOT USED) x = Redundant Switch Condition (NOT USED) y = Redundant Link Status (NOT USED) z = Terminal Status Change NOTE: This is the condensed version of the RAS query.	CAS=	CAS=a;...z

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Concise Configuration Status	N/A	CCS?	26 bytes	Query only. Returns the configuration status of the unit, semicolon delimited, in the form aa.aa;b;c;d;e;ff.ffa;g;hhh where: aa.aa = attenuation in dB (ATT) b = RF power amplifier state: 0 = Off, 1 = On (AMP) c = mute state: 0 = unmuted, 1 = muted (MUT) d = Online status (NOT USED) e = Redundancy state and mode (NOT USED) ff.ffa = Attenuator offset in dB (NOT USED) g = auto fault recovery mode (AFR) hhh = External reference status (NOT USED) NOTE: This is the condensed version of the RCS query.	CCS=	CCS=aa.aa;...hh h
Concise RF Power FET Current Status	N/A	CFS?	Length varies depending on the number of installed FETs	Query only. Returns the values of installed FETs in abbreviated format. NOTE: This is the condensed version of the RFS query. EXAMPLE: <0001/CFS?{CR} >0001/CFS=.xxx;.xxx;xx.x;x.....;xx.x;{CR}{LF}	CFS=	CFS=x;....x
Circuit Identification	CID=	CID?	48 bytes	Command or Query. Sets or returns the user-defined label for the unit or station. NOTE: The 48-character string is entered as one line, but it is read back from the unit as two 24-byte lines of information. Default Setting: -----CID MESSAGE----- ----- COMMAND EXAMPLE: <0001/CID= Station #001--SSPA #01--{CR} >0001/CID={CR}{LF} QUERY EXAMPLE: <0001/CID?{CR} >0001/CID={CR} Station #001{CR} --SSPA #01--{CR}{LF}	CID= CID? CID*	CID=x;...x

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Concise Maintenance Status	N/A	CMS?	95 bytes	<p>Query only. Returns the Maintenance status of the unit in a concise format, response is semicolon delimited, in the form aaa.a;bbb.b;ccc.c;ddd.d;eee.e;fff.f;ggg.g;hh.h;iii.i;jjj.j;kkk.k;lll.l;mmm.m;nnn.n;ooo.o;ppp.p;qqq.q; rrr.r; sss.s;ttt.t{CR}{LF} where: aaa.a = P24V1 bbb.b = P24V2 (NOT USED) ccc.c = LNBVT (NOT USED) ddd.d = P13VT eee.e = P10V1 fff.f = A10V1 ggg.g = A10V2 (NOT USED) hhh.h = P7V8T iii.i = P5V8T jjj.j = P2V5T kkk.k = P1V2T lll.l = N5V8T mmm.m = FANR1 nnn.n = FANR2 (PS 1.5 ONLY) ooo.o = BUCVT (ONLY WHEN BUC OPTION INSTALLED) ppp.p = FWPWR qqq.q = REFVT (NOT USED) rrr.r = LNBCS (NOT USED) sss.s = ATEMP ttt.t = OTEMP (PS 1.5 ONLY) NOTE: This is the condensed version of the RMS query.</p>	CMS=	CMS=x....x
Clear Trending Data	CTD=	N/A	1 byte	<p>Command only. Clears the trending data in the form x, where: x = 1 EXAMPLE: <0001/CTD=1{cr}</p>	CTD= CTD? CTD*	CTD=
Set RTC Date (by Month)*	DAT=	DAT?	6 bytes	<p>Command or Query. Sets or returns the date in the form mmdyy, where: mm = month of the year (01 to 12) dd = day of the month (01 to 31) yy = year (00 to 96) (2000 to 2096) COMMAND EXAMPLE (date = April 25, 2016): <0001/DAT=042516{CR}</p>	DAT= DAT? DAT*	DAT=mmdyy
Set RTC Date (by Day)	DAY=	DAY?	6 bytes	<p>Command or Query. Sets or returns the date in the form ddmmyy, where: dd = day of the month (01 to 31) mm = month of the year (01 to 12) yy = year (00 to 99) (2000 to 2099) COMMAND EXAMPLE (date = April 25, 2016): <0001/DAY=250416{CR}</p>	DAY= DAY? DAY*	DAY=ddmmyy

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Statistics Averaging	ESA=	ESA?	1 byte	Command or Query. Enables or Disables averaging of statistics data, at a rate of once per second every 10 seconds, in the form x, where: 0 = Disable (DEFAULT) 1 = Enable NOTE: If Disabled, burst values will be logged instead of averaged values. COMMAND EXAMPLE: <0001/ESA=0{CR}	ESA= ESA? ESA*	ESA=x
Retrieve Firmware Number	N/A	FRW?		Query only. Returns the Boot, Bulk1, and Bulk2 firmwares loaded into the unit, each firmware load [a,b,c] is in the form FW- AAAAAAA B.B.BB DD/MM/YY where: FW-AAAAAAA = the firmware part number B.B.BB = the version number DD/MM/YY = Day/Month/Year firmware released EXAMPLE: <0001/FRW?{CR} >0001/FRW={CR} Boot: {CR} FW-0000082 0.0.1a 04/09/08{CR} Bulk1: {CR} FW-0000078 0.0.1a 04/09/08{CR} FW-0000080 0.0.1a 04/09/08{CR} FW-0000081 0.0.1a 04/09/08{CR} Bulk2: {CR} FW-0000078 0.0.1a 04/09/08{CR} FW-0000080 0.0.1a 04/09/08{CR} FW-0000081 0.0.1a 04/09/08{CR}{LF}	FRW=	FRW=Boot:[a]:{ CR}Bulk1:{CR}[a]{CR}[b]{CR}[c]{ CR}Bulk2:{CR}[a]{CR}[b]{CR}[c]{ CR}{LF}

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Global Amplifier Configuration	GAC=	GAC?	43 bytes	<p>Command or Query.</p> <p>Sets or returns the global status of the SSPA/BUC, semicolon delimited, in the form aa.aa;b;cccc;d;e;f;g;h;j;k;l;m;n;o where:</p> <p>a = Redundancy mode (NOT USED) b = Online status (NOT USED) cc.cc = Attenuation Offset (NOT USED) dd.dd = Customer Attenuation(ATT) e = Auto Fault Recovery (AFR) ffff = Unit Alarm Mask (MSK) g = LNB Current Source (NOT USED) hh = LNB Current Window (NOT USED) i = LNB Current Window Enable (NOT USED) j = Enable Statistics Averaging (ESA) k = Set Statistics Interval (SSI) l = Enable Statistics Logging (NOT USED) m = Auxiliary Mute (NOT USED) n = user mute state (MUT) o = RF power amplifier state (AMP)</p>	GAC= GAC* GAC? GAC#	GAC=x....x
Initialize Events Pointer	IEP=	N/A	None	<p>Command only.</p> <p>Resets internal pointer to allow RNE? queries to start at the beginning of the stored events log. This command takes no arguments.</p> <p>EXAMPLE: <0001/IEP={CR}</p>	IEP= IEP? IEP*	N/A
Software Image	IMG=	IMG?	1 byte	<p>Command or Query.</p> <p>Sets or returns the Current Active Software Image in the form x, where:</p> <p>1 = Bulk Image # 1 currently active 2 = Bulk Image # 2 currently active</p> <p>COMMAND EXAMPLE: <0001/IMG=1{CR} (instructs the unit to load firmware from image #1 at the next reset / power up).</p> <p>QUERY EXAMPLE: <0001/IMG?{CR} (queries the image number that the firmware loaded during bootup)</p> <p>NOTE: If you send the IMG command and then query the IMG value, the numbers may not be equal because the command tells the firmware which image to boot from at the next bootup, while the query reports the image that the firmware booted from on the previous bootup.</p>	IMG= IMG? IMG* IMG#	IMG=x

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Management IP Address	IPA=	IPA?	18 bytes	<p>Command or Query. Sets or returns the Management IP Address and network prefix for the 'J6 COM1' 10/100 BaseT Ethernet management port, in the form xxx.xxx.xxx.xxx.yy, where: xxx.xxx.xxx.xxx = the IP Address yy = the network prefix (8 to 30) NOTE: Default Value = 192.168.001.004.24 COMMAND EXAMPLE: <0001/IPA=192.168.001.004.24{CR} CAUTION: Changing the Management IP Address through the Telnet interface requires you to power cycle the unit, and then restart a new Telnet session with the new IP Address. The IP Address that you type into the Telnet client software does not include the range parameter so it would be: 192.168.1.4</p>	IPA= IPA? IPA* IPA#	IPA=xx.xxx.xxx. xxx.yy
Gateway IP Address	IPG=	IPG?	15 bytes	<p>Command or Query. Sets or returns the Gateway IP Address for the 'J6 COM1' 10/100 Base Tx Ethernet management port, in the form xxx.xxx.xxx.xxx, where: xxx.xxx.xxx.xxx = the IP Address NOTE: Default Value = 192.168.001.005 COMMAND EXAMPLE: <0001/IPG=192.168.001.005{CR}</p>	IPG= IPG? IPG*	IPG=xxx.xxx.xxx .xxx
Initialize Statistics Pointer	ISP=	N/A	None	<p>Command only. Resets the internal pointer to allow RNS? queries to start at the beginning of the stored statistics log. This command takes no arguments. EXAMPLE: <0001/ISP={CR}</p>	ISP= ISP? ISP*	N/A
Retrieve next 5 unread Stored Alarms*	N/A	LNA?	145 bytes	<p>Query only. Returns the five oldest stored events in the alarm log, in the reply format: YYYYYYYYYY ZZ mmddyy hhmmss{CR} YYYYYYYYYY ZZ mmddyy hhmmss{CR} YYYYYYYYYY ZZ mmddyy hhmmss{CR} YYYYYYYYYY ZZ mmddyy hhmmss{CR} YYYYYYYYYY ZZ mmddyy hhmmss{CR}{LF} Where: YYYYYYYYYY is the fault description. ZZ is the event type FT = Fault; OK = Clear; or IF = Information mmddyy hhmmss = date / time stamp. NOTE: If there are no events in the log the unit will reply with LNA*. All events that are read from the log are also automatically removed from the log. EXAMPLE: <0001/LNA?{CR} >0001/LNA={CR} LOG CLR IF 175503 052307{CR} FAN #1 FT 175504 052307{CR} OVR TMP FT 175504 052307{CR} FAN #1 OK 175504 052307{CR} IIC BUS FT 175504 052307{CR}{LF}</p>	LNA=	LNA=YY..ss

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Low forward Power Threshold	LPT=	LPT?	5 bytes	Command or Query. Sets or returns the threshold for the low forward power alarm/fault in the form xx.xx: Default Value: 00.00 – Setting this parameter to 00.00 effectively disables the threshold. NOTE: If the forward power drops below the specified value, the alarm/fault will be indicated. COMMAND EXAMPLE: <0001/LPT=00.00{CR}	LPT = LPT? LPT *	LPT=xx.x
Unit MAC Address	N/A	MAC?	17 bytes	Query only. Returns the read-only MAC address of the unit, reported in hexadecimal in the form xx-xx-xx-xx-xx-xx. EXAMPLE: <0001/MAC?{CR} >0001/MAC=00-06-B0-00-D2-A7{CR}{LF}	MAC=	MAC=xx-xx-xx- xx-xx-xx
Unit Alarm Mask	MSK=	MSK?	5 bytes	Command or Query. Sets or returns the alarm mask conditions in the form abcde where: 0 = Fault, 1 = Alarm, 2 = Masked a = Low Forward RF Power b = External Reference Lock detect c = Fan Speed d = LNB Current Detect (NOT USED) e = LNB 22V Power Supply (NOT USED) NOTES: 1) Default Value = 2x1xx 2) If the value is set to 'Fault' (MSK=0) for a parameter, then the fault condition will be logged as a fault if specified hardware conditions are not met. 3) If the mask value is set to 'Alarm' (MSK=1), then the fault condition will only log as an alarm. 4) If the mask value is set to 'Masked' (MSK=2), then the fault condition will not be reported to the user. COMMAND EXAMPLE: <0001/MSK=2x1xx{CR}	MSK= MSK? MSK*	MSK=abcde
Mute State	MUT=	MUT?	1 byte	Command or Query. Sets or returns the unit muting in the form x, where: 0 = Disable (Not Muted) 1 = Enable (Muted) (DEFAULT) 2 = Unit muted due to HW mute signal (SEE NOTE) NOTE: This value is only shown in the response to a query, and cannot be issued as a command. When MUT=2 this means that one of the "hardware" mute conditions is present. Additionally, certain faults can generate a hardware mute, e.g., BUC Lock Detect. If MUT=2, you must check the active faults and the status of the auxiliary mute. COMMAND EXAMPLE: <0001/MUT=1{CR}	MUT= MUT? MUT*	MUT=x
Number of Unread stored Events	N/A	NUE?	3 bytes	Query only. Unit returns the Number of Unread stored Events in the form xxx. EXAMPLE: <0001/NUE?{CR} >0001/NUE=126{CR}{LF}	NUE=	NUE=xxx

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Number of Unread stored Statistics	N/A	NUS?	3 bytes	Query only. Unit returns the Number of Unread stored Statistics in the form xxx. EXAMPLE: <0001/NUS?{CR} >0001/NUS=126{CR}{LF}	NUS=	NUS=xxx
Part Number	N/A	PNM?	96 bytes alphanumeric	Query only. Returns the DOTCODE string that is loaded into the unit. EXAMPLE: <0001/PNM?{CR} >0001/PNM=HPODC0.350WRSW00{CR}{LF}	PNM= PNM? PNM *	PNM=x...x
Retrieve Alarm Status	N/A	RAS?	168 bytes	Query only. Returns the Alarm status of the unit, where: OK = No fault condition; FT = Faulted; AL = Alarm; YS = Yes; NO = No; MS = Masked. EXAMPLE: <0001/RAS?{CR} >0001/RAS={CR} P24V1=OK{CR} (+24V power supply) P24V2=NA{CR} (+24V switch power supply) (NOT USED) LNBVT=XXXXX{CR} (+13/18V LNB power supply) (NOT USED) P13VT=OK{CR} (+13.5V power supply) P10V1=OK{CR} (+10V power supply) A10V1=OK{CR} (+10V1 RF supply) A10V2=NA{CR} (+10V2 RF supply) (NOT USED) P7V8T=OK{CR} (+7.8V power supply) P5V8T=OK{CR} (+5.8V power supply) P2V5T=OK{CR} (+2.5V power supply) P1V2T=OK{CR} (-1.2V power supply) N5V8T=OK{CR} (-5.8V power supply) FANR1 = OK{CR} (Fan 1 speed) FANR2=OK{CR} (Fan 2 speed) (PS 1.5 ONLY) ATEMP=OK{CR} (Amplifier temperature) SHTDN=OK{CR} (Over-temp shutdown) IICST=OK{CR} (I2C bus status) FWPWR=OK{CR} (Forward power in dBm) CHKSM=OK{CR} (Flash checksum) FPGAD=NA{CR} (FPGA done status) (NOT USED) BUCLD=OK{CR} (BUC lock detect) (NOT USED) REFLD=NA{CR} (Reference lock detect) (NOT USED) LNBCS=XXXXX{CR} (LNB current status) (NOT USED) SWITC=NA{CR} (Waveguide switch position status) (NOT USED) RDLNK=NA{CR} (Redundant link status) (NOT USED) TRMST=YS{CR}{LF} (Terminal Status)	RAS=	RAS=x...x

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Reboot	RBT=	N/A	1 byte	Command only. Soft Reboots the unit in the form x where: x = 1 (Reboot System)	RBT = RBT? RBT*	RBT=x
Retrieve Configuration Status	N/A	RCS?	45 bytes	Query only. Returns the configuration status of the unit in detailed format, where: ATT= attenuation in dB AMP=RF power amplifier state where 0=OFF, 1 = ON MUT=RF mute state where 0=Unmuted, 1 = Muted ONL= Online status for redundancy (NOT USED) RED=Redundancy mode (NOT USED) ESW=Redundancy state and mode (NOT USED) AOF=Attenuator Offset in dB (NOT USED) AFR= Auto fault recovery where 0=Manual, 1=Auto XRF=External reference status: N/A=no external reference; 05M=5 MHz; 10M=10 MHz (NOT USED) EXAMPLE: <0001/RCS?{CR} >0001/RCS={CR} RCS={CR} ATT=12.75{CR} AMP=1{CR} MUT=1{CR} ONL=1{CR} (NOT USED) RED=0{CR} (NOT USED) ESW=X{CR} (NOT USED) AOF=XXXXX{CR} (NOT USED) AFR=1{CR} XRF=N/A (NOT USED) {CR}{LF}	RCS=	RCS=x....x
Retrieve Equipment Type*	N/A	RET?	22 bytes	Query only. Returns the Model Number and the installed M&C firmware version. EXAMPLE: <0001/RET?{CR} >0001/RET=CPA-300 VER: 1.0.3{CR}{LF}	RET=	RET=x....x

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
RF Power FET current Status	N/A	RFS?	Length varies depending on the number of installed FETs	Query only. Returns currents for all installed FETs. EXAMPLE: <0001/RFS? {CR} >0001/RFS={CR} Q01=.xxx{CR} Q02=.xxx{CR} Q03=xx.x{CR} Q04=xx.x{CR} Q05=xx.x{CR} Q06=xx.x{CR} Q07=xx.x{CR} Q08=xx.x{CR} Q09=xx.x{CR} Q10=xx.x{CR} Q11 = xx.x{CR} Q12=xx.x{CR} Q13=xx.x{CR} Q14=xx.x{CR} Q15=xx.x{CR} Q16=xx.x{CR}{LF} NOTE: If the reported value is one amp or greater, the format is xx.x; if the value is less than one amp, the format is .xxx	RFS=	RFS=x...x

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Retrieve Maintenance Status	N/A	RMS?	213 bytes, alpha- numeric	<p>Query only. Returns the Maintenance status of the unit in detailed format, where:</p> <p>P24V1 = +24V power supply P24V2 = +24V switch power supply (NOT USED) LNBVT = +13/18V LNB power supply (NOT USED) P13VT = +13.5V power supply P10V1 = +10V1 power supply A10V1 = +10V1 on RF Module A10V2 = +10V2 on RF Module (NOT USED) P7V8T = +7.8V power supply P5V8T = +5.8V power supply P2V5T = +2.5V power supply N1V2T = -1.2V power supply N5V8T = -5.8V power supply FANR1 = Fan 1 speed in percent FANR2 = Fan 2 speed in percent (PS 1.5 ONLY) BUCVT = BUC tuning voltage (SEE NOTE) FWPWR = Forward power in dBm REFVT = Reference osc. tuning voltage (NOT USED) LNBCS = LNB current supply in mA (NOT USED) ATEMP = Heatsink temperature in Celsius OTEMP = Outside temperature in Celsius (PS 1.5 ONLY)</p> <p>EXAMPLE: <0001/RMS?{CR} >0001/RMS={CR} P24V1 = 024.1{CR} P24V2=XXXXX{CR} (NOT USED) LNBVT=XXXXX{CR} (NOT USED) P13VT=013.4{CR} P10V1 = 010.1{CR} A10V1 = 010.1{CR} A10V2=XXXXX{CR} (NOT USED) P7V8T=007.8{CR} P2V5T=002.5{CR} P1V2T=001.2{CR} N5V8T=-05.9{CR} FANR1 = 100.0{CR} FANR2=100.0{CR} (PS 1.5 ONLY) BUCVT=008.3{CR} (VALID ONLY WHEN BUC OPTION INSTALLED – OTHERWISE “XXXXX”) FWPWR=+53.2{CR} REFVT=XXXXX{CR} (NOT USED) LNBCS=XXXXX{CR} (NOT USED) ATEMP=+40.0{CR} OTEMP=+30.0{CR} (PS 1.5 ONLY)</p>	RMS=	RMS=x....x

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Retrieve Next 5 unread stored Events	N/A	RNE?	75 bytes	<p>Query only. Returns the oldest 5 Stored Events that have not yet been read over the remote interface, in the form {CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body, where Sub-body is in the form ABCcddmmyyhhmss: A=Fault/clear indicator: F = Fault; C = Clear; I = Info B=Fault type: 1 = Unit; 2 = RF; 3 = Log CC=Fault Code numbers, as in RAS? or Info Codes: RAS FAULT CODES MAP AS FOLLOWS: 1) P24V1 2) P13VT 3) A10V1 4) A10VPS 5) P5V8T 6) P2V5T 7) P1V2T 8) N5V8T 9) P7V8T 10) FANR1 11) FANR2 (PS 1.5 ONLY) 12) ATEMP 13) SHTDN 14) IICST 15) FWPWR 16) CHKSM 17) FPGAD 18) BUCLD (ONLY WHEN BUC OPTION INSTALLED) INFO CODES REPORT AS FOLLOWS: 0=Power Off; 1 = Power On; 2=Log Cleared; 3=Global Config Change; 4=Redundancy Config Change ddmmyy=Date in day/month/year format hhmmss=Time in hour:minutes:seconds format NOTES: 1) If less than 5 events are retrieved, the remaining positions are padded with zeros. 2) If there are no new events, the response is RNE*. 3) A Global Config Change is defined as any time a command is successfully executed. 4) A query does not set the status change flag. The status change flag is cleared after being read. No other events toggle a status change.</p>	RNE=	RNE={CR}ABCCddmmyyhhmss{CR}ABCCddmmyyhhmss{CR}ABCCddmmyyhhmss{CR}ABCCddmmyyhhmss{CR}ABCCddmmyyhhmss{CR}ABCCddmmyyhhmss

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Retrieve Next 5 unread stored Statistics	N/A	RNS?	75 bytes	<p>Query only. Unit returns the oldest 5 Stored Statistics that have not yet been read over the remote interface, in the form {CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body, where Sub-body is in the form ddmmyyhhmmssaaa.abb.bccc.dd.ddefghh.hiii.i: ddmmyy = Date in day/month/year format hhmmss = Time in hour:minutes:seconds format aaa.a = Operating Temperature (I.E. +30.0) (PS 1.5 ONLY) bbb.b = Amp Temperature (I.E. +40.0) ccc.c = RF Power output dd.dd = Attenuation Setting e = Amp On/Off f = Mute On/Off g = Online/Offline Status (NOT USED) hhh.h = LNB Current (mA) (NOT USED) iii.i = BUC Tuning Voltage (VALID ONLY WHEN OPTIONAL BUC IS INSTALLED) NOTES: 1) If less than 5 entries are retrieved, the remaining positions are padded with zeros. 2) If there are no new entries, the response is RNS*.</p>	RNS=	RNS={CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body{CR}Sub-body
Serial Number	N/A	RSN?	9 bytes	<p>Query only. Returns the unit's nine-digit serial number in the form xxxxxxxxx. EXAMPLE: <0001/RSN?{CR}> >0001/RSN=0123445678{CR}{LF}</p>	RSN=	RSN=xxxxxxx
Summary Fault Status	N/A	SFS?	1 byte	<p>Query only. Returns the summary fault state in the form x, where: 0 = Not Faulted (SumFLT_COM J6 pin K is not connected to SumFLT_NC J6 pin M) 1 = Faulted (SumFLT_COM J6 pin K is connected to SumFLT_NC J6 pin M) EXAMPLE: <0001/SFS?{CR}> >0001/SFS=0{CR}{LF}</p>	SFS=	SFS=x
Set FSK Address	SFA=	SFA?	2 bytes, numeric	<p>Command or Query. Sets or returns the FSK Address in the form xx, where: xx = Address value from 01 (DEFAULT) to 15. COMMAND EXAMPLE: <0001/SFA=01{CR}></p>	SFA = SFA? SFA*	SFA=xx
SNMP Authentication Trap Enable	SNA=	SNA?	1 byte	<p>Command or Query. Sets or returns the SNMP Authentication Trap in the form x, where: 0 = Disabled 1 = Enabled COMMAND EXAMPLE: <0001/SNA=0{CR}></p>	SNA= SNA?	SNA=x

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
SNMP Enable	SNM=	SNM?	1 byte	Command or Query. Sets or returns SNMP in the form x, where: 0 = Disabled 1 = Enabled COMMAND EXAMPLE: <0001/SNM=0{CR}	SNM= SNM?	SNM=x
Serial Number*	N/A	SNO?	9 bytes	Query only. Returns the unit's nine-digit serial number in the form xxxxxxxxx. NOTE: This query is functionally identical to RSN. EXAMPLE: <0001/SNO?{CR} >0001/SNO=012345678{CR}{LF}	SNO=	SNO=xxxxxxxxx
Set Physical (remote) Address	SPA=	SPA?	4 bytes	Command or Query. Sets or returns the Physical Address in the form xxxx where: xxxx = Address value from 0001 (DEFAULT) to 9999. COMMAND EXAMPLE: <0001/SPA=0412{CR}	SPA= SPA? SPA*	SPA=xxxx
SNMP Read Community	SRC=	SRC?	16 bytes, characters, no spaces	Command or Query. Sets or returns the SNMP Read Community string. NOTE: An empty string is not allowed. COMMAND EXAMPLE: <0001/SRC=public{CR}	SRC = SRC!	SRC=x
SNMP System Contact	SSC=	SSC?	255 bytes, characters,	Command or Query. Sets or returns the SNMP System Contact string. COMMAND EXAMPLE: <0001/SSC=Joe Net Admin{CR} NOTE: When not configured, the Target returns an empty string: <0001/SSC={CR}{LF}	SSC = SSC!	SSC=x [1..128]
Set Statistics Interval	SSI=	SSI?	2 bytes	Command or Query. Sets or returns the time interval, in minutes, at which statistics are logged in the form xx, where: xx = interval, from 01 to 99 minutes (see NOTE) NOTE: Default value is 90 minutes. COMMAND D EXAMPLE: <0001/SSI=90{CR}	SSI= SSI?	SSI=xx
SNMP System Location	SSL=	SSL?	255 bytes, characters,	Command or Query. Sets or returns the SNMP System Location string. COMMAND EXAMPLE: <0001/SSL=Upstairs back right. NOTE: When not configured, the Target returns an empty string. <0001/SSL={CR}{LF}	SSL = SSL!	SSL=x[1..128]
SNMP Unit Name	SSN=	SSN?	16 bytes, characters,	Command or Query. Sets or returns the SNMP Unit Name string. COMMAND EXAMPLE: <0001/SSN=Remote1{CR} NOTE: When not configured, the Target returns an empty string. <0001/SSC={CR}{LF}	SSN = SSN!	SSN=x[1..128]
SNMP Trap Destination IP Address 1	STA=	STA?	15 bytes, Numerical	Command or Query. Sets or returns the IP Address of the SNMP Trap Destination IP Address 1 (where traps will be sent first) in the form xxx.xxx.xxx.xxx, where: xxx.xxx.xxx.xxx = IP Address COMMAND EXAMPLE: <0001/STA=010.006.030.001{CR} NOTE: When not configured, the Target returns >0001/STA=0.0.0.0{CR}{LF}	STA = STA!	STA=xxx.xxx.xx x.xxx

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
SNMP Trap Destination IP Address 2	STB=	STB?	15 bytes, Numerical	Command or Query. Sets or returns the IP Address of the SNMP Trap Destination IP Address 2 in the form xxx.xxx.xxx.xxx, where: xxx.xxx.xxx.xxx = IP Address COMMAND EXAMPLE: <0001/STB=010.006.030.002{CR} NOTE: When not configured, the Target returns >0001/STB=0.0.0.0{CR}{LF}	STB = STB!	STB=xxx.xxx.xxx .xxx
SNMP Trap Version	STV=	STV?	1 byte	Command or Query. Sets or returns the SNMP Trap Version that will be used to send traps in the form x, where: 1 = SNMP Trap Version 1 2=SNMP Trap Version 2 COMMAND EXAMPLE: <0001/STV=0{CR}	STV = STV!	STV=x
SNMP Write Community	SWC=	SWC?	16bytes, characters, no spaces	Command or Query. Sets or returns the SNMP Write Community string. COMMAND EXAMPLE: <0001/SWC=private{CR} NOTE: An empty string is not allowed.	SWC = SWC!	SWC=x
Software Revision	N/A	SWR?	34-37 bytes	Query only. Returns the value of the internal software revision installed in the unit, in the form: Boot:x.y.z Bulk1:x.y.z Bulk2:x.y.z -or- Boot:x.y.zz Bulk1:x.y.zz Bulk2:x.y.zz	SWR=	SWR=Boot:x.y.z z Bulk1:x.y.zz Bulk2:x.y.z
Set RTC Time	TIM=	TIM?	6 bytes	Command or Query. Sets or returns the Real-Time-Clock time in the form hhmmss, where: hh = hours, from 00 to 23; mm = minutes, from 00 to 59, ss = seconds, from 00 to 59 COMMAND EXAMPLE (time = 23 hours, 12 minutes and 59 seconds since midnight – i.e., 11:12:59 PM): <0001/TIM=231259{CR}	TIM = TIM? TIM *	TIM=xxxxxx
Heatsink Temperature	N/A	TMP?	5 bytes	Query only. Returns the temperature of the Heatsink in the form sxxxx, where: s = sign byte, positive or negative (+ or –) xxxx = temperature (including decimal point) EXAMPLE: <0001/TMP?{CR} <0001/TMP=+26.0{CR}{LF}	TMP=	TMP=sxxxx
Retrieve Number of unread stored Alarms*	N/A	TNA?	2 bytes	Query only. Returns the number of stored events that remain unread in the alarm log in the form xx, where: xx = number from 00 to 99. NOTE: Although a maximum of 255 events may be stored in the alarm log, event tallies greater than 99 are reported as 99. EXAMPLE: <0001/TNA?{CR} >0001/TNA=14{CR}{LF}	TNA=	TNA=xx

Parameter Type (* indicates End-of-Life)	Controller-to-Target Instruction Code and Qualifier		Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes from 48 to 57)	Target-to-Controller (see Description of Arguments)	
	Command	Query			Response to Command	Response to Query
Terminal Status Change	N/A	TSC?	1 byte	Query only. Indicates if there has been a change in the configuration since the last time the command was given, in the form x, where: 0 = No status change. 1 = Status change has occurred. NOTES: 1) A "status change" is defined as any time a parameter is changed, e.g., when a command is successfully executed that changes a value. A status change also results when there is a fault condition. 2) A query does not set the status change flag. The status change flag is cleared after being read. EXAMPLE: <0001/TSC?{CR} >0001/TSC=0{CR}{LF}	TSC=	TSC=x
Time Protocol Enable	TPE=	TPE?	1 byte, numerical	Command or Query. Sets or returns Time Protocol in the form x, where: 0 = Disable 1 = Enable COMMAND EXAMPLE: <0001/TPE=1{CR} (Enables Time protocol)	TPE= TPE?	TPE=x
Time Protocol Server	TPS=	TPS?	15 bytes, alphanumeric	Command or Query. Sets or returns the Time Server IP Address for the unit's Tx Ethernet management port, in the form xxx.xxx.xxx.xxx. NOTE: Default Value = 255.255.255.255 COMMAND EXAMPLE: <0001/TPS=192.168.001.005{CR}	TPS= TPS?	TPS=xx.xxx.xxx. xxx

Notes:

Appendix A. CABLE DRAWINGS

A.1 Overview

This appendix provides line details for the cables available for use with the LPOD-R in standalone applications. Each figure illustrates the cable's technical specifications – e.g., connector types used, cable labeling, wiring lists, etc.

A.2 Control and Data Cables

Figure	CEFD CABLE P/N	DESCRIPTION	USED FOR:
A-1	CA-0020526	Serial Interface Cable (19-pin circular connector to RJ-11)	Connecting a standalone LPOD-R PS 1 or PS 1.5 original version (now optional) 19-pin 'J6 COM1' receptacle to the CLC-10 RJ-11 comms jack (Cable and CLC-10 are furnished as part of optional CEFD KIT KT-0020518)
A-2	CA-0000352	Ethernet Interface Cable (19-pin circular connector to <2X> RJ-45)	Connecting a standalone LPOD-R PS 1 or PS 1.5 original version (now optional) 19-pin 'J6 COM1' receptacle to an LPODnet or a user PC Ethernet jack (Cable and LPODnet are furnished as part of optional CEFD KIT KT-0000203)
A-3	PP/CAT5FF7FTGY	CAT5e Ethernet Cable (RJ-45 to RJ-45)	Connecting a standalone LPOD-R PS .5, PS 1, or PS 1.5 current production version RJ-45 'J6 COM1' weatherproof receptacle to an LPODnet or a user PC Ethernet jack. (LPODnet is furnished as part of optional CEFD KIT KT-0000203) RECOMMENDED ONLY FOR TEMPORARY APPLICATIONS.

A.2.1 Serial Interface Cable – PS 1 or PS 1.5 (OPTIONAL)

Earlier versions of the LPOD-R PS 1 and PS 1.5 featured a 19-pin 'J6 | COM1' remote communications and discrete control receptacle for optional serial-based M&C of the LPOD-R. (This is now an optional configuration. This interface is now a weatherproof RJ-45 Ethernet receptacle providing Ethernet-based M&C.) The optional Comtech EF Data CLC-10 Serial M&C Accessory Kit (CEFD P/N KT-0020518) includes the CA-0020526 Serial Interface Cable. This kit is available to provide optional serial-based M&C of standalone LPOD-R PS 1 and PS 1.5 units using the CLC-10 Comtech LPOD Controller (a preconfigured Two Technologies, Inc. TechTerm Handheld Terminal).

The circular connector end of this cable installs onto the LPOD-R 19-pin 'J6 | COM 1' receptacle. The RJ-11 connector end plugs directly into the CLC-10.

Current production versions of the LPOD-R PS 1 and PS 1.5 do not support use of the CLC-10.

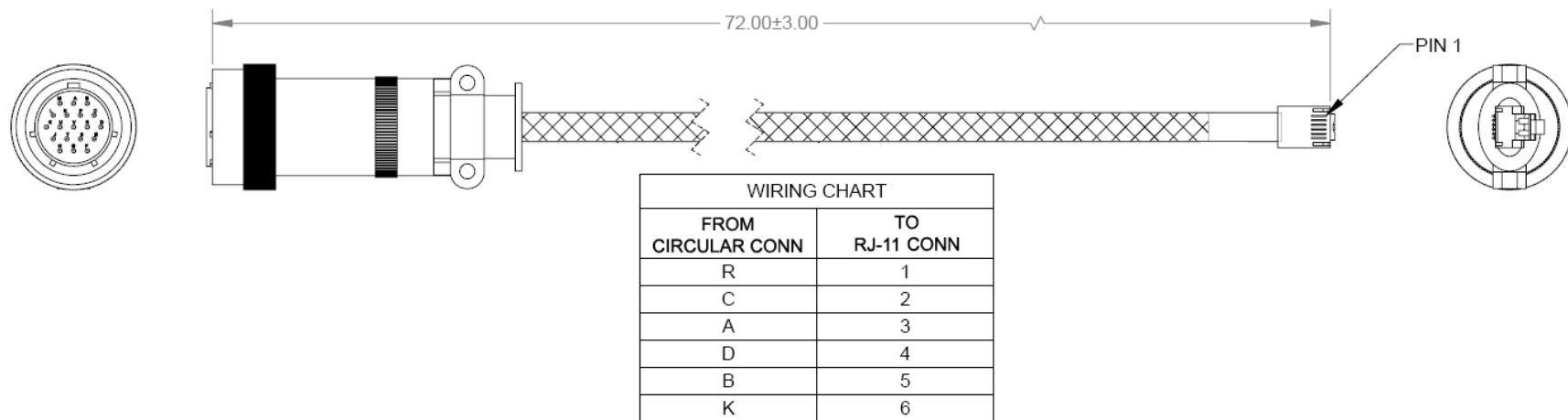


Figure A-1. Serial Interface Cable (CA-0020526, part of KT-0020518)

A.2.2 Ethernet Interface Cable – PS 1 or PS 1.5 (OPTIONAL)

Earlier versions of the LPOD-R PS 1 and PS 1.5 featured a 19-pin 'J6 | COM1' remote communications and discrete control receptacle for optional serial-based M&C of the LPOD-R. (This is now an optional configuration. This interface is now a weatherproof RJ-45 Ethernet receptacle providing Ethernet-based M&C.) The optional Comtech EF Data Ethernet Utility Kit (CEFD P/N KT-0000203) includes the LPODnet (a Samsung NB30 Plus Netbook) and the CA-0000352 Ethernet Interface Cable.

The 'P1' circular connector end of this cable installs onto the LPOD-R 19-pin 'J6 | COM 1' receptacle. The 'J3' RJ-45 end of this cable plugs directly into the Ethernet network jack of either the LPODnet or a user PC. The 'J2' RJ-45 connector is not used in standalone applications.

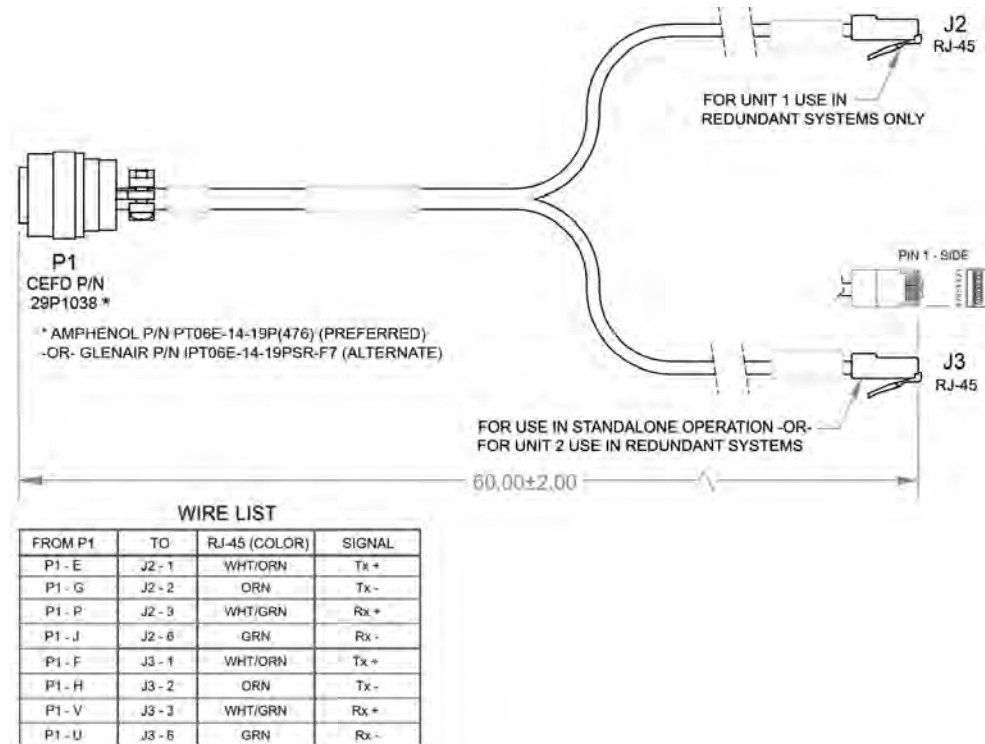


Figure A-2. Ethernet Interface Cable (CA-0000352, part of KT-0000203)

A.2.3 Ethernet Data Cable (CAT5e RJ-45)

This CAT5e RJ-45 data cable is available for directly connecting the LPOD-R RJ-45 'J6 | COM1' Ethernet receptacle to the Ethernet network jack of the LPODnet or a user PC. It is recommended for use only in temporary applications.



CAUTION

For permanent Ethernet data connections, you **MUST** use the appropriate mating connector on your supplied Ethernet cable to ensure a weatherproof installation. Comtech EF Data provides kits for fabricating Ethernet cables having weatherproof connectors. See **Section 2.2.5.1** and **Figure 2-4** in **Chapter 2. SYSTEM CONNECTORS, INSTALLATION, AND STARTUP** for details.

T568B Wiring Diagram		
Pair No.	Wire	Pin No.
1	Blue/White tracer	5
	Blue	4
2	Orange/White tracer	1
	Orange	2
3	Green/White tracer	3
	Green	6
4	Brown/White tracer	7
	Brown	8

350 MHz Category 5E Patch Cable Specs:

- EIA/TIA TSB-40A ETL Verified
- Contact Gold Plating 50µ" (Short body)
- Assembly Strain Relief
- Stranded 50dB
- RoHS Compliant
- Length: 7 ft.

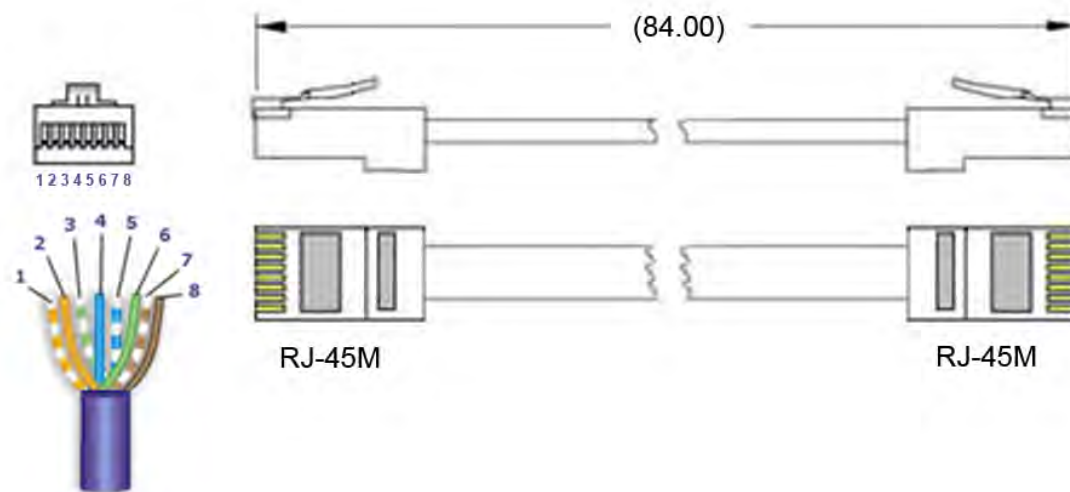


Figure A-3. Ethernet Data Cable (PP/CAT5FF7FTGY)

A.3 RF Cables

Figure	CEFD CABLE P/N	DESCRIPTION	USED FOR:
A-4	CA/3722-X	Type 'N' to Type 'N' 1/4" Helix Coaxial Cable (lengths vary)	LPOD-R Rx or Tx connections in standalone LPOD-R applications

A.3.1 RF Cable (Type 'N')

Use this Type 'N' cable for the Tx or Rx connections in LPOD-R standalone or future 1:1 Redundancy applications:

- For all LPOD-R standalone applications – This cable connects directly from the Tx signal source to the 'J1 | L-BAND IN' LPOD interface.
- For LPOD-R PS 1 C-Band standalone applications – This cable connects directly from the 'J2 | RF OUT' LPOD interface to the Rx signal destination.

PART NO.	DIM A
CA/3722	144.00 ± 4.00
CA/3722-1	48.00 ± 1.50
CA/3722-2	60.00 ± 2.00
CA/3722-3	90.00 ± 2.00
CA/3722-4	264.00 ± 4.00
CA/3722-5	288.00 ± 4.00
CA/3722-6	72.00 ± 2.00
CA/3722-7	240.00 ± 4.00
CA/3722-8	120.00 ± 4.00
CA/3722-9	180.00 ± 4.00
CA/3722-10	192.00 ± 12.00
CA/3722-11	108.00 ± 4.00

NOTE: CABLE MUST MEET VSWR 10.96-12.75 ≤ 1.40:1
WITH INSERTION LOSS AS FOLLOWS:

FREQUENCY MHz	ATTENUATION db/100ft	ATTENUATION db/100 M	AVERAGE POWER kW
10000	21.8	71.5	0.054
12000	24.3	79.7	0.049
14000	26.7	86.3	0.044
16000	29.0	95.2	0.040

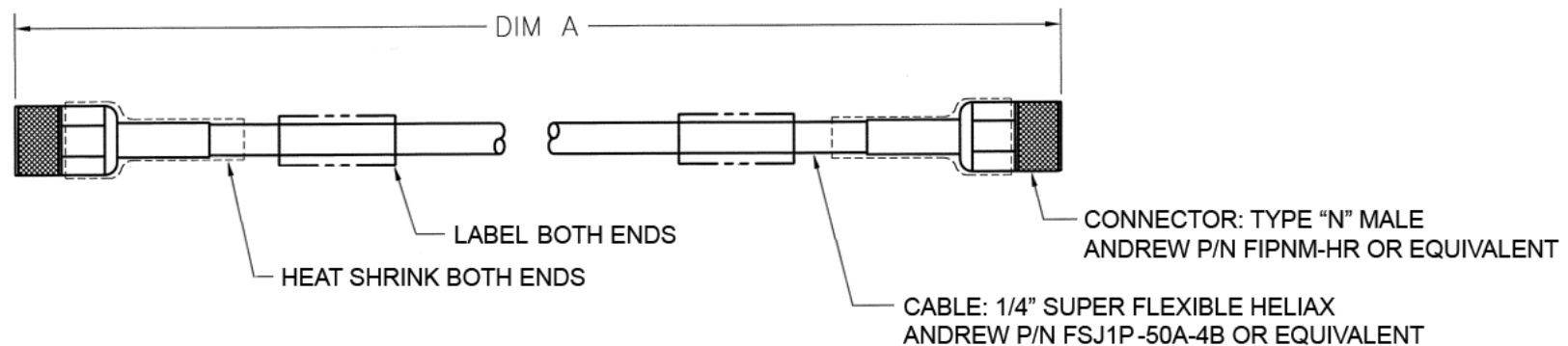


Figure A-4. 1/4" Heliax Coaxial Cable (CA/3722-X)

Appendix B. MAINTENANCE

B.1 Overview

This appendix outlines the procedures for uninstalling the LPOD-R PS .5, PS 1, or PS 1.5 fan shroud, inspecting and cleaning the heat sinks, and then re-installing the fan shroud.



Figure B-1. Comtech EF Data LPOD-R Outdoor Amplifiers / BUCs

The fans used by Comtech EF Data's LPOD-R family of Outdoor Amplifiers / Block Up Converters (BUCs) (**Figure B-1**) are designed for long life, even in harsh environments. Still, they are mechanical devices, subject to wear, and may need replacement after several years.

In most environments, Comtech EF Data recommends clearing the heat sinks of dust and debris approximately once per year to ensure optimal fan life. You can use the temperature trending data, available from the LPOD-R HTTP Interface 'Status | Trending Graphs' page (**Figure B-2**) as a guide to determine if more or less frequent preventative maintenance is required.



Section 4.5.4.6 Status | Trending Graphs (Chapter 4. ETHERNET INTERFACE OPERATION)

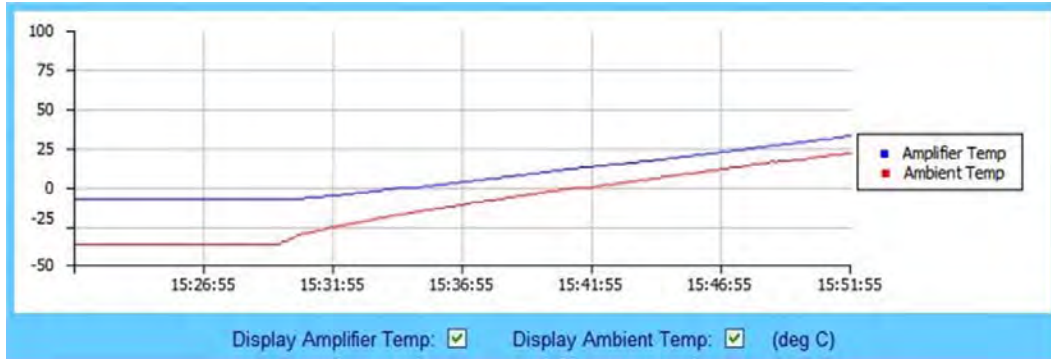







Figure B-2. LPOD-R HTTP Interface ‘Status | Trending Graphs’ Page – Temperature Graph Example

B.2 Clean the LPOD-R PS .5 Heat Sinks

Do these steps to clean the LPOD-R PS .5 Heat Sinks:

Step	Task
1	Disconnect power from the LPOD-R.
2	Remove the four fan cover screws – see Figure B-3.  Make sure to use the correct screwdriver, to avoid damaging the screws.
3	Set aside the cover plate to access the fan assembly – see Figure B-4.
4	 CAUTION Carefully set aside the fan assembly. Make sure not to crimp or otherwise damage the fan’s power supply wiring – see Figure B-5.
5	Visually inspect the exposed LPOD-R heat sinks for any accumulated debris or blockage that may be obstructing airflow. Use compressed air to clear and clean the heat sinks as needed – see Figure B-6.  Make sure to blow <u>between</u> the heat sink fins to remove any foreign object accumulation.
6	 CAUTION Reseat the fan assembly in the LPOD-R chassis. Make sure to keep the fan power supply wiring clear of the fan and heat sink surfaces. See Figure B-7.

Step	Task
7	Re-install the fan cover plate onto the chassis – see Figure B-8 – make sure to keep the fan power supply wiring clear of the cover plate surfaces. Then, re-install the four cover screws as described in Step 2.
	 Torque the screws to 11 ± 2 inch lbs.
8	Reconnect the power source to the LPOD-R.

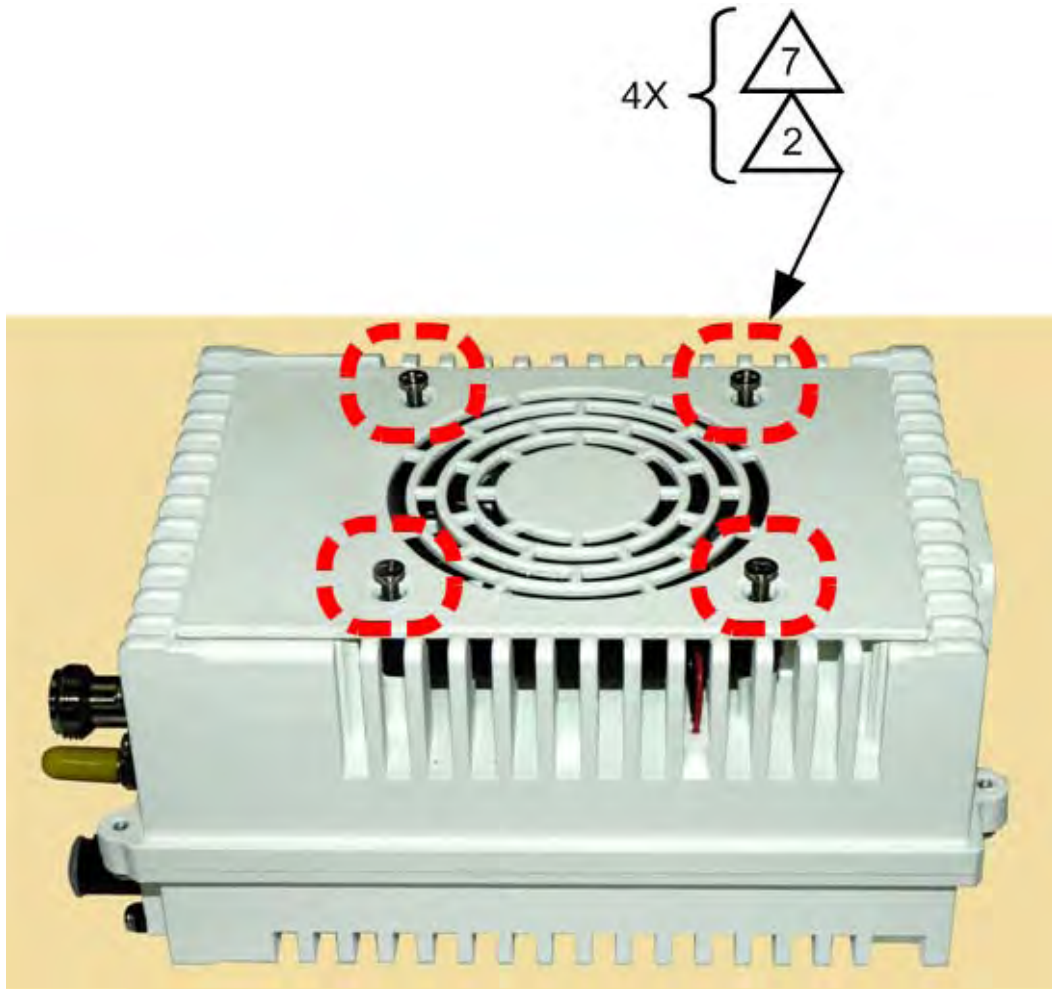


Figure B-3. LPOD-R PS .5 Cover Plate Screw Locations

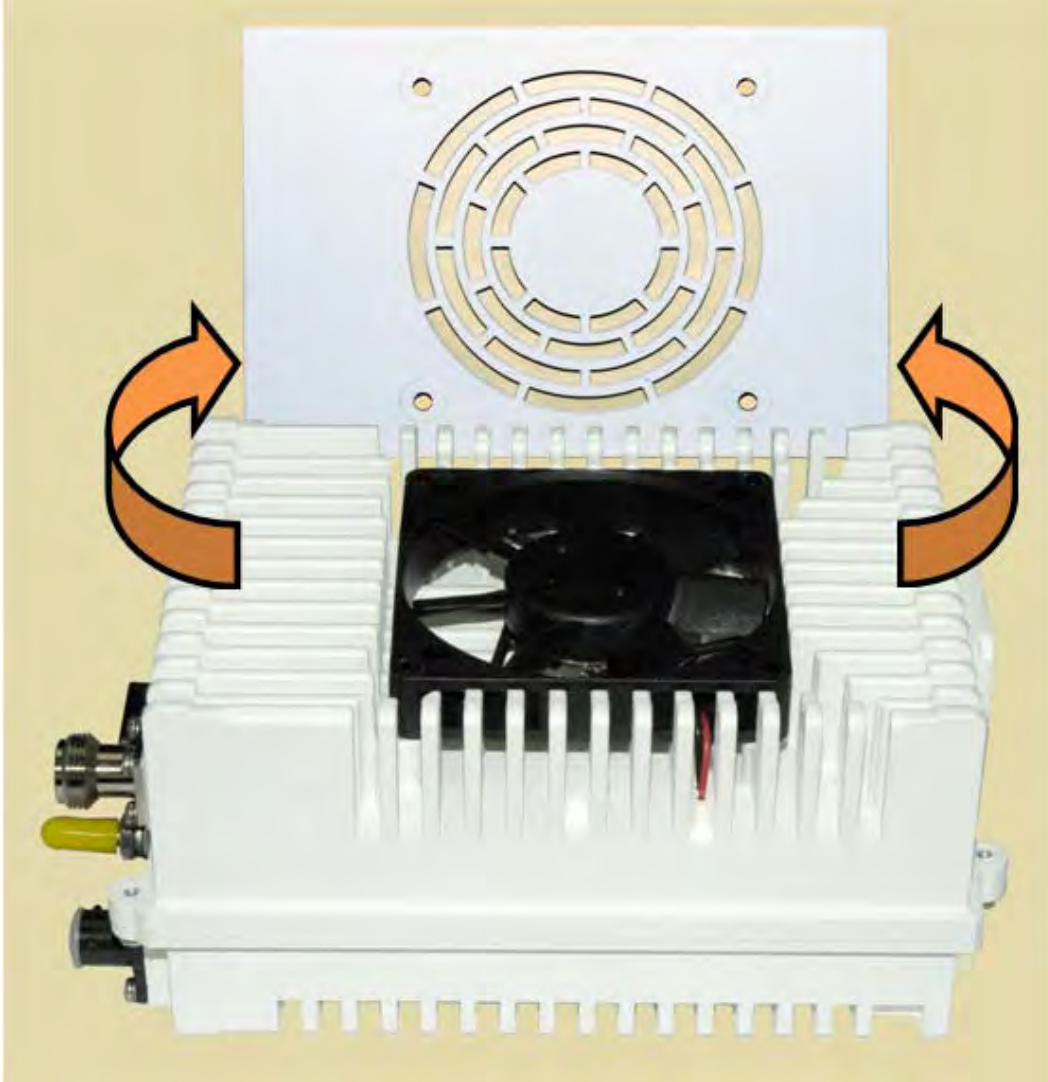


Figure B-4. Remove the Cover Plate

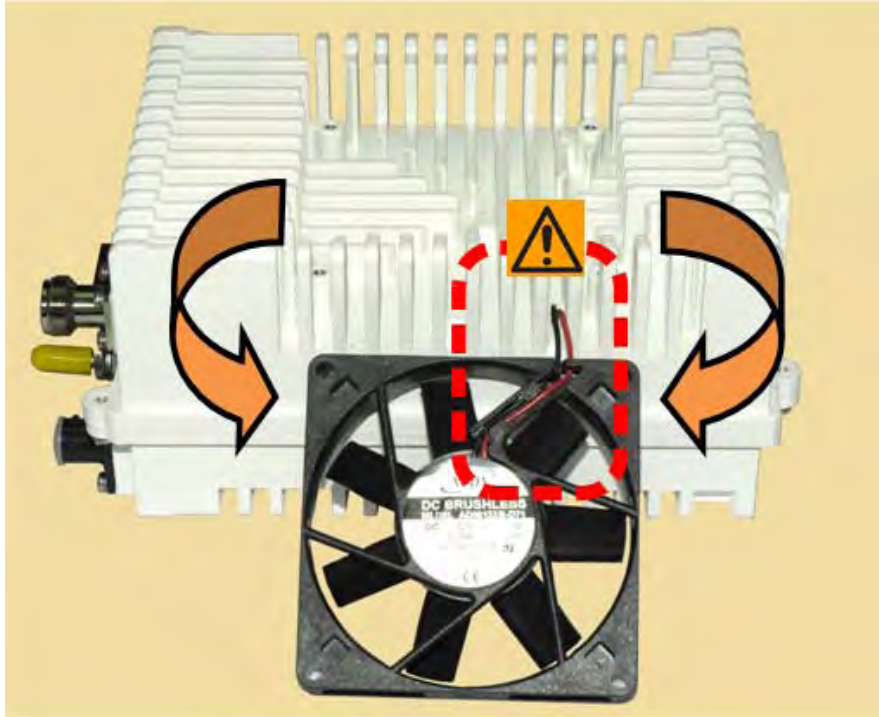


Figure B-5. Set Aside the Fan Assembly

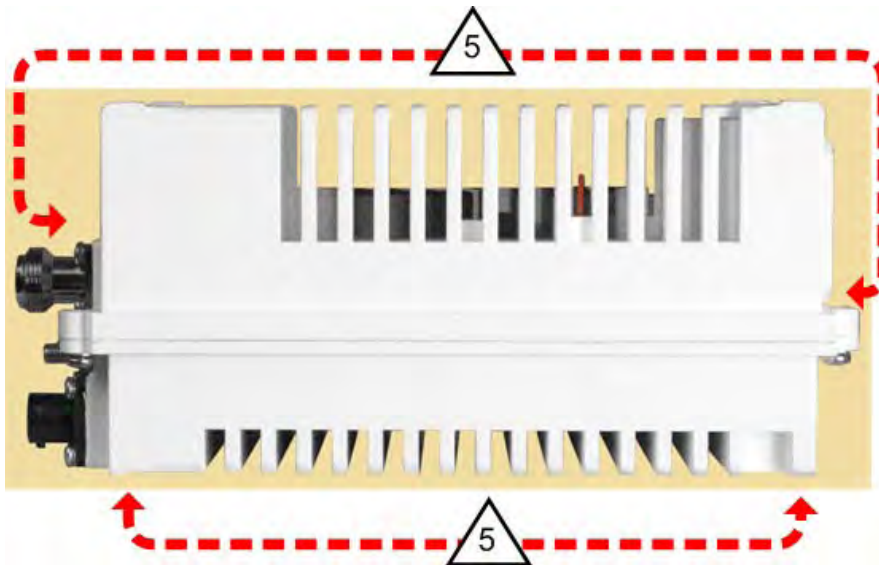


Figure B-6. LPOD-R PS .5 Heat Sink Locations (Fan Not Shown for Clarity)

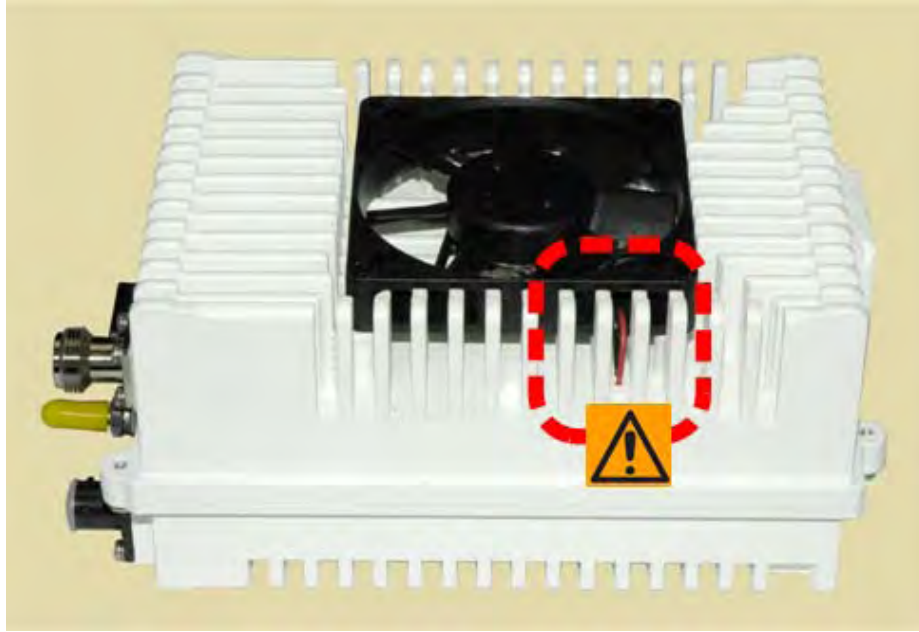


Figure B-7. Reseat the Fan Assembly

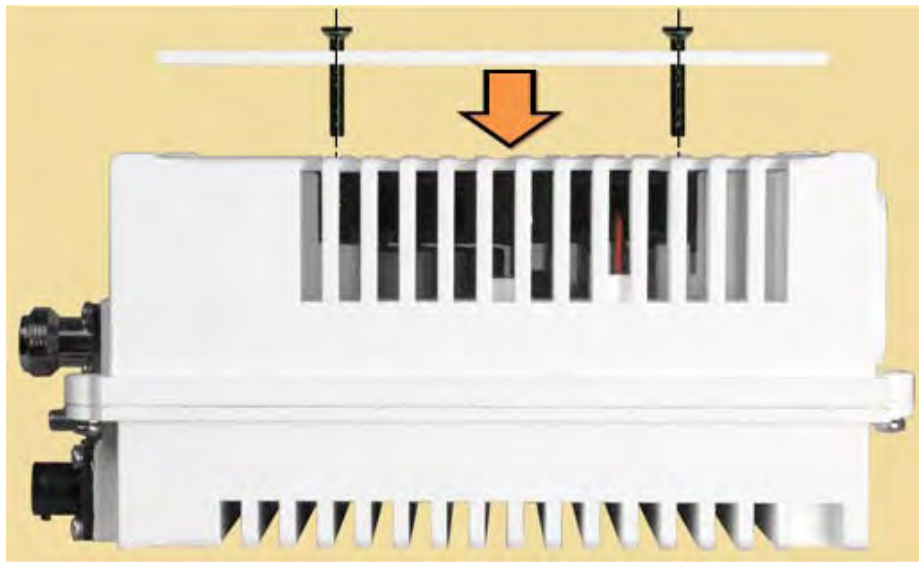





Figure B-8. Replace the Cover Plate

B.3 Clean the LPOD-R PS 1 Heat Sinks

Do these steps to clean the LPOD-R PS 1 Heat Sinks:

Step	Task
1	Disconnect power from the LPOD-R.
2	Remove the eight screws – four on either side of the fan shroud – see Figure B-9.  Make sure to use the correct screwdriver, to avoid damaging the screws.
3	Lift the fan shroud assembly far enough off the chassis to expose the heat sinks and access the fan's power supply connection – see Figure B-10.
4	Disconnect the fan power supply. First, depress the connector's locking mechanism, and then pull apart the mated components – see Figure B-11.
5	Visually inspect the exposed LPOD-R heat sinks, located on the top and either side of the chassis, for any accumulated debris or blockage that may be obstructing airflow. Use compressed air to clear and clean the heat sinks as needed – see Figure B-12.  Make sure to blow <u>between</u> the heat sink fins to remove any foreign object accumulation.
6	Reconnect the fan power supply by pressing the male and female connectors together until the locking mechanism snaps and locks – see Figure B-13.
7	Re-install the fan shroud onto the chassis – make sure to keep the fan power supply cable clear of the fan and heat sink surfaces. Then, re-install the eight screws as described in Step 2.  Torque the screws to 11 ±2 inch lbs.
8	Reconnect the power source to the LPOD-R.

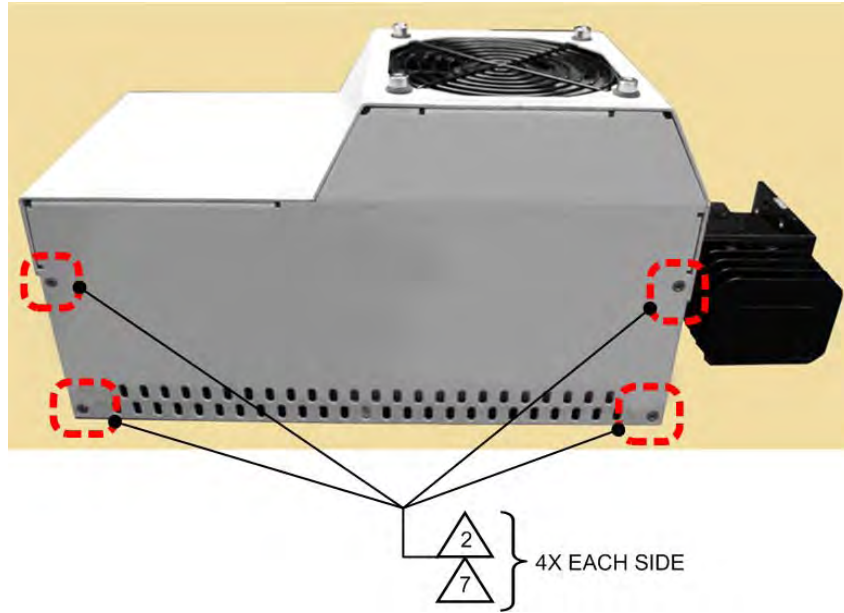


Figure B-9. LPOD-R PS 1 Shroud Screw Locations

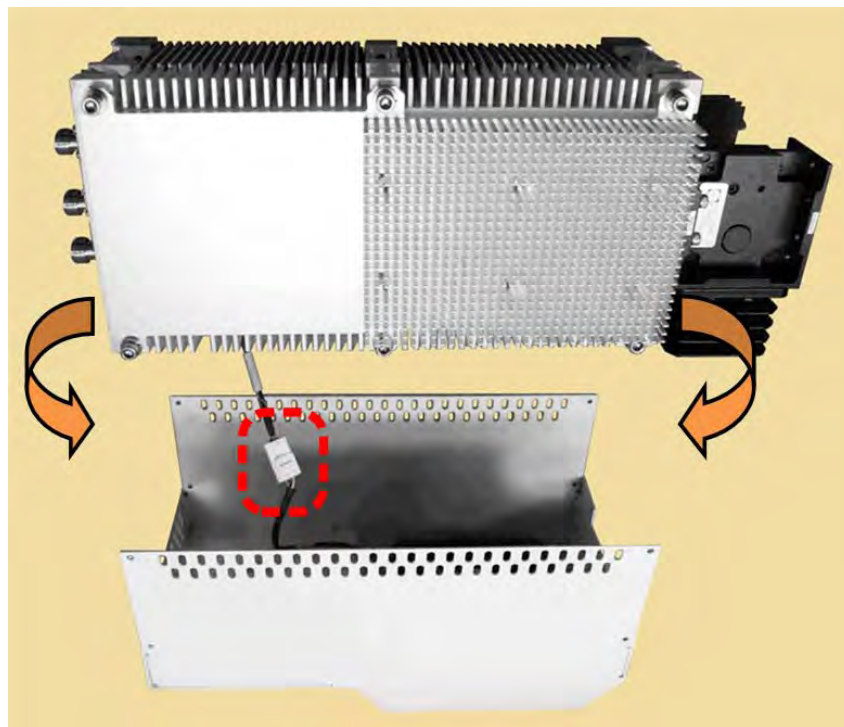


Figure B-10. Remove the Fan Shroud

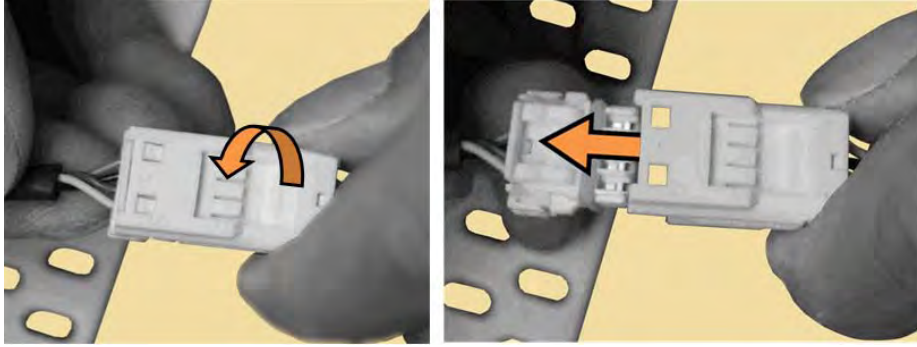


Figure B-11. Disconnect the Fan Power Supply

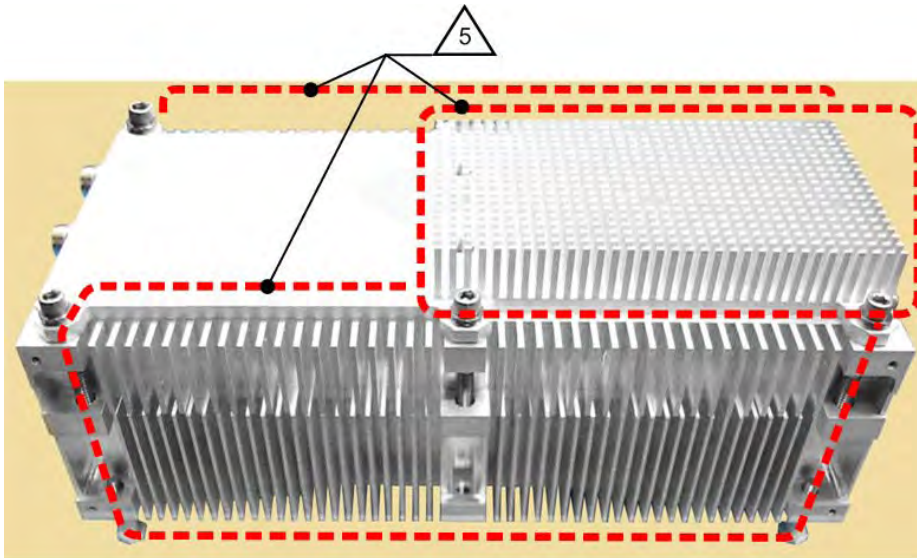


Figure B-12. LPOD-R PS 1 Heat Sink Locations

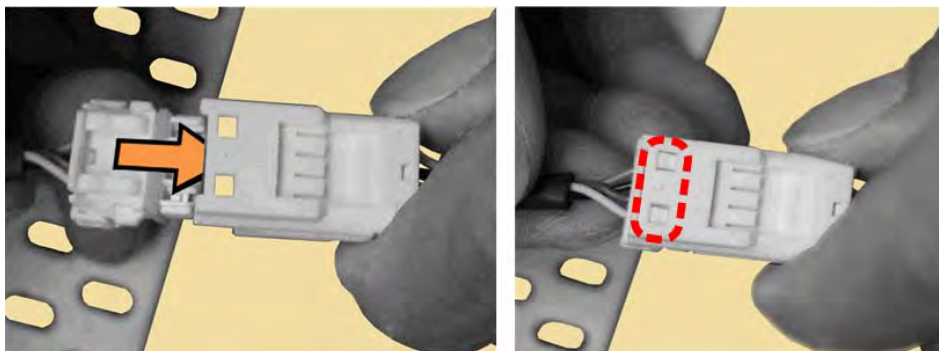







Figure B-13. Reconnect the Fan Power Supply

B.4 Clean the LPOD PS 1.5 Heat Sinks

Do these steps to clean the LPOD-R PS 1.5 Heat Sinks:

Step	Task
1	Disconnect power from the LPOD-R.
2	Remove the screws from all four sides of the LPOD-R as needed – see Figure B-14.  <ul style="list-style-type: none">• Make sure to use the correct screwdriver, to avoid damaging the screws.• The length of the four screws indicated in green are longer than those indicated elsewhere. Make sure to re-install these longer screws at the same locations.• The two screws located behind the waveguide may be difficult to remove without first removing the waveguide from the chassis.
3	Lift the fan shroud assembly far enough off the chassis to expose the heat sink and access the fan power supply connections – see Figure B-15.
4	Disconnect each fan power supply by carefully pulling the mated connector components straight apart – see Figure B-16.  Do not twist the mated cable connection when disconnecting the cable assemblies.
5	Visually inspect the exposed LPOD-R heat sink, located on the top of the chassis, for any accumulated debris or blockage that may be obstructing airflow. Use compressed air to clear and clean the heat sink as needed – see Figure B-17.  Make sure to blow <u>between</u> the heat sink fins to remove any foreign object accumulation.
6	Reconnect each fan power supply. First, align the male and female connector's tabs. Then, push the connectors together until the connection locks – see Figure B-18.  <ul style="list-style-type: none">• Do not twist the mated cable connections when reconnecting the fan power supplies.• The fan power supply cables are labeled Fan 1 and Fan 2. Make sure to connect the chassis Fan 1 cable to the fan shroud Fan 1 cable, and the chassis Fan 2 cable to the fan shroud Fan 2 cable.

Step	Task
7	Re-install the fan shroud onto the chassis – Make sure to keep the fan power supply cables clear of the fan and heat sink surfaces. Then, re-install all screws as described in Step 2, making sure to re-install the four longer screws at their same locations.  Torque the screws to 8 ±1 inch lbs.
8	Reconnect the power source to the LPOD-R.

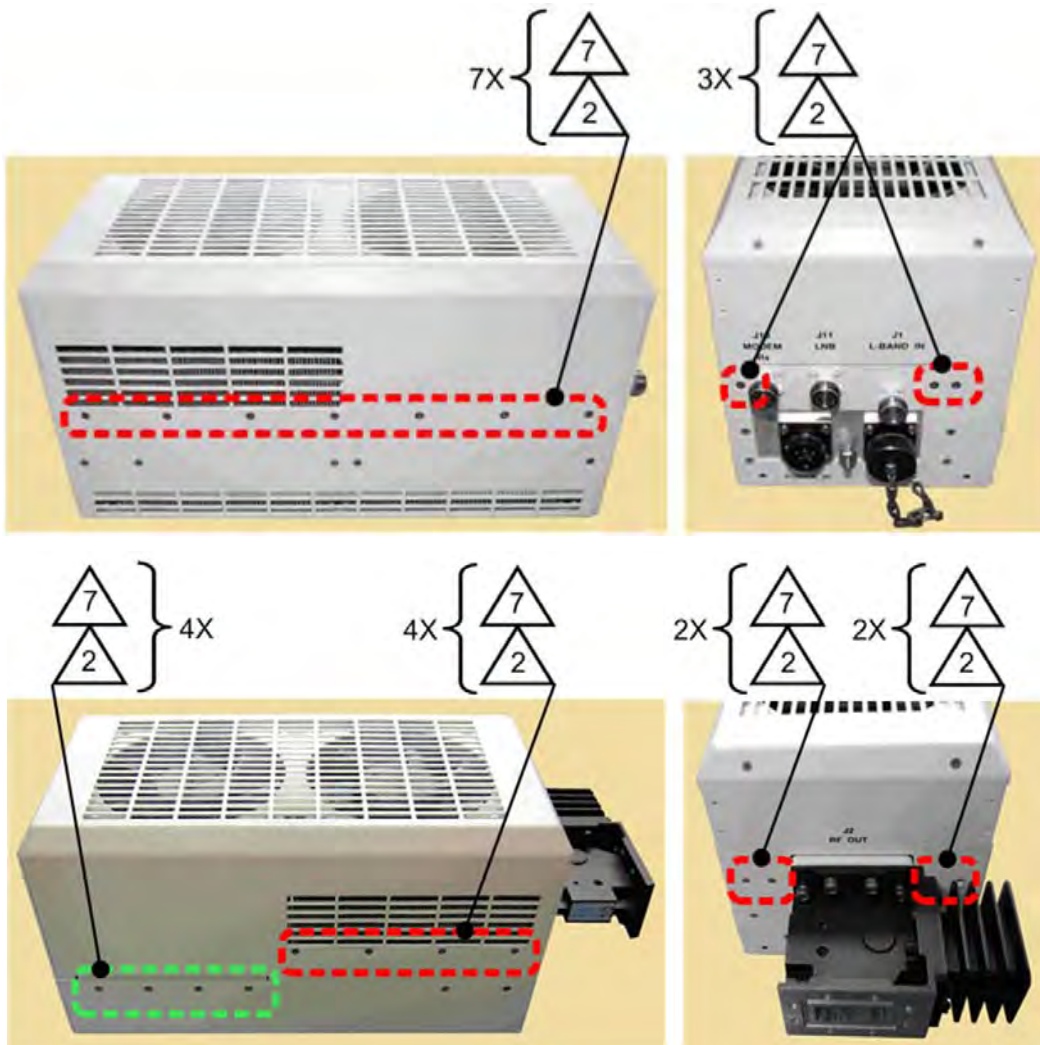


Figure B-14. LPOD-R PS 1.5 Shroud Screw Locations

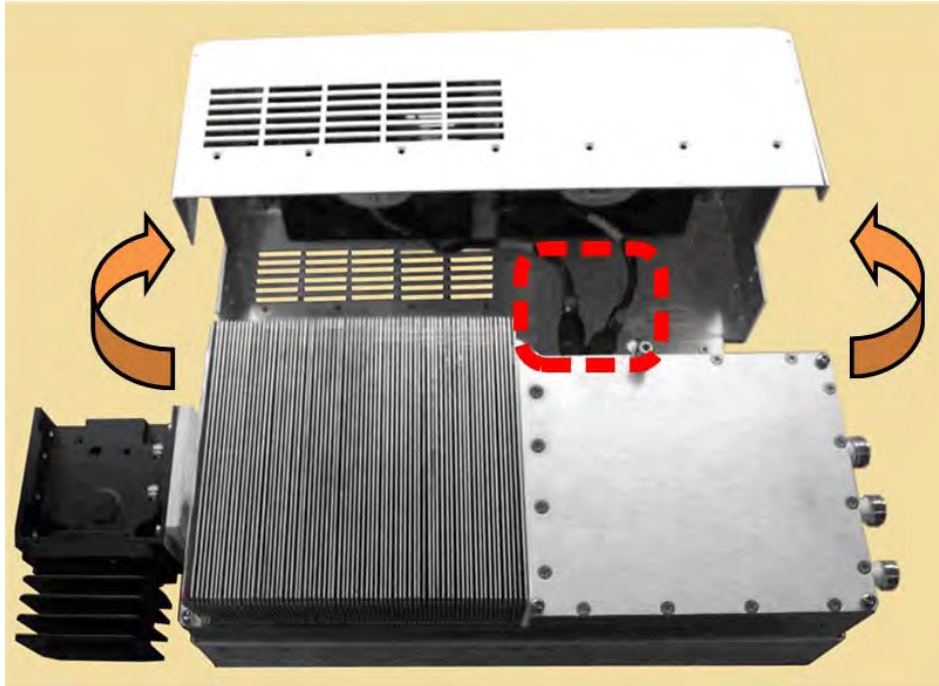


Figure B-15. Remove the Fan Shroud



Figure B-16. Disconnect the Fan 1 / Fan 2 Power Supplies

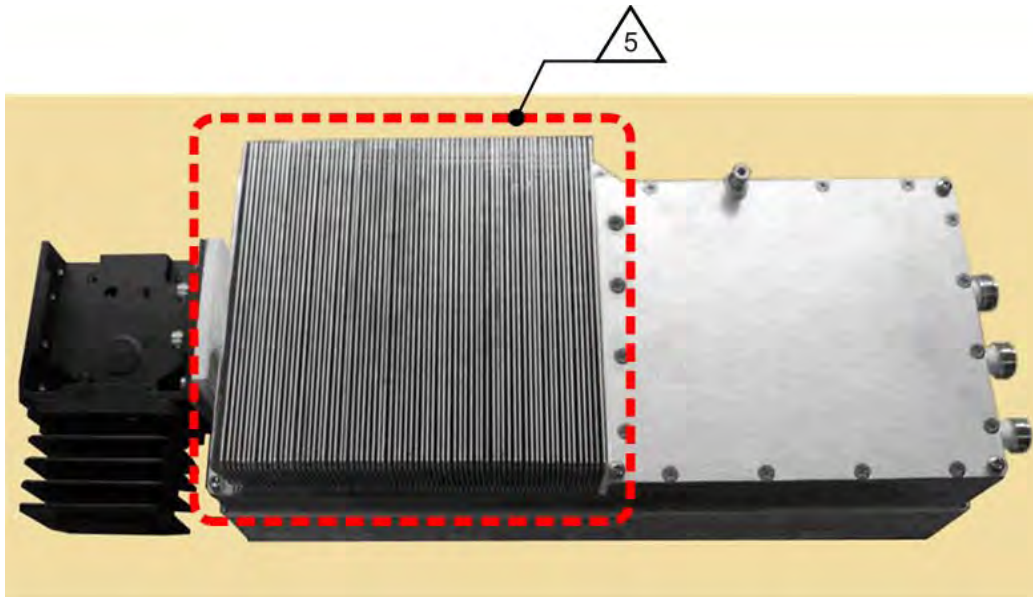


Figure B-17. LPOD-R PS 1.5 Heat Sink Location



Figure B-18. Reconnect the Fan 1 / Fan 2 Power Supplies

B.5 Water Tight Sealing



CAUTION

Before you resume operation of your equipment, you **MUST** make sure that all external cable assemblies for the outdoor equipment are properly sealed to prevent water intrusion. Failure to achieve water tight sealing will result in possible performance degradation and even product failure.



To maintain your product warranty, you must follow the guidelines and recommendations provided in Section 2.2 Water Tight Sealing (Chapter 2. SYSTEM CONNECTORS, INSTALLATION, AND STARTUP).



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