



LBC-4000

**L-Band Up/Down Converter System
Installation and Operation Manual
Firmware Version 1.2.5 and Higher**

Includes Model LBC-4000-ST

Part Number MN-LBC-4000
Revision 6

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.

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Revision History

Rev	Date	Description
0 - 4	Varies	Various updates.
5	Mar 2016	Rewrite manual and FW Update Guide to document Ethernet -ready current production, CDROM part.
6	Dec 2020	Added LBC-4000-ST. Updated formatting to reflect current company styles.

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Acronym List

Acronym	Description	First Use Page Numbe
AID	Application Identification	6-20
BDC	Block Down Converter	7-23
BUC	Block Up Converter	7-23
CEFD	Comtech EF Data	1-1
DC	Direct Current	1-1
ESD	Electrostatic Discharge	3-1
FTP	File Transfer Protocol	5-13
IDU	Interface Data Unit	1-2
LED	Light Emitting Diode	1-5
M&C	Monitor and Control	1-2
MIB	Management Information Base	7-1
NMS	Network Management System	7-1
OID	Object Identifier	7-2
OS	Open System Interconnection	5-6
PC	Personal Computer	5-1
SMTP	Simple Mail Transfer Protocol	7-12
SNMP	Simple Network Management Protocol	7-1
USB	Universal Serial Bus	4-4
VFD	Vacuum Fluorescent Display	1-5

Units of Measurement

Unit / Symbol	Definition
Ω	Ohm
A	Ampere
bps	bits per second
$^{\circ}\text{C}$	Celsius (degrees)
Hz	Hertz
kHz	kiloHertz
dB	decibel
dBc	Decibels relative to the carrier
dBm	Decibel-milliwatts
$^{\circ}\text{F}$	Fahrenheit (degrees)
Kbps	Kilobit per second
kg	kilogram
ksps	Kilosymbols per second
lbs.	pounds
mA	Milli-amp
Mbps	Megabit per second
MHz	Megahertz
mm	millimeter
ms	millisecond
Msps	Megasymbols per second
mW	milliwatt
in.	inch
Ppm	Packets per minute
Pps	Packets per second
SR	Symbols per second
μF	100 micro-farads
W	Watt
V	Volt

PREFACE

About this Manual

This manual provides installation and operation information for the Comtech EF Data LBC-4000/-ST L-Band Up/Down Converter System. This document is intended for the persons responsible for the operation and maintenance of the LBC-4000/-ST.

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.comtechefdata.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.

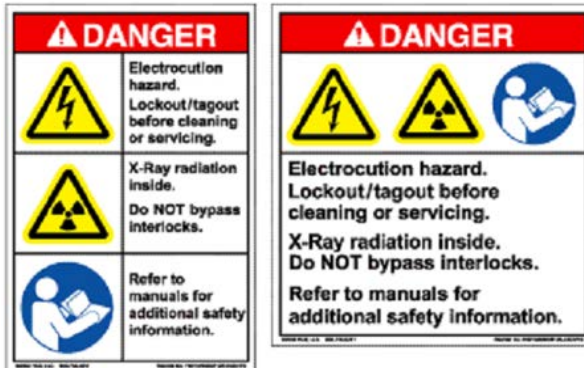


A **NOTE** gives you important information about a task or the equipment.



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.



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

Safety and Compliance

Electrical Safety and Compliance

The unit complies with the **EN 60950 Safety of Information Technology Equipment (Including Electrical Business Machines)** safety standard.

Electrical Installation



CONNECT THE UNIT TO A POWER SYSTEM THAT HAS SEPARATE GROUND, LINE AND NEUTRAL CONDUCTORS. DO NOT CONNECT THE UNIT WITHOUT A DIRECT CONNECTION TO GROUND.



Sect 4.2.2 Unit Ground Connection

Operating Environment



DO NOT OPERATE THE UNIT IN ANY OF THESE EXTREME OPERATING CONDITIONS:

- **AMBIENT TEMPERATURES LESS THAN 0°C (32°F) OR MORE THAN 50°C (122°F).**
- **PRECIPITATION, CONDENSATION, OR HUMID ATMOSPHERES OF MORE THAN 95% RELATIVE HUMIDITY.**
- **UNPRESSURIZED ALTITUDES OF MORE THAN 3048 METRES (10,000 FEET).**
- **EXCESSIVE DUST.**
- **FLAMMABLE GASES.**
- **CORROSIVE OR EXPLOSIVE ATMOSPHERES.**

European Union Radio Equipment and Telecommunications Terminal Equipment (R&TTE) Directive (1999/5/EC) and EN 301 489-1

Independent testing verifies that the unit complies with the European Union R&TTE Directive, its reference to EN 301 489-1 (*Electromagnetic compatibility and Radio spectrum Matters [ERM]; Electromagnetic Compatibility [EMC] standard for radio equipment and services, Part 1: Common technical requirements*), and the Declarations of Conformity for the applicable directives, standards, and practices that follow:

European Union Electromagnetic Compatibility (EMC) Directive (2004/108/EC)






- **EN 55022 Class A (Emissions)** – Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment.
- **EN 55024 (Immunity)** – Information Technology Equipment: Immunity Characteristics, Limits, and Methods of Measurement.
- **EN 61000-3-2** – Harmonic Currents Emission
- **EN 61000-3-3** – Voltage Fluctuations and Flicker.
- **Federal Communications Commission Federal Code of Regulation FCC Part 15, Subpart B.**



TO ENSURE THAT THE UNIT COMPLIES WITH THESE STANDARDS, OBEY THESE INSTRUCTIONS:

- Operate the unit with its cover on at all times.
- Use Type 'D' connectors that have back-shells with continuous metallic shielding.
- Type 'D' cabling must have a continuous outer shield (either foil or braid, or both). The shield must be bonded to the back-shell.
- Use coaxial cable that is of good quality for connections to the Switch Module Type 'N' female connectors.

European Union Low Voltage Directive (LVD) (2006/95/EC)

Symbol	Description		
<HAR>	Type of power cord required for use in the European Community.		
	CAUTION: Double-pole/Neutral Fusing ACHTUNG: Zweipolige bzw. Neutraleiter-Sicherung		
International Symbols			
Symbol	Definition	Symbol	Definition
	Alternating Current		Protective Earth
	Fuse		Chassis Ground



For additional symbols, refer to Warnings, Cautions and Notes listed earlier in this Preface.

European Union RoHS Directive (2002/95/EC)

This unit satisfies (with exemptions) the requirements specified in the European Union Directive on the Restriction of Hazardous Substances in Electrical and Electronic Equipment (EU RoHS, Directive 2002/95/EC).

European Union Telecommunications Terminal Equipment Directive (91/263/EEC)

In accordance with the European Union Telecommunications Terminal Equipment Directive 91/263/EEC, the unit should not be directly connected to the Public Telecommunications Network.

CE Mark

Comtech EF Data declares that the unit meets the necessary requirements for the CE Mark.

Product Support

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)

Comtech EF Data Headquarters

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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 (CEFD)'s LBC-4000 (Figure 1-1) and the LBC-4000-ST (Figure 1-2) L-Band Up/Down Converter System are designed to interface legacy 70 MHz or 140 MHz equipment to tri-band or quad-band block converters.



Figure 1-1. LBC-4000 L-Band Up/Down Converter



Figure 1-2. LBC-4000-ST L-Band Up/Down Converter

1.2 Functional Description



Chapter 2. SPECIFICATIONS

Use standard, off-the-shelf coaxial cabling to connect external equipment (e.g., a modem), to each internal converter module. Use coaxial cabling to connect the output for each module to RF equipment either at the same location or at the antenna location. When configured with the redundancy option, the system may contain two diode "OR-ed" internal power supplies for increased reliability.

See **Chapter 2. SPECIFICATIONS** for component specifications.

1.2.1 LBC-4000 System Application

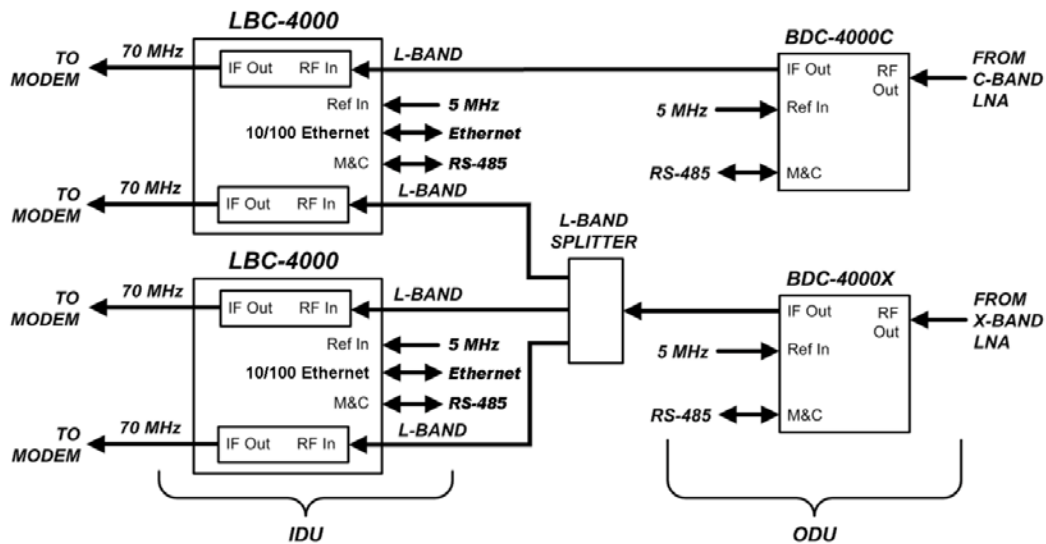


Figure 1-3. LBC-4000 Typical Application Block Diagram

The LBC-4000 features:

- Flexible configuration: Two Interface Data Unit (IDU) module bays allow for (1) Up Converter Module and (1) Down Converter Module; Dual Up Converters Modules; or Dual Down Converters Modules.
- 70 MHz \pm 18 MHz IF (optional 140 MHz \pm 36 MHz)
- Auto band-sensing capabilities
- No spectral inversion
- Low phase noise
- 1 kHz step size
- 5 dB gain adjustment
- 1:1 Redundancy availability
- Remote Monitor and Control (M&C) via the EIA-485/232 Serial Interface or the Ethernet Interface
- Meets or exceeds MIL-STD-188-164A

1.2.2 LBC-4000-ST System Application

The LBC-4000-ST is the “single converter only” version of the LBC-4000, but with a few modifications:

- Front panel mounted 70/140 MHz IF and L-band RF sample ports (nominal 20 dBc coupling for either)
- No integrated switching option
- Rear panel power switch
- Single power input and supply
- Single hard mounted converter module (installed as CONV A) and is not field replaceable

Operation is the same as a standard LBC-4000 unit with a single module installed in the CONV A location.

References to redundant switching, CONV B, and dual power supplies are not applicable.

1.3 Converter Features

1.3.1 Physical Description



For:	See:
Rack installation and mounting instructions	Chapter 3. INSTALLATION AND STARTUP
Cabling Connections	Chapter 4. REAR PANEL CONNECTORS
Firmware Updating Instructions	Chapter 5. FIRMWARE UPDATE
Local control operating instructions and procedures	Chapter 6. FRONT PANEL OPERATION
Remote control operating instructions and procedures	Chapter 7. ETHERNET INTERFACE OPERATION and Chapter 8. SERIAL INTERFACE OPERATION
Maintenance procedures	Appendix A. UP/DOWN CONVERTER IDU MODULE REMOVAL / RE-INSTALLATION
Redundant system operating instructions and procedures	Appendix B. REDUNDANCY OPERATION

The LBC-4000/-ST features a 1RU-high (1.75") 19-inch wide chassis that is designed for rack mounting into a standard 19-inch (48.26 cm) equipment rack. The unit may also be mounted into the rack using the provided slide mechanisms to allow service without removal from the rack. The unit may be freestanding if desired.

The LBC-4000 drop-down front panel provides access to the ON/OFF switch and installation bays for two Up Converter modules, two Down Converter modules, or one of each.

All operator controls, indicators and displays are located on the LBC-4000-ST front panel.

External interface connectors, including those intended for Ethernet or Serial Remote M&C, are located on the LBC-4000-ST rear panel.

1.3.2 Dimensional Envelope

Dimensions are shown in inches and [millimeters].

1.3.2.1 LBC-4000 Dimensional Envelope

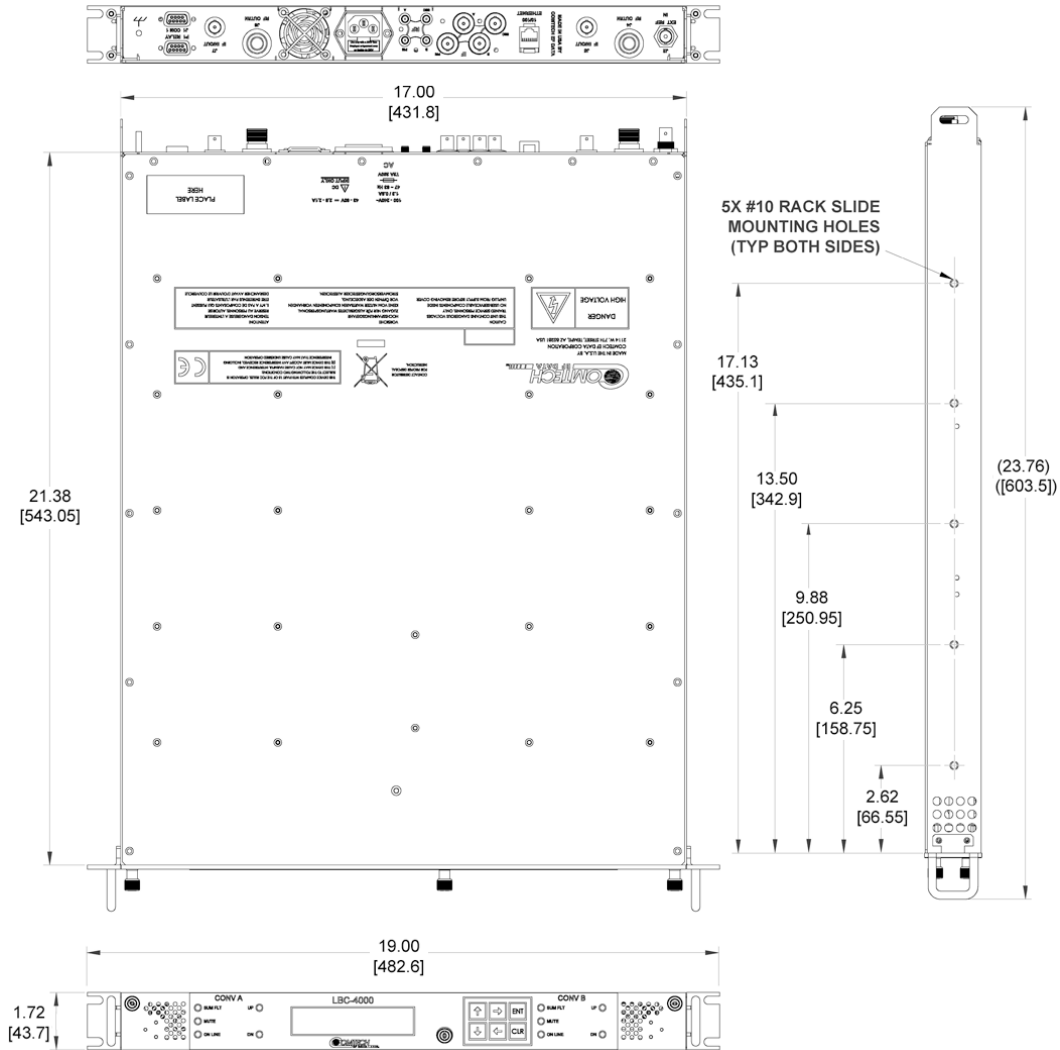


Figure 1-4. LBC-4000 Dimensional Envelope

1.3.2.2 LBC-4000-ST Dimensional Envelope

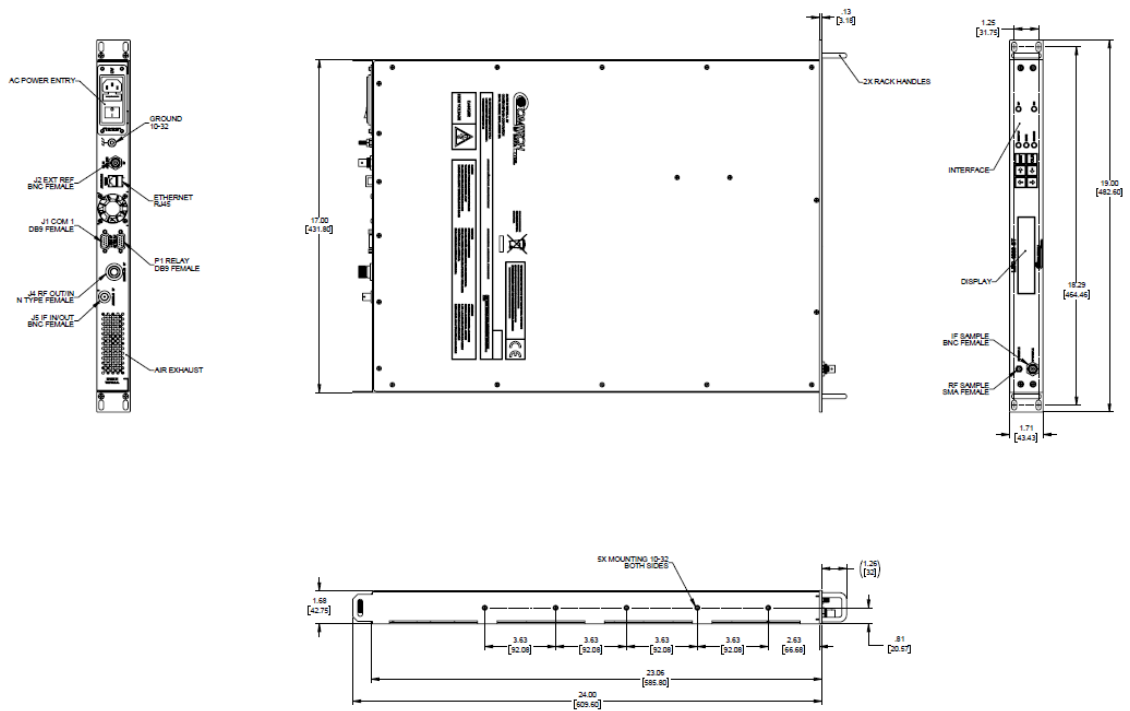


Figure 1-5. LBC-4000-ST Dimensional Envelope

1.3.3 Front Panel



Chapter 6. FRONT PANEL OPERATION

See **Chapter 6. FRONT PANEL OPERATION** for front panel figures and details.

1.3.4 Rear Panel



Chapter 4. CONNECTORS

See **Chapter 4. CONNECTORS** for rear panel figures and connector details.

Chapter 2. SPECIFICATIONS

2.1 Physical and Environmental Specifications

2.1.1 Regulatory Compliance

- “CE” as follows:
 - EN 50082-1 (EMC/Generic Immunity)
 - EN 55022 Class B (Emissions)
 - EN 55024 (Immunity)
 - EN 60950 (Safety)
- FCC Part 15 Subpart B
- RoHS-Compliant

2.1.2 Physical Specifications

LBC-4000:

- Dimensions: 1.75 (1 RU) H x 19.00 W x 22 D inches
(44.45 mm H x 482.6 mm W x 558.8 mm D)
- Weight: 25 lbs (11.34 kg) Maximum

LBC-4000-ST:

- Dimensions: 1.71 (1 RU) H x 19.00 W x 24 D inches
(43.43 mm H x 482.6 mm W x 609.6 mm D)
- Weight: 25 lbs (11.34 kg) Maximum

2.1.3 Temperature Range

- Operating: 32 to 122°F (0 to 50°C)
- Non-operating (Storage): -58 to 160°F (-50 to 71°C)

2.1.4 Humidity (Non-condensing)

- Operating: 0 to 95% Relative maximum
- Non-operating (Storage): 99% maximum

2.1.5 Operational Altitude

10,000 ft above Mean Sea Level (MSL)

2.1.6 Shock

Normal commercial shipping and handling

2.1.7 Front Panel Features

2.1.7.1 LED Monitoring

LCB-4000: Two sets of five Status LEDs – ‘CONV A’ and ‘CONV B’.

LCB-4000-ST: One set of five Status LEDs – ‘CONV A’.

- Sum Fault Red
- Mute Amber
- Online Green
- Up Green
- Down Green

2.1.7.2 Vacuum Fluorescent Display (VFD)

Two lines, 24 characters per line.

2.1.7.3 Keypad

Six Keys: [←] (LEFT), [→] (RIGHT), [↑] (UP), [↓] (DOWN), [ENT] (ENTER), [CLR] (CLEAR)

2.1.7.4 Power Switch

LCB-4000: Located behind the drop-down front panel.

LCB-4000-ST: Located on the rear panel.

2.1.7.5 Modular Design

LBC-4000: Two IDU Module bays ('CONV A' and 'CONV B') are located behind the drop-down front panel.

LBC-4000-ST: One internal 'CONV A' IDU Module bay.

2.1.7.5.1 L-Band Up Converter IDU Module

Input Frequency	Standard: 70 MHz \pm 18 MHz Optional: 140 MHz \pm 36 MHz	
Output Frequency	950 MHz to 2000 MHz, 1 kHz steps Optional: 950 to 2150 MHz, 1 kHz steps	
Input/Output Impedance	50 Ω	
Input Return Loss	18 dB minimum	
Output Return Loss	15 dB minimum	
Input connector	BNC female	
Output connector	Type 'N' female	
Gain	25 dB \pm 1 dB nominal at minimum attenuation	
Ripple	\pm 5 dB over any \pm 18 MHz for standard 70 MHz IF units \pm 5 dB over any \pm 36 MHz for optional 140 MHz IF units	
Slope	0.05 dB/MHz	
User Attenuation Range	0 to 50 dB, in 0.25 dB steps (Standard) or 0.1 dB steps (Optional)	
Input Power Level	Up to \pm 10 dBm maximum	
Output Power, P1dB	+10 dBm minimum	
Third Order Intercept	+20 dBm minimum	
Carrier Spurious	-60 dBc	
Non-Carrier Spurious	-75 dBm	
Transmit Phase Noise	Exceeds MIL-STD-188-164A	
Stability	Over Time	\pm 1 X 10 ⁻⁹ /Day
	Over Temp	\pm 1 x 10 ⁻⁸ 32 to 122°F (0 to 50°C)

2.1.7.5.2 L-Band Down Converter IDU Module

Input Frequency Range	950 MHz to 2000 MHz, 1 kHz steps Optional: 950 to 2150 MHz, 1 kHz steps	
Output Frequency	Standard: 70 MHz \pm 18 MHz Optional: 140 MHz \pm 36 MHz	
Input/Output Impedance	50 Ω	
Input Return Loss	15 dB minimum	
Output Return Loss	20 dB minimum	
Input connector	Type 'N' female	
Output connector	BNC female	
Gain	35 dB nominal at minimum attenuation	
Ripple	\pm .5 dB over any \pm 18 MHz for 70 MHz IF units \pm .5 dB over any \pm 36 MHz for 140 MHz IF units	
Slope	0.05 dB/MHz	
User Attenuation Range	Standard: 0 to 40 dB, in 0.25 dB steps Optional: 0.1 dB steps	
Output Power, P1dB	+13 dBm minimum	
Third Order Intercept	+23 dBm minimum	
Carrier Spurious	-60 dBc	
Non-Carrier Spurious	-60 dBm	
Stability	Over Time	\pm 1 X 10 ⁻⁹ /Day
	Over Temp	\pm 1 x 10 ⁻⁸ 32 to 122°F (0 to 50°C)

2.1.8 Rear Panel Features

2.1.8.1 External Reference Connector

(1X) Type BNC female 'J2| EXT REF IN' connector, used to supply a 5 or 10 MHz (auto-detect) @ ± 5 dBm master reference input (50 Ω impedance) to the entire chassis.

2.1.8.2 RF Connectors Access

Standard (part of Up or Down Converter IDU Module):

- (1X) 'J4 | RF OUT/IN' Type 'N' female connector provided for either the 'CONV B' L-Band output signal interface (with the Down Converter IDU installed) or the L-Band input signal interface (with the Up Converter IDU installed).
- (1X) 'J6 | RF OUT/IN' Type 'N' female connector provided for either the 'CONV A' L-Band output signal interface (with the Down Converter IDU installed) or the L-Band input signal interface (with the Up Converter IDU installed).

Optional:

- (2X) Type 'SMA' female 'RF Primary A / Secondary B' connector pairs (4X total) provide the RF "baseball" switch for optional redundant operations.
-

2.1.8.3 IF Connectors Access

Standard (part of Up or Down Converter IDU Module):

- (1X) 'J5 | IF IN/OUT' BNC female connector serves as either the 'CONV B' downconverted IF input signal (with the Down Converter IDU installed), or the upconverted IF output signal (with the Up Converter IDU installed).
- (1X) 'J7 | IF IN/OUT' BNC female connector serves as either the 'CONV A' downconverted IF input signal (with the Down Converter IDU installed), or the upconverted IF output signal (with the Up Converter IDU installed).

Optional:

- (2X) BNC female 'IF Primary A / Secondary B' connector pairs (4X total) provide the IF "baseball" switch for optional redundant operations.
-

2.1.8.4 Ethernet Connector

(1X) 100BaseTX RJ-45 female '10/100 Ethernet' Management Utility Port for operation of the Ethernet remote control interfaces (SNMP, Telnet, HTTP).

2.1.8.5 Serial Connectors

- **Summary Alarm:** (1X) DB-9F (D-Subminiature) 'P1 | Relay' Utility Connector to access the Form C Alarms (relay closures).
- **Serial Remote Control Interface:** (1X) DB-9F (D-Subminiature) 'J1 | COM1' EIA-232/EIA-485 (2-Wire/4-Wire) connector.

2.1.8.6 Chassis Power and Grounding

2.1.8.6.1 Power Supply Input

STANDARD AC:

- Two 100 W power supplies with diode "OR-ed" outputs provide the system supply voltages of +12 VDC and +5 VDC.
- 90 to 260 VAC, 47 to 63 Hz frequency, nominal system power consumption of 35 W total dissipation (two up/down converter IDU modules).
- An IEC-60320 Type C13 (female) three-prong plug power cord for 90 to 125 VAC or 205 to 240 VAC power sources is provided with the converter. This detachable power cord mates with the AC Prime Power Module IEC-60320 Type C14 male connector on the rear of the converter chassis.

OPTIONAL DC:

- The DC Filter Input Module input voltage is 48 VDC nominal, -36 VDC minimum, -72 VDC maximum.

2.1.8.6.2 Grounding

A #10-32 stud provides a common chassis ground connection among equipment.

Chapter 3. INSTALLATION AND STARTUP

3.1 Unpack and Inspect the Shipment



CAUTION

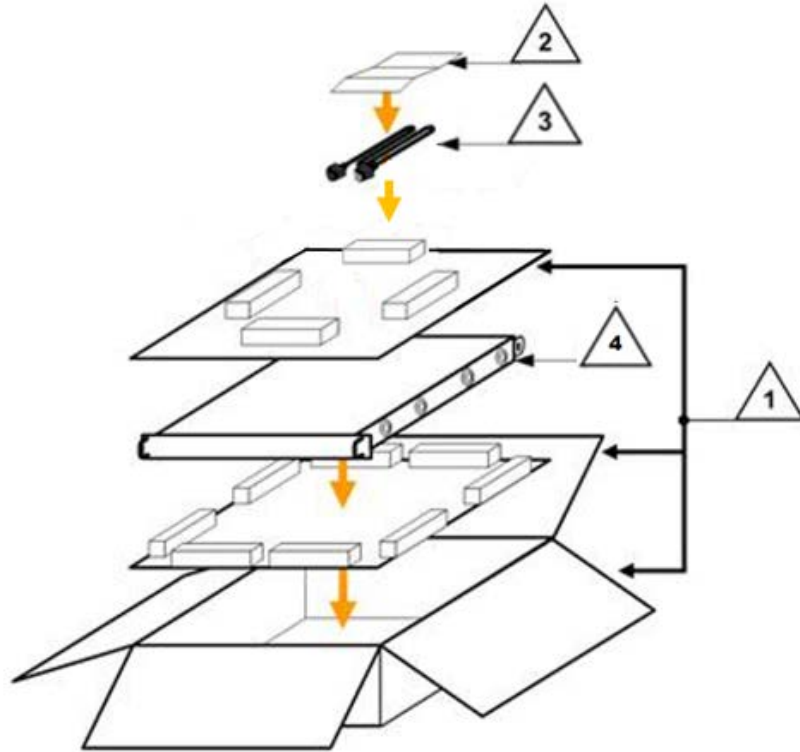
This equipment contains parts and assemblies sensitive to damage by Electrostatic Discharge (ESD). Use ESD precautionary procedures when handling the equipment.



Inspect the shipment. Do these steps:

- 1. Keep all shipping materials.*
- 2. Check the packing list to make sure the shipment is complete.*
- 3. Inspect the equipment for damage. If damage exists, immediately contact the carrier and CEFD to submit a damage report.*
- 4. Read the manual.*

The LBC-4000/-ST and its power cord are packaged and shipped in a reusable cardboard carton containing protective foam spacing (Figure 3-1). The Installation and Operation Manual can be found on the CEFD website, www.comtechedata.com under the Download Manuals tab.



Item	Description
1	Reusable cardboard carton and protective foam spacing
2	Packing Slip
3	Power Cord
4	LBC-4000/ST Modem

Figure 3-1. LBC-4000/ST Package Content

3.2 Rack Enclosure Installation



CAUTION

CORRECT GROUNDING PROTECTION IS REQUIRED – Connect the ground stud, located on the rear panel of the unit, to a power system that has separate ground, line and neutral conductors. Do not operate the unit without a direct connection to ground.

The rack must be connected to a suitable earthing connection at all times. You must connect the rack ground bar to a suitable earthing demarcation point.

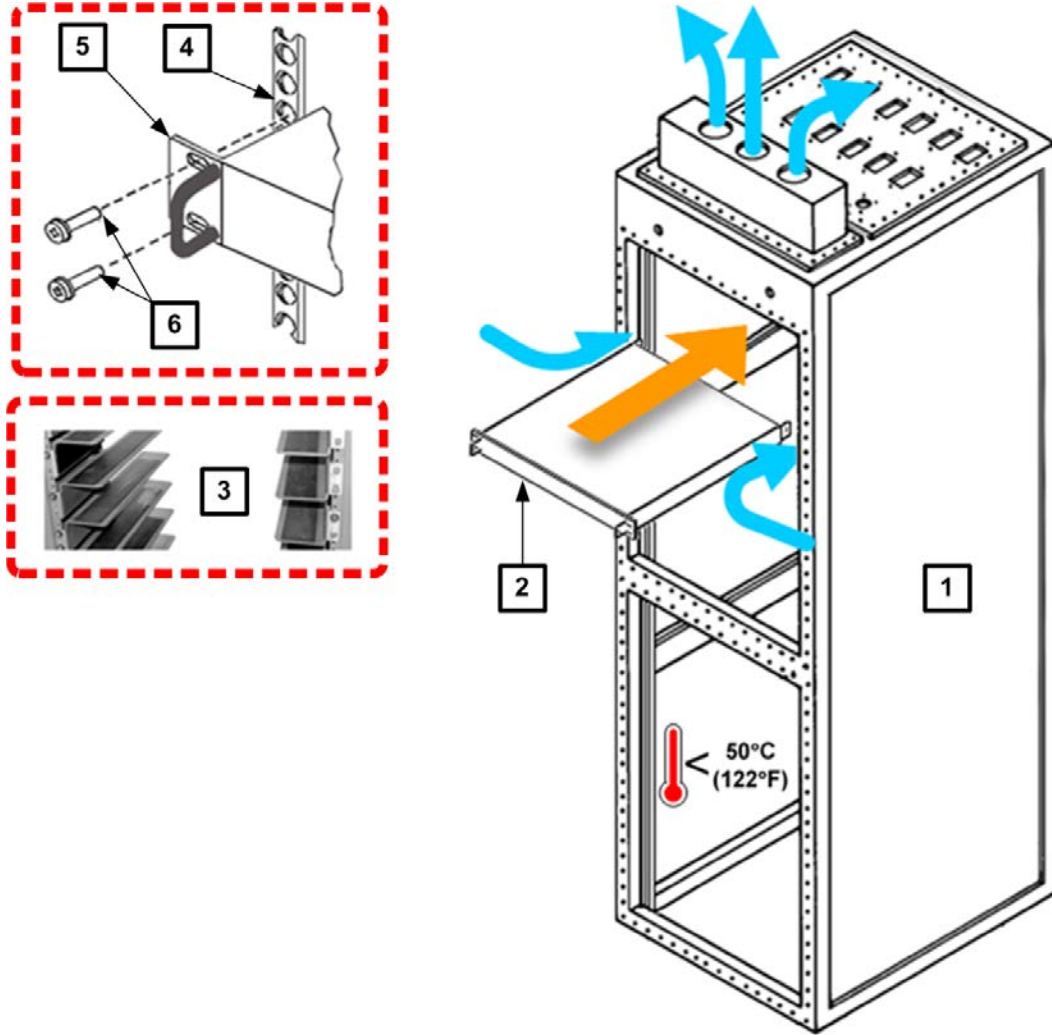
CORRECT AIR VENTILATION IS REQUIRED – Air flow must not be impeded. Make sure there is proper air ventilation. Do not block the top of the rack or the presence of a rack blower. The air temperature inside the rack must never exceed 50°C (122°F).

If there is any doubt, contact Comtech EF Data Product Support during normal business hours.

Install the unit in its assigned position in a rack enclosure (Figure 3-2). You must install the rack in a location with a controlled environment. Failure to obey this requirement can cause damage to the equipment, and denial of subsequent warranty claims. You may use:

- A standard rack-mounted shelf
- User-supplied screws to secure the front panel to the rack enclosure threaded front mounting rails
- CEFD's optional KT/6228-2 (4") or KT/6228-3 (10") Rear Support Brackets Kit (Figure 3-3).
- CEFD's optional 22" (FP/SL0007), 24" (FP/SL0008) or 26" (FP/SL0006) Side-Mounting Rack Slide Set (Figure 3-4).

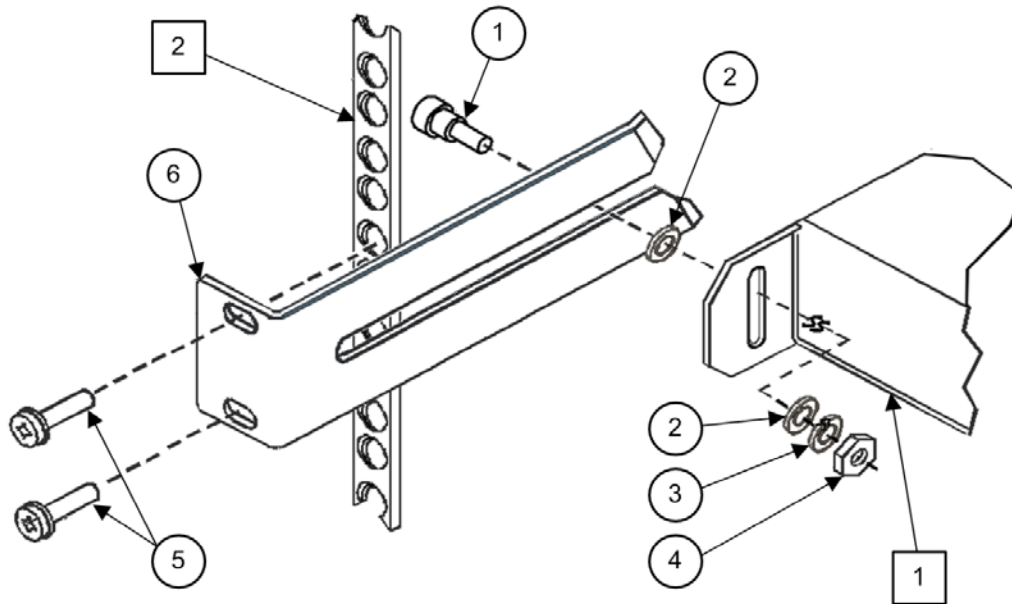
For information about custom rack enclosures, contact CEFD Product Support.



Feature	Description
1	Custom Rack Enclosure
2	LBC-4000/-ST chassis
3	Standard Rack Shelving
4	Rack Enclosure Threaded Front Rail (typical)
5	Unit Front Panel
6	User-supplied Screws

Figure 3-2. Rack Enclosure Installation

3.2.1 Rear Support Brackets Kit (Optional)



Feature	Description
1	Back of unit
2	Rack Enclosure Threaded Rear Mounting Rail (typical)

Item	Kit / Quantity		CEFD P/N	Description
	KT/6228-2	KT/6228-3		
1	2	2	HW/10-32SHLDR	Shoulder Screw, #10
2	4	4	HW/10-32FLT	Flat Washer, #10
3	2	2	HW/10-32SPLIT	Lock Washer, #10
4	2	2	HW/10-32HEXNUT	Hex Nut, #10
5	4	4	HW/10-32x1/2RK	Bolt, #10, Rear Support Bracket
6	2	-	FP/6138-2	Bracket, Rear Support (4")
	-	2	FP/6138-3	Bracket, Rear Support (10")

Figure 3-3. Install the Optional Rear-Mounting Support Brackets Kit



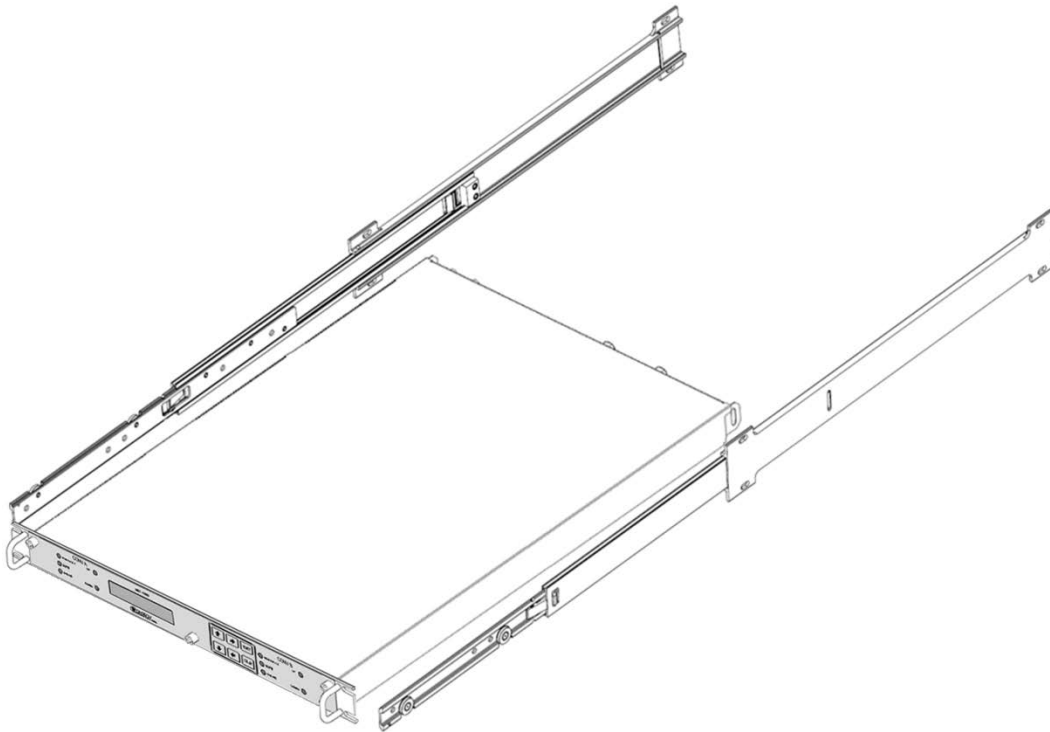
Tools needed to install the optional KT/6228-2 (4") or KT/6228-3 (10") Brackets Kit:

- A medium Phillips™ screwdriver
- A 5/32-inch SAE Allen™ Wrench
- An adjustable Crescent™ wrench.

Do these steps to install the brackets kit (Figure 3-3):

1. Use the #10 flat washers, #10 split washers, and #10 hex nut to secure the #10 shoulder screws to the unit chassis through the rear right and left side mounting slots as shown.
2. Mount the Rear Support Brackets to the rack enclosure threaded rear mounting rails using the #10 Rear Support Bracket Bolts.
3. Slide the unit into the front of the rack enclosure. Make sure that the #10 Shoulder Screws properly engage into the slots of the Rear Support Brackets.

3.2.2 Install the Optional Rack Slide Set



CEFD Part Number	Description
FP/SL0007	Bearingless Rack Slide Set – 22"
FP/SL0008	Bearingless Rack Slide Set – 24"
FP/SL0006	Bearingless Rack Slide Set – 26"

Figure 3-4. Optional Rack Slide Set Installation

If the converter is to be mounted on slides, install the provided bearingless rack slide set into the rack cabinet, and onto the sides of the LBC-4000/-ST. Use the hardware provided with the slide set that is determined to be appropriate for installation.

Do these steps to install the slide set (Figure 3-4):

1. Use the provided hardware to install one slide onto each side of the unit chassis.
2. Use the provided hardware to install the slide rail components into each interior side of the equipment rack cabinet.
3. Install the unit into the front of the equipment rack. Ensure that the slides properly engage the cabinet-mounted slide rails.
4. Continue to slide the unit into the equipment rack to its final operating position. Then, use four user-provided screws to secure the unit to the equipment rack's right and left threaded front rails (through the front panel slots).

3.3 Connect External Cables



Chapter 4. REAR PANEL CONNECTIONS

Proceed to connect all external cables to the connectors outlined in the next chapter (**Chapter 4. REAR PANEL CONNECTIONS**). Should difficulties occur, call CEFD Product Support for assistance.

3.4 Connect Prime Power

An IEC-60320 Type C13 (female) three-prong plug power cord for 90-125VAC or 205-240VAC power sources is provided with the converter. This detachable power cord mates with the AC Prime Power Module IEC-60320 Type C14 male connector on the rear of the converter chassis.

3.5 Converter IDU Modules Management



Appendix A. UP/DOWN CONVERTER IDU MODULE REMOVAL/ RE-INSTALLATION

The LBC-4000 comes preassembled as ordered for the specific customer application. In the event removal or replacement of the Up or Down Converter IDU Modules is required, complete instructions are provided in **Appendix A. UP/DOWN CONVERTER IDU MODULE REMOVAL/RE-INSTALLATION**.

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Chapter 4. REAR PANEL CONNECTORS

4.1 Overview – Cabling Connection Types

CEFD's LBC-4000/-ST L-Band Up/Down Converter System uses a number of different cables. Each cable type is typically dedicated to a specific mode of operation.

- *Not all of these operational interface types may be available.*
- *The European EMC Directive (EN55022, EN50082-1) requires using properly shielded cables for DATA I/O. These cables must be double-shielded from end-to-end, ensuring a continuous ground shield.*

4.1.1 Coaxial Cable Connections



(TOP) Bayonet Coupling Plug and Jack ('BNC' Shown)
(BOTTOM) Threaded Coupling Plug and Jack (Type 'N' Shown)
Figure 4-1. Coaxial Connector Examples

The types of coaxial cables used by CEFD are 'BNC', 'TNC', 'N', 'F', and 'SMA'. Coaxial cables (plugs) and their mating connectors (jacks/sockets) are available in two coupling styles – Bayonet or Threaded:

Bayonet Coupling Style – The jack has a pair of guideposts that accommodate the plug's lockdown slots. This lockdown design provides secure assembly without over-tightening the connection.

Threaded Coupling Style – The jack features external threads. The plug shell features internal threads, and has either a knurled outer surface to permit hand-tightening of the connection, or hex flats to accommodate torqued installation.

Connection Instructions

Bayonet Coupling Connections – Use the plug slots to guide, and then slide the plug onto the jack posts. Then, turn the plug clockwise until the jack posts are fully seated within the plug slot.

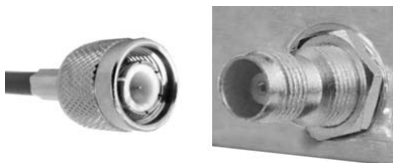
Threaded Coupling Connections – Engage the plug onto the jack threads, and then turn the plug clockwise until it is fully threaded onto the jack. Do not over-tighten the connection.

4.1.1.1 'BNC'



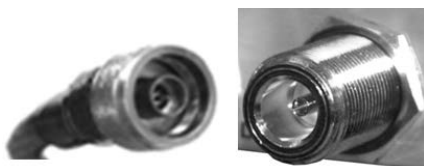
BNC plugs and jacks feature a Bayonet Coupling design.

4.1.1.2 'TNC'



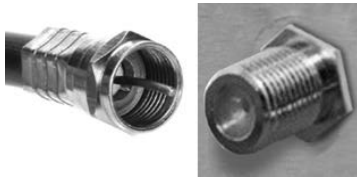
TNC plugs and jacks feature a Threaded Coupling design similar to Type 'N', Type 'F' and Type 'SMA' connectors.

4.1.1.3 Type 'N'



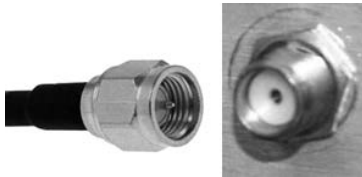
Type 'N' connectors feature a Threaded Coupling design similar to Type 'TNC', Type 'F', and Type 'SMA' connectors.

4.1.1.4 Type 'F'



Type 'F' connectors feature a Threaded Coupling design similar to Type 'TNC', Type 'N', and Type 'SMA' connectors.

4.1.1.5 Type 'SMA'

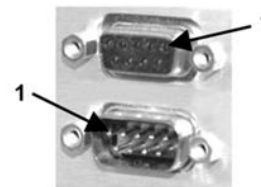


Type 'SMA' connectors feature a Threaded Coupling design similar to Type 'TNC', Type 'N', and Type 'F' connectors.

4.1.2 D-Subminiature Cable Connections



**Type 'D' Cable with Jack Screws
(Female Shown)**



**Type 'D' Chassis Receptacles
with Jack Nuts:
(TOP) Female
(BOTTOM) Male**

Figure 4-2. D-Subminiature Connector Examples

D-Subminiature connectors are also called Type 'D' or 'D-Sub' connectors. The cable plug and chassis receptacle each feature a D-shaped profile that interlock to ensure proper pin orientation and connector seating. The connector pair features multiple rows of pins (male side) coupled to mating sockets (female side).

Whether the gender is male or female, the cable plug features two jack screws for secure connection to the jack nuts provided on the mating chassis receptacle.

Connection Instructions

Orient the plug to the receptacle in the proper position. Press firmly into place. Hand tighten, or use a standard flat-blade screwdriver, to secure the plug jack screws to the receptacle jack nuts. Do not over-tighten.

About Connector Pinout Tables

Figure 4-2 identifies the Pin 1 location for either gender connector.

4.1.3 RJ-45, RJ-48 Cable Connections

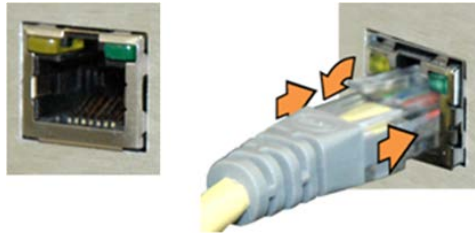


Figure 4-3. RJ-45/RJ-48 Connector Example

The plug for an RJ-45 or RJ-48 cable features a flexible tab. The RJ-45 or RJ-48 receptacle features a mating slot. This design configuration ensures a secure installation.

Connection Instructions

As shown in Figure 4-3, press down the tab on the cable plug and then insert the plug into the receptacle. The connection is complete when the tab 'clicks' into position inside the receptacle.

4.2 Unit Connectors



Appendix B. REDUNDANCY OPERATION

4.2.1 LBC-4000 Rear Unit Connectors

External cables are attached to connectors provided on the rear panel of the unit (Figure 4-5).



The LBC-4000 chassis, as initially released, does not provide a '10/100 ETHERNET' 100BaseTX RJ-45 port (Figure 4-6). Ethernet interface operation is not available on these legacy products.

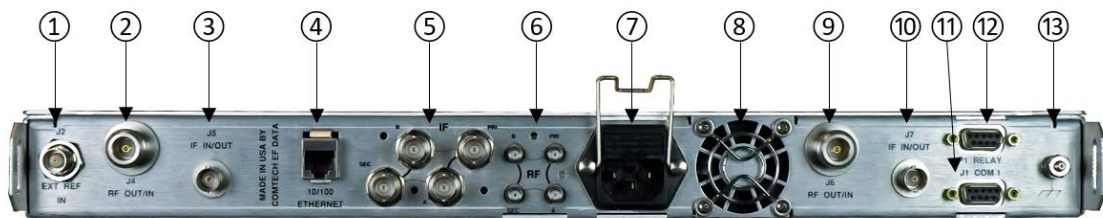


Figure 4-4. LBC-4000 Rear Panel View (Optional Redundant Chassis)

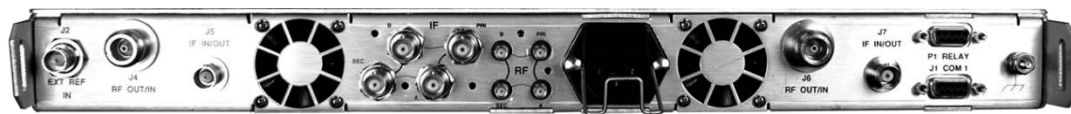


Figure 4-5. LBC-4000 Rear Panel – OBSOLETE

Item	Name	Description
1	'J2 EXT REF IN' Utility Connector	Use this female BNC connector to supply a master reference to the entire chassis. The user-supplied input signal is used for phase-locking the internal 10 MHz reference oscillator to a user-provided 5 or 10 MHz station clock.
2	'J4 RF OUT/IN' (part of IDU Up / Down Converter Module)	Use this Type 'N' female connector as either the 'CONV B' L-Band output signal interface (with the Down Converter IDU installed) or the L-Band input signal interface (with the Up Converter IDU installed).
3	'J5 IF IN/OUT' (part of IDU Up / Down Converter Module)	Use this BNC female connector as either the 'CONV B' downconverted IF input signal (with the Down Converter IDU installed), or the upconverted IF output signal (with the Up Converter IDU installed).

Item	Name	Description																						
4	'10/100 ETHERNET' Management Utility Port	<p>Use this 100BaseTX Ethernet RJ-45 port for operation of the Ethernet remote control interfaces. It is also used for updating the modem firmware. This receptacle uses a CAT5 Ethernet cable for connection to an Ethernet hub, router, switch, PC, etc.</p> <p style="text-align: center;">10/100 Ethernet M&C Interface Connector Pinout</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pin #</th> <th>Description</th> <th>Direction</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Tx+</td> <td>Out</td> </tr> <tr> <td>2</td> <td>Tx-</td> <td>Out</td> </tr> <tr> <td>3</td> <td>Rx+</td> <td>In</td> </tr> <tr> <td>4</td> <td>N/A</td> <td>--</td> </tr> <tr> <td>5</td> <td>N/A</td> <td>--</td> </tr> <tr> <td>6</td> <td>Rx-</td> <td>In</td> </tr> </tbody> </table>	Pin #	Description	Direction	1	Tx+	Out	2	Tx-	Out	3	Rx+	In	4	N/A	--	5	N/A	--	6	Rx-	In	
Pin #	Description	Direction																						
1	Tx+	Out																						
2	Tx-	Out																						
3	Rx+	In																						
4	N/A	--																						
5	N/A	--																						
6	Rx-	In																						
5	Optional IF Connector Group	These BNC female 'IF Primary A / Secondary B' connector pairs provide the IF "baseball" switch for optional redundancy operations.																						
6	Optional RF Connector Group	These Type 'SMA' female 'RF Primary A / Secondary B' connector pairs provide the RF "baseball" switch for optional redundancy operations.																						
7	Power Connection (part of Power Supply module)	<p>Use this Prime Power receptacle for connection to 90 to 125 VAC, or 205 to 240 VAC power sources.</p> <p>The standard AC (Alternating Current) unit features an IEC-60320 Type C14 three-prong male connector for use with the provided IEC-60320 Type C13 (female) receptacle power cord for connection to 90 to 125 VAC, or 205 to 240 VAC power sources.</p> <p>The optional DC (Direct Current) Filter Input Module input voltage is 48 VDC nominal, -36 VDC minimum, -72 VDC maximum.</p>																						
8	Internal Fan	Allows airflow to the internal fan.																						
9	'J6 RF OUT/IN' (part of IDU Up / Down Converter Module)	Use this Type 'N' female connector as either the 'CONV A' L-Band output signal interface (with the Down Converter IDU installed) or the L-Band input signal interface (with the Up Converter IDU installed).																						
10	'J7 IF IN/OUT' (part of IDU Up / Down Converter Module)	Use this BNC female connector as either the 'CONV A' downconverted IF input signal (with the Down Converter IDU installed), or the upconverted IF output signal (with the Up Converter IDU installed).																						
11	'P1 RELAY' Utility Connector	<p>Use this DB-9F connector to access the Form C Alarms (relay closures).</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Pin #</th> <th>Description</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Summary Fault #1 NC</td> <td rowspan="9"> <ol style="list-style-type: none"> 1. Pin 1 to Pin 6: Fault #1 2. Pin 2 to Pin 6: OK (No Fault) #1 3. Pin 3 to Pin 8: Fault #2 4. Pin 4 to Pin 8: OK (No Fault) #2 5. Pin 7 to Pin 5: Forced External Fault (typically used with external group delay equalizers) </td> </tr> <tr> <td>2</td> <td>Summary Fault #1 NO</td> </tr> <tr> <td>3</td> <td>Summary Fault #2 NC</td> </tr> <tr> <td>4</td> <td>Summary Fault #2 NO</td> </tr> <tr> <td>5</td> <td>Ground</td> </tr> <tr> <td>6</td> <td>Summary Fault #1 COM</td> </tr> <tr> <td>7</td> <td>EXT_FLT_IN#</td> </tr> <tr> <td>8</td> <td>Summary Fault #2 COM</td> </tr> <tr> <td>9</td> <td>-</td> </tr> </tbody> </table>	Pin #	Description	Notes	1	Summary Fault #1 NC	<ol style="list-style-type: none"> 1. Pin 1 to Pin 6: Fault #1 2. Pin 2 to Pin 6: OK (No Fault) #1 3. Pin 3 to Pin 8: Fault #2 4. Pin 4 to Pin 8: OK (No Fault) #2 5. Pin 7 to Pin 5: Forced External Fault (typically used with external group delay equalizers) 	2	Summary Fault #1 NO	3	Summary Fault #2 NC	4	Summary Fault #2 NO	5	Ground	6	Summary Fault #1 COM	7	EXT_FLT_IN#	8	Summary Fault #2 COM	9	-
Pin #	Description	Notes																						
1	Summary Fault #1 NC	<ol style="list-style-type: none"> 1. Pin 1 to Pin 6: Fault #1 2. Pin 2 to Pin 6: OK (No Fault) #1 3. Pin 3 to Pin 8: Fault #2 4. Pin 4 to Pin 8: OK (No Fault) #2 5. Pin 7 to Pin 5: Forced External Fault (typically used with external group delay equalizers) 																						
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5	Ground																							
6	Summary Fault #1 COM																							
7	EXT_FLT_IN#																							
8	Summary Fault #2 COM																							
9	-																							
12	'J1 COM1' Serial Management Utility Connector	<p>Use this DB-9F EIA-485/232 connector for operation of the Serial remote-control interface. The mating connector is a DB-9M connector.</p> <p>See Table 4-1 for the EIA-485 2-wire pinout specification, Table 4-2 for the EIA-485 4-wire pinout, and Table 4-3 for the EIA-232C pinout.</p>																						


Item	Name	Description
13	Unit Ground Lug	 <p>CAUTION PROPER GROUNDING PROTECTION IS REQUIRED. You must connect the equipment to the protective earth connection at all times. Use this ground stud during installation, configuration, and operation.</p> <p>Use this #10-32 stud as the command chassis ground.</p>

Table 4-1. 'J1 | COM1' 2-Wire EIA-485 Pinout

Pin #	Description
1	GND; Ground
2	-
3	-
4	+Rx/Tx; Signal
5	-Rx/Tx; Signal Complement
6	-
7	-
8	+Rx/Tx; Signal
9	-Rx/Tx; Signal Complement

Table 4-2. 'J1 | COM1' 4-Wire EIA-485 Pinout

Pin #	Description
1	GND; Ground
2	-
3	-
4	+Tx; Signal
5	-Tx; Signal Complement
6	-
7	-
8	+Rx; Signal
9	-Rx; Signal Complement

Table 4-3. 'J1 | COM1' EIA-232C Pinout

Pin #	Description
1	-
2	TD; Transmit Data
3	RD; Receive Data
4	-
5	GND; Ground
6	-
7	-
8	-
9	-

4.2.2 LBC-4000-ST Rear Unit Connectors

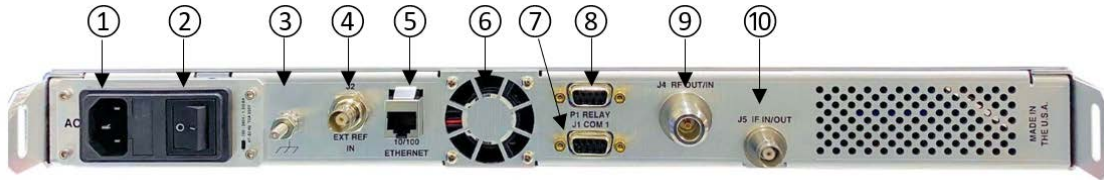



Figure 4-6. LBC-4000-ST Rear Panel

Item	Name	Description																					
1	Power Connection (part of Power Supply module)	Use this Prime Power receptacle for connection to 90 to 125 VAC, or 205 to 240 VAC power sources. The standard AC (Alternating Current) unit features an IEC-60320 Type C14 three-prong male connector for use with the provided IEC-60320 Type C13 (female) receptacle power cord for connection to 90 to 125 VAC, or 205 to 240 VAC power sources. The optional DC (Direct Current) Filter Input Module input voltage is 48 VDC nominal, -36 VDC minimum, -72 VDC maximum.																					
2	ON/OFF Switch	This switch turns power OFF/ON to the unit.																					
3	Unit Ground Lug	 CAUTION PROPER GROUNDING PROTECTION IS REQUIRED. You must connect the equipment to the protective earth connection at all times. Use this ground stud during installation, configuration, and operation. Use this #10-32 stud as the command chassis ground																					
4	'J2 EXT REF IN' Utility Connector	Use this female BNC connector to supply a master reference to the entire chassis. The user-supplied input signal is used for phase-locking the internal 10MHz reference oscillator to a user-provided 5 or 10 MHz station clock.																					
5	'10/100 ETHERNET' Management Utility Port	Use this 100BaseTX Ethernet RJ-45 port for operation of the Ethernet remote control interfaces. It is also used for updating the modem firmware. This receptacle uses a CAT5 Ethernet cable for connection to an Ethernet hub, router, switch, PC, etc. 10/100 Ethernet M&C Interface Connector Pinout <table border="1" data-bbox="699 1402 1409 1625"> <thead> <tr> <th>Pin #</th> <th>Description</th> <th>Direction</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Tx+</td> <td>Out</td> </tr> <tr> <td>2</td> <td>Tx-</td> <td>Out</td> </tr> <tr> <td>3</td> <td>Rx+</td> <td>In</td> </tr> <tr> <td>4</td> <td>N/A</td> <td>--</td> </tr> <tr> <td>5</td> <td>N/A</td> <td>--</td> </tr> <tr> <td>6</td> <td>Rx-</td> <td>In</td> </tr> </tbody> </table>	Pin #	Description	Direction	1	Tx+	Out	2	Tx-	Out	3	Rx+	In	4	N/A	--	5	N/A	--	6	Rx-	In
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6	Internal Fan	Allows airflow to the internal fan.																					

Item	Name	Description																														
7	'P1 RELAY' Utility Connector	<p>Use this DB-9F connector to access the Form C Alarms (relay closures).</p> <table border="1"> <thead> <tr> <th>Pin #</th> <th>Description</th> <th>Notes</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Summary Fault #1 NC</td> <td>1. Pin 1 to Pin 6: Fault #1</td> </tr> <tr> <td>2</td> <td>Summary Fault #1 NO</td> <td>2. Pin 2 to Pin 6: OK (No Fault) #1</td> </tr> <tr> <td>3</td> <td>Summary Fault #2 NC</td> <td>3. Pin 3 to Pin 8: Fault #2</td> </tr> <tr> <td>4</td> <td>Summary Fault #2 NO</td> <td>4. Pin 4 to Pin 8: OK (No Fault) #2</td> </tr> <tr> <td>5</td> <td>Ground</td> <td>5. Pin 7 to Pin 5: Forced External Fault (typically used with external group delay equalizers)</td> </tr> <tr> <td>6</td> <td>Summary Fault #1 COM</td> <td></td> </tr> <tr> <td>7</td> <td>EXT_FLT_IN#</td> <td></td> </tr> <tr> <td>8</td> <td>Summary Fault #2 COM</td> <td></td> </tr> <tr> <td>9</td> <td>-</td> <td></td> </tr> </tbody> </table>	Pin #	Description	Notes	1	Summary Fault #1 NC	1. Pin 1 to Pin 6: Fault #1	2	Summary Fault #1 NO	2. Pin 2 to Pin 6: OK (No Fault) #1	3	Summary Fault #2 NC	3. Pin 3 to Pin 8: Fault #2	4	Summary Fault #2 NO	4. Pin 4 to Pin 8: OK (No Fault) #2	5	Ground	5. Pin 7 to Pin 5: Forced External Fault (typically used with external group delay equalizers)	6	Summary Fault #1 COM		7	EXT_FLT_IN#		8	Summary Fault #2 COM		9	-	
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8	'J1 COM1' Serial Management Utility Connector	<p>Use this DB-9F EIA-485/232 connector for operation of the Serial remote-control interface. The mating connector is a DB-9M connector. See Table 4-1 for the EIA-485 2-wire pinout specification, Table 4-2 for the EIA-485 4-wire pinout, and Table 4-3 for the EIA-232C pinout.</p>																														
9	'J4 RF OUT/IN' (part of IDU Up / Down Converter Module)	<p>Use this Type 'N' female connector as either the 'CONV B' L-Band output signal interface (with the Down Converter IDU installed) or the L-Band input signal interface (with the Up Converter IDU installed).</p>																														
10	'J5 IF IN/OUT' (part of IDU Up / Down Converter Module)	<p>Use this BNC female connector as either the 'CONV A' downconverted IF input signal (with the Down Converter IDU installed), or the upconverted IF output signal (with the Up Converter IDU installed).</p>																														

4.2.3 Power and Ground Connections

4.2.3.1 Power Interface Module – Standard AC Unit

A detachable power cord, provided with the LBC-4000/ST, mates with the AC (Alternating Current) Prime Power receptacle (Item 7, Figure 4-5 and Item 1, Figure 4-7) for connection to 90-125 VAC or 205-240 VAC power sources.

4.2.3.2 AC Operation Prime Power Connection

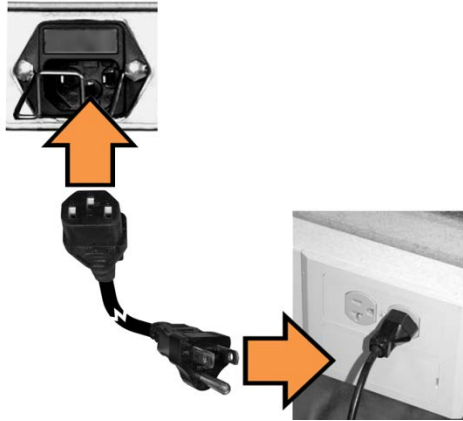


Figure 4-7. AC Power

Do these steps to apply AC power to the unit (Figure 4-8):

1. Plug the provided AC power cord female end into the unit.
2. Plug the AC power cord male end into the user-supplied power source.
3. Switch the unit ON if so equipped (see Sect. 4.2.3.6). Otherwise, the unit energizes upon plug-in to the AC power source.

4.2.3.3 LBC-4000 Optional -48 VDC Filter Input Module

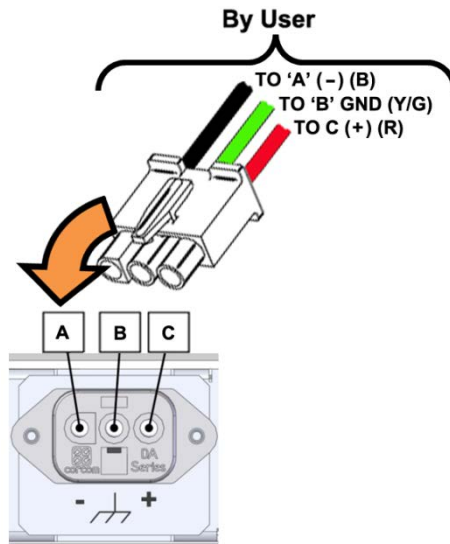


Figure 4-8. LBC-4000 Optional -48 VDC Filter Input Module with User-Supplied Power Harness

Note the following:

- The DC (Direct Current) Filter Input Module input voltage is -48 VDC nominal, -36 VDC minimum, -72 VDC maximum.
- Power Module Manufacturer: TE Connectivity P/N 6DAF1 (CEFD P/N 506-0015-002).
- Mating Connector (by User): Molex 03-12-1036.

Table 4-4. DC Input Filter Module Pinouts

Pin #	Signal Name	Wire Colors	Wiring Options	
A	Negative	Black	-48 VDC	0 VDC
B	Ground	Green/Yellow	Earth Ground	Earth Ground
C	Positive	Red	0 VDC	+48 VDC

4.2.3.4 LBC-4000 Optional DC Operation Prime Power Connection



WARNING!
DISCONNECT THE DC POWER SUPPLY BEFORE PROCEEDING!

To apply DC power to the LBC-4000, do these steps:

1. Plug the user-supplied DC power harness connector into the DC Input Filter Module. *Number 18 AWG minimum wires are recommended.*
2. Connect the user-supplied DC power harness leads to the user-supplied DC Power source.
3. Switch the unit ON if so equipped (see Sect. 4.2.3.6). Otherwise, the unit energizes upon connection to the DC power source.

4.2.3.5 Chassis Ground Interface



PROPER GROUNDING PROTECTION IS REQUIRED. You must connect the equipment to the protective earth connection at all times. Use this ground stud during installation, configuration, and operation.



The AC power interface provides the safety ground.



Figure 4-9. Chassis Ground Interface

Use the #10-32 stud (Item 13, Figure 4-5 and Item 3, Figure 4-7) for connecting a common chassis ground among equipment.

4.2.3.6 LBC-4000 ON/OFF Power Switch

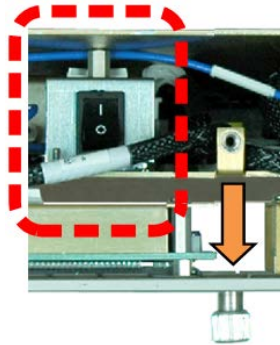


Figure 4-10. LBC-4000 ON/OFF Power Switch

For units as equipped, an ON/OFF power switch is mounted behind the front panel. To access the switch, loosen the three front panel thumb screws, slide the front panel out from the chassis, and then drop down the panel.

Prior to turning on power to the unit, check to ensure that installation is complete, and verify that the LBC-4000 is connected to the proper prime power source, RF Input, and RF Output.

Turn the switch ON and verify the cooling fan is operational, the LED indicators illuminate as expected, and the VDF is readable.

Chapter 5. FIRMWARE UPDATE

5.1 Firmware Overview



Make sure to operate the LBC-4000/-ST with its latest available firmware.

The LBC-4000/-ST L-Band Up/Down Converter System is factory-shipped with its latest version of operating firmware. If you need to update the firmware, you can apply the update to the unit without having to remove it from operation. You may directly acquire the download from CEFD's web site (www.comtechedata.com), or receive the archive file by e-mail from CEFD Product Support.

5.1.1 Firmware Update Procedure Summary

1. Download the firmware update archive file to a user-supplied personal computer (PC). The PC must be Microsoft Windows® compatible.
2. Connect a user-supplied Ethernet cable from the User PC to the '**10/100 ETHERNET**' 100BaseTX RJ-45 port.
3. Connect a user-supplied serial cable from the User PC to the '**J1 | COM1**' DB-9F port.
4. Extract the firmware update files from the archive download file. You may then use CEFD's "CReflash" utility. Otherwise, you must use the units Management IP Address to connect the FTP client to an FTP server, and then FTP-transfer the files from the User PC to the LBC-4000/-ST.

5.1.2 About Firmware Numbers, File Versions, and Formats

The CEFD website site catalogues its firmware update archive files by product type (e.g., router, modem, etc.), the specific model, and optional hardware configurations. The LBC-4000/-ST files are provided under "Home | Support | Software Downloads | Flash & Software Update Files | Converters | LBC-4000/-ST."

The firmware download hyperlink for the Ethernet-ready (current) production unit is F0020503x_V####.

The firmware download hyperlink for the original non-Ethernet unit is F9965x_V####.

Note that 'x' is the firmware revision letter, and '####' represents the firmware version number (e.g., V125 = Version 1.2.5).

CEFD 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). CEFD does not provide this utility program.

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

5.2 Prepare for the Firmware Download

5.2.1 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).

5.2.2 Terminal Emulator Program Configuration



Read your terminal emulator program user guide or HELP feature for operating and configuration instructions.

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

5.2.3 Front Panel Used for Management IP Address and Firmware Information

1. Apply power to the unit. Typical for either the standard AC unit or the optional DC unit, switch the power ON.
2. Use the front panel to identify your default Management IP Address. You will not be able to access the HTTP Interface without this information. See Section 5.2.3.1.
3. Get the firmware information using one these methods:
 - To use the front panel, see Section 5.2.3.1.
 - To use the HTTP (Web Server) Interface, see Section 0.
 - To use the serial remote control, see Section 5.2.3.3.

5.2.3.1 Front Panel Used for Management IP Address and Firmware Status



Chapter 6. FRONT PANEL OPERATION

Using the unit front panel:

View the factory-assigned Management IP Address within the **CONFIG → REMOTE → ETHERNET → ADDRESS** menu branch:

```
IP Address/Range :  
XXX.XXX.XXX.XXX/YY
```

View the current Firmware M&C version at the top-level menu of the front panel display (press the **[CLEAR]** key several times):

```
LBC-4000  
VER X.X.X SN:#####
```

```
LBC-4000-ST  
VER X.X.X SN:#####
```

View the detailed firmware information within the **UTILITY → FIRMWARE → INFO → IMAGE#1** or **IMAGE#2 → BULK** menu branches:

```
Image#X: BLK APP FPGA
```

```
Bulk#X: FW-0020503  
X.X.X. MM/DD/YY
```

5.2.3.2 HTTP Interface Used for Firmware Information



Chapter 7. ETHERNET INTERFACE OPERATION

Do these steps:

1. Go to either 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:

```

Firmware Information
Boot:
FW-0020506;1.1.1;06/07/11
Bulk1:
FW-0020503;1.2.5 ;04/17/13
FW-0020504;1.1.5 ;04/17/13
FW-0020505;1.1.2b;03/01/13
Bulk2:
FW-0020503;1.2.5 ;04/17/13
FW-0020504;1.1.5 ;04/17/13
FW-0020505;1.1.2b;03/01/13
    
```

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

Summary

PARAMETER	STATUS	PARAMETER	STATUS
Circuit Identification :	[FIRST-LINE]CRAWL-TEXT-[SECOND-LINE]CRAWL-TEXT-	Summary Fault :	OK
Serial Number :	00000001	External Reference :	N/A
Model Number :	LBC-4000	Reference Tuning (Vdc) :	5.2 V
FW Revision :	1.2.5	Number Unread Faults :	063
Active Software Image :	Bulk 1	Date (mm/dd/yy) :	11/13/14
Next Reboot Image :	Bulk 1	Time (hh:mm:ss) :	20:26:26
Redundancy :	ON		

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

5.2.3.3 Serial Interface Used for Firmware Information



Chapter 8. SERIAL INTERFACE OPERATION

Use your terminal emulator program to execute remote queries with the LBC-4000/-ST. Use the “FRM” or “FRW” remote query to find the pertinent firmware information:

- **<DEV/FRM_{cr}**
(returns the current (Ethernet-ready) firmwares running under Boot, Bulk1, and Bulk2 in the form FW-AAAAAAA; B.B.B; DD/MM/YY, where:
 - FW-AAAAAAA = the firmware part number
 - B.B.B = the firmware version number
 - MM/DD/YY = the firmware release date (Month/Day/Year)
- **<DEV/FRW_{cr}**
(returns the legacy (Serial operation only) firmwares in the form:
 - BULK=FW/9965X (where X is the Revision Letter)
 - M&C=FW/9966X (where X is the Revision Letter)
 - FPGA=FW/9967X (where X is the Revision Letter)

5.2.4 Temporary Folder (Subdirectory) on the User PC

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

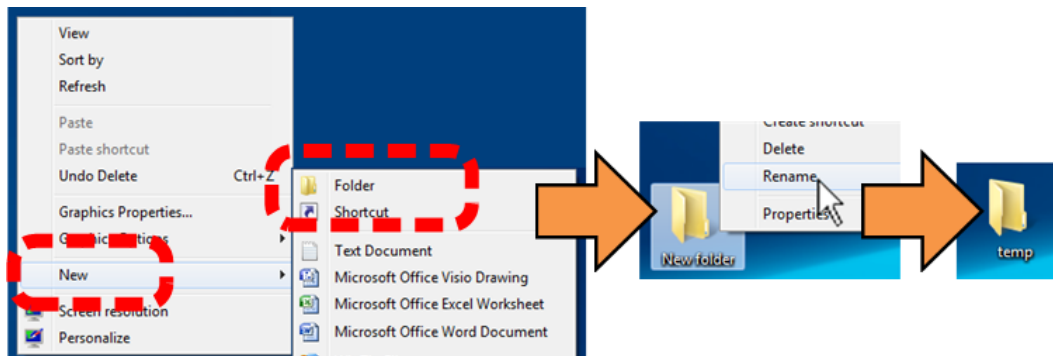
- To use the Windows Desktop, see Section 5.2.4.1.
- To use Windows Explorer, see Section 0.
- To use the Run and Browse windows, see Section 5.2.4.3.
- To use Windows Command-line or the Command Prompt, see Section 5.2.4.4.



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 the temporary folder is created, proceed to Section 5.3 to download and extract the firmware files.

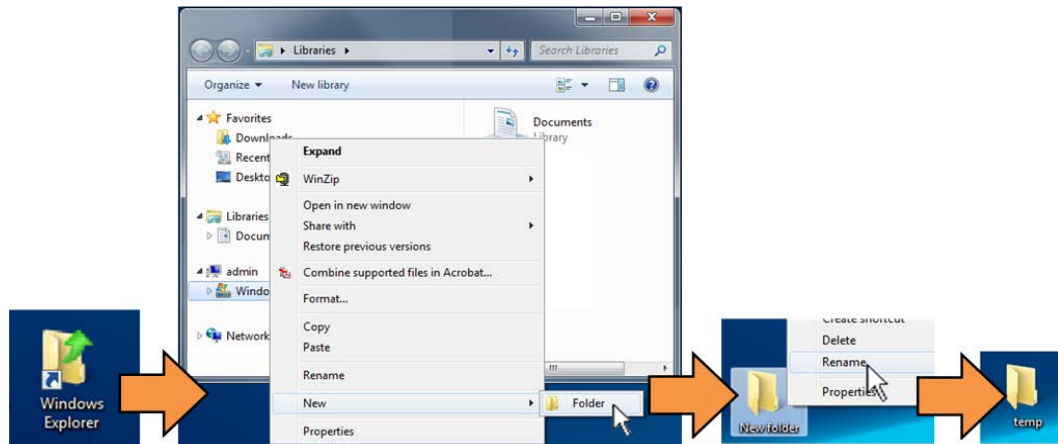
5.2.4.1 Windows Desktop Folder Creation



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.

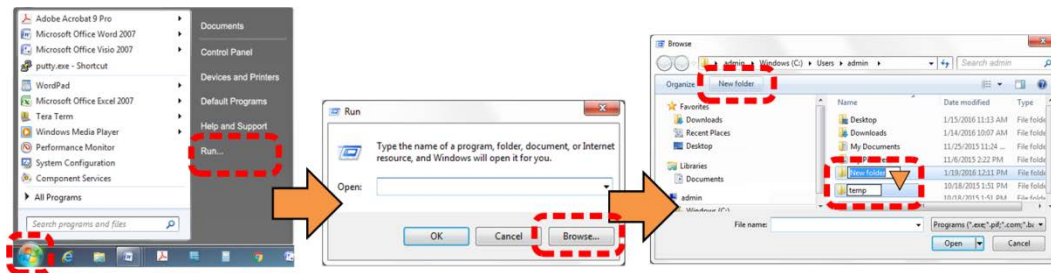
5.2.4.2 Windows Explorer Folder Creation



Do these steps:

1. Left-double-click the Windows Explorer icon on the Windows Desktop.
2. Depending in your Windows Operating System (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.

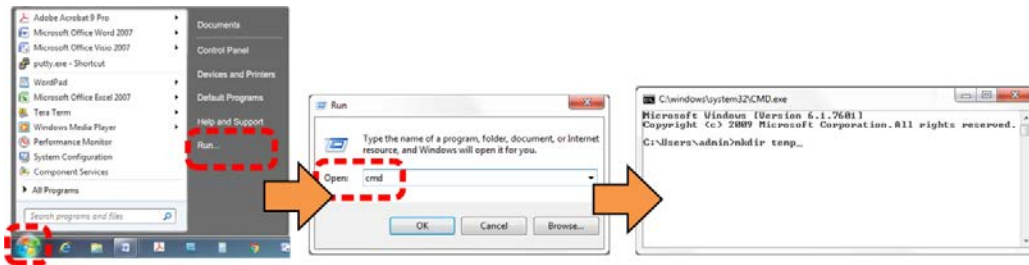
5.2.4.3 Run and Browse Windows Folder Creation



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

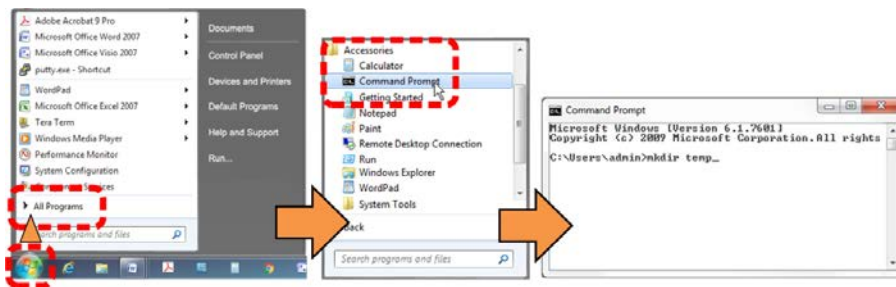
1. Click **Run...** to open the **Run** window.
2. Click **Browse...** to open the **Browse** window.
3. Click **New Folder**. This can be an icon or a text label, depending on the Windows OS version.
4. Right-click the **New Folder** folder name, and then **Rename** this folder to “temp” or some other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

5.2.4.4 Windows Command-line or Command Prompt Folder Creation



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**:



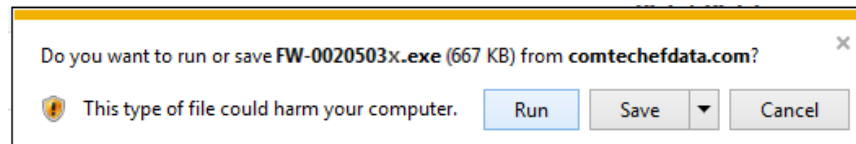
3. From the `c:\>` prompt, type either “mkdir temp” or “md temp” (both “mkdir” and “md” mean “make directory”), and then press **Enter**.

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

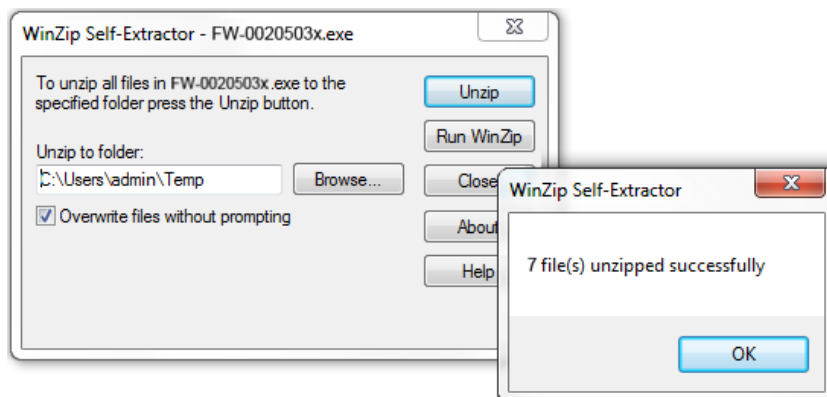
5.3 Download and Extract Firmware Update Files

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**) **Converters** hyperlink.
5. On the **Converters** product page – Select the **LBC-4000** or LBC-4000-ST 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:

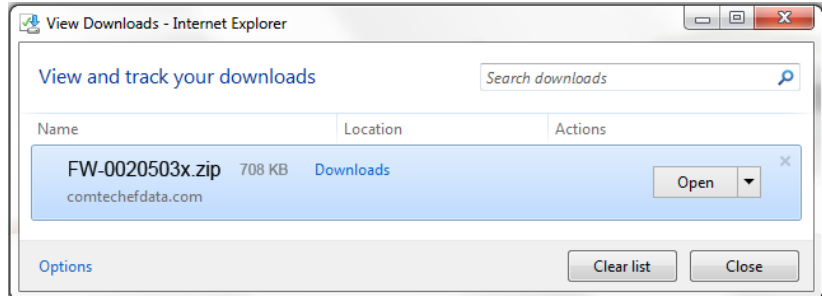


- Click **[Run]** to open the self-extractor dialogue window. Use **[Browse]** to select your destination folder. Click **[Unzip]** to extract the files. Your results display as per this example – click **[OK]** to close. Your files are now available for transfer to the LBC-4000.



- 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.

The FW-0020503x.exe download has completed. Run Open folder View downloads ×



- 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):
- FW-0020503x_LBC4000_Ethernet_#.#.#.bin – The Firmware Bulk image file
 - LBC-4000/-STReleaseNotes_v#-#-#.pdf – The Firmware Release Notes PDF file
 - CReflash.exe –The Firmware Update Utility program



'x' is the firmware revision letter, and '#-#-#' is the firmware version (e.g., FW Ver. 1.2.5)

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 5.3.1.1.
 - To use Windows Command-line or Command Prompt, see Section 5.3.1.2.

After you confirm the firmware files are in the folder, proceed to Section 5.4 to upload the firmware update to the LBC-4000/-ST.

5.3.1.1 Windows Desktop Used 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.

5.3.1.2 Windows Command-line Used to View Folder Contents

From 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.

5.4 Firmware Files Upload and Unit Update

5.4.1 Important Considerations

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

- You connect the LBC-4000/-ST ‘**10/100 ETHERNET**’ 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 LBC-4000/-ST Telnet or serial interfaces.
- You have noted your LBC-4000/-ST Management IP Address.
- Your PC is running a compatible Web browser for operation of the LBC-4000/-ST HTTP Interface.
- You download or otherwise have CEFD’s latest firmware files and the “CReflash” utility available on the User PC in an accessible temporary folder.

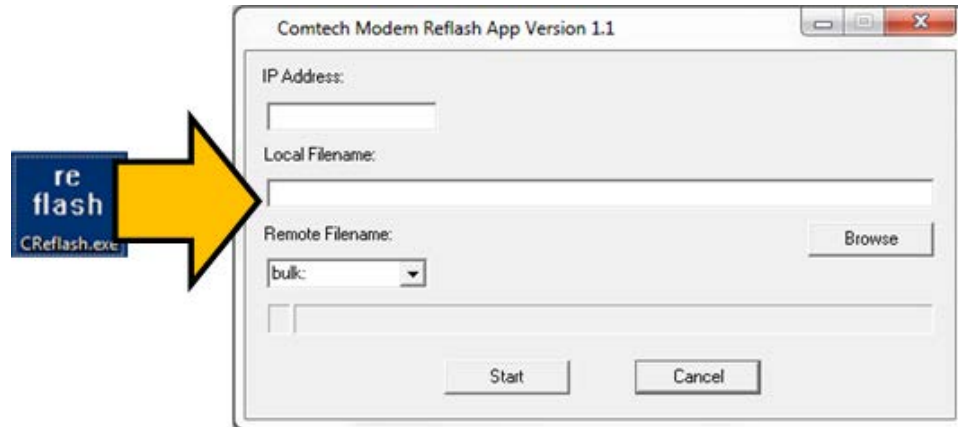
5.4.2 “CReflash” Used to Upload the Firmware Files



1. *The “CReflash” utility is provided with the firmware download.*
2. *Serial-only (i.e., non-Ethernet) units must use this procedure.*

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.
 - 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.

5.4.3 FTP Upload for 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 LBC-4000/-ST as instructed in Section 5.2.3.1.
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 LBC-4000/-ST 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, type
 - f. “put FW-0020503x_LBC4000_Ethernet_#_#_#.bin bulk:” or
“put FW-0020503x_LBC4000-ST_Ethernet_#_#_#.bin bulk:”



The destination “bulk:” must be all lower-case.

4. Press **Enter**. The unit reports the update progress (e.g., first “Programming App Flash ... Please wait.” and then “Programming main FPGA ... Please wait.”)
 - a. Wait for the file transfer to end.
 - b. Type “bye” to close the File Transfer Protocol (FTP) session.
 - c. Close the Windows Command-line window.
5. To verify that the PC-to-unit FTP file transfer was successful, find the current firmware information via the front panel or the HTTP or Serial Interface (see Sections 5.2.3.1, 0, or 5.2.3.3).

5.4.4 Steps to Complete the Firmware Update Procedure



- **Chapter 6. FRONT PANEL OPERATION**
- **Chapter 7. ETHERNET INTERFACE OPERATION**

Use the LBC-4000/-ST front panel or the HTTP Interface to select the new firmware image. You must then reboot the unit for the update to take effect.

5.4.4.1 Select the Boot Image

5.4.4.1.1 Front Panel Used to Select the Boot Image

Do these steps from the LBC-4000/-ST front panel:

1. Go to the UTILITY → FIRMWARE → SELECT menu branch.

```
Current Active Image: #2
```

```
Next Reboot Image: #1 #2
```

2. On the bottom line, use the ◀ ▶ arrow keys to change to the other image.

```
Remote Mode: press ENTER
```

```
For local mode, or CLEAR
```



You must be in LOCAL MODE to perform this task. If you are not in Local Mode (via the CONFIG → REMOTE menu branch), the unit will prompt you to take an action before continuing:

3. Cycle power to hard-reboot the unit.

5.4.4.1.2 Use the HTTP Interface to Select the Boot Image

Do these steps from the HTTP Interface 'Config | Utility' page:

1. Use the 'Next Reboot Image' drop-down list to select Image 1 or 2 as the preferred Current Active Firmware Image:

```
Current Active Firmware Image : 1
```

```
Next Reboot Image: 1 Submit
```

2. Click **[Submit]**.
3. Hard-reboot or soft-reboot the unit.

5.4.4.2 Reboot the Unit

5.4.4.2.1 Hard-reboot the Unit from the Rear Panel

Typical for either the standard AC unit or the optional DC unit:

1. From the unit rear panel, switch the power OFF, and then turn the power back ON.
2. Verify the new firmware version has booted; for example, check the firmware version displayed on the LBC-4000/-ST front panel:

```
LBC-4000
```

```
VER X.X.X SN:#####
```

```
LBC-4000-ST
```

```
VER X.X.X SN:#####
```

5.4.4.2.2 Soft-reboot the Unit from the HTTP Interface

Do these steps from the HTTP Interface 'Config | Utility' page:

1. In the 'Perform Soft Reboot' section, click [Reboot Now]:



2. Wait while the LBC-4000 reboots with the Current Active Firmware Image.
3. To load a second image, repeat the tasks described throughout Section 5.4.4.

The LBC-4000/-ST is now operating with its latest firmware. The firmware update process is complete.

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Chapter 6. FRONT PANEL OPERATION

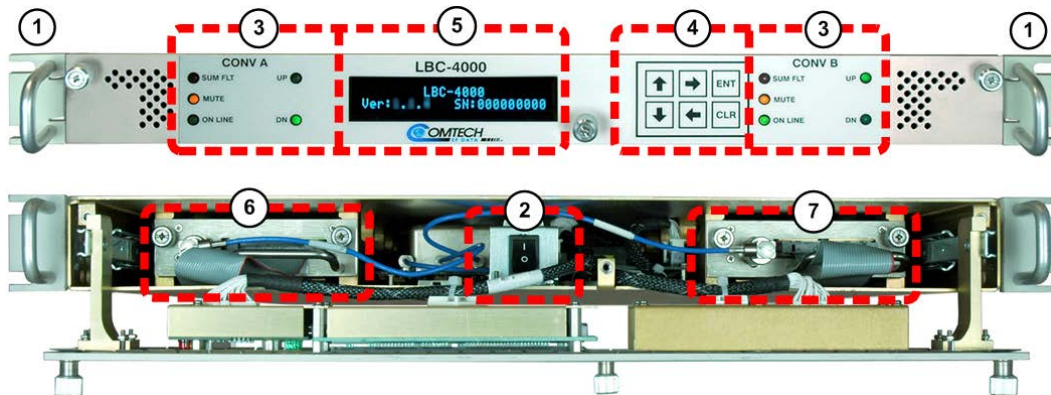
6.1 Front Panel Overview

You may fully control and monitor the LBC-4000/-ST L-Band Up/Down Converter System from the front panel.

6.2 LBC-4000 Front Panel



Appendix A. UP/DOWN CONVERTER IDU MODULE REMOVAL / RE-INSTALLATION



(TOP) Operating Position
(BOTTOM) Service Position
Figure 6-1. LBC-4000 Front Panel

Item	Name	Description
1	Rack Handles	Used to easily remove and replace the chassis into the user-provided rack enclosure.
2	Power Switch	Used to turn power ON/OFF the unit. For units as equipped, a prime power switch is mounted behind the front panel. To access the switch, loosen the three front panel thumb screws, slide the front panel out from the chassis, and then drop down the panel. Before turning on power to the unit, check to make sure that installation is complete, and verify that the LBC-4000 is connected to the proper prime power source, RF Input, and RF Output. Turn the switch ON and verify the cooling fan is operational, the LED indicators illuminate as expected, and the VFD is readable.
3	Light Emitting Diode (LED) Indicators	The operational state of the LBC-4000 is represented by two sets of five front panel Light-Emitting Diode (LED) indicators – one set each for 'CONV A' and 'CONV B'. Each set of LEDs convey operational states as follows: Sum Fault: Lights RED when a fault condition has been logged and stored. Mute: Lights AMBER when the unit is in Mute Mode. Online: Lights GREEN when the unit is online and carrying traffic. Up: Lights GREEN when the module is operating as an Up Converter. Down: Lights GREEN when the module is operating as a Down Converter.
4	Vacuum Fluorescent Display (VFD)	An active display showing two lines of 24 characters each. It produces a blue light with adjustable brightness. Nested menus display all available options and prompt you to carry out a required action.
5	Keypad	Comprised of six keyswitches behind a flat membrane. The keys have a positive 'click' action that provides tactile feedback. Enter data via the keypad. Data, prompts, and messages are displayed on the VFD.
6	CONV A IDU Module Bay	Each bay accepts one Up Converter or Down Converter IDU Module.
7	CONV B IDU Module Bay	Each bay accepts one Up Converter or Down Converter IDU Module.

6.2.1 LBC-4000-ST Front Panel

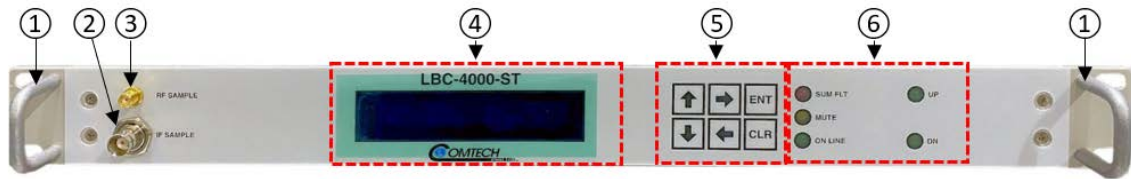


Figure 6-2. LBC-4000-ST Front Panel

Item	Name	Description
1	Rack Handles	Used to easily remove and replace the chassis into the user-provided rack enclosure.
2	IF Sample Connector	Provides a sample (nominally 20 dBc down) of the signals present.
3	RF Sample Connector	Provides a sample (nominally 20 dBc down) of the signals present.
4	Vacuum Fluorescent Display (VDF)	An active display showing two lines of 24 characters each. It produces a blue light with adjustable brightness. Nested menus display all available options and prompt you to carry out a required action.
3	Light Emitting Diode (LED) Indicators	The operational state of the LBC-4000 is represented by two sets of five front panel Light-Emitting Diode (LED) indicators – one set each for 'CONV A' and 'CONV B'. Each set of LEDs convey operational states as follows: Sum Fault: Lights RED when a fault condition has been logged and stored. Mute: Lights AMBER when the unit is in Mute Mode. Online: Lights GREEN when the unit is online and carrying traffic. Up: Lights GREEN when the module is operating as an Up Converter. Down: Lights GREEN when the module is operating as a Down Converter.
5	Keypad	Comprised of six keyswitches behind a flat membrane. The keys have a positive 'click' action that provides tactile feedback. Enter data via the keypad. Data, prompts, and messages are displayed on the VFD.
6	CONV A IDU Module Bay	Module bay accepts one Up Converter or Down Converter IDU Module.

6.2.2 Vacuum Fluorescent Display (VFD)

See Item 5, Figure 6-1 and Item 4, Figure 6-2.

The VFD is an active display showing two lines of 24 characters each. It produces a blue light with adjustable brightness.

```
LBC-4000
VER #.#.# SN:012345678
```

```
LBC-4000-ST
VER #.#.# SN:012345678
```

On most menu screens, you will see a flashing, solid-block cursor that blinks at a once-per-second rate. This indicates the currently selected item, digit, or field:

```
CONFIG MONITOR FAULTS
UTILITY
```

Where this solid block cursor obscures the item under edit (e.g., a numeric field), the cursor automatically changes to an underline cursor:

```
IP Address/Range:
 192.168.001.006/24
```

To prevent the display from becoming burnt by a constant image, the unit employs a screen saver feature that activates after a preset amount of time, or a default of one hour. This message constantly scrolls and wraps across the screen. The top line displays the AID (the user-defined name for the unit); the bottom line displays the message “**Press any key...**” as shown:

```
APPLICATION ID:-----
---Press any key...
```

Press any key to restore the previously active screen.

6.2.3 Keypad

See Item 4, Figure 6-1 and Item 5, Figure 6-2.

The keys for the current production unit keypad have a positive 'click' action that provides tactile feedback. Enter data via the keypad. Data, prompts, and messages are displayed on the VFD. Operation of the individual keys is as follows:

- Use the **[ENT]** (ENTER) key to select a displayed function or to execute a unit configuration change.
- Use the **[CLR]** (CLEAR) key to back out of a selection or to cancel a configuration change that has not been executed using **[ENT]**. Pressing **[CLR]** generally returns the display to the previous selection.
- Use the **[←]** (LEFT) and **[→]** (RIGHT) keys to move to the next selection or to move the cursor functions. At times, they may also be used to move from one section to another.
- Use the **[↑]** (UP) and **[↓]** (DOWN) keys to change configuration data (numbers). You may also use these keys to move from one section to another.



The keypad has an auto-repeat feature. If a key is held down for more than 1 second, the key action will repeat, automatically, at the rate of 15 keystrokes per second. This is particularly useful when editing numeric fields, with many digits, such as the IP Address assignments.

6.3 Front Panel Operation – Menu Matrix

Chapter Sect.	Menu Screen Description	Submenu Selections
6.3.1	Opening Screen	–
6.3.2	Select (Main) Menu	CONFIG; MONITOR; FAULTS; UTILITY
6.3.3	CONFIG (Configuration)	CONV-A; CONV-B; REMOTE; REDUND; REFADJ; SPECT-INV
6.3.3.1	(CONFIG:)CONV-A / CONV-B	FREQ/MUTE; ATTEN/SLOPE
6.3.3.1.1	(CONFIG:)CONV-X ¹ FREQ/MUTE	–
6.3.3.1.2	(CONFIG:)CONV-X ¹ ATTEN/SLOPE	–
6.3.3.2	(CONFIG:) REMOTE	Local; Serial; Ethernet
6.3.3.2.1	(REMOTE:) LOCAL	–
6.3.3.2.2	(REMOTE:) SERIAL	Serial Mode; Address; Baudrate
6.3.3.2.3	(REMOTE:) ETHERNET	ADDRESS; GATEWAY; SNMP
6.3.3.2.3.1	(REMOTE:) ETHERNET ¹ ADDRESS	–
6.3.3.2.3.2	(REMOTE:) ETHERNET ¹ GATEWAY	–
6.3.3.2.3.3	(REMOTE:) ETHERNET ¹ SNMP	COMMUNITIES; TRAPS
6.3.3.3	(CONFIG:) REDUND(ANCY)	MODE; STATE; FrcBkup
6.3.3.4	(CONFIG:) REFADJ	–
6.3.3.5	(CONFIG:) SPECT-INV	ConvA; ConvB
6.3.4	MONITOR	ConvA; ConvB; RefOsc; PS-A; PS-B
6.3.5	FAULTS	CURRENT; STORED
6.3.5.1	(FAULTS:) CURRENT	ConvA; ConvB; PS-A; PS-B; ExtRef
6.3.5.2	(FAULTS:) STORED	VIEW; CLEAR-ALL
6.3.5.2.1	(FAULTS:) STORED ¹ VIEW	–
6.3.5.2.2	(FAULTS:) STORED ¹ CLEAR-ALL	–
6.3.6	UTILITY	TIME; DISP; FIRMWARE; AID; LAMPTEST; RELAY; SCRSAVER
6.3.6.1	(UTILITY:) TIME	Time (HH:MM:SS); Date (MM/DD/YY)
6.3.6.2	(UTILITY:) DISP	25%/50%/75%/100%
6.3.6.3	(UTILITY:) FIRMWARE	INFO; SELECT
6.3.6.3.1	(FIRMWARE:) INFO	BOOTROM; IMAGE#1; IMAGE#2
6.3.6.3.1.1	(FIRMWARE:) INFO ¹ BOOTROM	–
6.3.6.3.1.2	(FIRMWARE:) INFO ¹ IMAGE#1/#2	BULK; APP; FPGA
6.3.6.3.2	(FIRMWARE:) SELECT	(IMAGE) #1/#2
6.3.6.4	(UTILITY:) AID	(Application ID Message)
6.3.6.5	(UTILITY:) LAMPTEST	No/Yes
6.3.6.6	(UTILITY:) RELAY	Normal/Invert
6.3.6.7	(UTILITY:) SCRSAVER	Theme; Time
6.3.6.7.1	(UTILITY:) SCRSAVER ¹ THEME	Classic; Zip-ped; Cycling; B-Board; S-Wiper
6.3.6.7.2	(UTILITY:) SCRSAVER ¹ TIME	OFF-999

6.3.1 Opening Screen

```
LBC-4000  
VER. #.#.# SN:012345678
```

```
LBC-4000-ST  
VER. #.#.# SN:012345678
```

The opening screen displays once power is applied to the unit. The top line identifies the unit model (e.g., LBC-4000/-ST). The bottom line displays the running Firmware Version (this number may vary) and the unit serial number.

Press **[ENT]** to display the Main Menu. Press **[CLR]** from any nested screen to alternate between this top-level screen and the user-defined AID screen.

6.3.2 Main Menu

```
CONFIG  MONITOR  FAULTS  
UTILITY
```

Use the **[←][→]** keys to move the cursor to the desired choice. Press **[ENT]**. The function of each menu branch is as follows:

- **CONFIG** (Configuration) Menu Branch – These screens provide selections for the full LBC-4000/-ST operations.
- **MONITOR** Menu Branch – These screens provide real-time monitoring of system voltages, unit temperature, IFLO tuning, and reference oscillator tuning.
- **FAULTS** Menu Branch – The converter displays up to 100 faults, date and time stamped and stored in memory as they occur.
- **UTILITY** Menu Branch – These screens permit you to configure such system functions as the Real-Time Clock, VFD brightness, unit AID, screen saver theme, and the firmware image loading preferences.

6.3.3 (SELECT:) CONFIG (Configuration) Menu Branch

LBC-4000:

```
CONV-A  CONV-B  REMOTE REDUND  REFADJ  
SPECT-INV
```

LBC-4000-ST:

```
CONV-A  REMOTE REDUND  REFADJ  SPECT-INV
```

Use the [←][→] keys to move the cursor to the desired choice. Press [ENT]. The function of each CONFIG submenu is as follows:

- **LBC-4000: CONV-A, CONV-B** Submenus – Displays the current configuration of the selected converter, including the frequency, attenuation, and slope.
LBC-4000-ST: CONV-A Submenu – Displays the current configuration of the selected converter, including the frequency, attenuation, and slope.
- **REMOTE** Submenu – The selections here allow you to select whether you control the unit locally or remotely, set the unit address, the interface type, and the operating parameters for that interface.
- **REDUND** Submenu – The selections here allow you to identify the redundancy state and mode (see **Appendix B. REDUNDANCY OPERATION** for detailed information about redundancy operations).
- **REFADJ** Submenu – This screen allows you to adjust the reference oscillator.
- **SPECT-INV** Submenu – The selections here allow you to set the Converter A and Converter B spectral inversion to INVERTED or NORMAL.

6.3.3.1 (CONFIG:) CONV-A or CONV-B (Converter Unit A or Unit B)

```
CONFIG CnvX: (IF=YYMHz)
FREQ/MUTE  ATTN/SLOPE
```

LBC-4000: Where ‘X’ is the selected converter – **CnvA** (Converter Unit A) or **CnvB** (Converter Unit B) – and ‘YYY’ indicates its operating frequency (**70** or **140 MHz**), use the [←][→] arrow keys to select **FREQ/MUTE** or **ATTEN/SLOPE**. Press [ENT].

LBC-4000-ST: Where ‘X’ is the selected converter – **CnvA** (Converter Unit A) and ‘YYY’ indicates its operating frequency (**70** or **140 MHz**), use the [←][→] arrow keys to select **FREQ/MUTE** or **ATTEN/SLOPE**. Press [ENT].

6.3.3.1.1 (CONFIG:) CnvA or CnvB → FREQ/MUTE

```
CONFIG CnvX:      CMM=ON
Frq=01980.000MHz Rx=ON
```

Select the CMM (Configuration Mute Mode): Use the [←][→] arrow keys on the top line to select CMM. Use the [↑][↓] arrow keys to select **ON** or **OFF**.

Set the operating frequency: Use the [←][→] arrow keys on the bottom line to select a digit to edit, and then use the [↑][↓] arrow keys to change its value. Repeat for all digits until you define the desired frequency.

Select the Tx/Rx mute status: Use the [←][→] arrow keys on the bottom line to select the parameter. Use the [↑][↓] arrow keys to select **ON** or **OFF**.



The displays reads ‘Tx’ when the installed module is an Up Converter, or ‘Rx’ when the installed module is a Down Converter.

Press [ENT].

6.3.3.1.2 CONFIG CnvA or CnvB → ATTEN/SLOPE

LBC-4000/-ST: For CnvA:

```
CONFIG CnvA: Ofst=+0.0dB  
Atten=00.00dB Slope=0.0
```

LBC-4000 only: For CnvB:

```
CONFIG CnvB:  
Atten=00.00dB Slope=0.0
```

Typical for either, use the [←][→] arrow keys to select **Atten** or **Slope**.

Set the attenuation: Use the [←][→] arrow keys to select a digit to edit, and then use the [↑][↓] arrow keys to change its value.

Set the slope value: Use the [↑][↓] arrow keys to select, in 0.1 increments, a value between 0.0 and 1.0.



For the CONFIG: Conv-A → ATTEN/SLOPE menu, the Ofst (Gain Offset) command is available only if redundancy is enabled. See Appendix B. REDUNDANCY OPERATION for further details on using this command in redundancy applications.

Press [ENT].

6.3.3.2 (CONFIG:) REMOTE (Remote Control) Submenu

```
Remote Control: Local  
SERIAL  ETHERNET
```

Use the [←][→] arrow keys to select **Local**, **SERIAL**, or **ETHERNET**. Press [ENT].

6.3.3.2.1 (REMOTE:) Local

```
Remote Mode: press ENT
for local mode, or CLR
```

Press [ENT] to switch to Local Mode to continue with your task, or press [CLR] to exit the task and remain in the active mode.



1. When you select Local mode, remote monitoring is possible, but remote control is disabled.
2. A number of operations are possible in Local mode only. If you are in Serial or Ethernet mode during such tasks, the unit alerts you to this remote state.

6.3.3.2.2 (REMOTE:) SERIAL

```
Serial Mode = RS-232
Addr=001 Baud=9600 8-N-1
```

On the top line, use the [↑][↓] arrow keys to set the mode to **RS-232** or **RS-485**.

On the bottom line, set the Serial address (**Addr**). Use the [←][→] arrow keys to select a digit, and then the [←][→] arrow keys to change its value. The valid range of addresses is from **001** (default) to **255**.

Next, set the **Baud** rate. Use the [←][→] arrow keys to select the parameter, and then the [↑][↓] arrow keys to select the desired baud rate of **1200**, **2400**, **4800**, **9600** (default), **19K2**, and **38K4**.

Finally, set the asynchronous character format. Use the [←][→] arrow keys to select the parameter, and then the [↑][↓] arrow keys to select the desired format (i.e., number of data bits; odd, even, or no parity; number of stop bits) as **8-N-1**, **7-E-2**, or **7-O-2**.

Press [ENT].

6.3.3.2.3 (REMOTE:) ETHERNET



The LBC-4000/-ST L-Band Up/Down Converter System, as initially released, does not feature a rear panel '10/100 ETHERNET' port. Only current production units offer Ethernet Interface operation. See Chapter 4. REAR PANEL CONNECTORS for more information.

```
ADDRESS GATEWAY SNMP
MAC = 00-06-B0-00-00-0F
```

On the top line, use the [←][→] arrow keys to select **ADDRESS**, **GATEWAY**, or **SNMP**. (The bottom line displays the *read-only* unit MAC address.) Press [ENT].

6.3.3.2.3.1 (REMOTE:) ETHERNET→ADDRESS

```
IP Address/Range:  
192.168.001.002/24
```

Edit the Management IP Address and Range for the rear panel '10/100 ETHERNET' port. Use the [←][→] arrow keys to select a digit, and then the [↑][↓] arrow keys to change its value. Press [ENT].

6.3.3.2.3.2 (REMOTE:) ETHERNET→GATEWAY

```
Ethernet IP Gateway:  
192.168.001.002
```

Edit the IP Gateway Address for the rear panel '10/100 ETHERNET' port. Use the [←][→] arrow keys to select a digit, and then the [↑][↓] arrow keys to change its value. Press [ENT].

6.3.3.2.3.3 (REMOTE:) ETHERNET→SNMP

```
COMMUNITIES TRAPS
```

Use the [←][→] arrow keys to select **COMMUNITIES** or **TRAPS**. Press [ENT].

(REMOTE:) ETHERNET→SNMP→COMMUNITIES

```
SNMP Communities:  
READ WRITE TRAP
```

Use the [←][→] arrow keys to select **READ**, **WRITE**, or **TRAP**. Press [ENT].

(REMOTE:) ETHERNET→SNMP→COMMUNITIES→READ

```
Read Community:  
public
```

View or edit the SNMP Read Community string. Use the [←][→] arrow keys to select a character, and then the [↑][↓] arrow keys to edit that character. Press [ENT].

(REMOTE:) ETHERNET→SNMP→COMMUNITIES→WRITE

```
Write Community:  
private
```

View or edit the SNMP Write Community string. Use the [←][→] arrow keys to select a character, and then the [↑][↓] arrow keys to edit that character. Press [ENT].

(REMOTE:) ETHERNET→SNMP→COMMUNITIES→TRAP

```
Trap Community:
comtech
```

View or edit the SNMP Trap Community string. Use the [←][→] arrow keys to select a character, and then the [↑][↓] arrow keys to edit that character. Press [ENT].

(REMOTE:) ETHERNET→SNMP→TRAPS

```
TRAPIP1 TRAPIP2 VERSION
```

Use the [←][→] arrow to select **TRAPIP1**, **TRAPIP2**, or **VERSION**. Press [ENT].

(REMOTE:) ETHERNET→SNMP→TRAPS→TRAPIP1/TRAPIP2



If both Trap IP Addresses are set to 000.000.000.000, it means that Traps are disabled.

```
TRAP IP ADDRESS #1:
000.000.000.000
```

```
TRAP IP ADDRESS #2:
000.000.000.000
```

Typical for both submenus: View or edit the Trap Destination IP Address. Use the [←][→] arrow keys to select a digit, and then the [↑][↓] arrow keys to change its value. Press [ENT].

(REMOTE:) ETHERNET→SNMP→TRAPS→VERSION

```
Trap Version:
SNMPv1  SNMPv2
```

Use the [↑][↓] arrow keys to set the trap version as **SNMPv1** or **SNMPv2**. Press [ENT].

6.3.3.3 (CONFIG:) REDUND (Redundancy) Submenu



Appendix B. REDUNDANCY OPERATION



This menu branch is functional in LOCAL MODE ONLY.

```
Redundancy:
Mode State FrcBkup
```

6.3.3.4 (CONFIG): REFADJ (Reference Oscillator Adjustment)

```
Reference frequency
Adjustment = 087
```

The reference oscillator adjustment may be manipulated with this menu. Use the [←][→] arrow keys to select a digit to edit, and then the [↑][↓] arrow keys to change its value. Press [ENT] when done.

The default Reference Frequency tuning adjustment is **087**, with allowable values from **000** to **255**.

When an external reference oscillator is connected and set to 10 MHz, the following screen appears:

```
EXTERNAL 10 MHZ
REFERENCE PRESENT
```

When an external reference oscillator is connected and set to 5 MHz, the following screen appears:

```
EXTERNAL 5 MHZ
REFERENCE PRESENT
```

When an external reference oscillator is connected and set to other than 5 MHz or 10 MHz, the following screen appears:

```
EXTERNAL REFERENCE FREQ
MUST BE 5/10 MHz
```

6.3.3.5 (CONFIG): SPECT-INV (Spectrum Inversion)

```
Spectrum Inversion:
ConvA=NRM      ConvB=INV
```

To set Spectrum Inversion operation: Use the [←][→] arrow keys to select ConvA or ConvB, and then use the [↑][↓] arrow keys to toggle the parameter as **NRM** (Normal) or **INV** (Invert). Press [ENT] when done.

6.3.4 (SELECT:) MONITOR Menu Branch



These examples are provided for reference only – the data that displays on your system will vary depending on your actual operating conditions.

Five *read-only* information screens provide monitoring of a number of operating voltage, temperature and tuning parameters. Use the [↑][↓] arrow keys to page between screens.

LBC-4000:

```
Monitor A:      iflo=08.2
rflo=01.6      tp=+32.1
```

```
Monitor B:      iflo=08.1
rflo=01.6      tp=+30.2
```

LBC-4000-ST:

```
Monitor A:      iflo=08.2
rflo=01.6      tp=+32.1
```

These screens show the active Monitor A (Conv-A) and Monitor B (Conv-B) for the LBC-4000 and only Monitor A (Conv-A) for the LBC-4000-ST Up and/or Down Converter IDU operating parameters, where:

- **iflo** = IF Lockout
- **rflo** = RF Lockout
- **tp** = Operating Temp (°C)

```
MON Ref Osc:
Vtune=04.7
```

This screen displays raw voltage of the **Ref Osc** voltage tuning monitor. Use this screen for debugging purposes only.

```
Monitor PS A: 12V=12.3
              8V=08.2    5V=05.3
```

```
Monitor PS B: 12V=12.2
              8V=08.1    5V=05.3
```

These screens display show the **PS A** and **PS B** (power supply) 12 V, 8 V, and 5 V values. Press **[ENT]** or **[CLR]** to continue.

6.3.5 (SELECT:) FAULTS Menu Branch

```
CURRENT  STORED
```

Use the **[←][→]** arrow keys to select **CURRENT** or **STORED**. Press **[ENT]**.

6.3.5.1 (FAULTS:) CURRENT



These examples are provided for reference only – the data that displays on your system will vary depending on your actual operating conditions.

Five read-only information screens provide fault monitoring for a number of operating parameters. The system reports the status as OK (operating within normal ranges), or FT (currently faulted). Use the **[↑][↓]** arrow keys to page between screens.

LBC-4000:

```
Faults: Conv-A      ▲
iflo=OK rflo=OK temp=OK ▼
```

```
Faults: Conv-B      ▲
iflo=OK rflo=OK temp=OK ▼
```

LBC-4000-ST:

```
Faults: Conv-A      ▲
iflo=OK rflo=OK temp=OK ▼
```

These screens show the active Conv-A and Conv-B for the LBC-4000 and only Conv-A for the LBC-4000-ST Up and/or Down Converter IDU operating parameters fault states, where:

- **iflo** = IF Lockout Fault
- **rflo** = RF Lockout Fault
- **temp** = Operating Temp Fault (°C)

```

Faults: Power Supply A ▲
12VT=OK 08V=OK 05V=OK ▼
    
```

```

Faults: Power Supply B ▲
12VT=OK 08V=OK 05V=OK ▼
    
```

These screens show the active **PS A** and **PS B** (power supply) 12 V, 8 V, and 5 V fault states.

```

Faults: Ext Ref ▲
Ext Ref = FT ▼
    
```

This screen displays the external reference oscillator fault state.

Press **[ENT]** or **[CLR]** to continue.

6.3.5.2 (FAULTS:) STORED

```

VIEW CLEAR-ALL
    
```

Use the **[←][→]** arrow keys to select **VIEW** or **CLEAR-ALL**. Press **[ENT]**.

6.3.5.2.1 (FAULTS:) STORED →VIEW

If you select **View** and no faults exist in the stored faults log, the system displays this message:

```

No Stored Faults.
    
```

Otherwise, stored faults log entries display as per this example:

```

Fault No. 06 10:28:53 ▲
OK-IFLO_A 08/10/16 ▼
    
```

Use the **[↑][↓]** arrow keys to page between screens. The faults log can store up to **100** faults. When a fault condition occurs, the unit assigns a number to the fault (in the order received), date- and time-stamps the fault, and provides a condensed description of the issue. When the fault condition clears, this action is recorded in the same fashion as the fault was originally recorded.

Once the number of faults reaches 100, the 100th fault displays as “**ER**.” The stored faults remain in memory until you execute the **CLEAR-ALL** command.

Press **[ENT]** or **[CLR]** to return to the previous menu.

6.3.5.2.2 (FAULTS:) STORED→CLEAR-ALL

```
Clear All Stored Faults
No Yes
```

Use the **[←][→]** arrow keys to select No or Yes. Press **[ENT]**.

When you select **Yes**, the unit clears the faults log and returns you to the previous menu. However, if there are faults present on the unit at this time, the unit will re-stamp the faults and generate new log entries.

6.3.6 (SELECT:) UTILITY Menu Branch

```
TIME DISP FIRMWARE AID
LAMPTEST RELAY SCRSAVER
```

Use the **[←][→]** arrow keys to move the cursor to the desired choice. Press **[ENT]**. The function of each UTILITY submenu is as follows:

- TIME Submenu – This allows configuration of the Real-Time Clock.
- DISP Submenu – This allows adjustment of the VFD brightness level.
- FIRMWARE Submenus – This allows you to review and select for bootup one of two installed firmware images.
- AID Submenu – This allows you to create a unit label.
- LAMPTEST Submenu – This executes a diagnostic test of the front panel LEDs and VFD.
- RELAY Submenu – This allows you to set the Fault Relay Logic as Normal or Inverted.
- SCRSAVER Submenu – This allows you to set one of five different screen saver behaviors.

6.3.6.1 (UTILITY:) TIME (Real-Time Clock) Submenu



This function follows Military time format (00 to 24 hours).

```
Edit Real-Time Clock:
HH:MM:SS MM/DD/YY
```

Edit the time and date settings of the real-time clock. Use the **[←][→]** arrow keys to select a digit to edit, and then use the **[↑][↓]** arrow keys to change its value. Press **[ENT]**.

6.3.6.2 (UTILITY:) DISP (VFD Display) Submenu

```
VFD Display Brightness:  
100%
```

Edit the display brightness. Use the [↑][↓] arrow keys to select a brightness value of **25%**, **50%**, **75%**, or **100%**. Press [ENT] when the brightness is suitable.

6.3.6.3 (UTILITY:) FIRMWARE Submenu



These menus are intended for diagnostic purposes only. Do not change an image unless otherwise instructed by CEFD Product Support.

This series of submenus permits you to view information about the DT-4500 internal firmware. The converter can store two complete firmware images, and you can select which image will be loaded the next time the unit reboots.

```
Firmware Images:  
INFO SELECT
```

Use the [←][→] arrow keys to select **INFO** or **SELECT**. Press [ENT].

6.3.6.3.1 (FIRMWARE:) INFO

```
Firmware Info: BOOTROM  
IMAGE#1 IMAGE#2
```

Use the [←][→] arrow keys to select **BOOTROM**, **IMAGE#1** or **IMAGE#2**. Press [ENT]. to view the information.

Typical for all nested screens, the top line identifies the firmware number. Where applicable, 'x' denotes the firmware revision letter. The bottom line identifies the Firmware Version Number (e.g., 1.2.5) and the firmware build date in month/day/year format.

6.3.6.3.1.1 (FIRMWARE:) INFO→BOOTROM

```
Bootrom: FW-0020506  
X.X.X MM/DD/YY
```

6.3.6.3.1.2 (FIRMWARE:) INFO→IMAGE#1/#2

Where '#X' denotes the IMAGE#1 or IMAGE#2 firmware load, the IMAGE#1 and IMAGE#2 firmware load info screens are nested as follows:

```
IMAGE#X: Bulk  APP  FPGA
```

Use the [◀][▶] arrow keys to select **Bulk**, **App**, or **FPGA**. Press [ENT].

(FIRMWARE:) INFO→IMAGE#1/#2→BULK

```
Bulk#X: FW-0020503  
X.X.X   MM/DD/YY
```

(FIRMWARE:) INFO→IMAGE#1/#2→APP

```
App#X:   FW-0020504  
X.X.X   MM/DD/YY
```

(FIRMWARE:) INFO→IMAGE#1/#2→FPGA

```
FPGA#X: FW-0020505  
X.X.X   MM/DD/YY
```

6.3.6.3.2 (FIRMWARE:) SELECT

```
Current Active Image: #1  
Next Reboot Image: #1 #2
```

Use this submenu to select the Current Active Firmware Image. The *read-only* top line shows the **Current Active Image**.

On the bottom line: Use the [◀][▶] arrow keys to select **#1** or **#2** as the **Next Reboot Image** (i.e., the image that will be active the next time the unit is rebooted). Press [ENT].

If the image that you select is already set as the designated Next Reboot Image, this message displays:

```
THAT IMAGE IS ALREADY  
CURRENT. NO CHANGE MADE.
```

You may repeat the task by instead selecting the alternate image.

6.3.6.4 (UTILITY:) AID (Application Identification String) Submenu

```
Edit AID Message?  
No Yes
```

The Application Identification (AID) submenu allows you to create a customized message. The AID may serve to identify the satellite, either transponder, beam, destination or other aspects of the application that may be significant to operations. The default AID is "AID MESSAGE".

On the bottom line: At the "Edit AID Message?" prompt, use the [←][→] arrow keys to select **No** or **Yes**. Press [ENT].

Typical for the top and bottom lines of the message, use the [←][→] arrow keys to select a character, and then use the [↑][↓] arrow keys to change that character. A maximum of 24 characters are available on each line – 48 characters in all. Permissible characters are: [Space]() * + - , . / 0-9 and A-Z.

An example of an AID message is as follows:

```
LBC-4000 SERIES  
48 CHARS MAX TST MESSAGE
```

Press [ENT] once you have composed your message. At the top level splash screen (which identifies the product in use), you may use the [CLR] key to toggle between the splash screen and the AID message.

6.3.6.5 (UTILITY:) LAMPTEST Submenu

```
Start Lamp Test?  
No Yes
```

On the bottom line: Use the [←][→] arrow keys to select **No** or press [CLR] to exit this submenu. Otherwise, select **Yes** and press [ENT] to continue. The test begins with this message:

```
Lamp Test in Progress  
Please Wait
```

The front panel runs through a series of diagnostics: the LED array cycles, and then the VFD generate a series of test patterns.

The LEDs and VFD return to their previous display state upon successful completion of the test. Once the test has run, press [CLR] to return to the main menu.

6.3.6.6 (UTILITY:) RELAY Submenu

```
FAULT RELAY LOGIC  
Normal
```

On the bottom line: Use the [↑][↓] arrow keys to set the Fault Relay Logic as **Normal** or **Invert**. Press [ENT].

6.3.6.7 (UTILITY:) SCRSAVER Submenu

```
ScreenSaver :
Theme=Classic Time=015m
```

If you were to display the same screen for weeks at a time, the display could become 'burnt' with this image. To prevent this, you may set the units 'screen saver' to activate after a user-selected timeframe.

On the bottom line: Use the [←][→] arrow keys to select **Theme** or **Time**. Do NOT press [ENT] at this time.

6.3.6.7.1 (UTILITY:) SCRSAVER → Theme

Five screen saver themes are selectable. Each theme establishes a unique behavior for the screen saver when activated.

Use the [↑][↓] arrow keys to select the theme as **Classic**, **Zip-ped**, **Cycling**, **B-Board**, or **S-Wiper**. Press [ENT].

The behavior of each theme is as follows:

- **The Classic theme** – The top line of the display shows the user-defined "Application ID", and the bottom line shows 'Press any key...'. The message 'crawls' from right to left across the screen, and then wraps around.



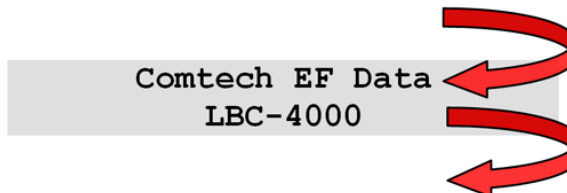
- **The Zip-ped theme** – This mode features a 'marquee' display. The message 'zips to center' from 'offstage right' and then 'zips/exits offstage right.'



- **The Cycling theme** – This mode features a single line display comprised of the user-defined "Application ID" and "LBC-4000." The message 'crawls' along from right to left across the top line of the VFD, and then wraps around to the bottom line, moving left to right as it 'crawls off' the display.

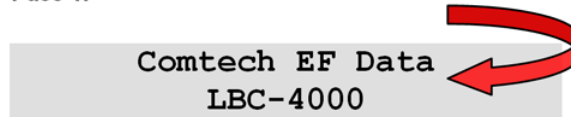


- **The B-Board theme** – This mode features a 'marquee' display that performs a 'slow reveal' from left to right, and then performs a 'slow wipe', again from left to right.

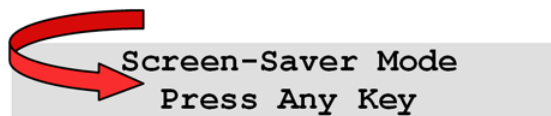


- **The S-Wiper theme** – This mode features two separate ‘marquee’ displays. The screens alternate, with Marquee ‘1’ performing a slow reveal/wipe from left-to-right; Marquee ‘2’ then performs a slow reveal/wipe from right-to-left.

Pass 1:



Pass 2:



Press any key to de-activate the screen saver and restore the previous screen.

6.3.6.7.2 (UTILITY:) SCRSAVER → Time

To prevent the display from becoming burnt by a constant image, the unit activates its screen saver feature after a factory default of 60 minutes (one hour).

Use the [▲][▼] arrow keys to adjust this time from **OFF** to **999** minutes. Press [ENT].

Chapter 7. ETHERNET INTERFACE OPERATION

7.1 Overview

Operation of the Ethernet Interface is available when you connect a user-supplied, Windows-based PC to the LBC-4000/-ST rear panel '10/100 ETHERNET' 100BaseTX RJ-45 port.



The LBC-4000 L-Band Up/Down Converter System, as initially released, does not feature a rear panel '10/100 ETHERNET' port. Only current production units offer Ethernet Interface operation. See Chapter 4. REAR PANEL CONNECTORS for more information.

Three protocols are available 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.



CEFD recommends use of the Ethernet-based SNMP interface for advanced users only. All other users are strongly encouraged to use the HTTP (Web Server) Interface for remote M&C of the unit.

- Telnet Interface. You may use the serial remote control protocol via this interface. This requires use of Windows Command-line, or a user-supplied terminal emulation program such as HyperTerminal.
- HTTP Interface. This requires a compatible user-supplied web browser such as Internet Explorer.

7.1.1 Prerequisites

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

- The converter is operating with the latest version firmware files.
- The User PC is running a terminal emulation program for operation of the Telnet Interface.
- The User PC is running a compatible web browser for operation of the HTTP Interface.
- The User PC is connected to the unit's '10/100 ETHERNET' port.
- You have recorded the unit's Management IP Address.

7.2 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 this unit.
- The SNMP Agent. This software runs on the converter. The unit SNMP Agent supports both SNMPv1 and SNMPv2.
- The user-supplied NMS. This software runs on the User PC.

7.2.1 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 unit MIB file names, the letter 'x' represents the revision of the file.

7.2.1.1 Common MIB File

- FW-0020542x.mib
- MIB file consists of all of the OID's for management of the unit functions.

7.2.1.2 Traps MIB File

- FW-0020543x.mib
- Trap MIB file provides SNMPv1 traps common for the unit.

7.2.2 SNMP Community Strings



In SNMP v1/v2, 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.



For correct SNMP operation, the converter MIB files must be used with the associated version of the unit M&C. See the LBC-4000/-ST FW Release Notes for information on the required FW/SW compatibility.

The LBC-4000/-ST 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 LBC-4000/-ST 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.

7.2.3 SNMP Traps



The LBC-4000/-ST SNMP agent supports both SNMPv1 and v2. The Traps file needs to be compiled only if SNMPv1 traps are to be used.

The LBC-4000/-ST has the ability to send out SNMP traps when certain events occur in the unit. For example, the unit sends out traps when an alarm or a fault occurs or clears. Which style of traps the LBC-4000/-ST sends are configured using the LBC-4000/-ST SNMPTrapVersion OID.

The LBC-4000/-ST supports MIB2 SNMPv1 traps and SNMPv2 notifications.

7.3 Telnet Interface



Chapter 8. SERIAL INTERFACE OPERATION

The LBC-4000/-ST provides a Telnet interface for equipment M&C via the standard equipment Remote Control protocol.

Telnet is implemented in the Ethernet M&C in a "Telnet wrapper". When the user Telnets to the unit, it emulates a local EIA-232C or EIA-485 serial connection to the unit. You can then type the same command syntax that he would use from a serial remote terminal and the Ethernet M&C "unwraps" the Telnet packet and sends it on to the base unit processor, which responds to it as if it was a serial remote command.

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. Figure 7-1 shows an example of the login process for remote control operation.

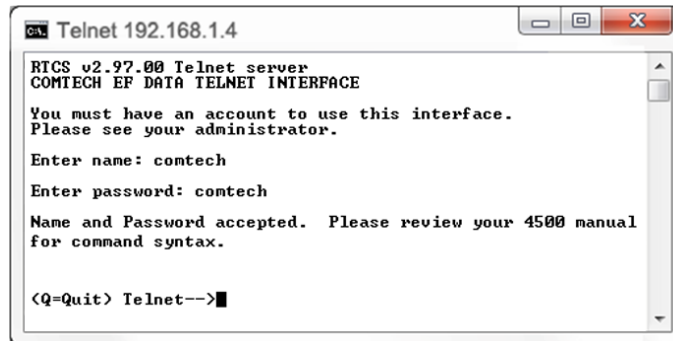


Figure 7-1. Telnet Interface Example – Windows Command-line

7.3.1 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. Figure 7-2 shows an example of the login process when using HyperTerminal as the Telnet interface.

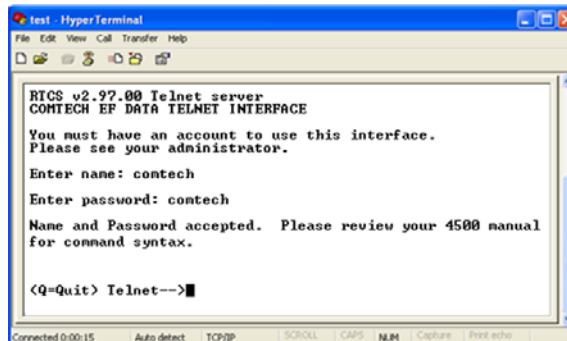


Figure 7-2. Telnet Interface Example – HyperTerminal

7.3.1.1 Configure HyperTerminal for Telnet Remote Control Operation

See Figure 7-3. Do these steps:

1. Make sure to define the Connect To Telnet connection properties correctly (**File → Properties**) (Figure 7-3, left):
 - a. Enter the unit'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 7-3, right side):
 - 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.

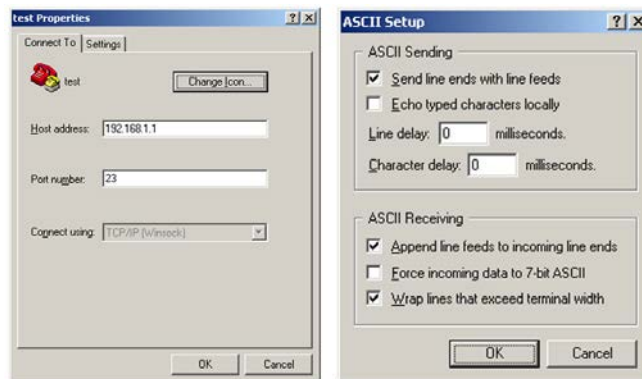


Figure 7-3. Configure HyperTerminal

7.4 HTTP (Web Server) Interface

A user-supplied web browser allows the full M&C of the LBC-4000/-ST from its HTTP Interface. This non-secure embedded web application is designed for, and works best with, Microsoft Internet Explorer Version 5.5 or higher.

7.4.1 HTTP Interface User Login



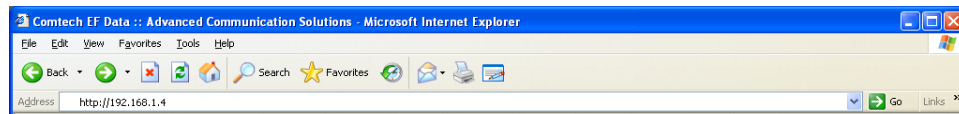
Chapter 6. FRONT PANEL OPERATION



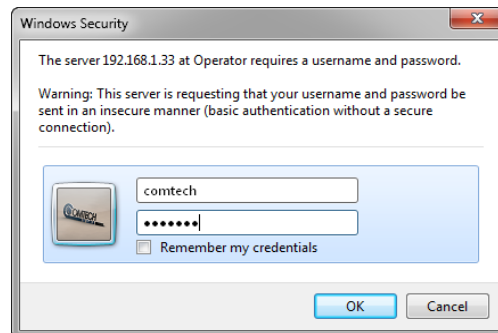
1. **You must use LBC-4000/-ST Front Panel operation to select “Ethernet” as your mode of operation prior to login. Failure to configure the unit accordingly will cause the Login dialogue box to return you to a blank web page.**
2. **You must retrieve the assigned Management IP Address from the LBC-4000/-ST Front Panel menu:
(SELECT:) CONFIG → Remote → Ethernet → Address
You may need to consult with your network administrator to determine the appropriate Management IP address assignment for your converter.**

Do the following steps:

1. From the PC, enter the default Management IP Address for the unit (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**.



Failure to enter the correct User name and Password will return you to the Login window. If you continue to use an invalid User name or Password, the message “You do not have security privilege to access this area.” displays.

Otherwise, upon entry of the valid IP address and login information LBC-4000/-ST Web Server Interface “splash” page displays, similar to the example shown in Figure 7-4. The unit and firmware version in this example will differ from your setup.

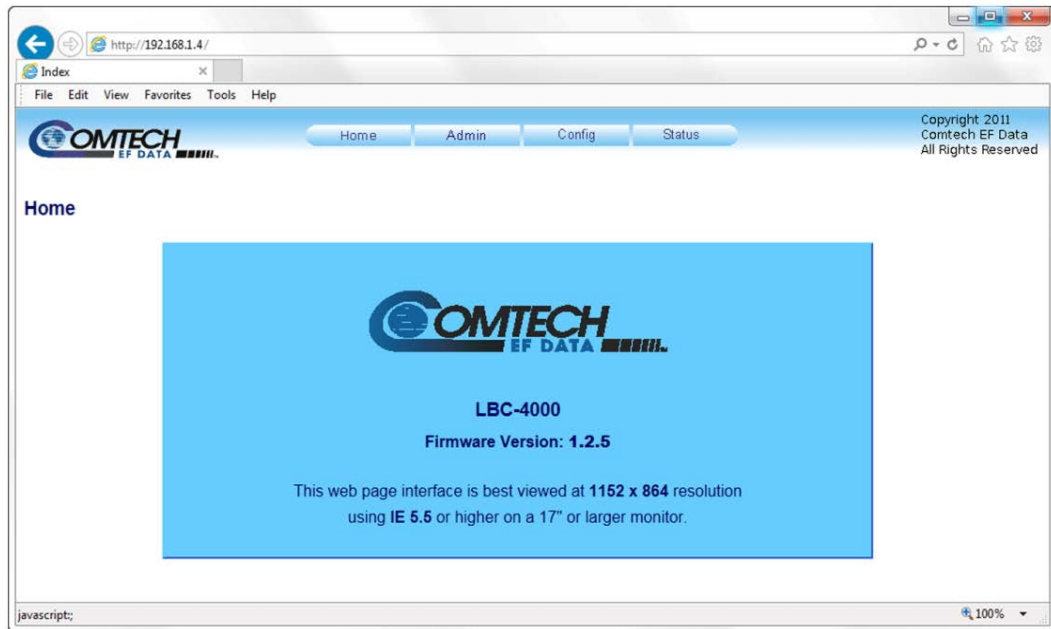


Figure 7-4. HTTP Interface “Splash” Page Example

7.4.2 HTTP Interface Features

7.4.2.1 Menu Tree

Figure 7-5 Illustrates the menu hierarchy for the HTTP Interface. It features four navigation tabs (shown in blue). Primary page hyperlinks (grey) grant access to individual web pages.

Home	Admin	Config	Status
Home	Access	Conv A	Summary
Contact	SNMP	Conv B	Faults
Support		Ref	
		Utility	
		Redundancy	
		Serial	

Figure 7-5. HTTP Interface Menu Tree (FW Ver. 1.2.5)

7.4.2.2 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 select the ‘Home’ page hyperlink.

7.4.2.3 Page Sections

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



7.4.2.4 Action Buttons

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



- Click **[Refresh]** to see the latest page data (see Sect. 0).
- **[Reset]** changed parameters to remove **unsaved** changes.
- Click **[Submit]** to 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.

7.4.2.4.1 Page Refresh

Many of the pages feature a **[Refresh]** action button located adjacent to the uppermost Page Section label. You may click **[Refresh]** at any time to update the page with its latest reported operational data and current configured settings.



7.4.2.5 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.



7.4.2.6 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.



7.5 HTTP Interface Page Examples and Descriptions



See Chapter 6. FRONT PANEL OPERATION



The page figures provided in this section are intended for reference only. Your setup will differ.

7.5.1 Home Pages

Click the **Home** tab, and then select the **Home**, **Contact**, or **Support** hyperlink to continue.

7.5.1.1 Home | Home

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

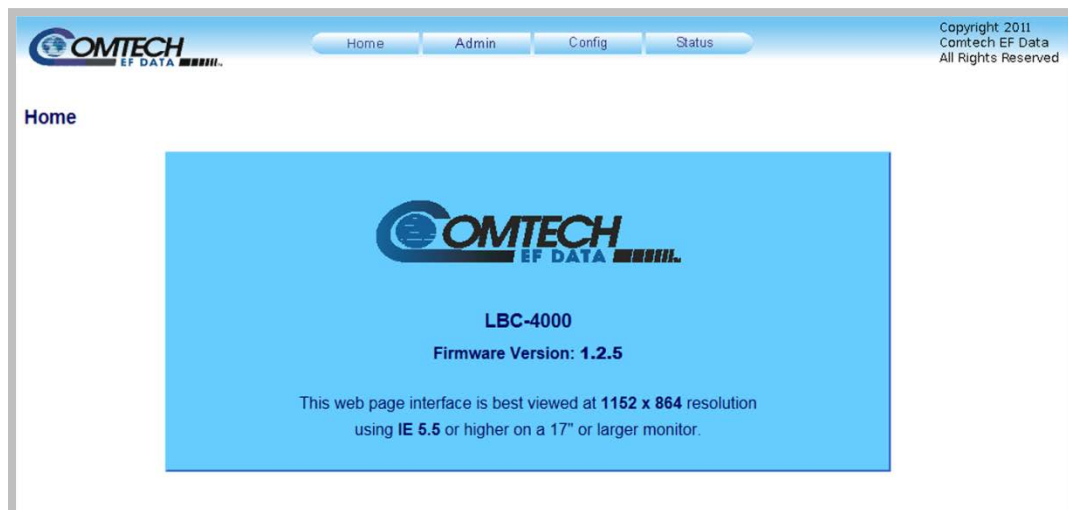


Figure 7-6. 'Home | Home' Page

7.5.1.2 Home | Contact

For all product support, please call:

+1.240.243.1880

+1.866.472.3963 (toll free USA)



The screenshot shows the 'Home | Contact' page of the COMTECH website. The page features a navigation menu with 'Home', 'Admin', 'Config', and 'Status' buttons. The 'Contact' section is highlighted in blue and contains a table with contact information for Sales and Service. Below the table, there is a link to the website and a section for CD-ROM availability.

VIA	Sales	Service
	sales@comtechefdata.com	cdmipsupport@comtechefdata.com
	(480) 333-2177	(480) 333-4357
	(480) 333-2540	(480) 333-2500

For product information online, please visit our website at : www.comtechefdata.com

Now available on CD-ROM:

- Product Data Sheets
- Software Demos
- Application Notes
- Manuals
- Contact information, and more

To request a CD-ROM, call (480) 333-2473 or email: sales@comtechefdata.com

Figure 7-7. 'Home | Contact' Page

7.5.1.3 Home | Support



The Administrator must configure the SMTP server, domain name, and destination on the 'Admin | Access' page (Sect. 7.5.2.1) in order to use this page.

Use this page to compose an e-mail message when you have questions about or problems with the unit.

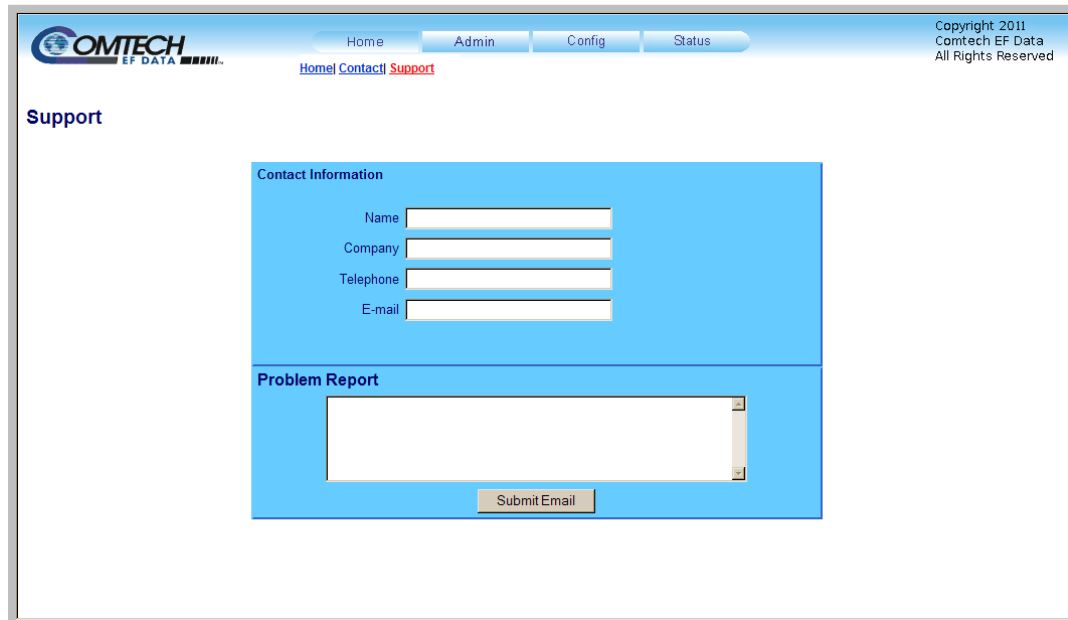


Figure 7-8. 'Home | Support' Page

The '**Home | Support**' page (**Figure 7-8**) uses Simple Mail Transport Protocol (SMTP) to send e-mail to CEFD Product Support:

cdmipsupport@comtechefdata.com

Enter the **Contact Information** and compose a message in the **Problem Report** text window. The **Problem Report** section allows up to 256 characters maximum.

Click [**Submit Email**] to send the message.

7.5.2 Admin (Administration) Pages



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

Click the **Admin** tab, and then select the **Access** or **SNMP** hyperlink to continue.

7.5.2.1 Admin | Access

The Administrator must use this page as the means to set up user names, passwords, the E-mail server, and the host IP addresses as needed to facilitate communication with the HTTP Interface.

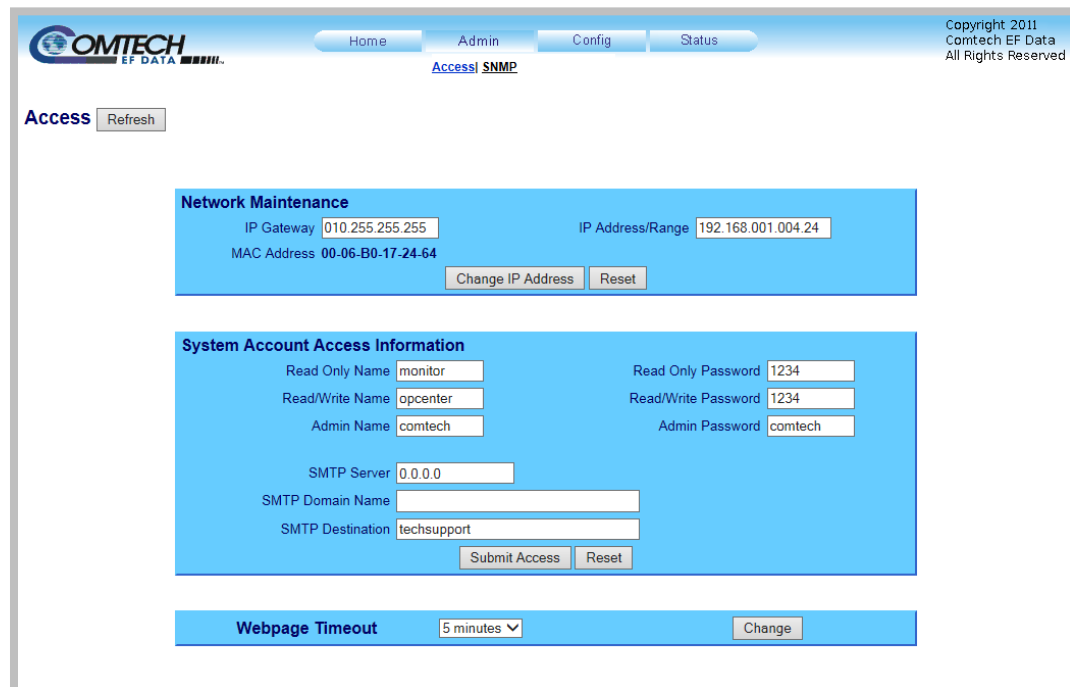


Figure 7-9. 'Admin | Access' Page

Network Maintenance

Name	Description
IP Gateway	Enter the desired IP Gateway Address in the text box.
IP Address/Range	Enter the desired IP Address/Range in the text box.
MAC Address (read only)	The MAC Address is <i>read-only</i> . It is set at the factory to a guaranteed unique address. It cannot be changed.

Click **[Change IP Address]**.

Click **[Reset]** to revert to the previously assigned settings.

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.

Name	Description
Read Only Name	The factory default is: monitor
Read Only Password	The factory default is: 1234
Read/Write Name	The factory default is: opcenter
Read/Write Password	The factory default is: 1234
Admin Name	The factory default is: comtech
Admin Password	The factory default is: comtech
SMTP Server	Specify the mail server IP address from where you want to send the e-mail.
SMTP Domain Name	The Administrator can assign the SMTP Domain Name and Destination. This is required if the e-mail feature of the 'Home Support' page (Sect. 7.5.1.3) is to be used. Specify the domain of the e-mail server (usually found to the right of the @ symbol in an e-mail address).
SMTP Destination	The Administrator can assign the SMTP Domain Name and Destination. This is required if the e-mail feature of the 'Home Support' page (Sect. 7.5.1.3) is to be used. Specify the e-mail recipient name (usually found to the left of the @ symbol in an e-mail address).

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

Click [**Reset**] to revert to the previously assigned settings.

Webpage Timeout

To set an automatic timeout to safeguard access to an already logged-in unit, use the drop-down list to set the time value as **5 minutes** or **8 hours**, and then click [**Change**].

The active session terminates if the unit remains idle (i.e., when no user activity occurs) beyond the assigned Webpage Timeout. A valid user name and password is then required to resume the HTTP Interface session.

7.5.2.2 Admin | SNMP



Sect. 7.2 SNMP Interface

The Administrator must use this page to manage the SNMP settings.

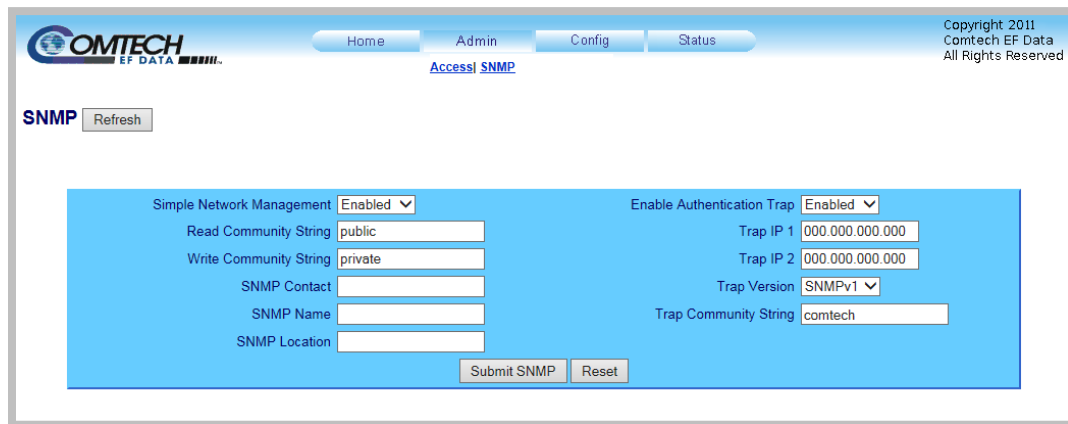


Figure 7-10. 'Admin | SNMP' Page

SNMP

Click **[Refresh]** to update screen.

Name	Description
Simple Network Management	Use the drop-down list to select Enabled or Disabled .
Read Community String	Automatically populates as public .
Write Community String	Automatically populates as private .
SNMP Contact	Enter this identity information in any alphanumeric combination with a length of 0 to 20 characters.
SNMP Name	Enter this identity information in any alphanumeric combination with a length of 0 to 20 characters.
SNMP Location	Enter this identity information in any alphanumeric combination with a length of 0 to 20 characters.
Enable Authentication Trap	Use the drop-down list to select Enabled or Disabled .
Trap IP 1	The Administrator can assign up to two SNMP Trap IP Addresses .
Trap IP 2	The Administrator can assign up to two SNMP Trap IP Addresses .
Trap Version	Use the drop-down list to select the version as SNMPv1 or SNMPv2 .
Trap Community String	This 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 accept the changes.

Click **[Reset]** to revert to the previously assigned settings.

7.5.3 Config (Configuration) Pages

Click the **Config** tab, and then select the **Conv A**, **Conv B**, **Ref**, **Utility**, **Redundancy**, or **Serial** hyperlink to continue.

7.5.3.1 Config | Conv A / B Pages

Use this page to configure the communications, operations, and alarms/faults handling for the Converter A or Converter B IDU modules.

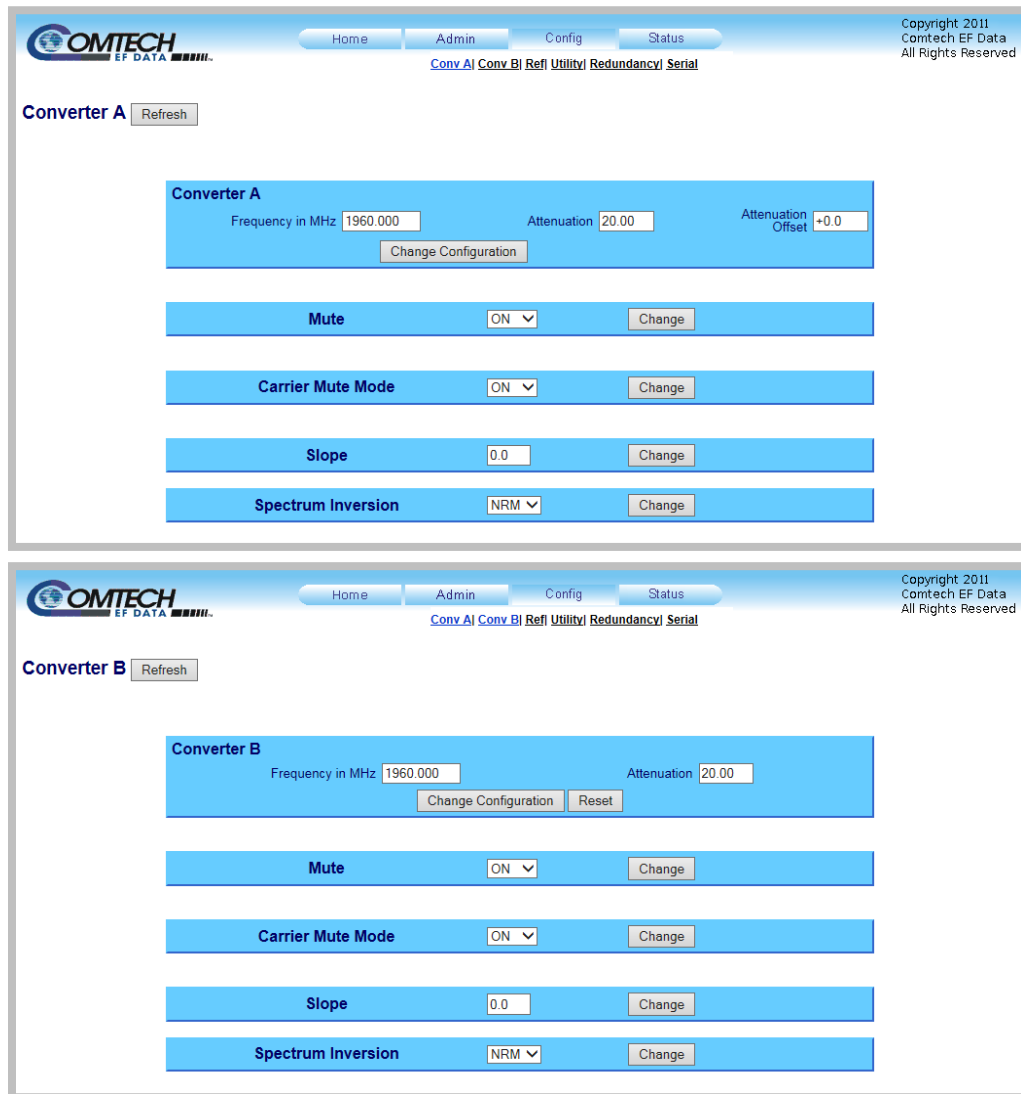


Figure 7-11. 'Config | Converter A/ B' Pages

Converter A / Converter B

Click **[Refresh]** to update screen.

Name	Description
Converter A	<p>Frequency in MHz: Enter an operating RF Frequency (if the converter is a Ku-Band down converter) in the range of 10950 to 12750 MHz; otherwise, this field displays as N/A.</p> <p>Attenuation (dB): Enter a valid attenuation level (00.00 to 20.00 dB) in 0.25 dB steps.</p> <p>Attenuation Offset: Enter a valid value, in dB, for the attenuation offset.</p> <p>Click [Change Configuration] to update settings.</p>
Converter B	<p>Frequency in MHz: Enter an operating RF Frequency (if the converter is a Ku-Band down converter) in the range of 10950 to 12750 MHz; otherwise, this field displays as N/A.</p> <p>Attenuation (dB): Enter a valid attenuation level (00.00 to 20.00 dB) in 0.25 dB steps.</p> <p>Click [Change Configuration] to update settings. Click [Reset] to revert to the previously assigned parameters.</p>
Mute	Use the drop-down list to set the Configuration Mute Mode as On or Off . Click [Change] to update settings.
Carrier Mute Mode	Use the drop-down list to set the Carrier Mute Mode as On or Off . Click [Change] to update settings.
Slope	Enter a slope value (0.0 to 1.0) in 0.1 steps. Click [Change] to update settings.
Spectrum Inversion	Use the drop-down menu to select the Spectrum Inversion function as INV or NRM (Normal), and then click [Change] to update settings.

7.5.3.2 Config | Ref

Use this page for monitor and control of the optional external reference oscillator.

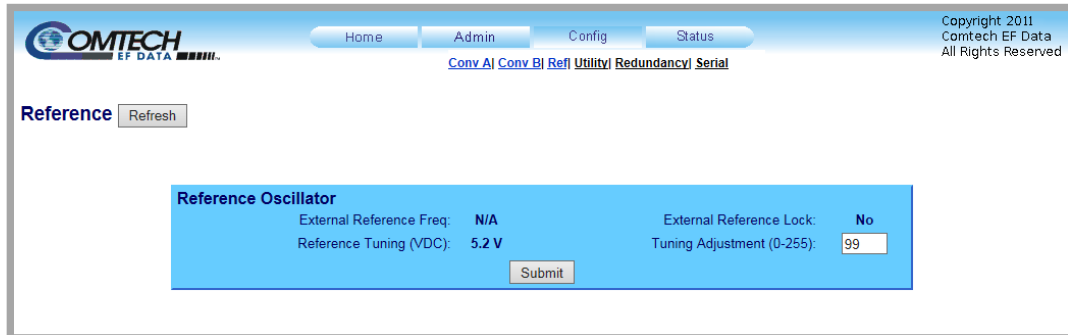


Figure 7-12. 'Config | Ref' Page

Reference

Click **[Refresh]** to update screen.

Reference Oscillator

Name	Description
External Reference Freq	This <i>read-only</i> item displays the operational value of the external reference oscillator (i.e., 5 MHz or 10 MHz) is displayed here.
Reference Tuning (VDC)	This <i>read-only</i> item displays the currently defined Reference Frequency tuning adjustment value.
External Reference Lock	This <i>read-only</i> item displays the External Reference Lock state.
Tuning Adjustment (0-255)	Enter a numeric value for the reference oscillator tuning voltage here. The default value is 087 , with allowable values from 0 to 255 .

Click **[Submit]** to update the changes.

7.5.3.3 Config | Utility

Use this page to configure a variety of converter operating parameters.

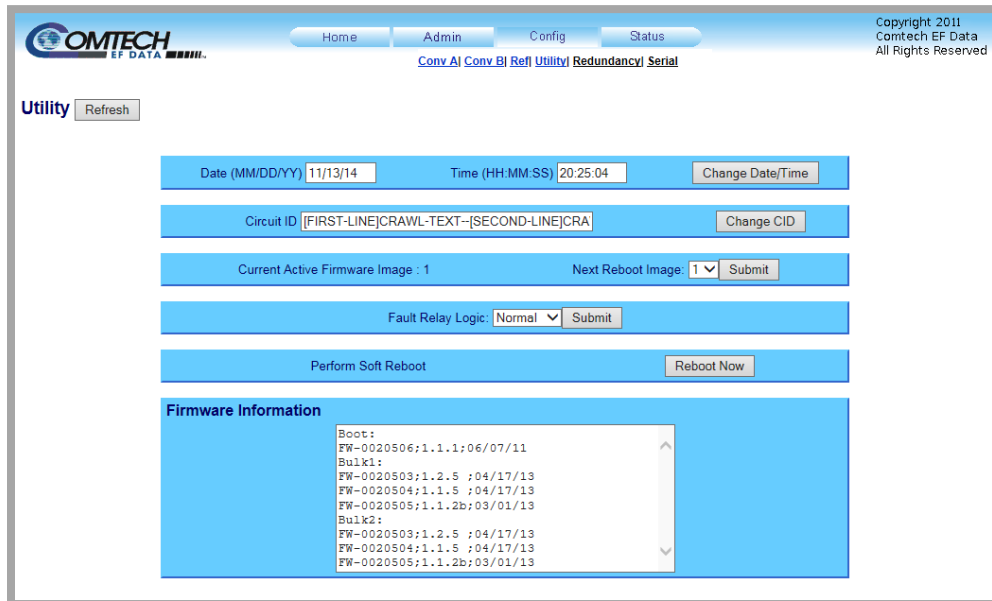


Figure 7-13. 'Config | Utility' Page

Utility

Click **[Refresh]** to update screen.

Name	Description
Date	Enter a date in the form MM/DD/YY (where MM = month [01 to 12], DD = day [01 to 31], and YY = year [00 to 99]).
Time	Enter a time in the form HH:MM:SS (where HH = hour [00 to 23], MM = minutes [00 to 59], and SS = seconds [00 to 59]). Click [Change Date/Time] to update settings.
Circuit ID	Enter a Circuit ID string of up to 48 characters – 24 characters per line. Click [Change CID] to update settings.
Current Active Firmware Image	This <i>read-only</i> section identifies the selected Current Active Firmware Image. In this example, Image 2 is the Current Active Firmware Image.
Next Reboot Image	Use the drop-down menu to select Image 1 or 2. Press [Submit] when done.
Fault Relay Logic	Use the drop-down menu to select the Fault Relay Logic as Normal or Invert , and then click [Submit] .
Perform Soft Reboot	Click [Reboot Now] to reboot the unit using the Current Active Firmware Image.
Firmware Information	This <i>read-only</i> scrollable window identifies the Bootrom, Bulk Image#1 and Bulk Image #2 firmware information.

7.5.3.4 Config | Redundancy



Appendix A. REDUNDANT SYSTEM OPERATION

Use this page to configure the units Redundancy Switch Mode.

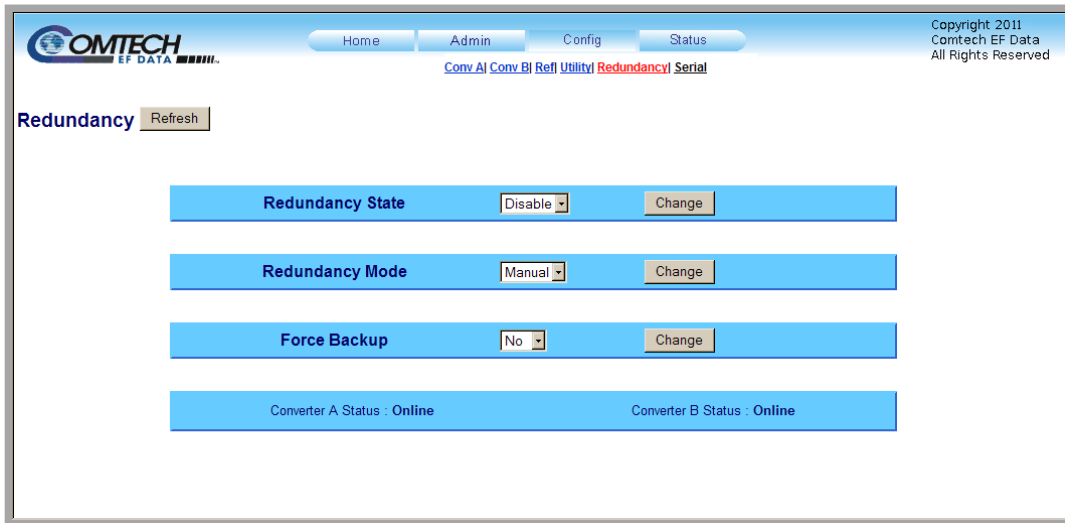


Figure 7-14. 'Config | Redundancy' Page

Redundancy

Click **[Refresh]** to update screen.

Name	Description
Redundancy State	Use the drop-down menu to select Enable or Disable . Click [Change] to update settings.
Redundancy Mode	Use the drop-down menu to select Manual or Auto . Click [Change] to update settings.
Force Backup	Use the drop-down menu to select Yes or No . Click [Change] to update settings.
Converter A Status	This <i>read-only</i> showing Online or Offline .
Converter B Status	This <i>read-only</i> showing Online or Offline .

7.5.3.5 Config | Serial

Use this page to configure the operating parameters over the EIA-485/232 serial interface.

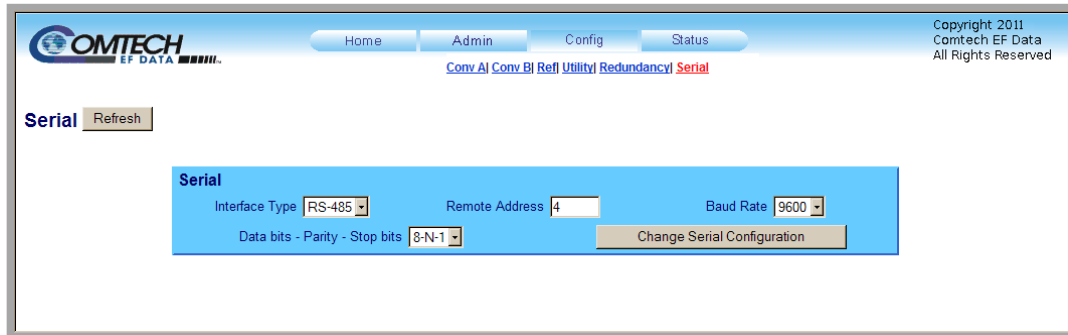


Figure 7-15. Config | Serial page

Serial

Click **[Refresh]** to update screen.

Serial

Name	Description
Interface Type	Use the drop-down menu to select the operating serial mode as RS-485 or RS-232.
Remote Address	Enter a valid remote control address from 0001 to 9999.
Baud Rate	Use the drop-down menu to select the operating baud rate as 1200, 2400, 4800, 9600, 19200, or 38400 baud.
Data bits - Parity - Stop bits	Use the drop-down menu to select the asynchronous character format as 8-N-1 (8 data bits, no parity, 1 stop bit); 7-O-2 (7 data bits, odd parity, 2 stop bits); or 7-E-2 (7 data bits, even parity, 2 stop bits).

Click **[Change Serial Configuration]** to update the changes.

7.5.4 Status Pages

Use these pages to review operational statistics, status windows, and the stored faults table. Click the **Status** tab, and then select the **Summary** or **Faults** hyperlink to continue.

7.5.4.1 Status | Summary

Use this *read-only* page to review pertinent information about the configured setup of the converter, its current operating parameters, and the operational status of the unit.

The screenshot displays the 'Status | Summary' page with the following content:

PARAMETER STATUS

Circuit Identification	: ABCDEFGHIJKLMNOPQRSTUVWXYZ123456789asdfghjkl
Serial Number	: 000000001
Modem Number	: LBC-4000
FW Revision	: 1.2.2
Active Software Image	: Bulk 1
Next Reboot Image	: Bulk 1
Redundancy	: OFF

PARAMETER STATUS

Summary Fault	: OK
External Reference	: N/A
Reference Tuning (Vdc)	: 11.0 V
Number Unread Faults	: 000
Date (mm/dd/yy)	: 12/22/11
Time (hh:mm:ss)	: 17:35:12

CONVERTER A STATUS

Type	: Down Converter
RF Frequency	: 1999.999
IF Frequency	: 140 MHz
Attenuation	: 10.90
Mute	: OFF
Online/Offline	: ONLINE

CONVERTER B STATUS

Type	: Up Converter
RF Frequency	: 1111.111
IF Frequency	: 70 MHz
Attenuation	: 09.20
Mute	: OFF
Online/Offline	: ONLINE

CONVERTER A MONITOR STATUS

RFLO:	14.8 Volts	OK
IFLO:	10.0 Volts	OK
Temperature:	26.1 deg C	OK

CONVERTER B MONITOR STATUS

RFLO:	03.4 Volts	OK
IFLO:	03.4 Volts	OK
Temperature:	27.1 deg C	OK

PS A MONITOR STATUS

12 Volts:	13.0 Volts	OK
08 Volts:	08.8 Volts	OK
05 Volts:	05.5 Volts	OK

PS B MONITOR STATUS

12 Volts:	13.0 Volts	OK
08 Volts:	08.9 Volts	OK
05 Volts:	05.5 Volts	OK

Figure 7-16. 'Status | Summary' Page

Typical for all STATUS columns, when any operating parameter is within acceptable limits, the STATUS indicates **OK** within a green box. If a fault condition exists, the message changes to **FAULT** within a red box.

Summary

Click [**Refresh**] to update screen.

Name	Description
Parameter SStatus	Product identification (i.e., CID/AID, serial and model numbers), active firmware, software image information, and other operational configuration information is provided here.
Converter A / B Status	This section identifies the converter installed in each module slot (BUC or BDC) and each module's associated RF conversion band and frequency, attenuation value, mute status, and online/offline status.
Converter A / B, PS (Power Supply) A / B, Monitor and Status	This section provides the current monitored value for each module (BUC or BDC), including the RF/IF lockout status, operating voltages and temperatures. The operating voltages for each power supply are also provided.

Notes:

1. Valid Converter A/Converter B LNA Current readings are provided only if the pertinent LBC-4000/-ST Block Down Converter (BDC) is optionally configured with an LNA. These parameters otherwise display as **N/A** if the pertinent converter is a BUC.
2. Valid Converter A/Converter B Forward RF Power readings are provided only if the pertinent LBC-4000/-ST Block Up Converter (BUC) is optionally configured with the Power Monitor feature. These parameters otherwise display as **N/A** if the pertinent converter is a BDC.
3. Valid Power Supply 2 and Local Switch Position information is provided with redundant configurations only.

7.5.4.2 Status | Faults

Use this *read-only* page to review the current stored faults.

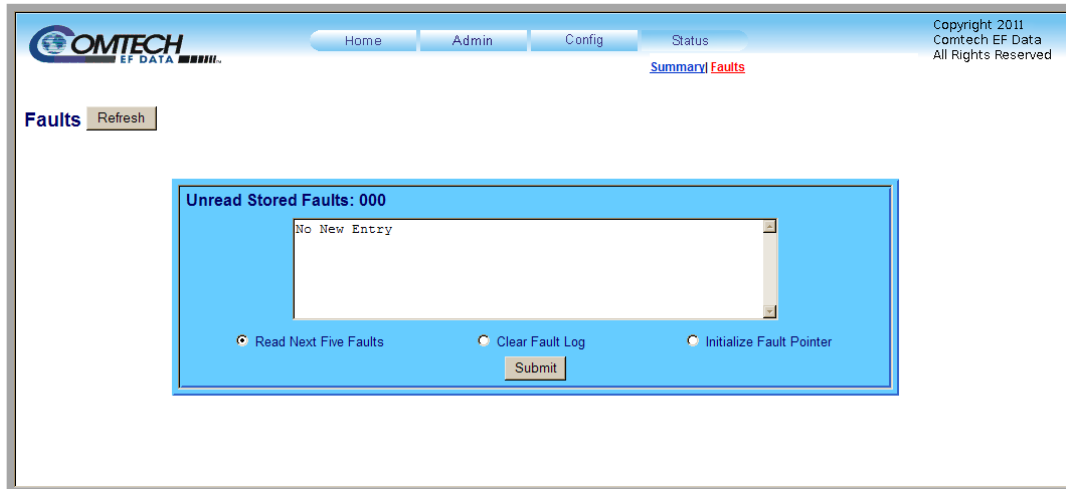


Figure 7-17. 'Status | Faults' Page

This page features a scrollable window that displays the unread stored faults log in sequential, date-stamped format.

Faults

Click **[Refresh]** to update screen.

Unread Stored Faults:

The section header displays the running tally of unread stored faults.

The event log displays the five oldest stored faults in the event log. The tally decrements as events are transferred from the stored events log for display in this window.

The bottom of the section provides the following management functions:

- **Read Next Five Faults** – Select this to display the next five unread stored faults in the log.
- **Clear Fault Log** – Select this to clear all stored faults from the log.
- **Initialize Faults Pointer** – Select this to reset the internal pointer. This allows queries to start at the beginning of the stored faults log.

Click **[Submit]** to update the changes.

Chapter 8. SERIAL INTERFACE OPERATION

8.1 Overview

Serial-based Remote Product Management of the LBC-4000 L-Band Up/Down Converter System is available using the rear panel 'J1 COM1' port. This interface is either an EIA-485 multi-drop bus (for the control of many devices) or an EIA-232 connection (for the control of a single device). Data is transmitted in asynchronous serial form, using ASCII characters. Control and status information is transmitted in packets of variable length, in accordance with the structure and protocol defined in later sections.

8.1.1 Prerequisites



Before you proceed with serial-based remote product management, make sure that:

- **Your LBC-4000/-ST is operating with the latest version firmware files.**
- **Your LBC-4000/-ST is connected to a user-supplied, Windows-based PC as follows:**
- **The PC serial port is connected to the LBC-4000/-ST rear panel 'J1 | COM1' port with a user-supplied serial cable. The pinout table for this connector is provided in Sect. 4.2.3 Operational Connections.**
- **The PC Ethernet port is connected to the LBC-4000/-ST rear panel '10/100 ETHERNET' port with a user-supplied hub, switch, or direct Ethernet cable connection.**
- **The PC is running a terminal emulation program (for use of the LBC-4000/-ST Serial Interface) and a compatible web browser (for use of the LBC-4000/-ST HTTP Interface).**
- **The LBC-4000/-ST Management IP Address has been noted using the serial interface. (The firmware information (i.e., revision letters, version numbers, etc.) as shown may differ from your setup.)**

8.1.2 EIA-485

For applications where multiple devices are to be monitored and controlled, a full-duplex (4-wire plus ground) EIA-485 is preferred. Half-duplex (2-wire plus ground) EIA-485 is possible, but is not preferred. In full-duplex EIA-485 communication, there are two separate, isolated, independent, differential-mode twisted pairs, each handling serial data in different directions.

It is assumed that a 'Controller' device (a PC or dumb terminal) transmits data in a broadcast mode via one of the pairs. Many 'Target' devices are connected to this pair, and all simultaneously receive data from the Controller. The Controller is the only device with a line-driver connected to this pair; the Target devices have only line-receivers connected.

In the other direction: On the other pair, each Target has a Tri-state line driver connected; the Controller has a line-receiver connected. All the line drivers are held in high-impedance mode until one – and *only* one – Target transmits back to the Controller. Each Target has a unique address; each time the Controller transmits, the address of the intended recipient Target is included in a framed 'packet' of data. All of the Targets receive the packet, but only one (the intended) will reply. The Target enables its output line driver and transmits its return data packet back to the Controller in the other direction on the physically separate pair.

EIA-485 (full duplex) summary: Two differential pairs – one pair for **Controller-to-Target**, one pair for **Target-to-Controller**.

- The **Controller-to-Target** pair has one line driver (Controller), and all Targets have line-receivers.
- The **Target-to-Controller** pair has one line receiver (Controller), and all Targets have Tri-state drivers.

8.1.3 EIA-232

With this simpler configuration, the Controller device is connected directly to the Target via a two-wire-plus-ground connection. Controller-to-Target data is carried, via EIA-232 electrical levels, on one conductor, while the Target-to-Controller data is carried on the other conductor.

8.2 Remote Commands and Queries Overview

8.2.1 Packet Structure

The structure of a Command, Response, or Error Message is as follows:

- Start of Packet Character
- Target (Device) Address
- Address Delimiter
- Instruction Code
- Instruction Code Qualifier
- Optional Message Argument
- End of Packet

Command Example (Controller-to-Target): <0412/MUT_A_ON{cr}

Query Example (Controller-to-Target): <0412/MUT_A{cr}

Query Response Example (Target-to-Controller): >0412/MUT_A_ON{CR}{LF}

8.2.1.1 Start of Packet Character

The Start of Packet Character begins each message:

- **Controller-to-Target:** ‘<’ (ASCII code 60) designates the start of a user command or query.
- **Target-to-Controller:** ‘>’ (ASCII code 62) designates the start of a Target response.

8.2.1.2 Target (Device) Address

Use the “SPA” remote command to assign an address to a Target unit. Up to 9,999 devices can be uniquely addressed.

Typical for EIA-232 or EIA-485 applications, the permissible range of values is from 0001 to 9999. Each block converter module has its own address:

Module	Address
LBC-4000/-ST	Base
Block Converter A	Base + 1
Block Converter B	Base + 2

If several devices share an EIA-485 bus, note that the LBC-4000 requires three addresses, and the device numbering should be spaced accordingly.



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.

8.2.1.3 Address Delimiter

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

8.2.1.4 Instruction Code

Upper and lower case alphabetic characters may be used (A-Z, and a-z).

This three-character alphabetic string, whenever possible, references the subject command or query. This aids in the readability of the message, should it be displayed in its raw ASCII form.

8.2.1.5 Instruction Code Qualifier

The Instruction Code Qualifier is the underscore '_' (ASCII code 95). This single character further qualifies the preceding instruction code. The Instruction Code Qualifier obeys these rules:

1. From **Controller-to-Target**, the underscore '_' plus additional parameter(s) comprise the assignment operator. This combination defines the **command** configuration parameters that are issued to the Target.
For example, the Controller-to-Target command "<0001/MUT_A_ON{cr}" means 'turn ON the mute function of Converter A'.
2. The '_' underscore, when submitted Controller-to-Target without parameters, functions as a **query**. Submitted in this format, the Controller directs the Target to report the current configured value for that parameter (Instruction Code).
For example, the Controller-to-Target query "<0001/MUT_A_{cr}" means 'return the current state of the mute function of Converter A'.
3. From **Target-to-Controller**, if the instruction sent from Controller-to-Target is successful, the Target responds by echoing that same instruction to the Controller.

8.2.1.5.1 Error Response

If a Target cannot execute a Command or detects a protocol violation, the Controller generates an error response. For example:

```
>0001?RED ER Error Message{cr}{lf}
```

Note that:

- The "/" address delimiter changes in the response to a "?".
- The Instruction Code is echoed, followed by two unique characters provided for analysis. This example uses "ER".
- A text string explaining the error follows.

8.2.1.6 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)

8.2.1.7 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.

8.3 Remote Commands and Queries

CODE	C	Q	PAGE
AID	X	X	8-8
ATO	X	X	8-8
ATT	X	X	8-9
CAA	X	-	8-9
CAS	-	X	8-9
CCS	-	X	8-10
CMM	X	X	8-11
CMS	X	X	8-11
CUS	-	X	8-12
DAT	X	X	8-12
FBU	X	-	8-12

CODE	C	Q	PAGE
FRE	X	X	8-12
FRL	X	X	8-13
FRM	-	X	8-13
FRW	-	X	8-13
IMG	X	X	8-14
IPA	X	X	8-14
IPG	X	X	8-14
LAA	-	X	8-15
LRS	X	X	8-15
MAC	-	X	8-15
MUT	X	X	8-16

CODE	C	Q	PAGE
ONL	-	X	8-16
PNM	-	X	8-16
RAS	-	X	8-17
RCS	-	X	8-18
RED	X	X	8-18
REM	X	X	8-19
RET	-	X	8-19
RET_y_	-	X	8-19
RMS	-	X	8-20
RUS	-	X	8-20
SAM	X	X	8-21

CODE	C	Q	PAGE
SAS	-	X	8-21
SBR	X	X	8-21
SPA	X	X	8-21
SPI	X	X	8-22
SRO	X	X	8-22
SSA	X	X	8-22
SSN	-	X	8-23
TIM	X	X	8-23
VFD	X	X	8-23

8.3.1 Customer Commands

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Applicable Identification	AID_	48 bytes, alphanumeric	<p>Command or Query.</p> <p>Use "AID" to sets or return a name (also called the 'Circuit ID') for the unit or station.</p> <p>Set or return in the form AID_XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXXXXXXXXXX where:</p> <p>x...x=First line, limited to first 24 characters.</p> <p>y...y=Second line, limited to next 24 characters.</p> <p>(Do not issue carriage return between first line and second line)</p> <p>Command Example: <0001/AID_----Earth Station 1----- Converter #1-----{cr}</p>	AID_	AID_	AID_x...y
Attenuation Offset	ATO_A_SY.Z	6 bytes, alphanumeric	<p>Command or Query.</p> <p>Use "ATO" to set or return the Converter A attenuation offset value.</p> <p>Set or return in the form ATO_A_SY.Z where:</p> <p>A=Conv 'A'</p> <p>S=Sign (+ or -)</p> <p>Y=Number between 0 and 5</p> <p>Z=Number between 0 and 9</p> <p>Command Example: <0001/ATO_A_+2.3{cr}</p> <p>Notes:</p> <ol style="list-style-type: none"> "ATO" is valid for Conv A only. Specifying Conv B returns an error message. Y.Z value cannot be greater than 5.0. If (displayed attenuation+offset)<0, actual attenuation will be set to 0 dB. If (displayed attenuation+offset)>maximum attenuation, actual attenuation will be set to maximum attenuation. Actual attenuation equals the sum of Attenuation displayed on front panel plus Offset. 	ATO_A_SY.Z	ATO_A_	ATO_A_

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Attenuation Level	ATT_y_xx.xx	7 bytes, alphanumeric	<p>Command or Query.</p> <p>Use "ATT" to set or return the attenuation level, in dB, in 0.1 dB steps.</p> <p>Set or return in the form ATT_y_xx.xx where:</p> <p>y=A (Conv A) or B (Conv B)</p> <p>xx.xx=Valid attenuation level, in dB (0.1 dB step size is factory default)</p> <p>Command Example: <0001/ATT_A_+12.20{cr}</p>	ATT_y_xx.xx	ATT_y_	ATT_y_ xx.xx
Clear All Alarms	CAA_xxx{cr}	3 bytes, alphabetic	<p>Command only.</p> <p>Use "CAA" to clear all stored alarms from the Target's events log.</p> <p>Set or return in the form CAA_xxx where:</p> <p>xxx=YES</p> <p>Command Example: <0001/CAA_YES{cr}</p>	CAA_CLEAR ED	N/A	N/A
Concise Alarm Status	N/A	13 bytes, numeric	<p>Query only.</p> <p>Use "CAS" to return the Alarm Status for the unit.</p> <p>Returns alarm status as 0 = NO FAULT or 1 = FAULT for each item in the form "CAS_abcdefghijklm{cr}{lf}" where:</p> <p>a=12VDC #1 Fault b=8VDC #1 Fault c=5VDC #1 Fault d=12VDC #2 Fault e=8VDC #2 Fault f=5VDC #2 Fault g=REF LD Fault h=IFLO A Fault i=RFLO A Fault j=TEMP A Fault k=IFLO B Fault l=RFLO B Fault m=TEMP B Fault</p>	N/A	CAS_	CAS_x...x

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Concise Configuration Status	N/A	52 bytes, numeric	<p>Query only. Use "CCS" to return a summarized version of the RCS query. Returns status info in the form "CCS_aaaaa.aaabb.bbcd.deffff.ffffg.gghi.ijklmnnnopqqqrs{cr}{lf}" where:</p> <ul style="list-style-type: none"> aaaaa.aaa=Conv A frequency in MHz bb.bb=Conv A attenuation in dB c=Conv A mute state (0=unmuted, 1=muted) d.d=Conv A slope adjustment level e=Conv A online/offline (redundancy) ffff.fff=Conv B frequency in MHz gg.gg=Conv B attenuation in dB h=Conv B mute state (0=unmuted, 1=muted) i.i=Conv B slope adjustment level j=Conv B online/offline (redundancy) k=Converter redundancy mode l=auto fault recovery (1=auto, 0=manual) m=External Ref present (0=none, 1=present) nnn=Internal Ref Osc adjustment level (000-255) o=remote mode (1=remote, 0=local) p=remote interface (0=EIA-232, 1=EIA-485) qqqq=remote address (0001-9999) r=remote baud rate (0=38400, 1=19200, 2=9600, 3=4800, 4=2400, 5=1200) s=remote data format (0=8N1, 1=7E2, 2=7O2) 	N/A	CCS_	CCS_a...s

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Configure Mute Mode	CMM_y_xxx	5 bytes, alphabetic	<p>Command or Query. Use "CMM" to set or return the mute mode. Set or return in the form CMM_y_xxx where:</p> <ul style="list-style-type: none"> y=A (Conv A) y=B (Conv B) xxx=ON (mute) xxx=OFF (unmute) <p>Command Example: <0001/CMM_A_OFF{cr} (Unmutes Converter A)</p>	CMM_y_xxx	CMM_y_	CMM_y_xxx
Concise Maintenance Status	N/A	85 bytes, numeric	<p>Query only. Use "CMS" to return a summarized version of the maintenance status. Returns status info in the form "CMS_aaa.abbb.bccc.dddd.eeff.fggg.ghhh.hiii.ijjj.kkkk.lll.lmmm.mnnn.nooo.pppp.pqqq.q{cr}{lf}" where:</p> <ul style="list-style-type: none"> aaa.a=12 VDC supply #1 in volts bbb.b=8 VDC supply #1 in volts ccc.c=5 VDC supply #1 in volts ddd.d=12 VDC supply #2 in volts eee.e=8 VDC supply #2 in volts fff.f= 5 VDC supply #2 in volts ggg.g=Ref Osc tuning in volts hhh.h=Converter A IFLO tuning in volts iii.i= Converter A RFLO tuning in volts jjj.j=Converter A Input Power in dBm (Reserved for future use) kkk.k=Converter A Output Power in dBm (Reserved for future use) lll.l= Converter A temperature in degrees C mmm.m=Converter B IFLO tuning voltage in volts nnn.n= Converter B RFLO tuning voltage in volts ooo.o=Converter B Input Power in dBm (Reserved for future use) ppp.p=Converter B Output Power in dBm (Reserved for future use) qqq.q=Converter B temperature in degrees C 	N/A	CMS_	CMS_a...q

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Concise Utility Status	N/A	85 bytes, numeric	Query only. Use "CUS" to return a summarized version of the utility status. Returns utility status in the form "CUS_hh:mm:ssmm/dd/yyabcsssffffffggggggghhhhhh{cr}{lf}" where: hh:mm:ss=TIME mm/dd/yy=DATE a=X (reserved for future use) b=X (reserved for future use) c=display brightness (0=100%, 1=75%, 2=50%, 3=25%) sss=screen saver time in minutes ffffff=BULK firmware ggggggg=M&C firmware hhhhhhh=FPGA firmware	N/A	CUS_	CUS_t...h
Set RTC (Real Time Clock) Date	DAT_	8 bytes, numeric	Command or Query. Use "DAT" to set or return the calendar date. Returns info in the form DAT_mm/dd/yy where: mm=month of the year, from 01 to 12 dd=day of the month, from 01 to 31 yy=year, from 00 to 96 (2000 to 2096) Command Example: <0001/DAT_04/25/16{cr} (Sets date as April 25, 2016)	DAT_	DAT_	DAT_mm/dd/y
Force Backup Unit	FBU_	0 bytes	Command only. Use "FBU" to force switchover to the backup unit. Valid in Manual redundancy mode only. This command takes no arguments.	N/A	N/A	N/A
Operating Frequency	FRE_y_xxxx x.xxx	11 bytes, alphanumeric	Command or Query. Use "FRE" to set or return the operating frequency, in MHz. Set or return info in the form FRE_y_ xxxxx.xxx where: y=A (Conv A) or B (Conv B) xxxxx.xxx=valid operating frequency, in MHz, entered in 1kHz steps. Command Example: <0001/FRE_A_00951.000{cr}	FRE_y_xxxxx .xxx	FRE_y_	FRE_y_xxxxx. xxx

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Fault Relay Logic	FRL_	1 byte, numeric	Command or Query. Use "FRL" to set or return the fault relay logic. Set or return info in the form FRL_x where: x=0 (Normal Logic) x=1 (Inverted Logic)	FRL_	FRL_	FRL_x
Retrieve Firmware Number	N/A	0 bytes	Query only. For use with current (Ethernet-ready) versions of the LBC-4000/-ST. Returns the firmware information for the unit. Returns the current unit firmware info in the form: "Boot: {cr} FW-0020506;X.X.X;mm/dd/yy{cr} Bulk1: {cr} FW-0020503; X.X.X;mm/dd/yy{cr} FW-0020504; X.X.X;mm/dd/yy{cr} FW-0020505; X.X.X;mm/dd/yy{cr} Bulk2: {cr} FW-0020503; X.X.X;mm/dd/yy{cr} FW-0020504; X.X.X;mm/dd/yy{cr} FW-0020505; X.X.X;mm/dd/yy{cr}{lf}" where: X.X.X is the Firmware Version Number, and mm/dd/yy is the release date.	N/A	FRM_	FRM_x...x
Retrieve Legacy Firmware Number	N/A	0 bytes	Query only. For use with legacy (non-Ethernet) versions of the LBC-4000. Returns the firmware information for the unit. Returns the legacy unit firmware info in the form: "BULK=FW/9965X{cr} M&C=FW/9966X{cr} FPGA=FW/9967X{cr}{lf}" where: 'X' denotes the Firmware Revision Letter)	N/A	FRW_	FRW_x

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Select Boot Image	IMG_	1 byte, numeric, 1 or 2	Command or Query. Set or return the firmware image to boot from at startup. Set or return in the form IMG_x where: x=1 (Bulk Image 1) or x=2 (Bulk Image 2)	IMG_	IMG_	IMG_x
Management IP Address	IPA_	18 bytes, numeric	Command or Query. Set or return the Management IP Address for the '10/100 ETHERNET' port. Set or return in the form IPA_aaa.bbb.ccc.ddd.yy where: aaa.bbb.ccc.ddd=IP Address where: aaa=0-223 bbb=0-255 ccc=0-255 ddd=0-255 yy=network prefix (08-30)	IPA_	IPA_	IPA_aaa.bbb.ccc.ddd.yy
Gateway IP Address	IPG_	15 bytes, numeric	Command or Query. Set or return the Gateway IP Address for the '10/100 ETHERNET' port. Set or return in the form IPG_aaa.bbb.ccc.ddd where: aaa.bbb.ccc.ddd=IP Address where: aaa=0-223 bbb=0-255 ccc=0-255 ddd=0-255	IPG_	IPG_	IPG_aaa.bbb.ccc.ddd

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
List All Alarms	N/A	Varies	<p>Query only. Use "LAA" to return the list of stored alarms. Return stored alarms in the form:</p> <pre>"xx yyyyyyyyyy hh:mm:ss mm/dd/yy{cr} " " " " {cr} " " " " {cr} xx yyyyyyyyyy hh:mm:ss mm/dd/yy{cr}{lf}"</pre> <p>where: xx=stored fault number yyyyyyyyyy=fault description hh:mm:ss=fault time mm/dd/yy=fault date</p>	N/A	LAA_	LAA_ xx y...y h...s m...y
Local or Remote State	LRS_	1 byte, numeric, 0 to 3	<p>Command or Query. Use "LRS" to set or return the unit operating mode. Set or return in the form LRS_x where:</p> <ul style="list-style-type: none"> x= 0 (Local) x=1 (Serial Remote EIA-232/485) x=2 (Ethernet Remote) x=3 (Ethernet+Serial Remote) 	LRS_	LRS_	LRS_x
Retrieve Unit MAC Address	N/A	12 bytes, alphanumeric	<p>Query only. Returns the factory-assigned MAC address for the unit, in hexadecimal. Return in the form LRS_x where:</p> <ul style="list-style-type: none"> x= 0 (Local) x=1 (Serial Remote EIA-232/485) x=2 (Ethernet Remote) x=3 (Ethernet+Serial Remote) <p>Query Response Example: >0001/MAC_0006B00001C2{cr}{lf}</p>	N/A	MAC_	MAC_aabbcccd deeff

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Mute State	MUT_	5 bytes, alphabetic	Command or Query. Use "MUT" to mute or unmute the specified module. Set or return in the form MUT_y_xxx where: y=A (Conv A) y=B (Conv B) xxx=ON (mute) xxx=OFF (unmute)	MUT_	MUT_y_	MUT_y_xxx
Online State	N/A	1 byte, alphabetic	Query only. Use "ONL" to return which converter (slot) is ONLINE. Return in the form ONL_y where: y=A (Conv A) y=B (Conv B)	N/A	ONL_	ONL_y
Retrieve Part Number	N/A	1 byte, alphabetic	Query only. Returns the factory-assigned CEFD part number for the Unit, Conv A, or Conv B. Return in the form PNM_y_ where: y=U (Unit) y=A (Conv A) y=B (Conv B) Query Examples: <0001/PNM_U_{cr} (Returns the Unit part number) <0001/PNM_A_{cr} (Returns the Conv A part number) <0001/PNM_B_{cr} (Returns the Conv B part number) Note: This number is the DOTCODE at the time the part was manufactured. The DOTCODE may be up to 96 printable ASCII characters long.	N/A	PNM_y_	PNM_y_x..x

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Alarm Status	N/A	122 bytes, alphanumeric	<p>Query only. Use "RAS" to return the alarm status for the unit. Return the detailed alarm status, where xx=OK (NO FAULT) 12VDC1_xx{cr} 08VDC1_xx{cr} 05VDC1_xx{cr} 12VDC2_xx{cr} 08VDC2_xx{cr} 05VDC2_xx{cr} REFLD_xx{cr} IFLOA_xx{cr} RFLOA_xx{cr} TEMPA_xx{cr} IFLOB_xx{cr} RFLOB_xx{cr} TEMPB_xx{cr}{lf}</p> <p>xx=FT (FAULT): 12VDC #1 Fault 8VDC #1 Fault 5VDC #1 Fault 12VDC #2 Fault 8VDC #2 Fault 5VDC #2 Fault Ref Osc Lock Detect Fault* Conv A IFLO Lock Detect Fault Conv A RFLO Lock Detect Fault Conv A Over Temperature Fault Conv B IFLO Lock Detect Fault Conv B RFLO Lock Detect Fault Conv B Over Temperature Fault</p> <p>*Note: "REFLD" is returned only when an external reference is present</p>	N/A	RAS_	RAS_x...x

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Configuration Status	N/A	186 bytes, alphanumeric	<p>Query only. Use "RCS" to return the configuration status for the unit. Return the detailed configuration status for the unit:</p> <p>FRE_A_xxxxx.xxx Conv A frequency ATT_A_xx.xx Conv A attenuation TX_A_yyy Conv A mute state SLP_A_x.x Conv A slope adjustment ONL_A_yyy Conv A ONline/OFFline FRE_B_xxxxx.xxx Conv B frequency ATT_B_xx.xx Conv B attenuation TX_B_yyy Conv B mute state SLP_B_x.x Conv B slope adjustment ONL_B_yyy Conv B ONline/OFFline RED_yyy Conv Redundancy ON/OFF AFR_yyy Auto Fault Recovery ON/OFF EXT_yyy External Reference YES/NO REF_xxx Ref Osc Adjustment REM_yyy Remote Mode YES/NO COMM_RS-xxx Remote Interface RS-232/RS-485 ADD_xxxx Remote Address 0001-9999 BR_xxxx Remote Baud Rate FMT_X-X-X Remote Data Format</p>	N/A	RCS_	RCS_F...X
Redundancy Mode	RED_	3 bytes, alphabetic	<p>Command or Query. Use "RED" to set or return the active redundancy mode. Set or return in the form RED_yyy where: yyy=ON (Redundancy is enabled) yyy=OFF (Redundancy is disabled)</p>	RED_	RED_	RED_

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Remote Mode	REM_	1 bytes, numeric, 0 or 1	<p>Command or Query.</p> <p>Use "REM" to set or return the active operating mode as Local or Remote.</p> <p>Set or return in the form REM_x where:</p> <ul style="list-style-type: none"> x=0 (Local Mode) x=1 (Remote Mode) <p>Command Example:</p> <p><0001/REM_1{cr} (sets operation to Remote Mode)</p>	REM_	REM_	REM_x
Retrieve Equipment Type	N/A	22 bytes, alphanumeric	<p>Query only.</p> <p>Use "RET" without an argument to return the model number and firmware version of the unit.</p> <p>Query, when used without argument, returns a string in the form RET_LBC-4000_VER:X.X.X where:</p> <ul style="list-style-type: none"> X.X.X=Firmware Version Number <p>Query Example:</p> <p><0001/RET_{cr}</p> <p>>0001/RET_LBC-4000 VER:1.2.5{cr}{lf}</p>	N/A	RET_	RET_
Retrieve Module Type	N/A	12 bytes, alphanumeric	<p>Query only.</p> <p>Use "RET" with an argument to return the operating frequency and function (i.e., up/down) of the selected module.</p> <p>Query, when used with argument y, where:</p> <ul style="list-style-type: none"> y=A (Conv A) y=B (Conv B) <p>returns a string in the form RET_y_xxx_ZZ where:</p> <ul style="list-style-type: none"> xxx=Frequency of selected module (070 or 140) ZZ=UL (Uplink) ZZ=DL (Downlink) <p>Query Examples:</p> <p><0001/RET_A_{cr}</p> <p>>0001/RET_A_140_DL{cr}{lf}</p> <p><0001/RET_B_{CR}</p> <p>>0001/RET_B_070_UL{cr}{lf}</p>	N/A	RET_y_	RET_y_x...Z

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Maintenance Status	N/A	203 bytes, alphanumeric	<p>Query only. Use "RMS" to return the maintenance status of the unit. Returns detailed maintenance status for the unit:</p> <p>12VT1=xxx.x{cr} 12VDC Supply #1 in volts 08VT1=xxx.x{cr} 8VDC Supply #1 in volts 05VT1=xxx.x{cr} 5VDC Supply #1 in volts 12VT2=xxx.x{cr} 12VDC Supply #2 in volts 08VT2=xxx.x{cr} 8VDC Supply #2 in volts 05VT2=xxx.x{cr} 5VDC Supply #2 in volts VTREF=xxx.x{cr} Ref Osc tuning in volts IFLOA=xxx.x{cr} Conv A IFLO tuning in volts RFLOA=xxx.x{cr} Conv A RFLO tuning in volts PIN_A=xxx.x{cr} Conv A Input power in dBm POUTA=xxx.x{cr} Conv A Output power in dBm TEMPA=xxx.x{cr} Conv A temperature in deg C IFLOB=xxx.x{cr} Conv B IFLO tuning in volts RFLOB=xxx.x{cr} Conv B RFLO tuning in volts PIN_B=xxx.x{cr} Conv B Input power in dBm POUTB=xxx.x{cr} Conv B Output power in dBm TEMPB=xxx.x{cr} Conv B temperature in deg C</p>	N/A	RMS_	RMS_x...x
Retrieve Utility Status	N/A	98 bytes, alphanumeric	<p>Legacy Query only. Use "RUS" to return the operating utility features for the unit. Return the detailed utility status for the unit where:</p> <p>hh:mm:ss=TIME mm/dd/yy=DATE xxxx=FSDA (Reserved for future use) xxxx=FSDB (Reserved for future use) yyy=BVFD zzz=SCRT FW9965X=BULK FW (where X=revision letter) FW9966X=M&C FW (where X=revision letter) FW9967X=FPGA FW (where X=revision letter)</p>	N/A	RUS_	RUS_x...x

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Set Auto/Manual Switching Mode	SAM_	1 byte, alphabetic	Command or Query. Use "SAM" to set or return the operating redundancy switching mode as Automatic or Manual. Set or return in the form SAM_x where: x=A (Automatic Switching Mode) x=M (Manual Switching Mode) Command Example: <0001/SAM_M{cr}	SAM_	SAM_	SAM_x
Summary Alarm Status	N/A	2 bytes, alphabetic	Query only. Use "SAS" to return the status of the Summary Fault Relay. Returns Summary Fault Relay status in the form SAS_xx where: xx=OK xx=FT	N/A	SAS_	SAS_x
Remote Baud Rate	SBR_	4 bytes, alphanumeric	Command or Query. Use "SBR" to set or return the serial baud rate of the unit. Set or return in the form SBR_xxxx where: xxxx=remote baud rate where: 1200=1200 baud 2400=2400 baud 4800=4800 baud 9600=9600 baud 19K2=19200 baud 38K4=38400 baud Command Example: <0001/SBR_38K4{cr} (sets baud rate to 38400 baud)	SBR_	SBR_	SBR_xxxx
Set Physical Address	SPA_	4 bytes, numeric	Command or Query. Use "SPA" to set or return the physical remote device address for the unit. Set or return in the form SPA_xxxx where: xxxx=Physical Address from 0001 to 9999 (Resolution=0001) Command Example: <0001/SPA_0412{cr} (sets physical device address to 0412)	SPA_	SPA_	SPA_xxxx

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Spectral Inversion	SPI_	5 bytes, numeric	<p>Command or Query.</p> <p>Use "SPI" to set or return the Spectral Inversion for the selected module.</p> <p>Set or return in the form SPI_y_xxx where:</p> <ul style="list-style-type: none"> y=A (Conv A) y=B (Conv B) xxx=NRM (Normal spectrum) xxx=INV (Inverted spectrum) <p>Command Example: <0001/SPI_A_INV{cr} (Set Conv A to Inverted spectrum)</p>	SPI_	SPI_	SPI_y_xxx
Reference Oscillator Adjustment	SRO_	3 bytes, numeric	<p>Command or Query.</p> <p>Use "SRO" to set or return the reference oscillator adjustment level.</p> <p>Set or return in the form SRO_xxx where:</p> <ul style="list-style-type: none"> xxx=value from 000 to 255 (Resolution=001) <p>Note: This command is not valid (SRO cannot be adjusted) when the unit is locked to an external reference source.</p>	SRO_	SRO_	SRO_xxx
Slope Adjustment Level	SSA_	5 bytes, alphanumeric	<p>Command or Query.</p> <p>Use "SSA" to set or return the converter slope adjustment level.</p> <p>Set or return in the form SSA_y_x.x where:</p> <ul style="list-style-type: none"> y=A (Conv A) y=B (Conv B) x.x=slope adjustment value from 0.1 to 1.0 in 0.1 steps <p>Command Example: <0001/SSA_B_0.3{cr} (Sets Converter B slope adjustment level to 0.3)</p>	SSA_	SSA_	SSA_xxx

Parameter Type	Command (Instruction Code and Qualifier)	Arguments for Command or Response to Query	Description of Arguments (Note that all arguments are ASCII numeric codes between 48 and 57)	Response to Command (Target to Controller)	Query (Instruction Code and Qualifier)	Response to Query (Target to Controller)
Retrieve Serial Number	N/A	9 bytes, numeric	<p>Query only. Use "SSN" to retrieve the unit or converter factory-assigned 9-digit serial number. Return in the form SSA_y_xxxxxxxx where: y=U (Unit) y=A (Conv A) y=B (Conv B) xxxxxxxx=9-digit serial number</p> <p>Query Example: <0001/SSN_U{cr} >0001/SSN_U_012345678{cr}{lf}</p>	N/A	SSN_y_	SSN_y_XXXX XXXX
Set RTC (Real Time Clock) Time	TIM_	8 bytes, numeric	<p>Command or Query. Use "TIM" to set or return the real-time clock time. Set or return the time, in military/from midnight format, in the form TIM_hh:mm:ss where: hh:=hours from 00 to 23 mm:=minutes, from 00 to 59 ss=seconds, from 00 to 59</p> <p>Command Example: <0001/TIM_23:12:59{cr} (Sets time from midnight to 23 hours, 12 minutes, 59 seconds, or 11:12:59 PM)</p>	TIM_	TIM_	TIM_hh:mm:ss
Set Vacuum Fluorescent Display Brightness	VFD_	1 byte, numeric value, 0 to 3	<p>Command or Query. Use "VFD" to set or return the brightness level for the front panel display. Set or return the vacuum fluorescent display brightness in the form VFD_x where: x=0 (100%) x=1 (75%) x=2 (50%) x=3 (25%)</p>	VFD_	VFD_	VFD_x

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Appendix A. LBC-4000 UP/DOWN CONVERTER IDU MODULE REMOVAL/RE-INSTALLATION

A.1 Overview

This appendix illustrates the procedure required to remove and re-install an IDU module for the LBC-4000 Up/Down Converter System into any LBC-4000 chassis (Figure A-1 shows a legacy serial-only chassis with the top cover removed for clarity). This procedure is typical for removing or installing a module into the LBC-4000's applicable Conv A or Conv B bay.



While Figure A-1 shows the legacy chassis (LBC-4000 L-Band Up/Down Converter System without Ethernet), the procedures in this appendix apply identically to the Ethernet-based LBC-4000.

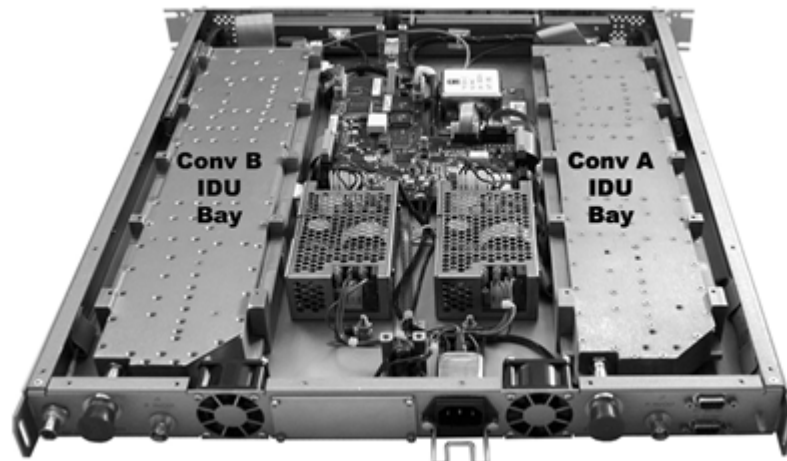
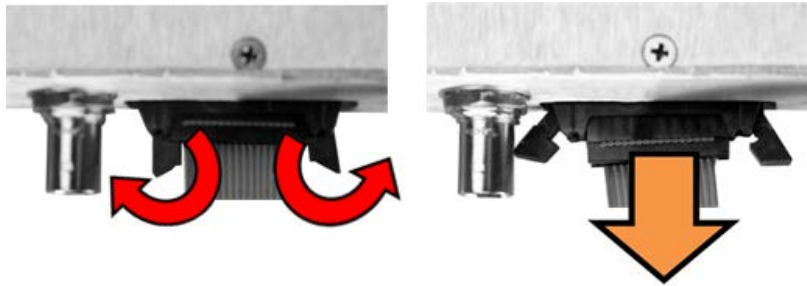



Figure A-1. LBC-4000 Chassis – IDU Module Bays

A.2 IDU Module Removal Procedure

Perform the following steps to remove the IDU Module:

Step	Task	
1	Loosen the front panel thumbscrews and drop the front panel to access the IDU modules.	
2	Loosen the captive machine screws holding the IDU module in place.	
3	Remove the Reference Cable: Unlock and then remove the connector from its socket.	

Step	Task	
4	Remove the Ribbon (Data) Cable: Unlock, and then remove, the ribbon cable connector from its socket.	 <p data-bbox="672 548 959 583">(a) Unlock Connector</p> <p data-bbox="1092 548 1398 583">(b) Remove Connector</p>
5	Remove the IDU module from the chassis. Use the module front handle to slide it straight out until it is free and clear of its internal chassis guides.	

A.3 IDU Module Re-Installation Procedure



Chapter 4. SPECIFICATIONS

Perform the following steps to re-install the IDU Module:

Step	Task	
1	Install the replacement IDU module. Make sure to engage the module guide rails within the chassis. Then, use the module front handle to slide the module into a position that allows you to connect the Reference Cable and the Ribbon (Data) Cable.	
2	Connect the Ribbon (Data) Cable: Insert, and then lock, the ribbon cable connector into its socket.	<p style="text-align: center;">(a) Install Connector (b) Lock Connector</p>
3	Connect the Reference Cable: Install the cable connector onto the socket, and then lock the cable into operating position.	

<p>4</p>	<p>Install the IDU module into the chassis: Use the module front handle to push it straight in until it is fully engaged inside its internal housing.</p>	
<p>5</p>	<p>Tighten the captive machine screws to secure the module in place.</p>	
<p>6</p>	<p>Swing the front panel back into operating position and finger-tighten the three thumbscrews.</p>	

The IDU module installation is complete and the LBC-4000 L-Band Up/Down Converter System is now ready for connection to other equipment. See **Chapter 4. REAR PANEL CONNECTIONS** for further information.

Appendix B. REDUNDANCY OPERATION

B.1 Overview



The redundancy hardware option is required for use of the LBC-4000 L-Band Up/Down Converter System in 1:1 redundant operations.

You may optionally configure the LBC-4000 for redundant system operation. This appendix provides detailed information for cabling and otherwise configuring the LBC-4000 for 1:1 redundancy.

Figure B-1 provides a functional schematic for LBC-4000 redundant operation.

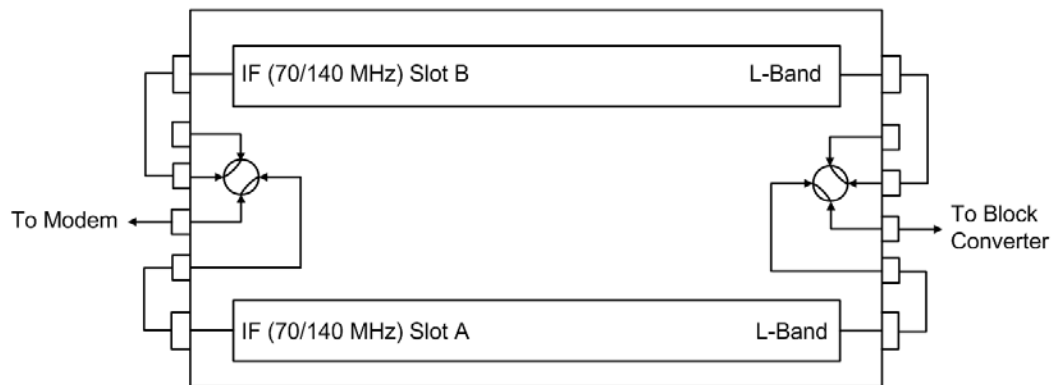


Figure B-1. LBC-4000 Redundancy – Functional Schematic

Figure B-2 illustrates the cabling requirements for redundant operation. Note the following:

- BNC connections, where applicable, use 50Ω BNC male-to-male cables.
- CEFD recommends that all Type 'N' to Type 'SMA' cable connections are best accomplished using a Type 'N' male to Type 'SMA' female adapter, then using Type 'SMA' female-to-female cables.

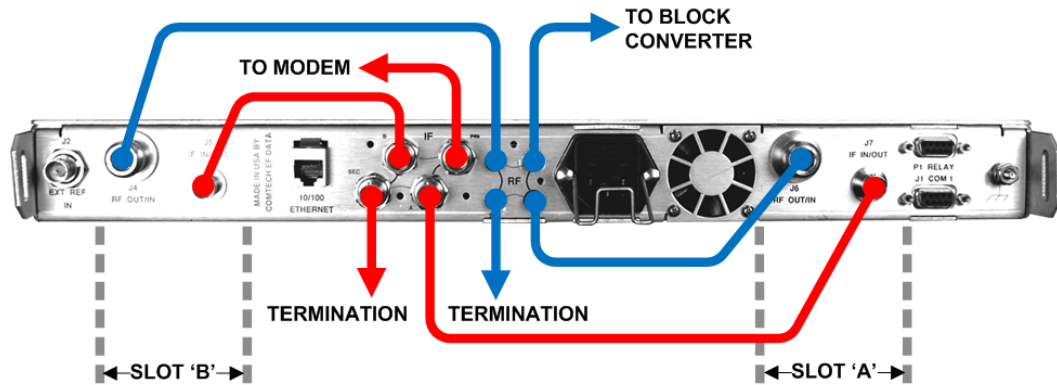


Figure B-2. LBC-4000 Rear Panel – Redundancy Cabling Schematic

See Sect. B.2 for LBC-4000 Redundancy System configuration, monitor and control using the LBC-4000 front panel.

See Sect. B.3 for LBC-4000 Redundancy System configuration, monitor and control using the LBC-4000 HTTP (Web Server) Interface.

See Sect. B.4 for LBC-4000 Redundancy System configuration, monitor and control using the serial remote interface.

B.2 LBC-4000 Front Panel Operations



Chapter 6. FRONT PANEL OPERATION

See **Chapter 6. FRONT PANEL OPERATION** for front panel figures and details.

See **Chapter 6. FRONT PANEL OPERATION**, Section **6.3.3** for the initial CONFIG menu.

B.2.1 (CONFIG:) REDUND (Redundancy) Submenu

```
Redundancy:
Mode  State  FrcBkup
```

Use the [**←**][**→**] arrow keys to select **Mode**, **State**, or **F** up. Press [**ENT**].

(CONFIG:) Redundancy → Mode

```
Redundancy:
Control Mode = Manual
```

Use the [**↑**][**↓**] arrow keys to select **Manual** or **Auto**. Press [**ENT**].

Note that, if you attempt to access this menu and the **Redundancy State** is **Disabled**, you will see this message:

```
Not Available In
Current Mode
```

CONFIG: Redundancy → State

```
Redundancy Mode:
Control State = Enable
```

Use the [**↑**][**↓**] arrow keys to select **Disable** or **Enable**. Press [**ENT**].

CONFIG: Redundancy → FrcBkup

```
Config Manual Redundancy
Force Backup      NO
```

To force the redundant unit into standby mode, use the [**↑**][**↓**] arrow keys to select **YES** or **NO**. Press [**ENT**].

Note that, if you attempt to access this menu and the **Redundancy State** is **Disabled**, you will see this message:

```
Not Available in  
Current Mode
```

B.2.2 Gain Offset for Redundant Operations

Once you enable redundancy operation, you must use the **Ofst** (Gain Offset) command to define the gain offset compensation in order to match gain between the two converters.



Gain Offset is configured at installation and initial setup only. You should use the normal attenuation functions during normal operations.

To set the Gain Offset parameters for redundant operation, do these steps:

1. Monitor the output signal level on power meter / spectrum analyzer.
2. Enable Redundancy on the converter (**SELECT:CONFIG → REDUND → STATE=Enable**).
3. Put the converter into “Manual” Redundancy Mode (**SELECT:CONFIG → REDUND → MODE=Manual**).
4. Force Converter B online (**SELECT:CONFIG→REDUND→FrcBkup=YES**). Then, measure the output.
5. Force Converter A online (**SELECT: CONFIG→REDUND→FrcBkup=YES**). Then, adjust the Gain Offset. Using the **SELECT: CONFIG → Conv-A → ATTEN/SLOPE** submenu:

```
CONFIG CnvA Ofst=+0.0dB  
Atten=20.00dB Slope=0.0
```

- a. Use the [**←**][**→**] arrow keys to select the Gain Offset (**Ofst=**) digit to edit, and then use the [**↑**][**↓**] arrow keys to change that value.
 - b. Once the Gain Offset output value matches Converter B, press [**ENT**].
6. Repeat Steps 4 and 5 until the output levels track.
 7. Return unit to the desired redundancy state.

B.3 Redundancy Operations Using the LBC-4000 HTTP Interface



Chapter 7. ETHERNET INTERFACE OPERATION

Use the LBC-4000 HTTP Interface '**Config | Redundancy**' page to configure the LBC-4000's Redundancy Switch Mode.

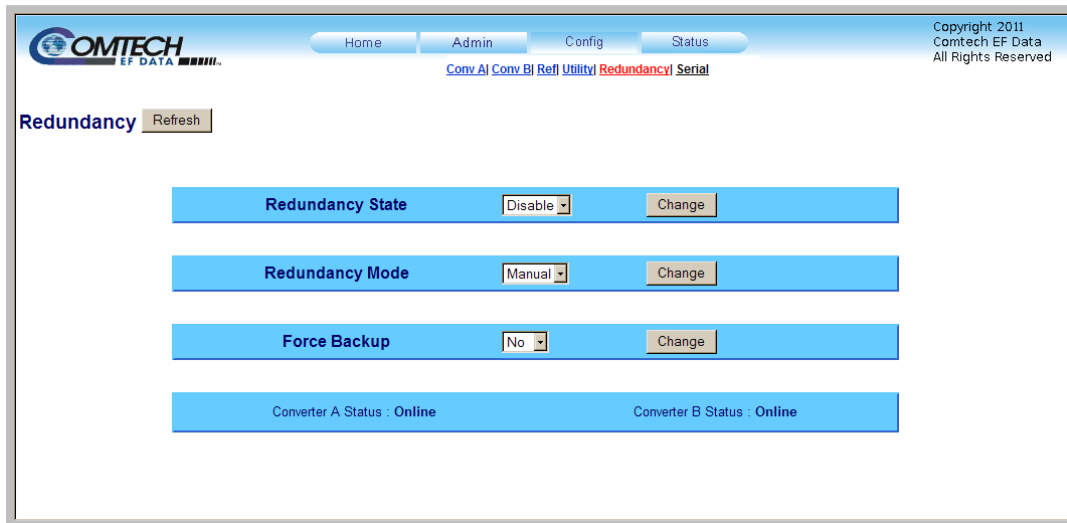


Figure B-3. 'Config | Redundancy' Page

Redundancy

Click [**Refresh**] to update screen.

Name	Description
Redundancy State	Use the drop-down menu to select Enable or Disable . Click [Change] to set LBC-4000 Redundancy operation to this select status.
Redundancy Mode	Use the drop-down menu to select Manual or Auto . Click [Change] to update LBC-4000 Redundancy operation to this select operating mode.
Force Backup	Use the drop-down menu to select Yes . Click [Change] to force the redundant unit into standby mode.
Converter A Status	This <i>read-only</i> showing Online or Offline .
Converter B Status	This <i>read-only</i> showing Online or Offline .

B.4 Redundancy Operations Using Serial Remote Control



Chapter 8. SERIAL INTERFACE OPERATION

The “FBU,” “RED,” and “SAM” remote commands and queries are provided for LBC-4000 redundancy operation.

See **Chapter 8. SERIAL INTERFACE OPERATION** for remote command details.



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