Instruction Manual

Model 4115-67

Block Upconverter

July 2014, Rev. A

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INSTRUCTION MANUAL

MODEL 4115-67 Block Upconverter, Weather Resistant*

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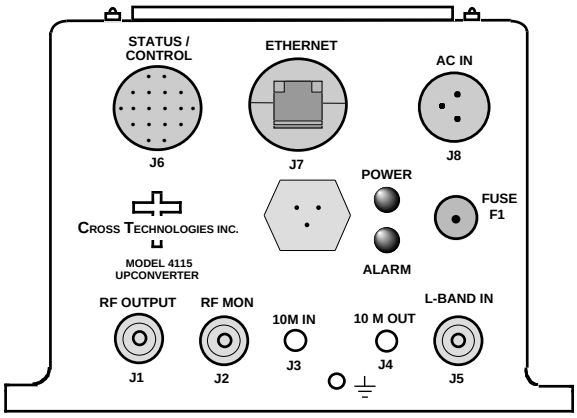
MODEL 4115-67 Block Upconverter, Weather Resistant*

1.0 General

1.1 Equipment Description

The 4115-67 Block Upconverter converts 0.95 - 1.825 GHz to 5.85 - 6.725 GHz with a 4.9 GHz local oscillator (LO). Front panel LEDs provide indication of DC Power, and PLL Alarm. The L-band to RF gain is +30 dB. Connectors are Type N for the L-band, RF and RF Monitor and SMA (all female) for the external reference input and reference output. Gain and internal 10 MHz frequency are controlled by the Ethernet M&C or via the Status/Control connector. In AUTO, the 10 MHz reference stays in external if the external level is in the +2 to +8 dBm range. The 4115 is powered by a 100-240 ± 10% VAC power supply, and mounted in a 8"W X 6"H X 16"D Weather Resistant* enclosure.

NOTE: ***Weather Resistant** enclosures are designed to be water resistant for installation in an outdoor enclosure/antenna hut OR mounted outdoors on an antenna assembly at their specified temperature ranges. They are designed to be located "out in the elements" (water, sleet, snow, etc.) but they are *not* designed to be "submerged under water". If an extended temperature range is required, there is an **Extended Temperature** option (**Option W21**; -30˚C to +60˚C) available at an additional cost. Contact Cross for quote.



Model 4115-67 Block Upconverter Front Panel

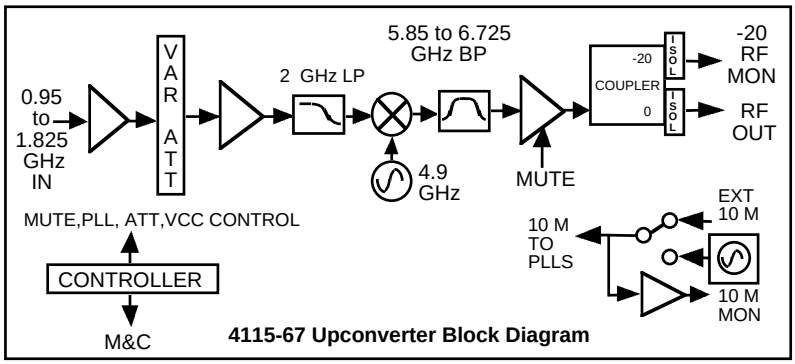


FIGURE 1.0 Model 4115-67 Upconverter Block Diagram

1.2 Technical Characteristics

TABLE 1.0 4115-67 Block Upconverter Specifications*	
Input Characteristics	
Input Impedance/Return Loss	50Ω/14 dB
Frequency	0.95 to 1.825 GHz
Noise Figure, Maximum	20 dB maximum gain
Input Level Range	-40 to -15 dBm
Output Characteristics	
Impedance/Return Loss	50Ω / 14 dB, Mute & UnMute
Frequency (GHz)	5.85 to 6.725
Output Level Range	-15 to 0 dBm
Output 1 dB Compression	+10 dBm, Maximum Gain
Mute	> 60 dB @ 0 dBm Output
Channel Characteristics	
Gain at F_C	+30 ±3 dB, (+30 to 0 dB variable in 0.5 ± 0.5 dB Steps)
Spurious, Inband	SIGNAL RELATED <-55 dBc in band, -15 to 0 dBm out; SIGNAL INDEPENDENT,<-60 dBm
Spurious, Out of Band	<-55 dBm; 4.85 - 5.84 and 6.726 - 7.725 GHz
Intermodulation	<-50 dBc for two carriers at 4 MHz spacing, each at -5 dBm out, max. gain
Frequency Response	±2 dB, over RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting
RF Output Monitor	-20 ±2 dB of RF Out; Response ±2 dB, over RF band; ± 0.5 dB, 40 MHz BW
LO Characteristics	
LO Frequency	4.9 GHz
Frequency Accuracy	± 0.05 ppm max. over temp internal reference; external reference input

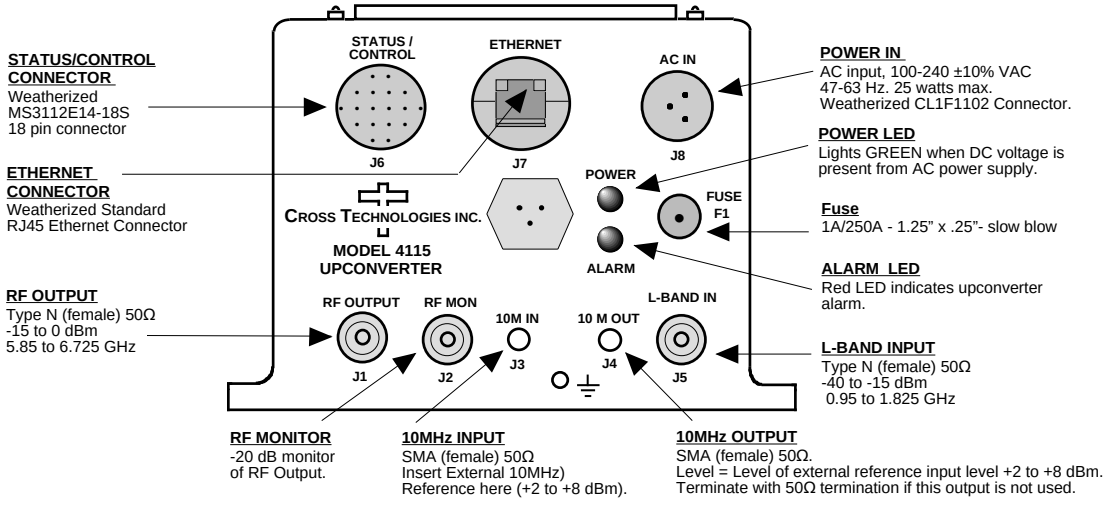
Phase Noise @ Frequency	100 MHz	1kHz	10kHz	100kHz	1MHz
dBc/Hz	-70	-80	-85	-98	-110

10 MHz Level (In/Mon)	+2 to +8 dBm in; Monitor Output = input level ± 1.0 dB, 50 ohms
Controls, Indicators	
Gain, 10 MHz Frequency	Gain and internal 10 MHz frequency via Ethernet M&C (with SNMP) or Status Control Connector
PLL Alarm	Red LED, External Contact Closure
Power	Green LED
Other	
RF In, Monitor Connector	Type N (female), 50Ω
L-Band Connector	Type N (female), 50Ω
10 MHz Connectors	SMA (female), 50Ω
Weather Resistant* Connectors	Status/Control Connector, MS3112E14-18S; Mating Cable Connector, MS3116F14-18P. Ethernet Conector, RJF21B; Mating Cable Connector, RJF6G; Cable interface, Standard RJ45. AC Input Connector, Clipper Series, CL1M1102, Mating Cable Connector, CL1F1101. (Unless otherwise specified, the mating connector is provided preassembled onto a standard NEMA 5-15 U.S. power cord.)
Size	8” Wide X 6” High X 16” Deep, Weather Resistant* Enclosure
Power	100-240 ±10% VAC, 47- 63 Hz, 25 Watts Maximum
*+0 to +50 degrees C; Specifications subject to change without notice	® 2014 Cross Technologies, Inc.

2.0 Installation

The 4115-67 Block Upconverter consists of a 8" Wide X 6" High X 16" Deep Weather Resistant* enclosure. A switching, ±12, +24, +5 VDC power supply provides power for the internal assemblies.
The 4115-67 can be secured to a mounting plate using the 4 holes on the bottom of the front and rear panels. See Drawing 2.6 (PG 14) for mounting dimensions.

Figure 2.0 - 4115-67 Front Panel Connections



2.1 Connection to AC Input Power

The 4115-67 is furnished with a pre-assembled AC power input cable as described below.

Table 2.1 - 4115-67 Power Input Connections

Table 2.1 4115-67 Power Input Connector, FCI Clipper Series, CL1M1102 & Crimp Pins	
Mating Connector FCI Clipper Series, CL1F1101, Crimp Pins and CL101021 Backshell	
Pin	**Input Connector Pin Description**
1	100-240 ±10% VAC, 47-63 Hz, 20 watts max.
2	Neutral
3	Ground

2.2 Message Protocol

The serial format for the RS232/RS422/RS485 port is 9600 baud, 8 data bits, no parity, and 1 stop bit.
All messages consist of ASCII printable characters so standard terminals and terminal emulator programs may be used to control and monitor the unit. All messages begin with the open bracket character "**{**" (ASCII 0x7B) and end with the close bracket character "**}**" (ASCII 0x7D). Messages consisting of commands to set or change operating parameters and modes of the unit begin with "C" (ascii 0x43) followed by a command specific character. Messages consisting of queries to report operating parameters and modes begin with "S" (ASCII 0x53) followed by a parameter specific character.

2.3 M&C Commands

The following tables summarize the Commands and Status Queries applicable to the 4115-67 frequency converter.

* **PLEASE NOTE:** The two character {aa} prefix, shown in the table below, is present ONLY when RS485 is selected.

Table 2.2 Model 4115-67 M&C Commands

Table 2.2: Model 4115-67 M&C Commands		
Command	**Syntax**	**Description**
Set Gain	{aaCGxxx}	where:
		xxx = 3 characters
		Range: 000 to 300 (00.0 to 30.0 in 0.5 dB steps)
Set Serial Interface	{aaCIx}	where:
		x = 0 to select RS232
		x = 1 to select RS422
		x = 2 to select RS485
Set Mute	{aaCMx}	where:
		x = 1 to mute the output
		x = 0 to unmute output
Set RS485 address	{aaCRxx}	where:
		xx = 2 characters
		Range: 00 to 31
Set Int. 10 MHz reference offset	{aaCOxxxxx}	where:
		xxxxx = 5 characters
		Range: +2000 to -2000
Set 10 MHz reference mode	{aaCEx}	where:
		x = 1 to select internal reference
		x = 2 to select external reference
		x = 3 to select auto reference

2.4 M&C Queries

Table 2.3 Model 4115-67 M&C Queries

Table 2.3: Model 4115-67 M&C Queries		
Command	**Syntax**	**Description**
Gain	{aaSG}	Returns {aaSGxxx} where:
		xxx = 3 characters
		Range: 0 to 300 (in 0.5 dB steps)
		Example: {aaSG245} indicates the current gain setting is 24.5 dB
10 MHz reference	{aaSE}	Returns {aaSEx} where:
		x = 1 if Internal 10 MHz reference is selected
		x = 2 if External 10 MHz reference is selected
		x = 3 if Auto 10 MHz reference is selected
Serial Interface	{aaSI}	Returns {aaSIx} where:
		x = 0 if RS232 is selected
		x = 1 if RS422 is selected
		x = 2 if RS485 is selected
RS485 address	{aaSR}	Returns {aaSAxx} where:
		xx = 2 characters
		Range: 00 to 31
Mute	{aaSM}	Returns {aaSMx} where:
		x = 0 if mute is off
		x = 1 if mute is on

Continued on page 8...

Table 2.3 Model 4115-67 M&C Queries (Continued from page 7)

Table 2.3: Model 4115-67 M&C Queries - Continued...		
Command	**Syntax**	**Description**
Int. 10 MHz reference offset	{aaSO}	Returns {aaSOxxxxx} where:
		xxxxx = 5 characters
		Range: +2000 to -2000
Summary Alarm	{aaSA}	Returns {aaSAx} where:
		x = 0 if no summary alarm, x = 1 if summary alarm
Internal Temperature	{aaST}	Returns {aaSTxxx} where:
		xxx = 3 characters
		Range (-99 to +99) degrees Celsius
Model and firmware revision	{aaSV}	returns {aaSVxxxxxxxxyyyy} where:
		xxxxxxxx = unit model number
		yyyy = unit firmware rev.
Unit Status	{aaSS}	returns {aaSSwxyz} where:
		w = summary alarm: 0 = off, 1 = on
		x = ref. source: 1 = internal, 2 = external
		y = oven status: 0 = normal, 1 = oven warmup
		z = mute status: 0 = not muted, 1 = muted

2.5 ETHERNET Interface Installation and Operation

The 4115-67 frequency converter is equipped with a 10/100 Base-T compatible Ethernet interface for control and monitoring of its operating parameters. An HTML script interface allows the user to monitor and control the converter using a standard web browser. SNMP (Simple Network Management Protocol) is also supported. Contact Cross Technologies for the SNMP MIB file.

2.5.1 Methods of Connection

Directly Connected to a PC:

For control from a local PC, attach the 4115-67's Ethernet port to the Ethernet network connector on the PC using a crossover RJ-45 cable.

LAN Connection

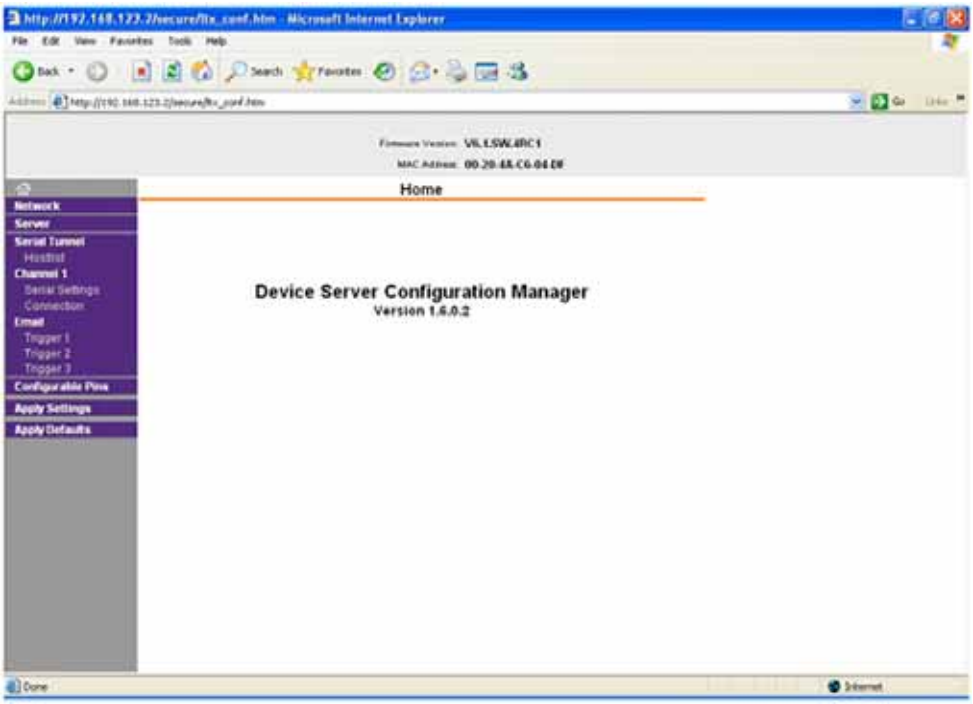
For LAN connections, attach the 4115-67 Ethernet port to the LAN using a normal RJ-45 cable. Use any PC on the LAN to connect to the 4115-67.

2.5.2 Ethernet Configuration

Each 4115-67 must be configured with an appropriate IP address, Netmask, and Gateway assigned by your network manager. The 4115-67 is set at the factory with a static address which is 192.168.123.2. The device server in the 4115-67 has a built in HTTP based configuration manager that is used to configure network settings. To access the configuration manager, open a web browser and enter the IP address of the 4115-67 in the browser's address field. The window shown in Figure 2-A will appear. As delivered, there is no password set. Choose your user name and password here or leave those fields blank and click OK to proceed to the configuration manager web page.

Figure 2-A: Password Screen

Figure 2-B: Configuration Manager Screen

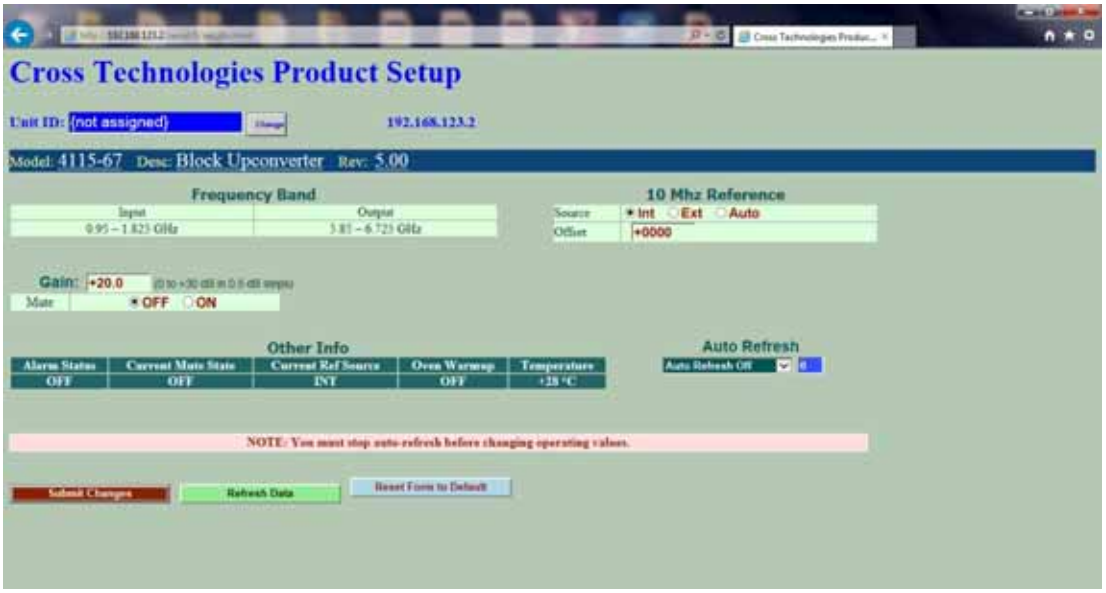


In the left frame of the configuration manager click on Network to display the Network Settings screen. Enter the IP address, Subnet mask, and Gateway address with delimiter dots (example: 192.168.192.47). Click on apply settings to apply the new settings in the device server.

2.5.3 Web page M & C

Enter the following address in a web browser to access the M & C web page:
http://<ip address of 41xx>/serial/0/setup.htm where <ip address> is the IP address of the unit. Figure 2-C shows the web page from a model 4115-67 frequency converter.

Figure 2-C: Model 4115-67 Web Page

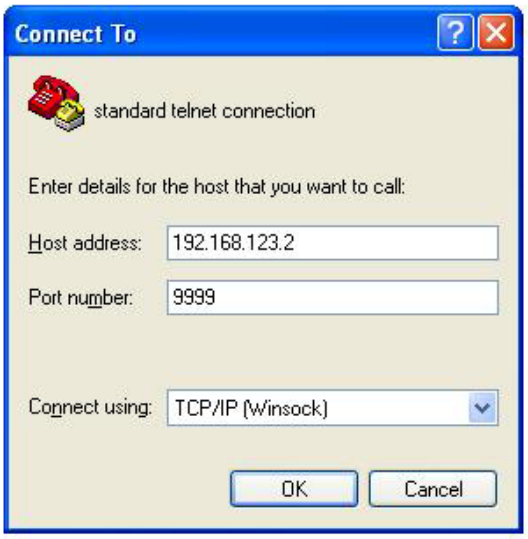


2.5.4 SNMP Configuration

Setting of SNMP parameters such as Community Write and Community Read strings requires a *Telnet* connection to port 9999. The following instructions explain how to establish such a *Telnet* connection using Windows XP's Hyper Terminal utility .

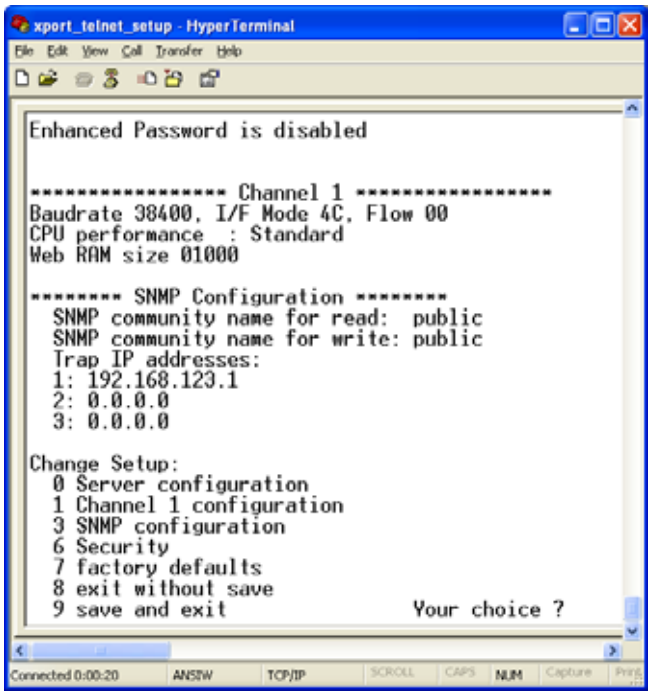
Start the Hyper Terminal application and select "*New Connection*" from the "*File*" drop down menu. The next screen is a "*Connect To*" dialog box. Select TCP/IP (Winsock) from the "*Connect*" using drop down menu. Enter the IP address of the 4115-67 in the "*Host Address*:" field and 9999 in the "*Port Number*" field. Figure 2-E shows an example of the Hyper Terminal settings required to access the SNMP configuration menu.

Figure 2-E: *Telnet* Settings in Hyper Terminal

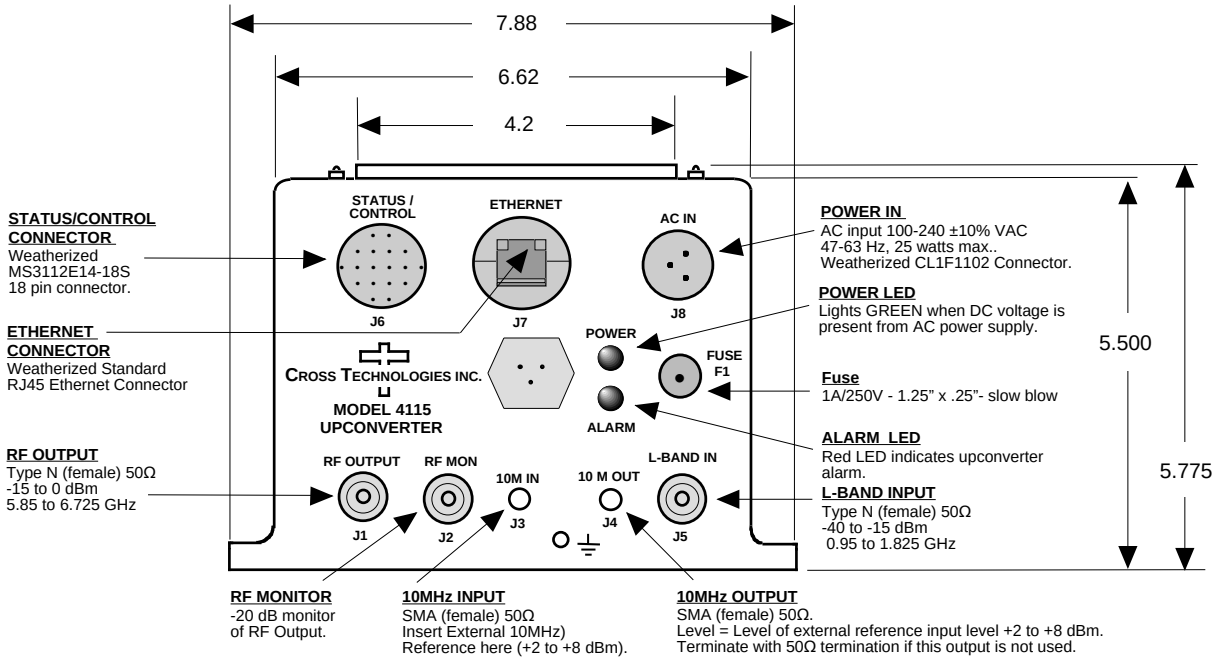


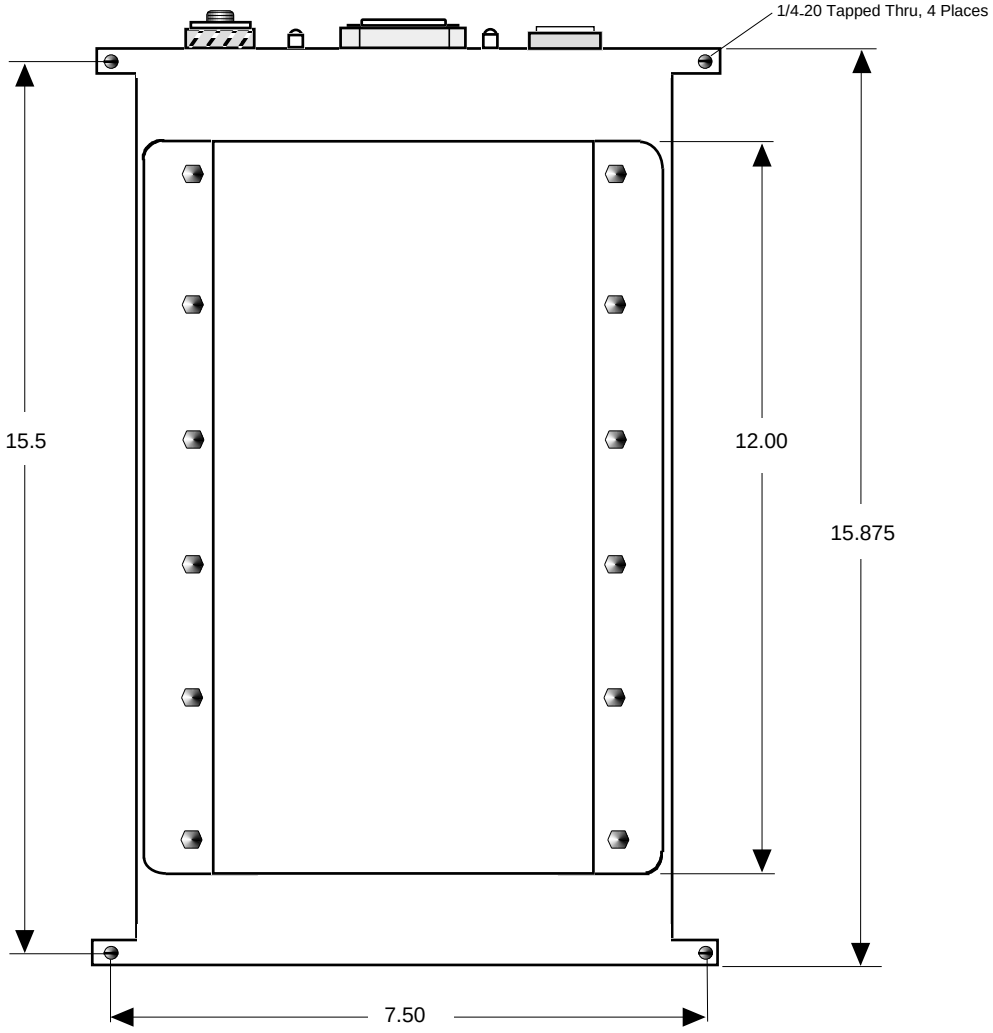
Once the *Telnet* connection is established you will be prompted to "*Press Enter for Setup Mode*." Press enter and a menu of device server configuration options will appear (see Figure 2-F). Select menu item 3, "*SNMP Configuration*." You will be prompted to enter SNMP community read and write strings. After setting your desired community strings you will be prompted to "*Enter IP addresses for SNMP traps*" You must enter at least one and up to four IP addresses of SNMP managers that will access the unit. This is required even though SNMP traps are not implemented. The unit will not process SNMP SET and GET requests from an SNMP manager unless the IP address associated with that manager is entered in the device server.

Figure 2-F: Device Server Configuration Menu



2.6 Upconverter Outline Drawing. Front panel input and output connections, top view, base plate and mounting dimensions for the 4115-67.





2.7 Physical Interface

All 4115 and 4116 units provide a RS232/RS422/RS485 interface port and a 10/100 Base-T Ethernet port. Both ports are available when the unit is installed and powered up. Commands may be sent to either port at any time and they will be processed in the order that they are received. The RS232/RS422/RS485 signals connect via an 18-pin, MS3112E14-18S connector as shown in Table 2.4. The Ethernet signals connect via a standard RJ45 connector, part #RJF6G.

Table 2.4: Monitor and Control Connector

Monitor and Control Connector Pinout	
Connector part number MS3112E14-18S	
Mating Cable Connector part number MS3116F14-18P	
Pin	**Signal Description**
A	Chassis Ground
N	Summary Alarm Normally Closed
P	Summary Alarm Common
R	Summary Alarm Normally Open
E	RS422/RS485 Data Out-
F	Signal Ground
C	RS422/RS485 Data In-
D	RS422/RS485 Data Out+, RS232 Data Out
B	RS422/RS485 Data In+, RS232 Data In

NOTE: Planning Ethernet Access
It is recommended that IP knowledgeable customer personnel be consulted as a resource in the installation and use of the Ethernet access features of the Cross Technologies product.

2.8 Installation/Operation

Installing and Operating the 4115-67 Upconverter

1. Connect a -40 dBm to -15 dBm signal to L-BAND INPUT (J5 - Drawing 2.6).
2. Connect the RF OUTPUT (J1), to the external equipment.
3. Using the pre-assembled AC power input cable (furnished), connect 100-240 ±10% VAC, 47 - 63 Hz to AC IN connector on the front panel.
4. If a custom length power cable must be made, refer to description below for connections*.
5. Be sure DS1 (green, DC Power) is on and DS2 (red, Alarm) is off (Drawing 2.6).
6. Set the gain for +30 to 0 dB insuring that the output level is always in the range of -15 to 0 dBm.
7. Select either INT (for internal 10 MHz ref), AUTO (for internal 10 MHz ref UNLESS an external 10 MHz, +2 to +8 dBm signal is connected to J2), or EXT (for external 10 MHz, +2 to +8 dBm reference that is inserted at J2, Drawing 2.6).
8. Check that a 10 MHz, signal is present at the 10 MHz REF OUTPUT at the same level as the input, ±0.5 dB. (J4 - Drawing 2.6).
9. AC Fuse - The fuse is a 1.25" x .25"- 1.0 amp (slow blow) and is inserted in the fuse F1 position.

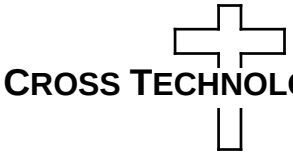
   NOTE: If a fuse continues to open, the power supply is most likely defective.

2.9 Connection to AC Input Power

The 4115-67 is furnished with a pre-assembled AC power input cable as described below.

Table 2.5 4115-67 Power Input Connections

4115-67 AC Power Input Connections	
Connector, Clipper Series, CL1M1102 and crimp pins	
Mating Connector, Clipper Series, CL1F1101 and crimp pins	
Pin	Input Connector Pin Description
1	100-240 ±10% VAC, 47-63 Hz, 20 watts max.
2	Neutral
3	Ground



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