

Instruction Manual

Model 4116-T31-146# Multi-Band Block Translator Weather Resistant Unit

February 2018, Rev. 0



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INSTRUCTION MANUAL

MODEL 4116-T31-146# Multi-Band Translator, Weather Resistant

<u>TABLE OF CONTENTS</u>	<u>PAGE</u>
Warranty	2
1.0 General	3
1.1 Equipment Description	3
1.2 Technical Characteristics	4
2.0 Installation	6
2.1 Message Protocol	6
2.2 M&C Commands	7
2.3 M&C Queries	8
2.4 Ethernet Interface Installation	10
2.4.1 Methods of Connection	10
2.4.2 Ethernet Configuration	10
2.4.3 Webpage M&C	12
2.4.4 SNMP Configuration	13
2.5 Translator Outline Drawings	15
2.6 Physical Interface	16
2.7 Installation/Operation	17

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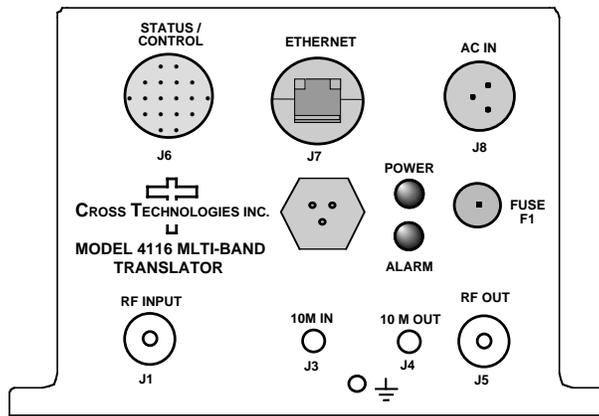
MODEL 4116-T31-146# Translator, Weather Resistant*

1.0 General

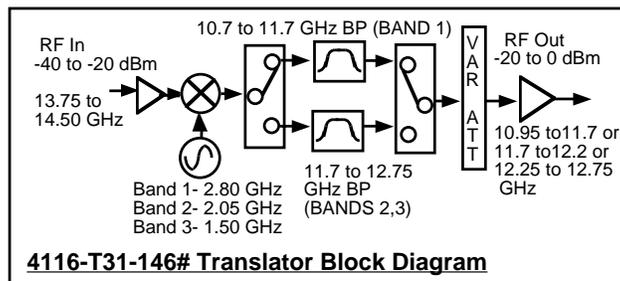
1.1 Equipment Description

The 4116-T31-146# Translator converts a 13.75 - 14.5 GHz input RF band to one of three output RF bands. Front panel LEDs provide indication of DC Power, and PLL Alarm. The RF to RF gain is +20 dB, maximum. Connectors are Type N female for the RF out, RF in and SMA female for the external reference input and reference output. Gain, band select, 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. It 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 4116-T31-146# Multi-Band Translator, Front Panel



4116-T31-146# Translator Block Diagram

FIGURE 1 Model 4116-T31-146# Multi-Band Block Translator Block Diagram

1.2 Technical Characteristics

TABLE 1.0 4116-T31-146# Multi-Band Block Translator Specifications**

Input Characteristics

Impedance/Return Loss	50Ω /14 dB min.
Frequency (GHz)	See Band Chart below
Noise Figure, max.	30 dB at max. gain
Input Level	-40 to -20 dBm

Output Characteristics

Impedance/Return Loss	50Ω /10 dB, 14 dB typical
Frequency (GHz)	See Band Chart below
Output Level Range	-20 to 0 dBm
Output 1dB Comp. max. gain	+10 dBm at max. gain
Output 1mute, max. gain	>50 dBc at max. gain

Band Chart - Frequencies, LOs, LO Harmonically-related Fixed Spurs

BAND NO.	IN RANGE (GHz)	OUT RANGE (GHz)	LO (GHz)	Fixed Spurs (25 dBC at -20 in) (5 dBC at -40 in)
1	13.75-14.50	10.95-11.70	2.80	11.2
2	13.75-14.25	11.70-12.20	2.05	12.3
3	13.75-14.25	12.25-12.75	1.50	12.0, 13.5

Channel Characteristics

Gain at F_c	$+20 \pm 3$ dB max., (+20 to 0 dB variable in 0.5 ± 0.5 dB steps)
Input to Output Isolation	> 45 dBC, min; > 60 dBC typ. (at max gain and 0 dBm out)
Spurious, Inband	> 30 dBC in band, except 25 dBC (> 30 dBC typ.) at -20 dBm in for harmonics of LOs that fall close to or in-band (See Chart)
Spurious, Out of band LOs (See Chart) in this band	<-50 dBm, signal independent; $f_c \pm 2$ GHz, except for harmonics of
Spurious, LO	<-50 dBm, measured at the input; <-40 dBm, measured at the output
Intermod 2 Tone	> 45 dBC (> 50 dBC typ.), for two carriers at 4 MHz spacing, each at -5 dBm out, at max gain
Frequency Response	± 2.0 dB, over RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	Band Specific
Frequency Accuracy	± 0.05 ppm max. over temp internal reference; ext. ref. input
10 MHz Level	+2 to +8 dBm in; Monitor Output= Input Level ± 1.0 dB, 50Ω

Phase Noise @ F (Hz) >	100	1K	10K	100K	1M
Specification dBC/Hz	65	75	85	95	110

TABLE 1.0 4116-T31-146# Multi-Band Block Translator Specifications (continued)

Controls, Indicators	
Gain, Band, 10M Frequency	Gain, band select and internal 10 MHz frequency via Ethernet M&C or Status/Control Connector
PLL, Alarm	Red LED, External Contact Closure
Power	Green LED
Other	
RF In RF Out, Mon. 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 Connector , 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.	

2.0 Installation

The 4116-T31-146# Multi-Band Block Translator consists of a 8” W x 6” H x 16” D Weather Resistant enclosure.

A switching, ± 12 , +24, +5 VDC power supply provides power for the internal assemblies. The 4116-T31-146# can be secured to a mounting plate using the 4 holes on the bottom of the front and rear panels. See Figure 2.5 for mounting dimensions.

2.0.1 Connection to AC Input Power

The 4116-T31-146# utilizes a pre-assembled AC power input cable as described below.

4116-T31-146# Power Input Connector, FCI Clipper Series, CL1M1102 & Crimp Pin	
Mating Connector FCI Clipper Series, CL1F1101, Crimp Pins and CL101021 Backshell	
Pin	Input Connector Pin Description
1	100-240 $\pm 10\%$ VAC, 47-63 Hz, 20 watts max.
2	Neutral
3	Ground

2.1 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.

2.2 M&C Commands

The following tables summarize the commands and status queries applicable to the 4116-T31-146# Multi-Band Block Translator.

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

Table 2.0: Model 4116-T31-146# M&C Commands		
Command	Syntax	Description
Set Frequency Band	{aaCBx}	x = 1 to select band 1: in = (13750 to 14500 MHz) out= (10950 to 11700 MHz)
		x = 2 to select band 2: in = (13750 to 14250 MHz) out = (11700 to 12200 MHz)
		x = 3 to select band 3: in = (13750 to 14250 MHz) out = (12250 to 12750 MHz)
Set Gain	{aaCGxxx}	where:
		xxx = 3 characters
		Range: 0 to 200 (0.0 to +20.0 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 the 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 10 MHz reference
		x = 2 to select External 10 MHz reference
		x = 3 to select Auto 10 MHz reference

2.3 M&C Queries

Table 2.1 Model 4116-T31-146# M&C Queries

Table 2.1: Model 4116-T31-146# M&C Queries		
Command	Syntax	Description
Frequency Band	{aaSB}	Returns {aaSBx} where:
		x = 1 if selected band is 1: in = (13750 to 14500 MHz) out = (10950 to 11750 MHz)
		x = 2 if selected band is 2: in = (13750 to 14250 MHz) out = (11700 to 12200 MHz)
		x = 3 if selected band is 3: in = (13750 to 14250 MHz) out = (12250 to 12750 MHz)
Gain	{aaSG}	Returns {aaSGxxxx} where:
		xxxx = 4 characters
		Range: (0 to +200 in 0.5 dB steps)
		Example: {aaSG-145} indicates that the current gain setting is +14.5 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

continued on page 9...

Table 2.1 Model 4116-T31-146# M&C Queries (continued from page 8)

Command	Syntax	Description
RS485 address	{aaSR}	Returns {aaSAxx} where:
		xx = 2 characters
		Range: 00 to 31
Mute Status	{aaSM}	Returns {aaSMx} where:
		x = 0 if mute is off
		x = 1 if mute is on
Int. 10 MHz reference offset	{aaSO}	Returns {aaSOxxxxx} where:
		xxxxx = 5 characters
		Range: +2000 to -2000
Unit Status	{aaSA}	Returns {aaSAxy} where:
		x = 0 if no summary alarm, x = 1 if summary alarm
		y = 0 if unit is using internal 10 MHz ref, y = 1 if unit is using external reference
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.

2.4 ETHERNET Interface Installation and Operation

The 4116-T31-146# Multi-Band Block Translator 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.

2.4.1 Methods of Connection

Directly Connected to a PC:

For control from a local PC, attach the 4116-T31-146#'s Ethernet port to the Ethernet network connector on the PC using a crossover RJ-45 cable.

LAN Connection

For LAN connections, attach the 4116-T31-146# Ethernet port to the LAN using a normal RJ-45 cable. Use any PC on the LAN to connect to the 4116-T31-146#.

2.4.2 Ethernet Configuration

Each 4116-T31-146# must be configured with an appropriate IP address, Netmask, and Gateway assigned by your network manager. The 4116-T31-146# is set at the factory with a static address that is written on a tag attached to the unit. The device server in the 4116-T31-146# 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 4116-T31-146# 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 webpage.



Figure 2-A: Password Screen

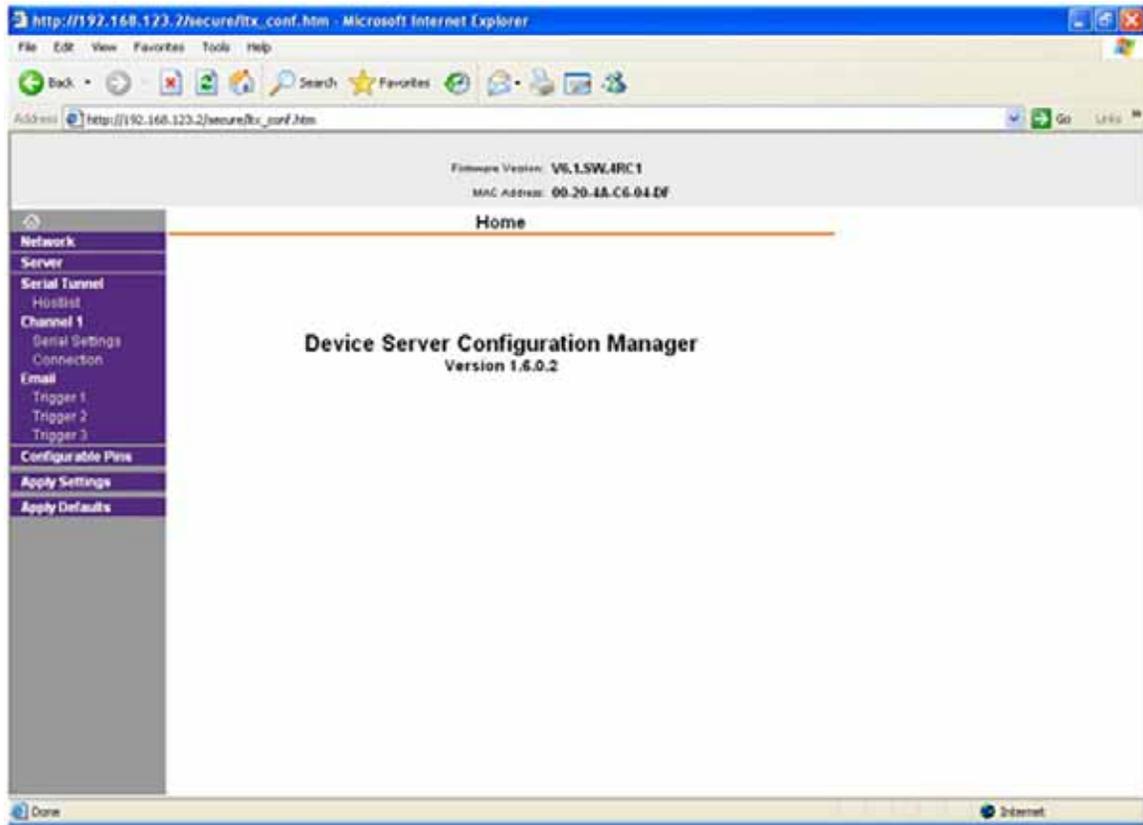


Figure 2-B: Configuration Manager Screen

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).

2.4.3 Webpage M & C

Enter the following address in a web browser to access the M & C webpage:

http://<ip address of 41xx>/serial/0/setup.htm where <ip address> is the IP address of the unit.

Figure 2-C (page 11) shows the product setup web page from a model 4116-T31-146# frequency converter.

The screenshot shows a web browser window with the address bar displaying "192.168.123.2/serial/0/results.html". The page title is "Cross Technologies Product Setup".

Unit ID: {not assigned} Change Unit ID 192.168.123.2

Model: 4116-T31-146 Desc: Multi-Band Block Translator Rev: 5.20

Frequency Band

Band	Input	Output
<input checked="" type="radio"/> 1	13.75 - 14.50 GHz	10.95 - 11.70 GHz
<input type="radio"/> 2	13.75 - 14.50 GHz	11.70 - 12.20 GHz
<input type="radio"/> 3	13.75 - 14.50 GHz	12.25 - 12.75 GHz

Gain: (0 to +20 dB in 0.5 dB steps)

Mute: OFF ON

10 Mhz Reference

Source: Int Ext Auto

Offset:

Other Info

Alarm Status	Current Mute State	Current Ref Source	Oven Warmup	Temperature
OFF	OFF	INT	OFF	+28 °C

Auto Refresh

Auto Refresh Off

NOTE: You must stop auto-refresh before changing operating values.

Submit Changes Refresh Data Reset Form to Default Values

Figure 2-C: Model 4116-T31-146# Product Setup Web Page

2.4.4 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” drop down menu.

Enter the IP address of the 4116-T31-146# 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.

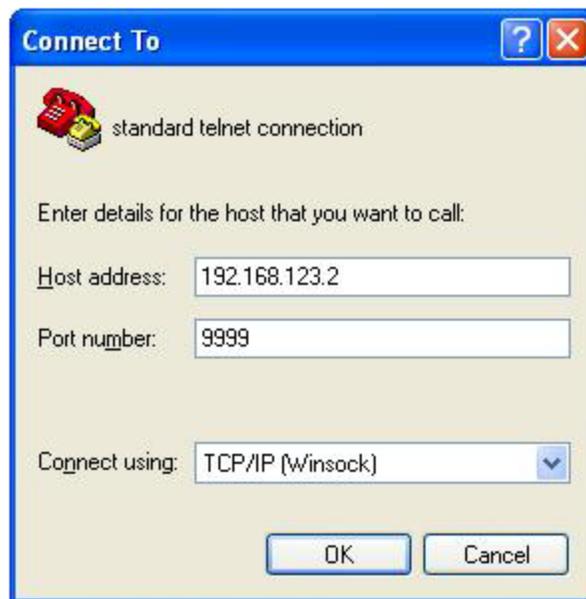


Figure 2-E: Telnet[®] Settings in Hyper Terminal

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

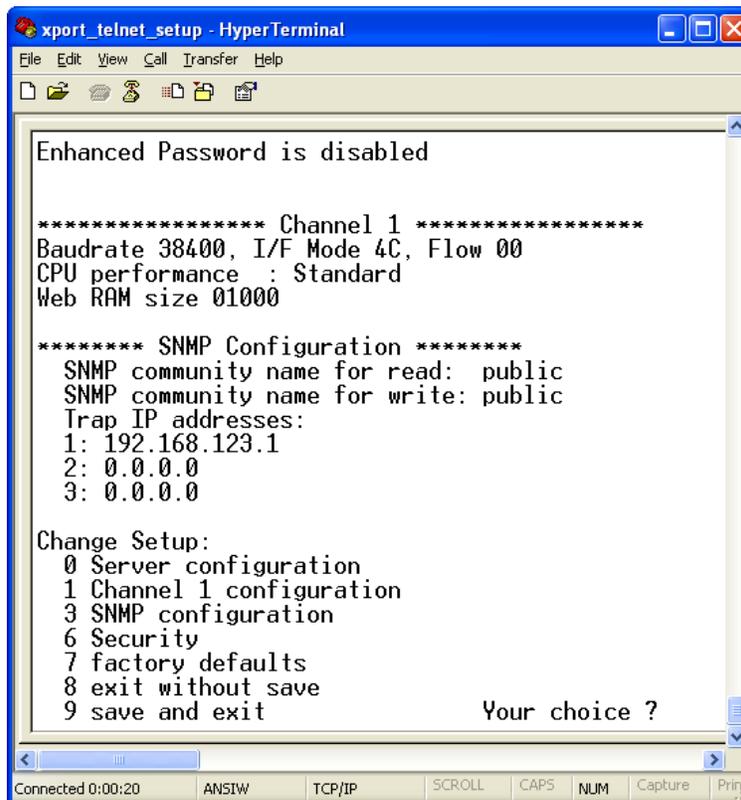
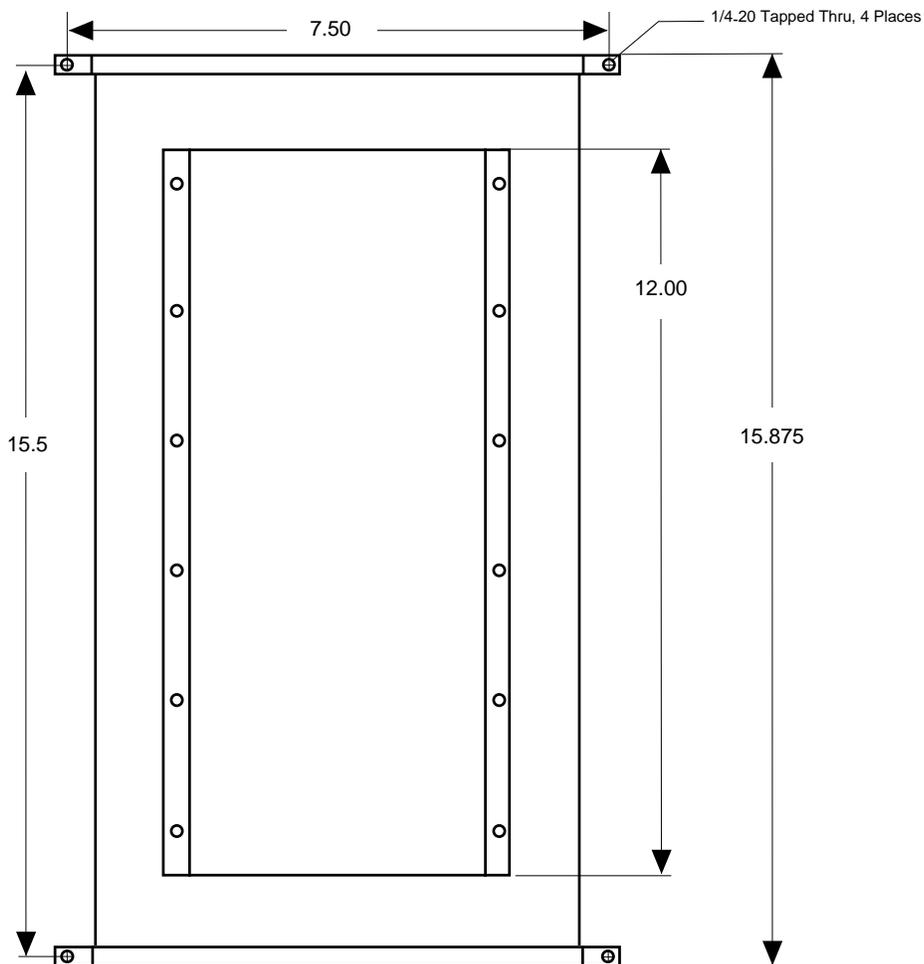
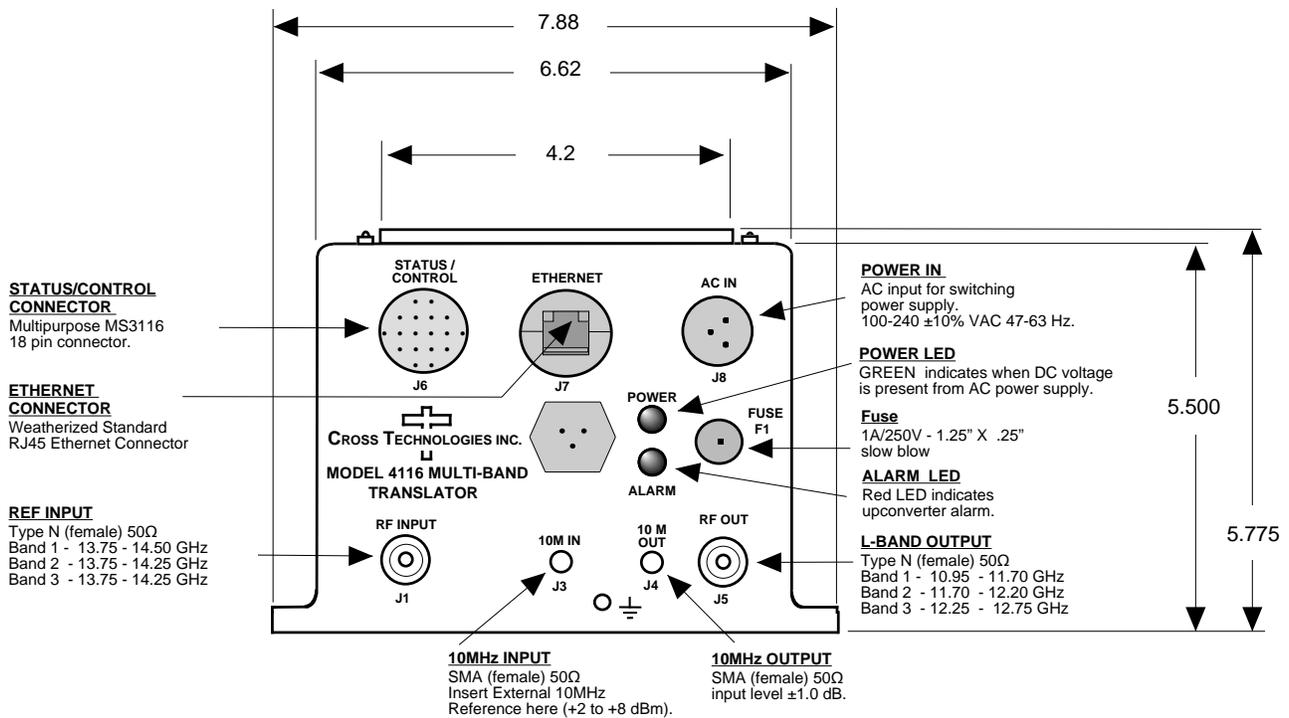


Figure 2.5 Shows the input and output connections on the front panel and the top view of the 4116-T31-146#:



2.6 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 a multipurpose MS3116, 18 pin connector as shown in Figure 2.5. The Ethernet signals connect via a standard RJ45 connector.

Table 2.5.1: 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.

2.7 Installation/Operation

Installing and Operating the 4116-T31-146# Multi-Band, Block Translator

1. Connect a -40 dBm to -20 dBm signal to L-BAND INPUT (Figure 2.5).
2. Connect the RF OUTPUT to the external equipment.
3. Using the pre-assembled AC power input cable (furnished), connect 100-240 \pm 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 (Figure 2.5).
6. Set the gain so that the output level is always within the range +20 to 0 dB (See Table 2.0 and 2.5.1).
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 ref. that is inserted at J2) via Ethernet or serial command (See Table 2.0 and 2.5.1).
8. Check that a 10 MHz, signal is present at the 10 MHz REF OUTPUT at the same level as the input, \pm 1.0 dB (J4 - Figure 2.5).
9. AC Fuse - The fuse is a 1.25" x 0.25" - 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.

CAUTION: When checking or replacing the fuse, do not over tighten the fuse holder cap. This can displace the cap's O-ring and the weatherproof seal will be lost.

4116-T31-146# 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 \pm 10% VAC, 47-63 Hz, 20 watts max.
2	Neutral
3	Ground



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