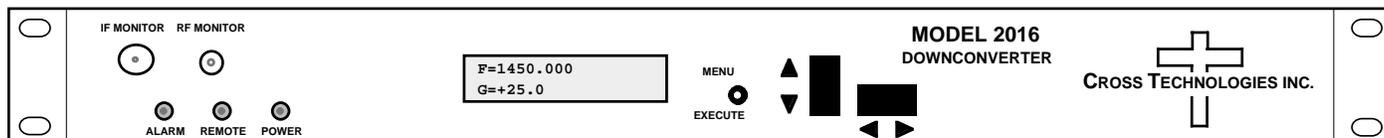


# Instruction Manual

# Model 2016-22 Downconverter

December 2012, Rev. E



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**INSTRUCTION MANUAL**  
**MODEL 2016-22 Downconverter**

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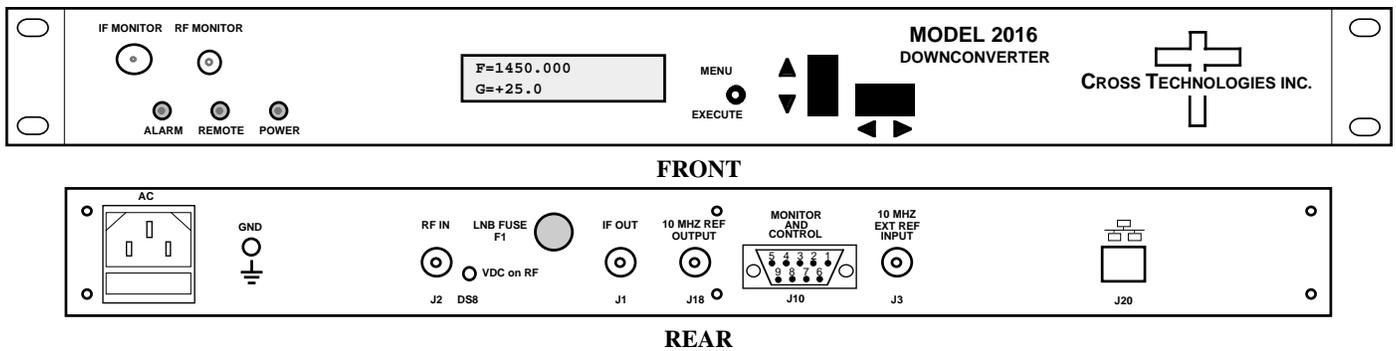
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# MODEL 2016-22 Downconverter

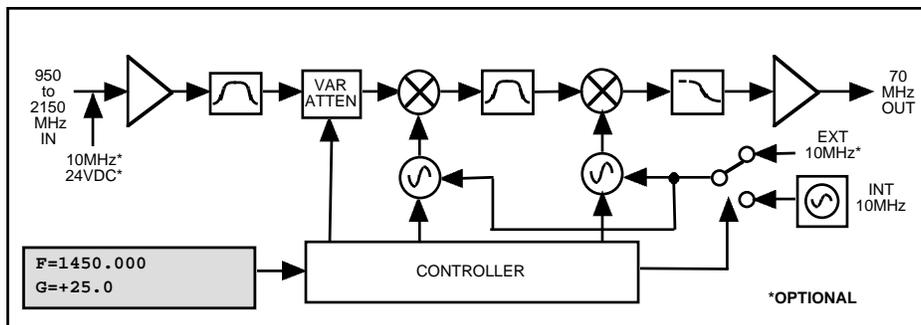
## 1.0 General

### 1.1 Equipment Description

The 2016-22 L-band Downconverter converts 950 to 2150 MHz in 1 kHz, 10 kHz, 100kHz, or 125 kHz steps (user selectable) to  $70 \pm 18$  MHz with low group delay and flat frequency response. Synthesized local oscillators (LO) provide very low phase noise and  $\pm 0.01$  ppm stability frequency selection. Multifunction push button switches select the RF frequency, gain, and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), and remote operation (yellow). Gain is adjustable manually over a 0 to +50 dB range as adjusted by the front panel multifunction push-button switches. Remote operation allows selection of frequency and gain. Parameter selection and frequency and gain settings appear on the LCD display. Connectors are BNC female for IF output and the optional external reference input and output, and Type F female for the RF input. LNB +24 VDC, 0.4 Amps and 10 MHz reference can be inserted on the RF line as added options. The 10 MHz option also includes a 10 MHz output connector, which contains either the internal or external 10 MHz reference signal. The unit is powered by a 100-240  $\pm 10\%$  VAC power supply, and housed in a 1 3/4" X 19" X 16" rack mount chassis.



**FIGURE 1.1 Front and Rear Panels**



**FIGURE 1.2 Block Diagram**

## 1.2 Technical Characteristics

**TABLE 1.0 2016-22 Downconverter Specifications\***

### Input Characteristics

Impedance	75 $\Omega$ (see TABLE 2.2 for connector options)
Return Loss	12 dB
Frequency	950 to 2150 MHz
Level range	70 to -20 dBm
1dB compression	-15 dBm

### Output Characteristics

Impedance	75 $\Omega$ (see TABLE 2.2 for connector options)
Return Loss	18 dB
Frequency	70 $\pm$ 18 MHz
Output Level/Max linear	-20 dBm / -10 dBm
1dB compression	-5 dBm

### Channel Characteristics

Gain range (adjustable)	0 to +50 dB, 1 dB steps
Image Rejection	> 50 dB, min
Spurious Response	< -50 dBC in band ( $\pm$ 18 MHz)
Frequency Response	$\pm$ 1.5 dB, 950-2150 MHz; $\pm$ 0.5 dB, 100 MHz BW; $\pm$ 0.5 dB, 72 MHz BW
Group Delay, max	0.015 ns/MHz <sup>2</sup> parabolic; 0.05 ns/MHz linear; 1 ns ripple
Spectrum Sense	Inverting or Non-inverting (selectable)

### Synthesizer Characteristics

Frequency Accuracy	$\pm$ 0.01 ppm internal reference
Frequency Step	1, 10, 100, or 125 kHz (user selectable)
10 MHz level	(In & Out) +3 dBm $\pm$ 3 dB ( <b>option E</b> )

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1MHz
dBC/Hz	-72	-85	-88	-105	-120

### Controls, Indicators

Frequency Selection	Direct readout LCD; push-button switches or remote selection
Gain Selection	Direct readout LCD; push-button switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED; RS232C , 9600 baud (RS485, <b>option Q</b> )

### Other

RF Connector	Type F (female) (see TABLE 2.2 for other options)
IF Connector	BNC (female) (see TABLE 2.2 for other options)
10 MHz Connectors	BNC (female), 50 $\Omega$ /75 $\Omega$
Alarm/Remote Connector	DB9 (female) - NO or NC contact closure on Alarm
Size	19 inch standard chassis 1.75"high X 16.0" deep
Power	100-240 $\pm$ 10% VAC, 47 - 63 Hz, 45 watts max.

### Options

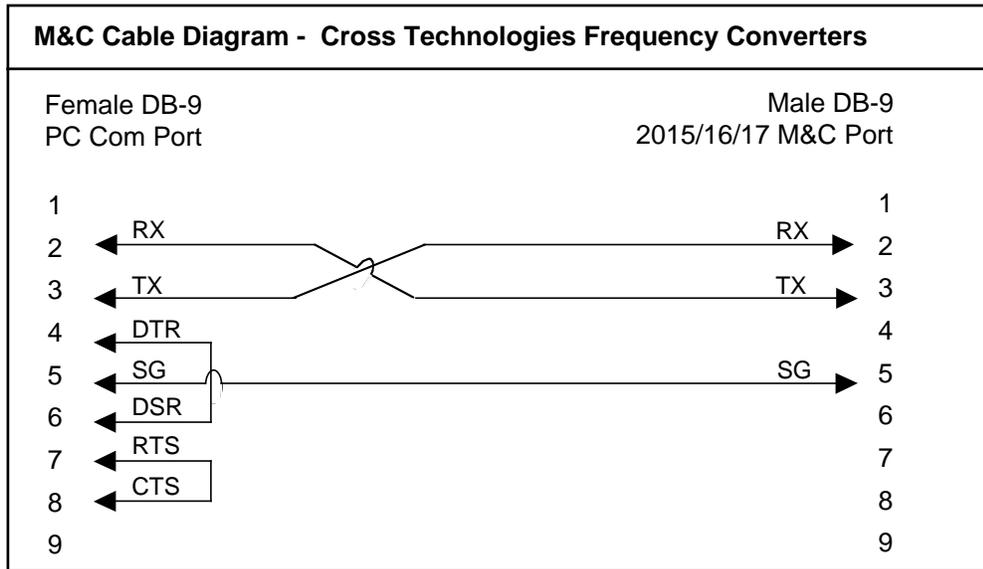
E -	External 10 MHz Reference Input and Output with RF insertion
L -	LNB voltage insertion on RF IN; +24VDC, 0.4A max
Q -	RS-422/RS-485 Remote capability
W7 -	RF (SMA) and IF (BNC) 50 $\Omega$ Monitor Ports
W8 -	Ethernet M&C Remote Interface
W18 -	Ethernet M&C Remote Interface with SNMP
W28 -	Provides Web Browser; allows direct TCP/IP and/or Telnet®addressability
Connector options	See TABLE 2.2

\*+10°C to +40°C; Specifications subject to change without notice

### 1.3 Monitor and Control Interface

#### A) Remote serial interface

**Protocol** - RS-485, RS-422 or RS-232C (selectable), 9600 baud rate, no parity, 8 data bits, 1 start bit, 1 stop bit.



**Connector:** Rear panel, DB-9 female

#### **Pinouts (RS-485/422/232C)**

Pin	Description
1	Rx-
2	Rx+ (RS-232C)
3	Tx+ (RS-232C)
4	Tx-
5	Ground
6	Alarm Relay - Common
7	Alarm Relay - Normally Open
8	Not Used
9	Alarm Relay - Normally Closed

## B) Status Requests

Table 1.1 lists the status requests for the 2016-22 and briefly describes them.

\* PLEASE NOTE: The two character {aa}(00-31) prefix, in the table below, should be used ONLY when RS-485, (OPTION-Q), is selected.

TABLE 1.1 2016-22 Status Requests		
Command	Syntax*	Description
Command Status	{aaS1}	Returns {S1bbbbbbccIA} where:
		• bbbbbbb = Rx frequency (in kHz)
		• cc = Rx gain
		• I = 1 - spectrum invert enabled
		• A = summary alarm; 1=alarmed, 0=normal
10MHz Ref Status (option E ONLY)	{aaS2}	Returns {S2ER} where:
		• E = 0 - Internal ref, 1 - External ref, 2 - Auto ref
		• R = 1 - 10 MHz reference inserted on RF IN connector
LNB Current (option L ONLY)	{aaS3}	Returns {S3eee} where:
		• eee = LNB current (000 to 500 = 0 to .500 A)

## C) Commands

Table 1.2 lists the commands for the 2016-22 and briefly describes them. After a command is sent the 2016-22 sends a return “>” indicating the command has been received and executed.

**General Command Format** - The general command format is {aaCND...}, where:

- { = start byte
- aa = Address (**RS-485 only**)
- C = 1 character, either C (command) or S (status)
- N = 1 character command or status request
- D = 1 character or more of data (depends on command)
- } = stop byte

\* PLEASE NOTE: The two character {aa}(00-31) prefix, in the table below, should be used ONLY when RS-485, (OPTION-Q), is selected.

Table 1.2 2016-22 Commands		
Command	Syntax*	Description
Set Receiver Frequency	{aaC2xxxxxxx}	where: • xxxxxxx = 7 characters • Range: 0950000 to 2150000 kHz, in 1kHz steps min.
Set Receiver Gain	{aaC4xx}	where: • xx = 2 characters • Range: 00 to 50 (0 dB to +50 dB, in 1 dB steps)
Enable 10MHz Ref Insertion <b>(option E ONLY)</b>	{aaC6x}	where x =: • 0 to disable 10MHz insertion on RF input connector • 1 to enable 10MHz insertion on RF input connector
Enable Spectrum Invert	{aaC7x}	where x =: • 0 to disable spectrum invert • 1 to enable spectrum invert
Enable External 10MHz IN <b>(option E ONLY)</b>	{aaCEx}	where x =: • 0 to disable External 10MHz ref signal • 1 to enable External 10MHz ref signal • 2 to set to Auto 10 MHz ref
Enable Remote	#	Just # sign
Disable Remote	{aaCRO}	{CR and zero}

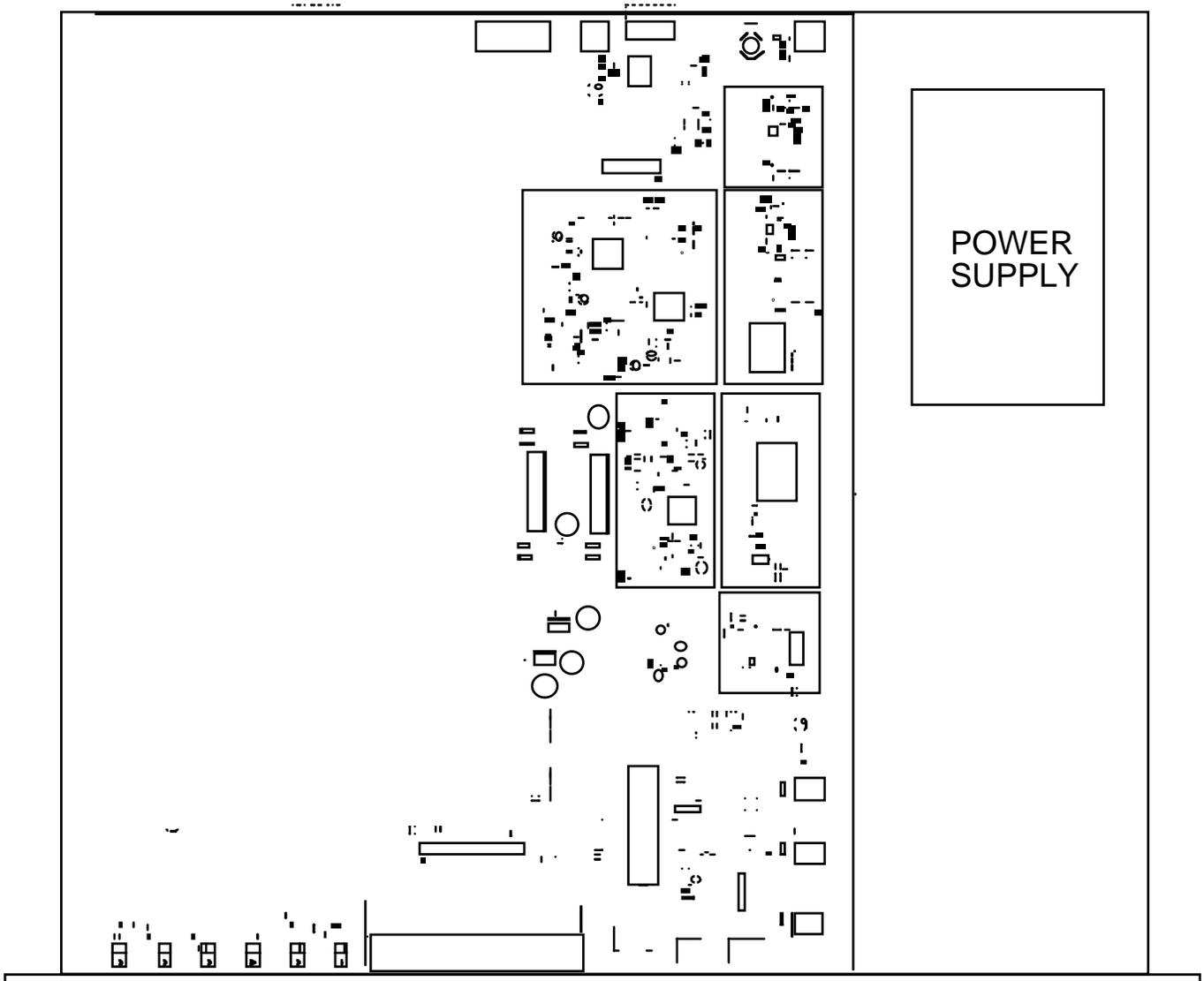
## 1.4 Environmental Use Information

- A. Rack-Mounting** - To mount this equipment in a rack, please refer to the installation instructions located in the user manual furnished by the manufacturer of your equipment rack.
- B. Mechanical loading** - Mounting of equipment in a rack should be such that a hazardous condition does not exist due to uneven weight distribution.
- C. Elevated operating ambient temperature** - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack may be greater than room ambient temperature. Therefore, consideration should be given to Tmra.
- D. Reduced air flow** - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised. Additional space between unit may be required.
- E. Circuit Overloading** - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of circuits could have on over current protection and supply wiring. Appropriate consideration of equipment name plate rating should be used, when addressing this concern.
- F. Reliable Earthing** - Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connection to the Branch (use of power strips).
- G. Top Cover** - There are no serviceable parts inside the product so, the Top Cover should not be removed. If the Top Cover is removed the ground strap and associated screw **MUST BE REINSTALLED** prior to Top Cover screw replacement. **FAILURE TO DO** this may cause **INGRESS** and/or **EGRESS** emission problems.

## 2.0 Installation

### 2.1 Mechanical

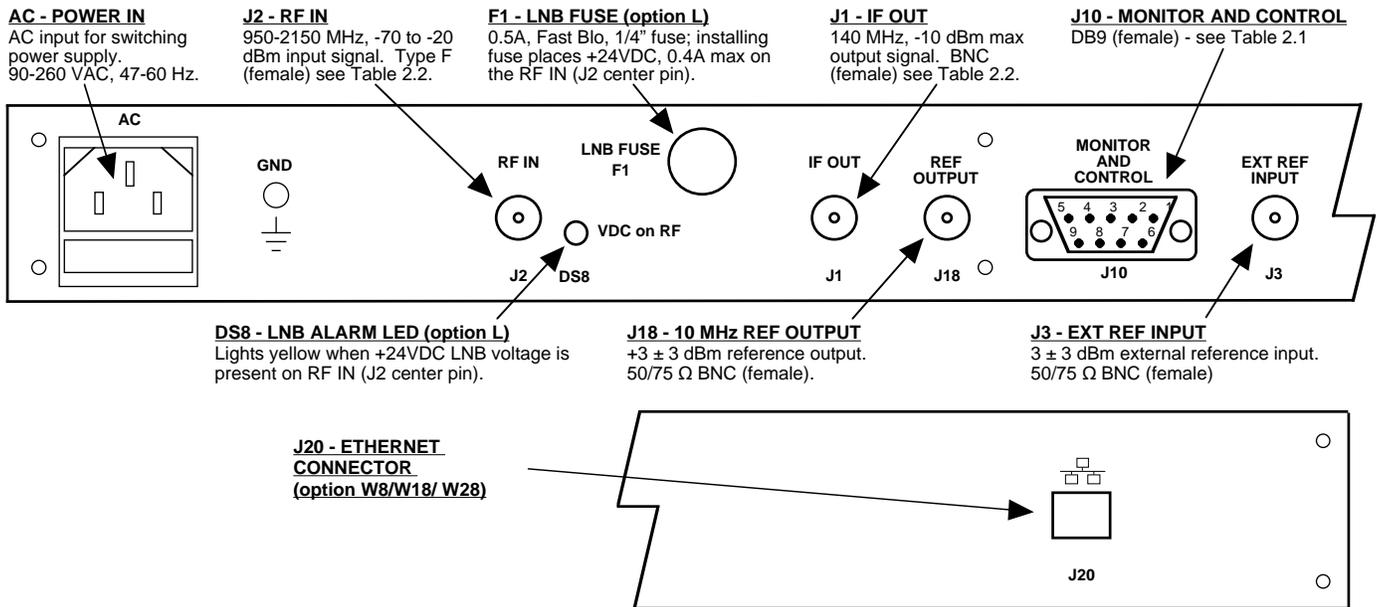
The 2016-22 consists of one RF/Controller PCB housed in a 1 RU (1 3/4 inch high) by 16 inch deep chassis. A switching,  $\pm 12$ , +24, +5 VDC power supply provides power for the assemblies. The 2016-22 can be secured to a rack using the 4 holes on the front panel. Figure 2.1 shows how the 2016-22 is assembled.



**FIGURE 2.1 Mechanical Assembly**

## 2.2 Rear Panel Input/Output Signals

Figure 2.2 shows the input and output connectors on the rear panel.



**FIGURE 2.2 2016-22 Rear Panel I/Os**

**TABLE 2.1 J10 Pinouts (RS-232C\*)**

Pin	Function
1	Rx-
2	Rx+ (RS-232C)
3	Tx+ (RS-232C)
4	Tx-
5	GND
6	Alarm Relay: Common
7	Alarm Relay: Normally Closed
8	Not Used
9	Alarm Relay: Normally Open

**TABLE 2.2 IF/RF Connector Options**

Option	IF	RF
STD	BNC, 75Ω	Type F, 50Ω
B	BNC, 75Ω	BNC, 75Ω
C	BNC, 75Ω	BNC, 50Ω
D	BNC, 50Ω	BNC, 50Ω
N	BNC, 75Ω	Type N, 50Ω
M	BNC, 50Ω	Type N, 50Ω
S	BNC, 50Ω	SMA, 50Ω

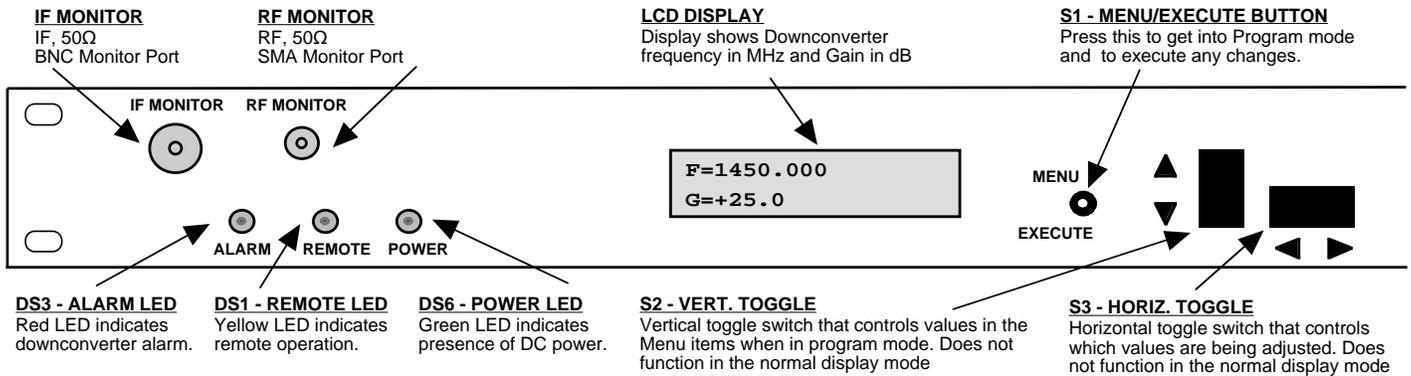
### \*Remote Serial Interface

Interface: DB-9 Female

Protocol: RS-232C, 9600 baud rate, no parity,  
8 data bits, 1 start bit, 1 stop bit

## 2.3 Front Panel Controls and Indicators

Figure 2.3 shows the front panel controls and indicators.

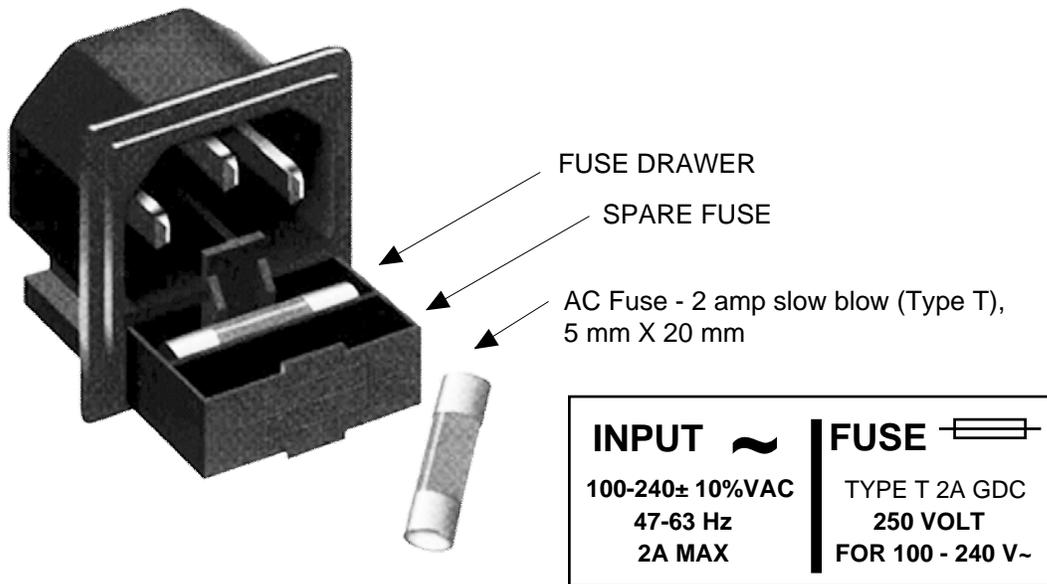


**FIGURE 2.3 2016-22 Front Panel Controls and Indicators**

## 2.4 Operation

### 2.4.1 Installing and Operating the 2016-22 Downconverter

1. Connect a -70 dBm to -20 dBm signal to RF IN, J2 (Figure 2.2)
2. Connect the IF OUT, J1, to the external equipment
3. Connect 100-240  $\pm$ 10% VAC, 47 - 63 Hz to AC on the back panel (Figure 2.2).
4. Set the input frequency (See Section 2.5 Menu Settings).
5. Set the gain for 0 to +50 dB (See Section 2.5 Menu Settings).
6. Be sure DS6 (green, DC Power) is on and DS3 (red, Alarm) is off (Figure 2.3).
7. Option L ONLY - To insert LNB +24 VDC on the RF center pin install 0.5A fast blo fuse (included) in F1 and check that DS8 lights yellow (Figure 2.2)
8. AC Fuse - The fuse is a 5 mm X 20 mm, 2 amp slow blow (Type T) and is inserted in the far slot in the drawer below the AC input as shown in Figure 2.4. There is a spare fuse in the near slot. If a fuse continues to open, the power supply is most likely defective.



**FIGURE 2.4 Fuse Location and Spare Fuse**

## 2.5 Menu Settings

### 2.5.1 Functions

This section describes operation of the front panel controls. There are three operator switches, the LCD display and alarm indicator LEDs. All functions for the equipment are controlled by these components. The functions are (see Figure 2.5):

#### **Power Up**

#### **Normal Display**

- Menu 1** Frequency in MHz
- Menu 2** Gain (0 to +50) Set Unit to Remote Operation
- Menu 3** Select Non-inverting or Inverting Spectrum
- Menu 4** Set Unit to Remote Operation
- Menu 5** Select Frequency Step Size (1kHz, 10kHz, 100kHz, or 125kHz)
- Menu 6** Select External 10 MHz Ref (option E)
- Menu 7** Select 10 MHz Reference Insertion (option E)
- Menu 8** Set Remote mode (option Q)
- Menu 9** Set RS-485 address (option Q)
- Menu 10** View LNB Current (option L)

**Save Menu** When “R” is selected in any above menu or at the end of the menu options

Alarm indications appear on the LEDs (see figure 2.3).

All program changes must start with the operation of the Menu/Execute switch and must also end with the operation of the Menu/Execute switch verified by the “Save Settings?” Menu. If this sequence is not followed, none of the changes will take effect. If programming is initiated and no operator action takes place for approximately 30 seconds (before the final press of the Menu/Execute switch) the display will revert to its previous status and you will need to start over.

## 2.5.2 Power On Settings

**NOTE: THE LAST STATUS OF A UNIT IS RETAINED EVEN WHEN POWER IS REMOVED. WHEN POWER IS RESTORED, THE UNIT WILL RETURN TO ITS PREVIOUS SETTINGS.**

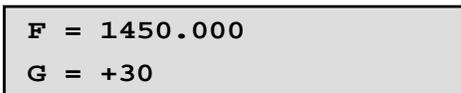
When power is first applied, the LCD display goes through three steps.

1. The LCD goes black to show all segments are functioning.
2. The software version will be displayed.



REV 1.00

3. The present frequency and gain of the downconverter is shown.



F = 1450.000  
G = +30

The unit is now operational and ready for any changes the operator may desire.

## 2.5.3 Control Switches

1. Menu/Execute - Any change to the programming of the unit must be initiated by pressing the Menu/Execute switch and completed by pressing the Menu/Execute switch.
2. Horizontal Switch - This switch is mounted so its movement is horizontal and moves the cursor left or right.
3. Vertical Switch - This switch is mounted so its movement is vertical and has two functions:
  - a. During frequency, gain changes, the vertical movement will raise or lower the number in the direction of the arrows.
  - b. For other functions such Mute on/off, the vertical switch will alternately turn the function on or off regardless of the direction operated.

## 2.5.4 Frequency Changes

At any time during the modification process, if you have made a mistake and do not wish to save the changes you have made, **do not press the Menu/Execute switch**; simply do nothing for approximately 30 seconds, and the system will return to the normal operating mode or scroll to “**R**” and push the menu/Execute switch and select “**NO**” in the “**SAVE SETTINGS?**” window.

To change the FREQUENCY:

Operate the Menu/Execute switch until you get to the menu item you want to change see Figure 2.5 for the sequence of menu options. The following display is for changing the downconverter frequency:

```
F = 1450.000      R
```

Pressing the Up/Down switch down will toggle the display to:

```
F = 1550.000      R
```

By using the horizontal rocker switch the cursor can be moved left or right .

```
F = 1550.000      R
```

**NOTE: CHANGES DO NOT TAKE PLACE ON FREQUENCY UNTIL YOU GO TO THE SAVE MENU AND INDICATE YOU WANT TO SAVE THE CHANGES.**

When the display indicates the value desired you can push the Menu/Execute switch to get to the next item:

```
G = +30          R
```

OR you can scroll to “R”, push the Menu/Execute switch to get to:

```
SAVE SETTINGS?   Y N
```

Selecting **Y** will save the new settings. Selecting **N** will revert to the previous settings.

Pushing the Menu/Execute switch then takes you to this:

```
F = 1550.000
G = +30
```

Figure 2.5 gives the menu items and how to make changes.

## 2.5.5 Gain Changes

When you get to this menu note that the gain changes will be made as you make them but if you do not wish to save the changes you have made, scroll to “**R**” and push the Menu/Execute switch and select “**NO**” in the “**SAVE SETTINGS?**” window or **do not press the Menu/Execute switch**; simply do nothing for approximately 30 seconds, and the system will return to the normal operating mode.

To change the GAIN:

Push the Menu/Execute switch to get to the gain setting (See Figure 2.5 for the sequence of menu options):

```
G = +30          R
```

Pressing the Up/Down switch will change the gain in 1 or 10 dB steps depending on the cursor location:

```
G = +40          R
```

By using the horizontal rocker switch the cursor can be moved left or right. Pressing the Up/Down switch will toggle the display digit selected until you have the desired gain.

```
G = +40          R
```

**NOTE: THE GAIN WILL BE CHANGED AS YOU ADJUST THE NUMBERS. HOWEVER, THE VALUE WILL NOT BE STORED UNTIL YOU INDICATE YES IN THE SAVE SETTINGS WINDOW.**

When the display indicates the value desired you can push the Menu/Execute switch to get to the next item:

```
REMOTE  OFF          R
```

OR you can scroll to “**R**” and push the Menu/Execute switch to get to:

```
SAVE SETTINGS?      Y N
```

Selecting **Y** will save the new settings. Selecting **N** will revert to the previous settings. Pushing the Menu/Execute switch then takes you to this:

```
F = 1550.000  
G = +40
```

Figure 2.5 gives the menu items and how to make changes.

## 2.5.5 Alarm Indications

An alarm condition will occur if any local oscillator phase lock loop (PLL) comes out of lock. The Mute LED will light if you select Mute and the Remote LED will light when you select the Remote mode.

ON POWER UP			
<b>Power Up</b>	REV 1.00		
NORMAL DISPLAY			
<b>Normal Display</b>	F = 1450.000 G = +30		PUSH BUTTON
PUSHING MENU/EXECUTE SEQUENCE			
<b>Menu 1</b> Frequency	F = 1 <u>4</u> 50.000 R	SCROLL <> SCROLL ⇅	PUSH BUTTON
<b>Menu 2</b> Gain (0 to +50)	G = +3 <u>0</u> R	SCROLL <> SCROLL ⇅	PUSH BUTTON
<b>Menu 3</b> Select Non-Inverting or Inverting Spectrum	REMOTE <u>O</u> FF R	SCROLL <> SCROLL ⇅	PUSH BUTTON
<b>Menu 4</b> Set Unit to Remote Operation	DNSPECTRUM <u>N</u> ON R	SCROLL <> SCROLL ⇅	PUSH BUTTON
<b>Menu 5</b> Select Frequency Step Size	STEP = <u>1</u> KHZ R	SCROLL <> SCROLL ⇅	PUSH BUTTON
<b>Menu 6</b> Select External 10 MHz Reference (option E)	EXT REF <u>O</u> FF R	SCROLL <> SCROLL ⇅	PUSH BUTTON
<b>Menu 7</b> Select 10 MHz Reference Insertion (option E)	REF OUT <u>O</u> FF R	SCROLL <> SCROLL ⇅	PUSH BUTTON
<b>Menu 8</b> Set Remote Mode (option Q)	RS 485 <u>O</u> FF R	SCROLL <> SCROLL ⇅	PUSH BUTTON
<b>Menu 9</b> Set RS-485 Address (option Q)	ADDRESS = <u>00</u> R	SCROLL <> SCROLL ⇅	PUSH BUTTON
<b>Menu 10</b> View LNB current (option L)	LNB DC = 0.150 R	SCROLL <>	PUSH BUTTON
<b>Save?</b> When "R" is selected or at the end of the menu options	SAVE SETTINGS? <u>Y</u> N	SCROLL <>	PUSH BUTTON

**FIGURE 2.5 Menu Display and Sequence**

## 2.5.6 10 MHz Reference Modes

**Internal** - Select internal to operate the frequency converter with the built-in 10 MHz OCXO.

**Auto** - Select AUTO to operate the frequency converter with a user supplied 10 MHz reference applied to J3. If the external 10 MHz reference signal drops below 0 dBm, the frequency converter will automatically switch to the internal 10 MHz VCO. When the external 10 MHz reference is restored to a level above 1 dBm, the frequency converter will automatically switch to the external reference.

NOTE: AUTO mode is recommended for users that operate with an externally supplied 10 MHz reference.

**External** - Select external to override AUTO switching while operating the unit with an external 10 MHz reference.

NOTE: There is a risk that the internal synthesizer will unlock and not recover if the frequency converter is operated in this mode.

## 2.6 Available Options (Models: 2015-XX, 2016-XX & 2017-XX)

Table 2.6.A Options Document		
Option	Available Product(s)	Option Description
AGC	2016-XX	Provides <b>Automatic Gain Control (AGC)</b> capability on 70 MHz Output on 2016-XX IF Downconverter.
AGC/2	2015-XX 2016-XX	Provides Automatic Gain Control (AGC) capability for 50 to 200 MHz Output via an add-on PCB. On-board SMA connectors allow insertion of bandpass filters (Option BPF-#) if required.
B	2015-XX 2016-XX	Connectors: All RF & IF Connectors, 75 Ohm BNC, (2015-XX & 2016-XX).
BPF-1	2015-XX 2016-XX	Bandpass Filter Option #1, highly selective elliptic function bandpass filter with multiple all pass delay equalizers.
C	2015-XX 2016-XX	Connectors, IF - 75 Ohm BNC, RF - 50 Ohm BNC for 2015-XX & 2016-XX Frequency Converters.
CE-Cert	2015-XX 2016-XX 2017-XX	<b>CE Certification Compliance</b> , Documentation & Labeling for 2015-XX, 2016-XX and 2017-XX frequency converters and 2115-XX & 2116-XX block converters.
D	2015-XX 2016-XX	All RF & IF Connectors, 50 Ohm BNC, 2015-XX & 2016-XX.
E	2015-XX 2016-XX	<b>External 10 MHz reference</b> input, also supports insertion of either internal or external 10 MHz source on RF, models 2015-XX & 2016-XX Up & Downconverters.
E/2	2015-XX 2016-XX	External 10 MHz reference input for IF to UHF-, S-, C-, Ku- Agile Frequency Converters.
F	2015-XX 2016-XX	Connectors, 75 F-type RF, 75 F-type IF, for 2015-XX & 2016-XX Frequency Converters.
H	2015-XX 2016-XX 2017-XX	<b>High Stability (<math>\pm 0.01</math> ppm) internal reference</b> , for 2015, 2106, & 2017-XX frequency converters and 2083-714A/-914A IF Translators.
I	2015-XX 2016-XX	<b>Spectrum Inversion</b> for 2015-XX Upconverters or 2115-XX Block Upconverters.
J	2015-XX 2016-XX	Connectors, 75 F-type RF, 50 Ohm BNC IF, for 2015 & 2016-XX Frequency Converters.
K	2015-XX 2016-XX	Connectors, 75 BNC RF, 50 Ohm BNC IF, for 2015 & 2016-XX Frequency Converters.
L	2015-XX 2016-XX	<b>LNB Voltage</b> + 24 VDC, 0.4 Amps, for 2016-XX Downconverter.
M	2015-XX 2016-XX	Connectors: N-type, 50 Ohm RF & BNC 50 Ohm IF; 2015 & 2016-XX Frequency Converters.
N	2015-XX 2016-XX	Connectors: N-type, 50 Ohm RF & BNC 75 Ohm IF; 2015 & 2016-XX Frequency Converters.
NF	2015-XX 2016-XX	Connectors: RF = N/50 Ohm, IF = F/75 Ohm, for 2015 & 2016-XX Frequency Converters.
P24	2015-XX 2016-XX	<b>DC Power P24</b> – $\pm 24$ VDC Power Supply, for 2015, 2016, & 2017-XX Frequency Converters; and 2115-XX & 2016-XX Block Converters.
P48	2015-XX 2016-XX	<b>DC Power P48</b> – $\pm 48$ VDC Power Supply, for 2015, 2016 & 2017 Frequency Converters; 2115-XX & 2016-XX Block Converters.
PWR	2015-XX 2016-XX	Option PWR - Provides +15 dB Output @ 1 dB Compression for 2015-XX L-band Upconverter. 50 Ohm Connectors ONLY.

**Table 2.6.B Options Document - Continued**

Option	Available Product(s)	Option Description
Q	2015-XX 2016-XX 2017-XX	<b>RS485/RS422 M&amp;C Remote</b> , for 2017-XX Frequency converters.
Q/2	2015-XX 2016-XX 2017-XX	RS485/RS422 Remote Interface, for 2015, 2016, & 2017-XX Frequency converters.
R	2015-XX 2016-XX 2017-XX	<b>Redundant Power Supply</b> , for 2015, 2016 & 2017-XX Frequency Converters. NOT AVAILABLE on units with SSPB Power Option (Option V).
S	2015-XX 2016-XX	Connectors: RF = all SMA, 50 Ohm , IF = all BNC 50 Ohm; 2115-XX & 2116-XX Frequency Converters.
S7	2015-XX 2016-XX	Connectors: RF - SMA 50 Ohm; IF BNC 75 Ohm for 2015 & 2016 Up or Downconverters OR 2115-XX and 2116-XX BLOCK Up or Downconverters.
SP	2015-XX 2016-XX	<b>Integrated 2 x 1 splitter</b> to provide dual, simultaneous IF Outputs.
SS	2015-XX 2016-XX	Connectors: RF=SMA/50 Ohm, IF=SMA/50 Ohm for ALL L-, C-, and Ku-band Frequency Converters.
SW	2015-XX 2016-XX	<b>Integrated RF Switch</b> with Remote RS485/RS522 control to enable remote switching of RF Output from RF A to RF B Outputs.
SW1	2015-XX 2016-XX	<b>Integrated RF Switch</b> , designed to switch between Low and High RF Inputs based on selected RF Frequency from Front Panel LCD menu or Remote M&C interface.
T	2015-XX 2016-XX 2017-XX	<b>Temperature Sensor</b> , for 2017-XX Up/Downconverter.
V41	2015-XX 2016-XX 2017-XX	<b>SSPB Voltage</b> , +48 VDC. 2.10 Amps, 100 Watts, for 2015-XX Upconverters.
V46	2015-XX 2016-XX	<b>SSPB Voltage</b> , +48 VDC. 1.25 Amps, 65 Watts, for 2015-XX Upconverters.
W1	2015-XX 2016-XX	<b>Level Detection</b> for 2016-25 Downconverter.
W4	2015-XX 2016-XX	<b>3 MHz bandwidth SAW Filter</b> for 2015 & 2016-XX Up or Downconverters.
W5	2015-XX 2016-XX	<b>Reference Oscillator Adjustment</b> , rear panel, screw adjust for 2015 & 2016-XX Up or Downconverters.
W7	2015-XX 2016-XX	<b>Front Panel, RF &amp; IF Test/Monitor Ports</b> for 2015 & 2016-XX Up or Downconverters; Connectors RF - SMA 50 Ohms, IF - BNC 50 Ohms.
W8	2015-XX 2016-XX 2017-XX	<b>Ethernet M &amp; C Remote Interface</b> , for 2015, 2016, & 2017-XX Frequency converters.

**Table 2.6.C Options Document**

Option	Available Product(s)	Option Description
W10	2015-XX 2016-XX 2017-XX	<b>Front Panel Disable</b> for Series 2015/2016 & 2017-XX Frequency Converters. Provides the ability to Disable the Front Panel Interface via the Remote Interface and to ONLY configure, monitor and control the unit via the Remote Interface.
W12	2015-XX 2016-XX	<b>REAR Panel, LO1 (SMA Connector)</b> and LO2 (BNC Connector) Test Ports for 2015-XX Upconverters.
W13	2015-XX 2016-XX	<b>REAR Panel, LO1 (SMA Connector)</b> Test Port for 2016-XX Downconverters.
W15	2015-XX 2016-XX 2017-XX	<b>Power ON/OFF Switch</b> , Rear Panel Mounted. 2015, 2016, & 2017 L-band Frequency Converters.
W16	2015-XX 2016-XX 2017-XX	<b>Individual Test Data</b> per unit. For Frequency Converters and/or Protection Switches.
W17	2015-XX 2016-XX	<b>Front Panel, IF Test/Monitor Ports</b> for 2015-XX Upconverters w/25 dB Gain, Max Output +5 dBm; Connector IF - BNC 50 Ohms.
W18	2015-XX 2016-XX	<b>Ethernet M &amp; C Remote Interface with SNMP</b> , for 2015, 2016, & 2017-XX Frequency converters.
X	2015-XX 2016-XX	<b>125 KHz Step Size</b> for 2015-XX or 2016 -XX Frequency Converters.
Z	2015-XX 2016-XX	<b>Upconverter Attenuator 0.1 dB</b> , on 2015-XX Upconverter or 2017-XX Upconverter portion.
Z1	2015-XX 2016-XX	Downconverter Attenuator 0.1 dB, on 2016-XX Downconverter or 2017-XX, Downconverter portion.
-5,	2015-XX	<b>500 KHz Frequency Step</b> for 2015-25 Upconverter.

# APPENDIX

## ETHERNET Interface Installation and Operation

### 1.0 General Information

The Cross Technologies 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.

### 1.1 Methods of Connection

#### 1.1.1 Directly Connected to a PC:

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

#### 1.1.2 LAN Connection

For LAN connections, attach the frequency converter's Ethernet port to the LAN using a normal RJ-45 cable. Use any PC on the LAN to connect to the frequency converter.

### 1.2 Ethernet Configuration

Each frequency converter must be configured with an appropriate IP address, Netmask, and Gateway assigned by your network manager. The frequency converter is set at the factory with a static address that is written on a tag attached to the unit. The device server in the frequency converter 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 frequency converter in the browser's address field. The window shown in Figure 1-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 1-A: Password Screen**



**Figure 1-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 to apply settings in the left frame to apply the new settings in the network device.

### 1.3 Webpage M & C

Enter the following address in a web browser to access the M & C webpage:  
http://<ip address>/serial/0/setup.htm where <ip address> is the IP address of the unit.

Figure 1-C shows the webpage from a model 2016-25-01 frequency converter.



**Figure 1-C: Example Webpage**

### 1.4 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 frequency converter in the “Host address:” field and 9999 in the “Port number” field.

Figure 1-E shows an example of the Hyper Terminal settings required to access the SNMP configuration menu.



**Figure 1-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 1-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.

**IMPORTANT: After “save and exit” is selected and complete the frequency converter’s power must be cycled off and on for the SNMP settings to load properly.**

```
xport_telnet_setup - HyperTerminal
File Edit View Call Transfer Help
Enhanced Password is disabled

***** Channel 1 *****
Baudrate 38400, I/F Mode 4C, Flow 00
CPU performance : Standard
Web RAM size 01000

***** SNMP Configuration *****
SNMP community name for read: public
SNMP community name for write: public
Trap IP addresses:
1: 192.168.123.1
2: 0.0.0.0
3: 0.0.0.0

Change Setup:
0 Server configuration
1 Channel 1 configuration
3 SNMP configuration
6 Security
7 factory defaults
8 exit without save
9 save and exit

Your choice ?

Connected 0:00:20 ANSFW TCP/IP SCROLL CAPS NUM Capture Print
```

**Figure 2-F: Device Server Configuration Menu**



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