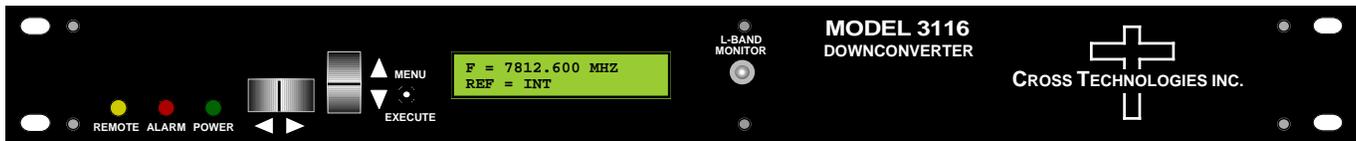


Instruction Manual

Model 3116-77#-1200

Block Downconverter

February 2014, Rev. 0



Data, drawings, and other material contained herein are proprietary to Cross Technologies, Inc., but may be reproduced or duplicated without the prior permission of Cross Technologies, Inc. for purposes of operating the equipment. Printed in USA.

When ordering parts from Cross Technologies, Inc., be sure to include the equipment model number, equipment serial number, and a description of the part.



6170 Shiloh Road
Alpharetta, Georgia 30005

(770) 886-8005
FAX (770) 886-7964
Toll Free 888-900-5588

WEB www.crosstechnologies.com
E-MAIL info@crosstechnologies.com

INSTRUCTION MANUAL

MODEL 3116-77#-1200 Block Downconverter

<u>TABLE OF CONTENTS</u>	<u>PAGE</u>
Warranty	2
1.0 General	3
1.1 Equipment Description	3
1.2 Technical Characteristics	4
1.3 Monitor & Control Interface	5
2.0 Installation	9
2.1 Mechanical	9
2.2 Rear I/O's	10
2.3 Front Panel Controls, Indicators	10
2.4 Operation	11
2.5 Menu Settings	12
3.0 Environmental Use Information	16

WARRANTY - The following warranty applies to all Cross Technologies, Inc. products.

All Cross Technologies, Inc. products are warranted against defective materials and workmanship for a period of one year after shipment to customer. Cross Technologies, Inc.'s obligation under this warranty is limited to repairing or, at Cross Technologies, Inc.'s option, replacing parts, subassemblies, or entire assemblies. Cross Technologies, Inc. shall not be liable for any special, indirect, or consequential damages. This warranty does not cover parts or equipment which have been subject to misuse, negligence, or accident by the customer during use. All shipping costs for warranty repairs will be prepaid by the customer. There are not other warranties, express or implied, except as stated herein.



6170 Shiloh Road
Alpharetta, Georgia 30005

(770) 886-8005
FAX (770) 886-7964
Toll Free 888-900-5588

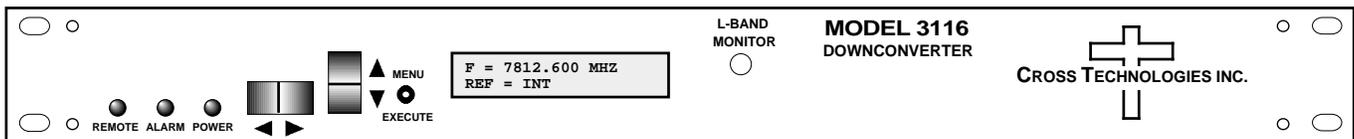
WEB www.crosstechnologies.com
E-MAIL info@crosstechnologies.com

MODEL 3116-77#-1200 Block Downconverter

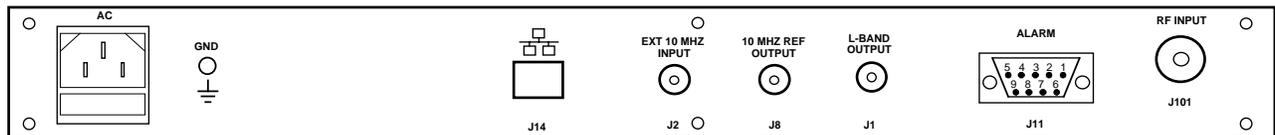
1.0 General

1.1 Equipment Description

The 3116-77#-1200 Downconverter converts 7.75 - 8.45 GHz to 1200 ± 20 MHz (non-inverted) in 100 kHz steps with a 6.55 - 7.25 GHz local oscillator. The gain is -5 ± 2 dB. Front panel LEDs provide indication of Remote operation, PLL Alarm and DC Power. Frequency and internal/external/Auto reference mode selection are controlled by front panel switches or remote selection (via RS-232C/485, standard; Ethernet Optional) and are viewable on the LCD Display. Connectors are N-Type female for the RF and BNC female for the L-Band and external reference input and reference output. In AUTO, the 10 MHz reference stays in external if the external level is $+3$ dBm, ± 3 dB. The 3116 is powered by a $100-240 \pm 10\%$ VAC power supply, and housed in a 1 3/4" X 19" X 14" rack mount chassis.



FRONT PANEL - 3116-77#-1200



REAR PANEL - 3116-77#-1200 (Shown with optional RJ45 Ethernet Connector/J14)

FIGURE 1.1 3116-77#-1200 Front and Rear Panels

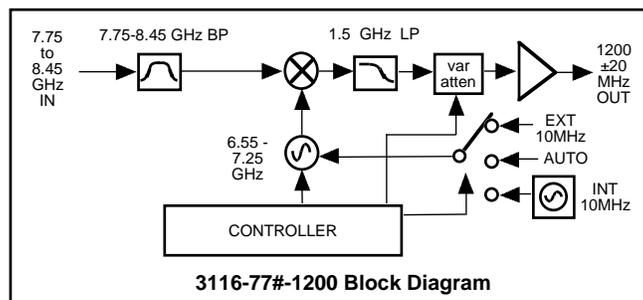


FIGURE 1.2 3116-77#-1200 Block Diagram

1.2 Technical Characteristics

TABLE 1.0 3116-77#-1200 Block Downconverter Specifications*

Input Characteristics (RF)						
Impedance / Return Loss	50Ω / 14 dB					
Frequency	7.75 to 8.45 GHz					
Noise Figure, Maximum	20 dB					
Input Level Range	-10 to 0 dBm					
Input 1 Non-damage	+10 dBm					
Output Characteristics (L-Band)						
Impedance / Return Loss	50Ω / 14 dB					
Frequency	1200 ±20 MHz					
Output Level Range	-15 to -5 dBm					
Output 1 dB Compression	+5 dBm					
Channel Characteristics						
Gain at Fc	-5 dB ±2 dB					
Image Rejection	> 60 dB, minimum					
Spurious, Inband	SIGNAL RELATED <-45 dBc, -5 dBm out; SIGNAL INDEPENDENT, <-60 dBm (1200 ±20 MHz Out)					
Spurious, Out of Band	<-50 dBm (0.5-1.17 GHz and 1.23 - 2.0 GHz Out)					
Intermodulation	<-50 dBc for two carriers at 4 MHz spacing, each at -15 dBm out					
Frequency Response	±1.5 over the band, ± 0.75 dB 1200 ± 20 MHz out;					
Frequency Sense	Non-inverting					
LO Characteristics						
LO Frequency	6.55 - 7.25 GHz, 100 kHz Steps					
Frequency Accuracy	±0.01 ppm maximum oven temperature internal reference; external reference input					
10 MHz Level In/Out	3 dBm, ± 3 dB, with Auto-detect					
Phase Noise @ F (Hz) >	10	100	1K	10K	100K	1M
Standard dBC/(Hz)	-55	-75	-80	-80	-100	-120
Controls, Indicators						
Frequency; Ext. Ref Selection	Direct Readout LCD; pushbutton switches or remote					
Power, Alarm, Remote, Mute	Green LED; Red LED; Yellow LED, Yellow LED					
Remote	RS232C/RS485/422, 9600 baud (Ethernet Optional)					
Other						
RF Connector	Type N (female), 50Ω					
L-Band Connector	BNC (female). 50Ω					
10 MHz Connectors	BNC (female). 75Ω works with 50 or 75 ohms					
Alarm / Remote Connector	DB9 - NO or NC Contact Closure on Alarm					
Size	19 inch, Standard Chassis, 1.75" high X 14.0" deep					
Power	100-24 ±10% VAC, 47-63 Hz, 30 watts maximum					
Available Options			Remote M&C Ethernet Options			
W71 -	IF Monitor Port (-20 dB, Front)		- W8	Ethernet with Web Browser Interface		
W31 -	0 to +50 degrees C Operation		- W18	Ethernet with SNMP (and MIB) Interface		
Available Connector Options, See Table 2.2, PG 9			- W28	Ethernet with Direct TCP/IP Interface		

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

© 2014 Cross Technologies, Inc..

1.3 Monitor and Control Interface

A) Remote Serial Interface

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

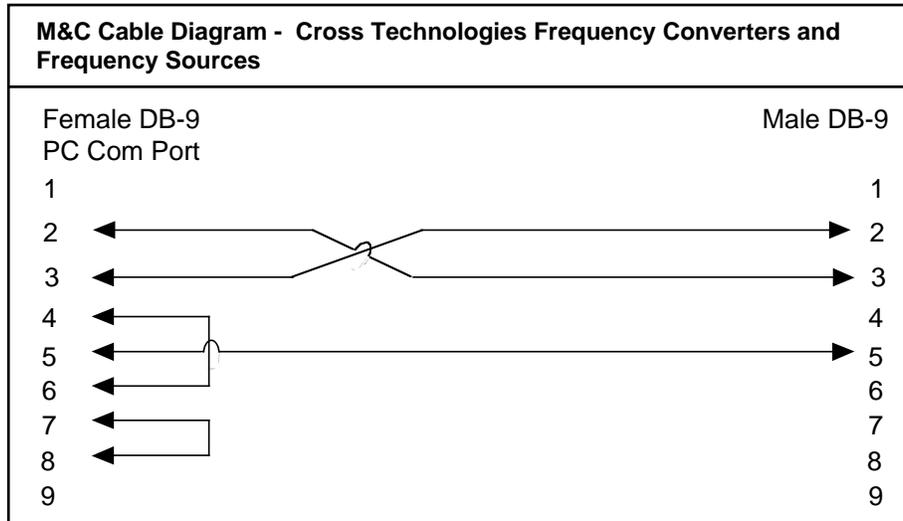
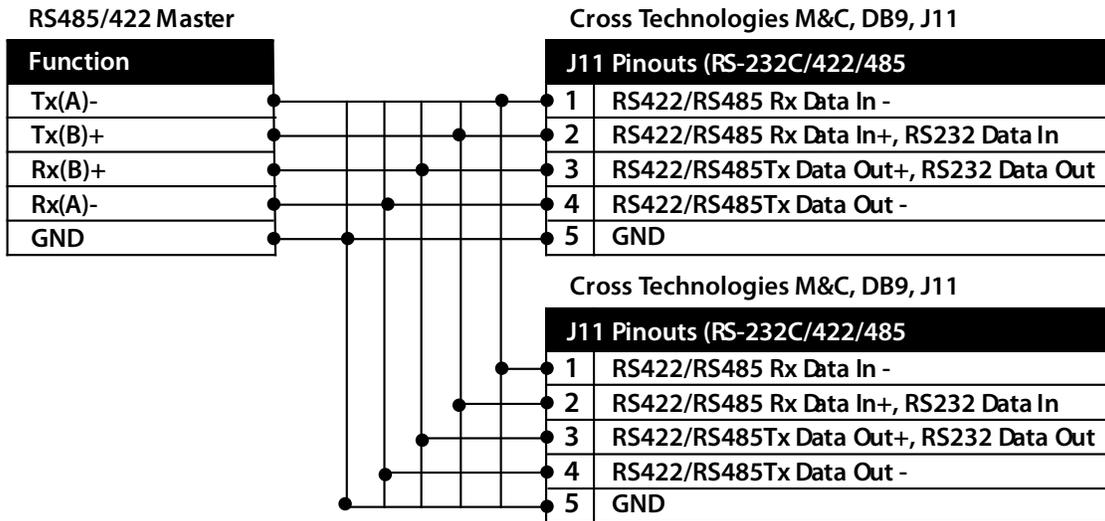


Figure 1.3 M&C Cable Diagram

Connector Pinouts: Rear Panel, DB9 male.

Table 1.1 J11 Pinouts (RS-232C/422/485)	
1	RS422/RS485 Rx Data In-
2	RS422/RS485 Rx Data In+, RS232 Data In
3	RS422/RS485 Tx Data Out+, RS232 Data Out
4	RS422/RS485 Tx Data Out-
5	GND
6	Alarm Relay: Common
7	Alarm Relay: Normally Open
8	Not Used
9	Alarm Relay: Normally Closed

RS485/422 Full Duplex Cabling



RS485/422 Half Duplex Cabling

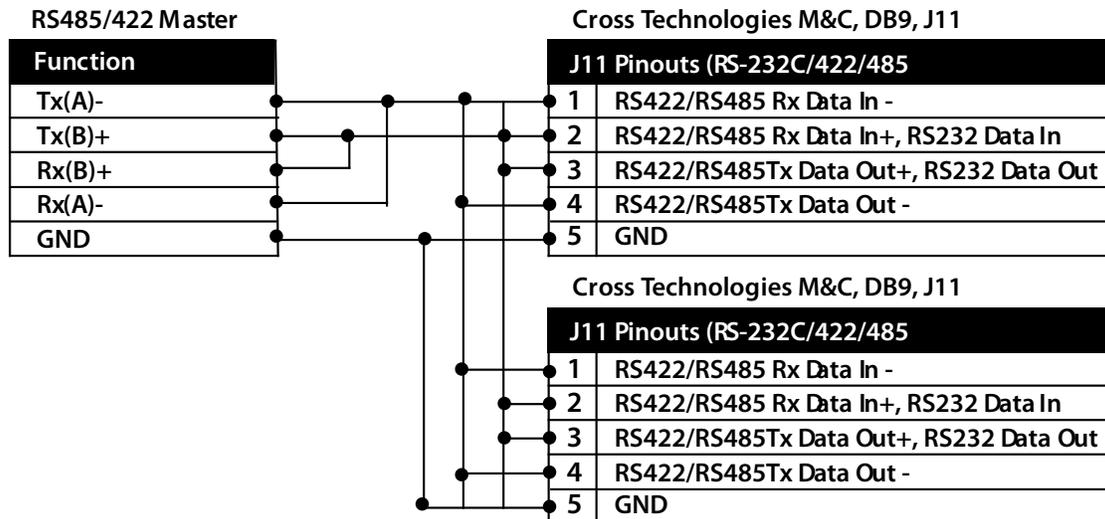


Figure 1.4 RS-232C/422/485 Duplex Cabling Diagrams

B) Status Requests - Table 1.2 lists the status requests for the 3116-77#-1200 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 1.2 3116-77#-1200 Downconverter Status Requests		
Command	Syntax *	Description
Get Frequency	{aaSF}	Returns {aaSFxxxxxx} where: <ul style="list-style-type: none"> • xxxxxxx = Converter Frequency in kHz
Get Internal 10 MHz Reference Offset	{aaSO}	Returns {aaSOxxxxx} where: <ul style="list-style-type: none"> • xxxxxx = Internal 10 MHz reference frequency offset.
Get 10 MHz Reference Mode	{aaSE}	Returns {aaSEx} where: <ul style="list-style-type: none"> • x = 0 if the converter's 10 MHz reference mode is set to Internal • x = 1 if the converter's 10 MHz reference mode is set to External • x = 2 if the converter's 10 MHz reference mode is set to Auto
Get Mute	{aaSM}	Returns {aaSMx} where: <ul style="list-style-type: none"> • x = 0 if the converter's RF output is NOT muted (RF output is ON) • x = 1 if the converter's RF output is muted (RF output is OFF)
Get 10 MHz Reference Status	{aaSB}	Returns {aaSBx} where: <ul style="list-style-type: none"> • x = 0 if the currently selected 10 MHz reference is Internal • x = 1 if the currently selected 10 MHz reference is External
Get Summary Alarm Status	{aaSA}	Returns {aaSAx} where: <ul style="list-style-type: none"> • x = 0 when there is no summary alarm condition • x = 1 if there is a summary alarm condition
Get IP Address (Option W8, W18, W28 only)	{aaSI}	Returns {Sixxx.xxx.xxx.xxx} where: <ul style="list-style-type: none"> • xxx.xxx.xxx.xxx = IP address
Get Subnet Mask (Option W8, W18, W28 only)	{aaSs}	Returns {Ssxxx.xxx.xxx.xxx} where: <ul style="list-style-type: none"> • xxx.xxx.xxx.xxx = subnet mask
Get Product/Model info	{aaSV}	Returns {SV3116-77#-1200y..yverZZZZ} where: <ul style="list-style-type: none"> • 3116-xx is the product model number • y..y = list of options, if any • ""ver" = separates model & options from firmware version • ZZZZ = firmware version (e.g., 4.00)

C) Commands

Table 1.3 lists the commands for the 3116-77#-1200 and briefly describes them.

After a command is sent, the 3116 sends a return “>” indicating the command has been received and executed.

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

{ = start byte

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 1.3 3116-77#-1200 Downconverter Commands		
Command	Syntax *	Description
Set Frequency	{aaCFxxxxxxx}	where: • xxxxxxx = Converter Frequency in kHz Range: 7750000 to 8450000 in 100 kHz steps Example: {CF 7812600} sets the converter's frequency to 7812.600 MHz
Set Internal 10 MHz Reference Offset	{aaCOxxxxx}	where: • xxxxxx = Internal 10 MHz reference frequency offset. Range: -2000 to +2000
Set 10 MHz Reference Mode	{aaCEx}	where: • x = 0 if the converter's 10 MHz reference mode is set to Internal • x = 1 if the converter's 10 MHz reference mode is set to External • x = 2 if the converter's 10 MHz reference mode is set to Auto
Set Mute	{aaCMx}	where: • x = 0 if the converter's RF output is NOT muted (RF output is ON) • x = 1 if the converter's RF output is muted (RF output is OFF)

2.0 Installation

2.1 Mechanical

The 3116 is powered by a 100-240 \pm 10% VAC power supply, and housed in a 1 3/4" X 19" X 14" rack mount chassis. The 3116-77#-1200 can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 3116-77#-1200 is assembled.

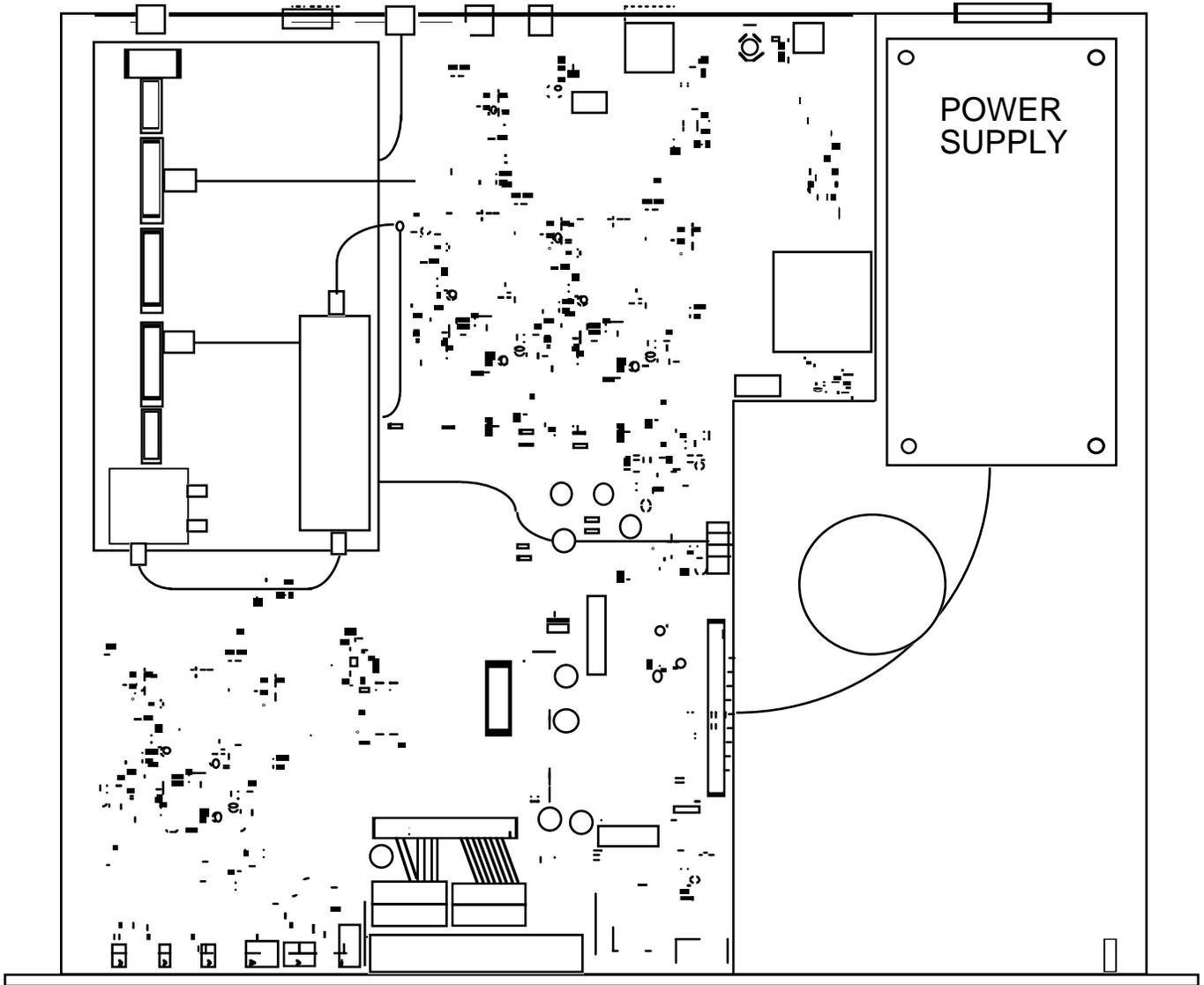


FIGURE 2.0 3116-77#-1200 Mechanical Assembly

2.2 Rear Panel Input/Output Signals

Figure 2.1 shows the input and output connectors on the rear panel.

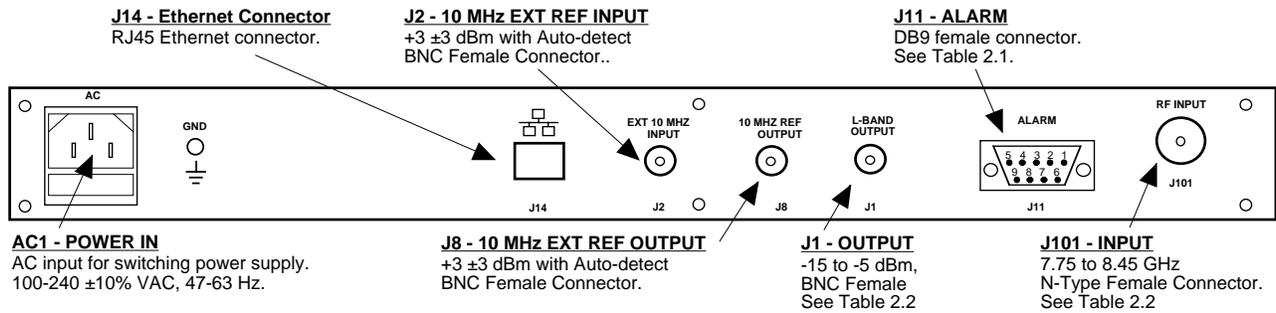


FIGURE 2.1 3116-77#-1200 Rear Panel I/O's

Table 2.0 J11 Pinouts (RS-232C/422/485)	
1	RS422/RS485 Rx Data In-
2	RS422/RS485 Rx Data In+, RS232 Data In
3	RS422/RS485 Tx Data Out+, RS232 Data Out
4	RS422/RS485 Tx Data Out-
5	GND
6	Alarm Relay: Common
7	Alarm Relay: Normally Open
8	Not Used
9	Alarm Relay: Normally Closed

TABLE 2.1 Available Connector Options		
Option	RF	L-Band
-N	50Ω Type N	75Ω BNC
-NN	50Ω Type N	50Ω Type N
-S7	50Ω SMA	75Ω BNC
-SN	50Ω SMA	50Ω Type N
-SS	50Ω SMA	50Ω SMA

*Remote Serial Interface

Interface: DB-9 Male Protocol: RS-232C (RS-232C/422/485),
9600 baud rate, no parity, 8 data bits, 1 start bit, 1 stop bit.

2.3 Front Panel Controls and Indicators

Figure 2.2 shows the front panel controls and indicators.

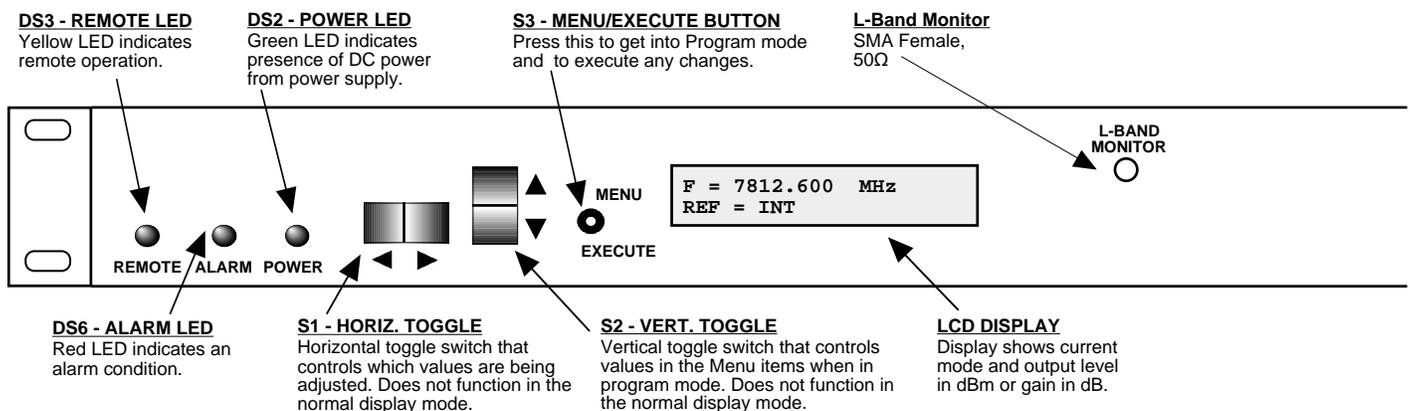


FIGURE 2.2 3116-77#-1200 Front Panel Controls and Indicators

2.4 Installation / Operation

2.4.1 Installing and Operating the 3116-77#-1200

1. Connect a -10 dBm to 0 dBm signal to RF IN, J101 (Figure 2.1).
2. Connect the L-Band OUT, J1, to the external equipment.
3. Connect 100-240 \pm 10% VAC, 47 - 63 Hz to AC connector on the back panel.
4. Be sure DS2 (green, DC Power) is on and DS6 (red, Alarm) is off (Figure 2.2).
5. 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 2.3. There is a spare fuse in the near slot. If a fuse continues to open, the power supply is most likely defective.

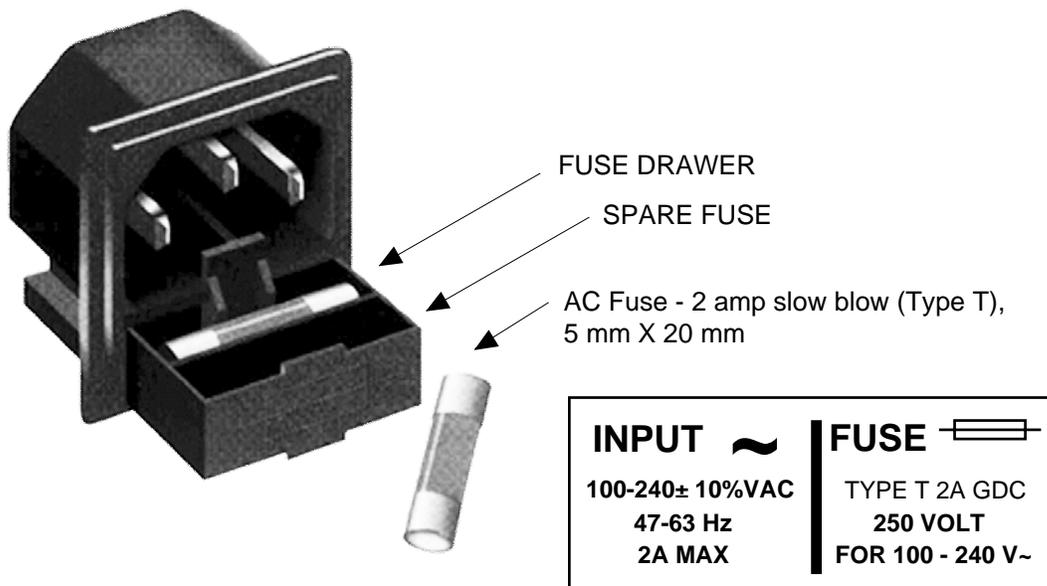


FIGURE 2.3 Fuse Location and Spare Fuse

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 2.4):

Power Up

Normal Display

Menu 1	Set Frequency
Menu 2	Set Mute
Menu 3	Set Reference Mode
Menu 4	Set Reference Offset
Menu 5	Set Remote, On/Off
Menu 6	Set Remote Interface
Menu 7	Set RS-485 Address

Save Menu When “R” is selected from any above menu or at the end.

Alarm indications appear on the LEDs (see Figure 2.2).

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 OPERATING PARAMETERS OF A UNIT ARE RETAINED EVEN WHEN POWER IS REMOVED. WHEN POWER IS RESTORED, THE UNIT WILL RETURN TO IT'S 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 Model and Software version will be displayed.



3116-77#-1200W18
Rev. 4.00

3. The present frequency and Reference Mode of the downconverter is shown.



F = 7812.600 MHz
REF = INT

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 display cursor left or right.
3. Vertical Switch - This switch is mounted so its movement is vertical and has two functions:
 - a. During gain changes, the vertical movement will raise or lower the number in the direction of the arrows.
 - b. For other functions such Remote on/off, the vertical switch will alternately turn the function on or off regardless of the direction operated.

2.5.4 Alarm Indications

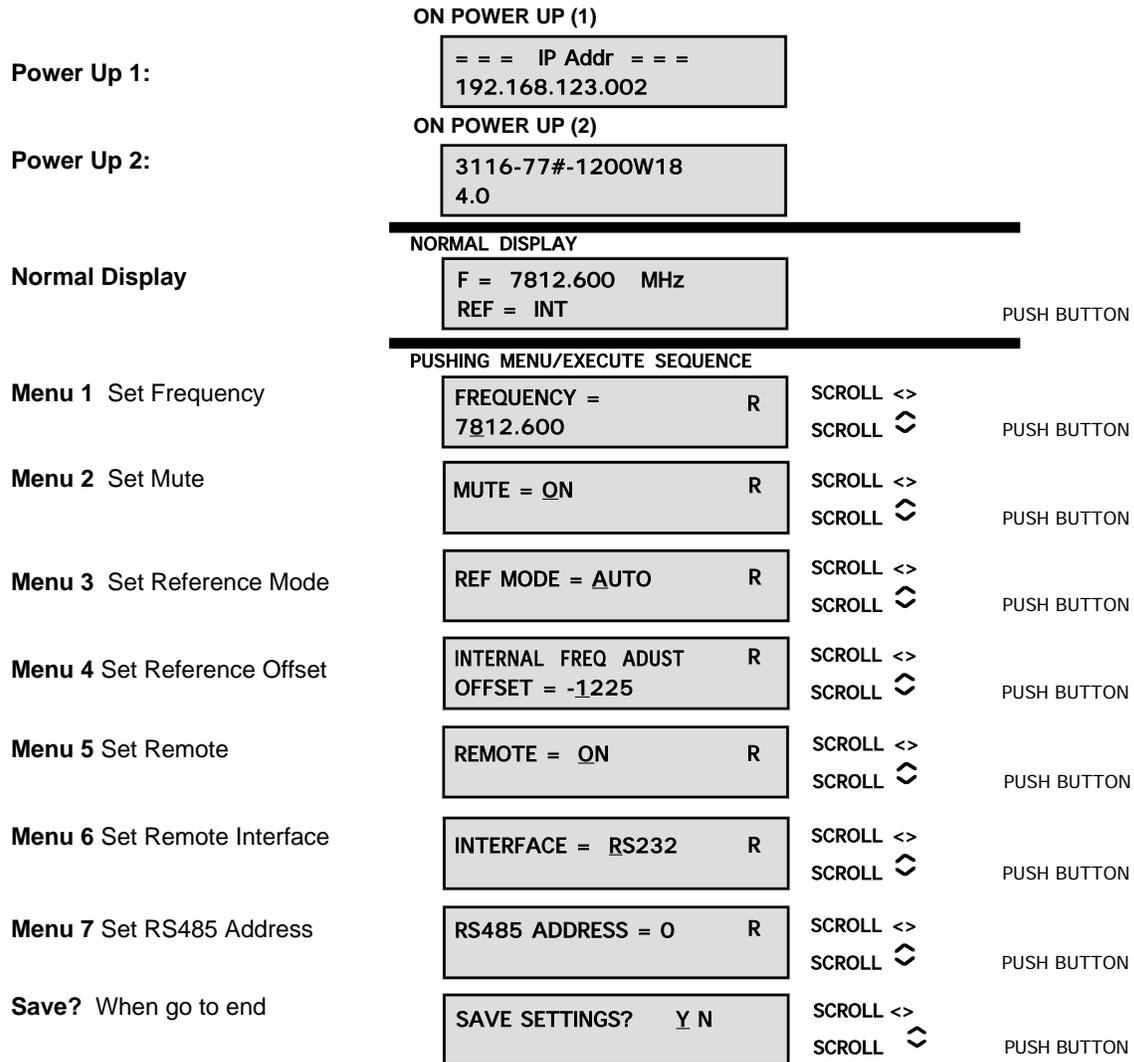
An alarm condition will occur if any local oscillator phase lock loop (PLL) comes out of lock. The Remote LED will light when you select the Remote mode.

2.5.5 10 MHz Reference Mode Operation

- Internal Mode:** The unit uses its own built-in 10 MHz OCXO. The Internal Reference is present on the Reference Output Connector, J8. REF = INT appears on the front panel display.
- External Mode:** The unit uses a 10 MHz Reference that is connected to the External Reference Input, J2. REF = EXT appears on the front panel display. The External 10 MHz Reference level must be +3dBm, ± 3 dB. If the External 10 MHz signal does not meet the unit's specified parameters then the unit will not function properly. The External Reference is present on the Reference Output connector, J8.
- Auto Mode:** The unit defaults to the External 10 MHz Reference as long as the level meets the +3dBm, ± 3 dB specification. REF = AUTO - E appears on the front panel display where the -E indicates that the unit is using the External 10 MHz Reference. The External Reference is present on the Reference Output connector, J8.

If the external 10 MHz Reference signal level is less than -1dBm, the unit switches to Internal 10 MHz Reference. REF = AUTO -I appears on the front panel display where -I indicates that the unit is using the Internal 10 MHz Reference. The Internal 10 MHz Reference is present on the reference output connector, J8.

FIGURE 2.4 Menu Display and Sequences



3.0 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 units 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.



6170 Shiloh Road
Alpharetta, Georgia 30005

(770) 886-8005
FAX (770) 886-7964
Toll Free 888-900-5588

WEB www.crosstechnologies.com
E-MAIL info@crosstechnologies.com

Printed in USA