Instruction Manual

Model 3116-140-4110
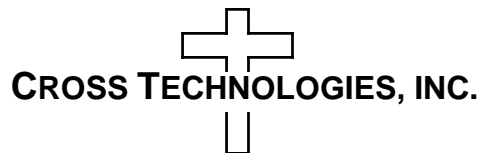
Agile Block Downconverter

October 2019, Rev. 0

```
                                    MENU    ┌─────────────────┐          MODEL 3116
                              ▲              │ FC = 14.250 GHZ │          DOWNCONVERTER
                              ▼    ○         │ G=+10.0  Ref AUTO│      CROSS TECHNOLOGIES INC.
   ◉      ◉      ◉           EXECUTE         └─────────────────┘
 REMOTE ALARM POWER  ◀  ▶
```
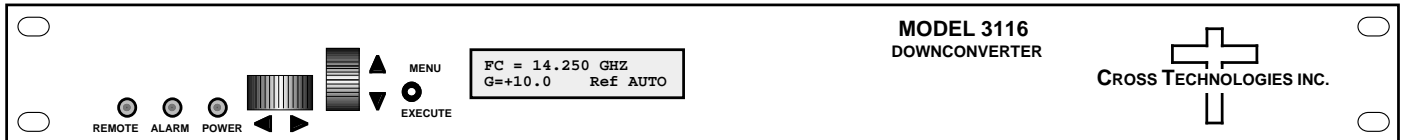
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INSTRUCTION MANUAL

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MODEL 3116-140-4110 Agile Block Downconverter

1.0 General

1.1 Equipment Description

The 3116-140-4110 Agile Block Downconverter converts 14.00 - 14.50 GHz to 4.11 GHz ± 62.5 MHz in 1 MHz steps with low phase noise and flat frequency response. Frequency translation is via a 9.89 - 10.39 GHz local oscillator (Fc =14.0-14.5 GHz). The gain is +35 ± 2 dB maximum and is adjustable in 0.5 ± 0.5 dB steps. Front panel LEDs provide indication of Remote operation, PLL Alarm and DC Power. Frequency, gain and internal/external/Auto reference frequency selection are controlled by front panel switches or remote selection (via RS 232C, standard; Ethernet Optional) and are viewable on the LCD Display. Connectors are SMA female for the RF Input and RF Output and BNC female for the external reference input and reference output. In AUTO, the 10 MHz reference stays in external if the external level is +1 to +8 dBm. The 3116 is powered by a 100-240 ± 10% VAC power supply, and housed in a 1 3/4" X 19" X 14" rack mount chassis.
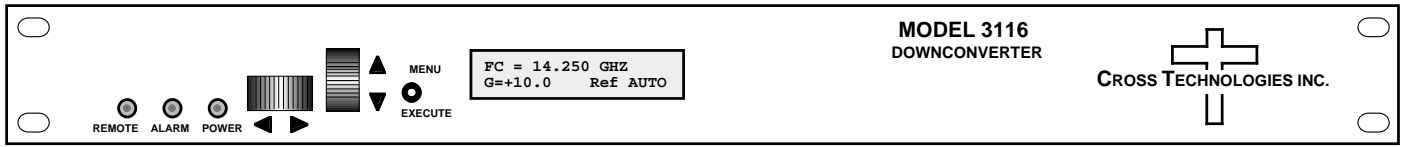
FRONT PANEL - 3116-140-4110
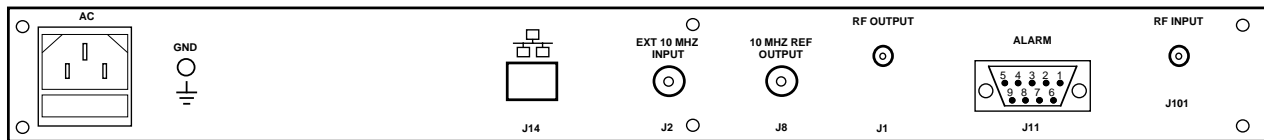
REAR PANEL - 3116-140-4110 (Shown with Optional RJ45 Ethernet Connector)

FIGURE 1.1   3116-140-4110 Front and Rear Panels

3116-140-4110 Block Diagram

FIGURE 1.2   3116-140-4110 Block Diagram

1.2 Technical Characteristics

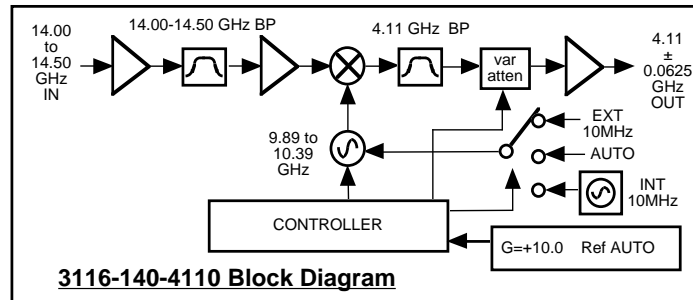| TABLE 1.0 3116-140-4110 Block Downconverter Specifications*	
Input Characteristics (RF Input)	
Impedance / Return Loss	50Ω / 14 dB
Frequency	14.00 to 14.50 GHz
Noise Figure, Maximum	12 dB maximum gain
Input Level Range	-55 to -35 dBm
Input 1 dB Compression	-25 dBm
Output Characteristics (RF Output)	
Impedance / Return Loss	50Ω / 14 dB
Frequency	4.11 ±0.0625 GHz
Output Level Range	-20 to 0 dBm
Output 1 dB Compression	+10 dBm at maximum gain
Channel Characteristics	
Gain, Maximum (adjustment)	+35 dB ±2 dB, max. gain; 30 dB adjustment in 0.5 ± 0.5 dB Steps
Image Rejection	> 60 dB, minimum
Spurious, Inband	SIGNAL RELATED <-55 dBC in band, 0 dBm out; 2XFo <-45dBC; SIGNAL INDEPENDENT, <-60 dBm
Spurious, Out of Band	<-50 dBm, 0.5 - 4.05 GHz and 4.20 - 6.0 GHz
Intermodulation	<-55 dBC for two carriers each at -10 dBm out
Frequency Response	±2 dB, Band; ±1.5 dB, 4.11 ± 0.0625 GHz out; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting
LO Characteristics	
LO Frequency	9.89 - 10.39 GHz (Fc =14.0-14.5 GHz)
Frequency Step	1.0 MHz
Frequency Accuracy	±0.01 ppm maximum over temp internal reference; external reference input
10 MHz Level In/Out	3 dBm, ± 3 dB, with Auto-detect

Phase Noise @ F (Hz) >	100	1K	10K	100K	1M
Standard dBC/(Hz)	-70	-80	-85	-100	-110

Controls, Indicators	
Freq; Gain; 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)

*10˚C to 40˚C; Specifications subject to change without notice

Technical Characteristics continued from page 4..

Other	
RFIN/OUT Connector	SMA (female), 50Ω / SMA (female), 50Ω
10 MHz Connectors	BNC (female), 75Ω works with 50 or 75 ohm
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
E6-25X Int 10MHz ref. locked to ext 25 MHz W31 0 to +50 degrees C operation.

Remote M&C Ethernet Options	
- W8	Ethernet with Web Browser Interface
- W18	Ethernet with SNMP (and MIB) Interface
- W28	Ethernet with Direct TCP/IP Interface
- W828	W8 +W18 +W28

Connector Options	
- STD	SMA (RF In), 50Ω SMA (RF Out)
- NN	N-type (RF In), 50Ω N-type (RF Out)
- SN	SMA (RF In), 50Ω N-type (RF Out)
Contact Cross Technologies for other options.	

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)

```
┌──────────────────────────────────────────────────────────────┐
│ M&C Cable Diagram -  Cross Technologies Frequency Converters and │
│ Frequency Sources                                              │
├──────────────────────────────────────────────────────────────┤
│ Female DB-9                                     Male DB-9      │
│ PC Com Port                                                    │
│ 1                                                          1   │
│ 2  ◄─────────────────╲    ╱─────────────────►              2   │
│ 3  ◄──────────────────╲  ╱──────────────────►              3   │
│ 4  ◄────┐              ╳                                    4   │
│ 5  ◄────┤     ╲────────────────────────────►              5   │
│ 6  ◄────┘                                                   6   │
│ 7  ◄────┐                                                   7   │
│ 8  ◄────┘                                                   8   │
│ 9                                                          9   │
└──────────────────────────────────────────────────────────────┘
```
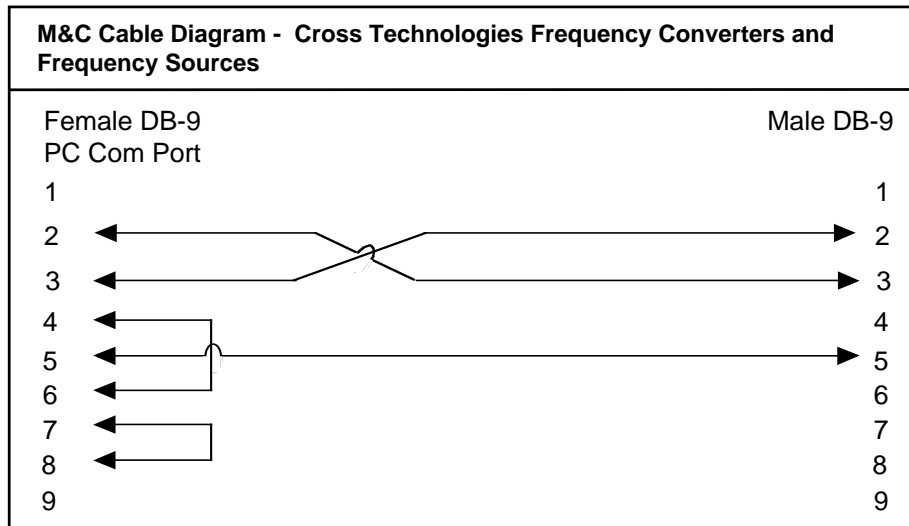
Connector: Rear panel, DB-9 male

J11 Pinouts (RS-232C/422/485)	
Pin	Function
1	Rx-
2	Rx+ (RS-232C)
3	Tx+ (RS-232C)
4	Tx-
5	GND
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 3116-140-4110 and briefly describes them.

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

TABLE 1.1 3116-140-4110 Downconverter Status Request/Inquiries		
Status Request/Inquiries		
Get Frequency	{aaSF}	returns: {aaSFxxxxx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		F = command code
		xxxxx = the converter's RF center frequency in MHz.
		The unit will append the '>' character if the command is sucessfully processed.
Get Gain	{aaSG}	returns: {aaSGxxx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		G = command code
		xxx = Gain in 0.5 dB.
		The unit will append the '>' character if the command is sucessfully processed.
Get Reference Mode	{aaSE}	returns: {aaSEx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		E = command code
		x = 0 for Internal, 1 for External, and 2 for Auto.
		The unit will append the '>' character if the command is sucessfully processed.
Get External Reference Frequency	{aaSH}	returns: {aaSHxx}
(Option E6-25X only)		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		H = command code
		xx = 10 for 10 MHz, 25 for 25 MHz
		The unit will append the '>' character if the command is sucessfully processed.

TABLE 1.1 3116-140-4110 Downconverter Status Commands (continued)

Get Mute	{aaSM}	returns: {aaSMx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		M = command code
		x = 0 for mute off, 1 for mute on.
		The unit will append the '>' character if the command is sucessfully processed.
Get Internal 10 MHz Reference Offset	{aaSO}	returns: {aaSOxxxxx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		O = command code
		xxxxx is the offset value.
		The unit will append the '>' character if the command is sucessfully processed.
Get alarm status	{SA}	returns {aaSAx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		A = command code
		x = 0 for alarm off, 1 for alarm on.
		The unit will append the '>' character if the command is sucessfully processed.
Get Last Frequency Command		
Processing Time	{aaST}	returns: {aaSTxxxx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		T = command code
		xxxx = command processing time in uS.
		example: unit returns {ST3195}
		This means the last command took 3.195 ms from the time the '}' character was received
		until all pll register data was loaded. This is a special command provided for testing
		the frequency tuning speed.
		The unit will append the '>' character if the command is sucessfully processed.
Get product/model info	{aaSV}	returns {aaSV3116-140-4110rev.5xx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		V = command code
		3116-140-4110 = product model and rev. 5.xx is the firmware revision.
		The unit will append the '>' character if the command is sucessfully processed.
Get IP address (ethernet option)	{aaSi}	returns {aaSixxx.xxx.xxx.xxx}
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		i = command code
		xxx.xxx.xxx.xxx = IP address
Get subnet mask (ethernet option)	{aaSs}	returns {Ssxxx.xxx.xxx.xxx}
		where xxx.xxx.xxx.xxx = subnet mask

C) **Commands**

Table 1.2 lists the commands for the 3116 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}(OO-31) prefix, in the table below,

   should be used ONLY when R S-485 is selected.

TABLE 1.2 3116-140-4110 Downconverter Commands		
Command Function	**Syntax**	**Command Description**
Set Frequency	{aaCFxxxxx}	where:
		aa = unit address, range = OO to 31, only used if interface is RS485, otherwise omit
		F = command code
		xxxxx = Converter center frequency in MHz.
		Range: 14000 to 14500 MHz in 1 MHz steps.
		example: {CF14125}
		Will set the converter center frequency to 14125 MHz.
		The unit will reply with the '>' character if the command is sucessfully processed.
Set Gain	{aaCGxxx}	where:
		aa = unit address, range = OO to 31, only used if interface is RS485, otherwise omit
		G = command code
		xxx = Desired gain in 0.5 dB steps, omit the decimal point.
		Range: 50 to 350 (5.0 to 35.0 in 0.5 dB steps).
		example: {CG155}
		Will set the gain to 15.5 dB.
		The unit will reply with the '>' character if the command is sucessfully processed.
Set Reference Mode	{aaCEx}	where:
		aa = unit address, range = OO to 31, only used if interface is RS485, otherwise omit
		E = command code
		x = O for Internal, 1 for External, and 2 for Auto.
		example: {CE1}
		Will set unit's 10 MHz reference mode to External.
		The unit will reply with the '>' character if the command is sucessfully processed.

TABLE 1.2 3116-140-4110 Downconverter Commands

Command Function	Syntax	Command Description
Set External Reference Frequency	{aaCHxx}	where:
Option E6-25X only)		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		H = command code
		xx = 10 for 10 MHz, 25 for 25 MHz
		example: {CH25}
		Will set unit's Internal reference input to 25 MHz.
		The unit will reply with the '>' character if the command is sucessfully processed.
Set Mute	{aaCMx}	where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		M = command code
		x = 0 for mute off and 1 for mute on.
		example: {CM1}
		Will mute the converter's RF output.
		The unit will reply with the '>' character if the command is sucessfully processed.
Set Internal 10 MHz Reference Offset	{aaCOxxxxx}	where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		O = command code
		xxxxx = Internal 10 MHz reference frequency offset.
		Range: -2000 to +2000
		example: {CO-1000}
		Will tune the internal reference frequency about -25%.
		The unit will reply with the '>' character if the command is sucessfully processed.
		Note: This command will only effect the reference frequency if the Reference Mode
		is set to internal.

2.0 Installation
2.1 Mechanical

The 3116 is powered by a 100-240 ± 10% VAC power supply, and housed in a 1 3/4"X 11.7 X 19" rack mount chassis.   The 3116-140-4110 can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 3116-140-4110 is assembled.
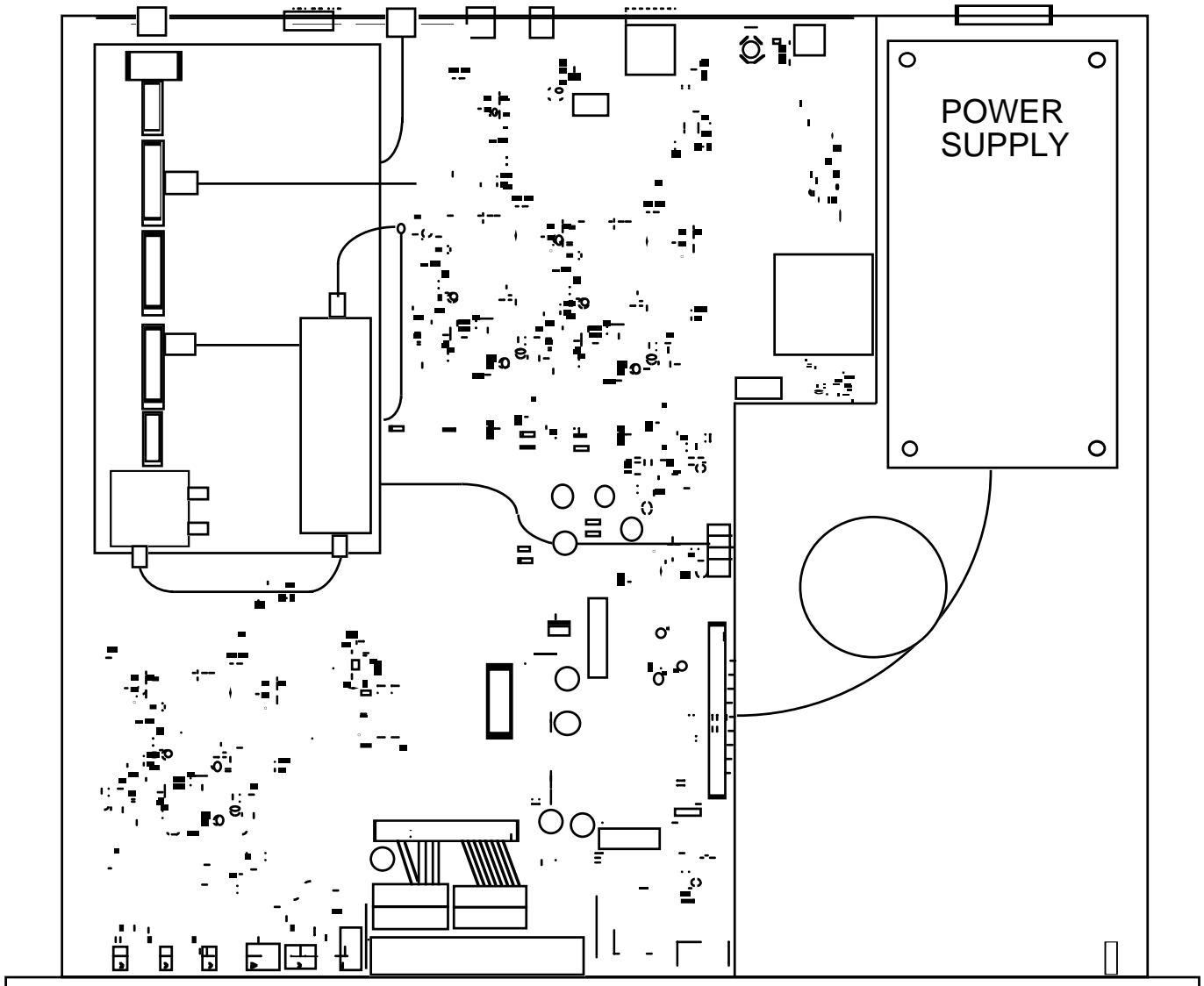
POWER
SUPPLY

FIGURE 2.0   3116-140-4110 Mechanical Assembly

2.2 Rear Panel Input/Output Signals

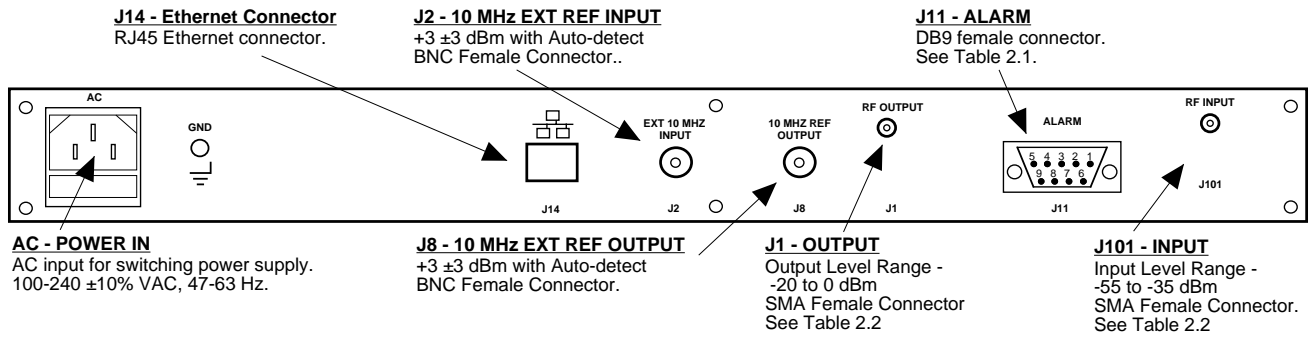Figure 2.1 shows the input and output connectors on the rear panel.

J14 - Ethernet Connector
RJ45 Ethernet connector.

J2 - 10 MHz EXT REF INPUT
+3 ±3 dBm with Auto-detect
BNC Female Connector..

J11 - ALARM
DB9 female connector.
See Table 2.1.

AC - POWER IN
AC input for switching power supply.
100-240 ±10% VAC, 47-63 Hz.

J8 - 10 MHz EXT REF OUTPUT
+3 ±3 dBm with Auto-detect
BNC Female Connector.

J1 - OUTPUT
Output Level Range -
 -20 to 0 dBm
SMA Female Connector
See Table 2.2

J101 - INPUT
Input Level Range -
-55 to -35 dBm
SMA Female Connector.
See Table 2.2

FIGURE 2.1   3116-140-4110 Rear Panel I/O's

TABLE 2.1, J11 Pinouts*	
Pin	Function
1	Rx-
2	Rx+ (RS-232C)
3	Tx+ (RS-232C)
4	Tx-
5	GND
6	Alarm Relay: Common
7	Alarm Relay: Normally Open
8	Not Used
9	Alarm Relay: Normally Closed

TABLE 2.2 Connector Options		
Option	RF IN	RF Out
STD	SMA (RF In)	50Ω SMA
-NN	N-type (RF In)	50Ω N-type
-SN	SMA (RF In)	50Ω N-type

*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

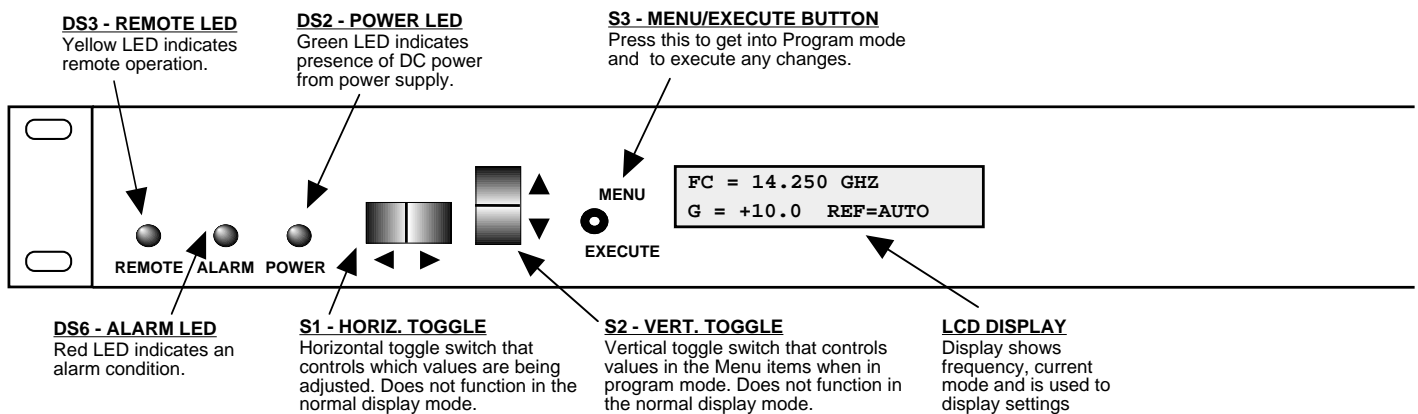Figure 2.2 shows the front panel controls and indicators.

DS3 - REMOTE LED
Yellow LED indicates
remote operation.

DS2 - POWER LED
Green LED indicates
presence of DC power
from power supply.

S3 - MENU/EXECUTE BUTTON
Press this to get into Program mode
and to execute any changes.


```
FC = 14.250 GHZ
G = +10.0  REF=AUTO
```

DS6 - ALARM LED
Red LED indicates an
alarm condition.

S1 - HORIZ. TOGGLE
Horizontal toggle switch that
controls which values are being
adjusted. Does not function in the
normal display mode.

S2 - VERT. TOGGLE
Vertical toggle switch that controls
values in the Menu items when in
program mode. Does not function in
the normal display mode.

LCD DISPLAY
Display shows
frequency, current
mode and is used to
display settings

FIGURE 2.2   3116-140-4110 Front Panel Controls and Indicators

2.4 Installation / Operation

2.4.1 Installing and Operating the 3116-140-4110

1. Connect a -55 dBm to -35 dBm signal to RF IN, J101 (Figure 2.1).
2. Connect the RF OUT, J1, to the external equipment.
3. Connect 100-240 ±10% VAC, 47 - 63 Hz to AC connector on the back panel.
4. Set the gain +35 dB maximum, adjustable in 0.5 ±0.5 dB steps
5. Make sure the output stays within -20 to 0 dBm with the gain.
   selected and the input level provided. (See Section 2.5 Menu Settings).
6. Be sure DS2 (green, DC Power) is on and DS6 (red, Alarm) is off (Figure 2.2).
7. 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.
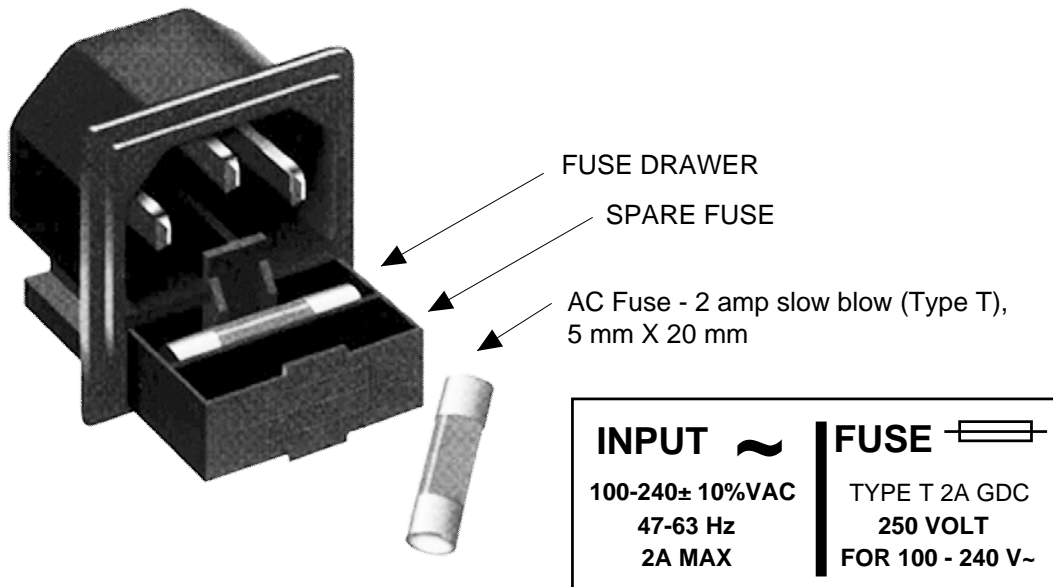   If a fuse continues to open, the power supply is most likely defective.

FUSE DRAWER

SPARE FUSE

AC Fuse - 2 amp slow blow (Type T),
5 mm X 20 mm

INPUT ~	FUSE
100-240± 10%VAC	TYPE T 2A GDC
47-63 Hz	**250 VOLT**
2A MAX	**FOR 100 - 240 V~**

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 Input Level Range
Menu 2   Set Gain
Menu 3   Set Mute
Menu 4   Set Reference Mode
Menu 5   Set Reference Offset
Menu 6   Set Remote
Menu 7   Set Remote Interface
Menu 8   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

<u>NOTE</u>**: 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.

```
3116-140-4110W18
Rev. 1.00
```

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

```
FC = 14.250 GHZ
G = +10.0    REF=AUTO
```

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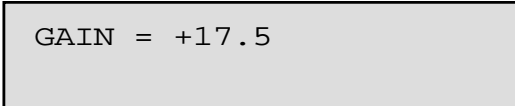
2.5.3 Control Switches

    1. <u>Menu/Execute</u> - 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. <u>Horizontal Switch</u> - This switch is mounted so its movement is horizontal and moves the display cursor left or right.

    3. <u>Vertical Switch</u> - 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 Gain Changes

When you get to this menu note that 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.

> **NOTE: THE GAIN WILL CHANGE AS YOU ADJUST THE NUMBERS. HOWEVER, THE VALUE WILL NOT BE STORED UNTIL YOU INDICATE YES IN THE SAVE SETTINGS WINDOW. DO NOT SET A GAIN THAT WOULD EXCEED 0 dBm OR HAVE LESS THAN -20 dBm OUTPUT LEVEL.**

Press the Up/Down switch to change the gain in 0.5, 1, or 10 dB steps and then push the Menu/Execute switch to get to the Save Settings Menu:

```
 GAIN = +17.5
```

When the display indicates the value desired you can push the Menu/Execute switch to the next item OR you can scroll to "R", push the Menu/Execute switch to get to:

```
 SAVE SETTINGS?
```

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

Figure 2.4 (page 18) 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 Remote LED will light when you select the Remote mode.

2.5.6 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, ±3dB. 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, ±3dB 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.

Option E6-25X External Reference Option

Option E6-25X provides the ability to lock the internal reference to an external 10 MHz or 25 MHz reference signal input. First, the reference mode must be set to either "external" or "auto". Next, the external reference frequency must be selected.

The external reference frequency may be selected from the front panel menu:

```
EXTERNAL REF       R
FREQUENCY = 25 MHz
```

The external reference frequency may also be selected with the following M&C command:

{CHxx} where xx is either 10 or 25 for 10 MHz or 25 MHz respectively.

The status of the internal reference is shown in the upper right corner of the LCD display when the unit is in normal display mode. When the unit is powered up from a cold start the internal reference's oven needs to warm up before it can lock to the external reference input. When the oven is warming up the normal display will show "**OV**" in the upper right corner. Once the oven is warmed up the display will show "**LK**" if the internal reference is locked to the external reference input. The display will show "**UL**" if the internal reference is not locked to the external reference input
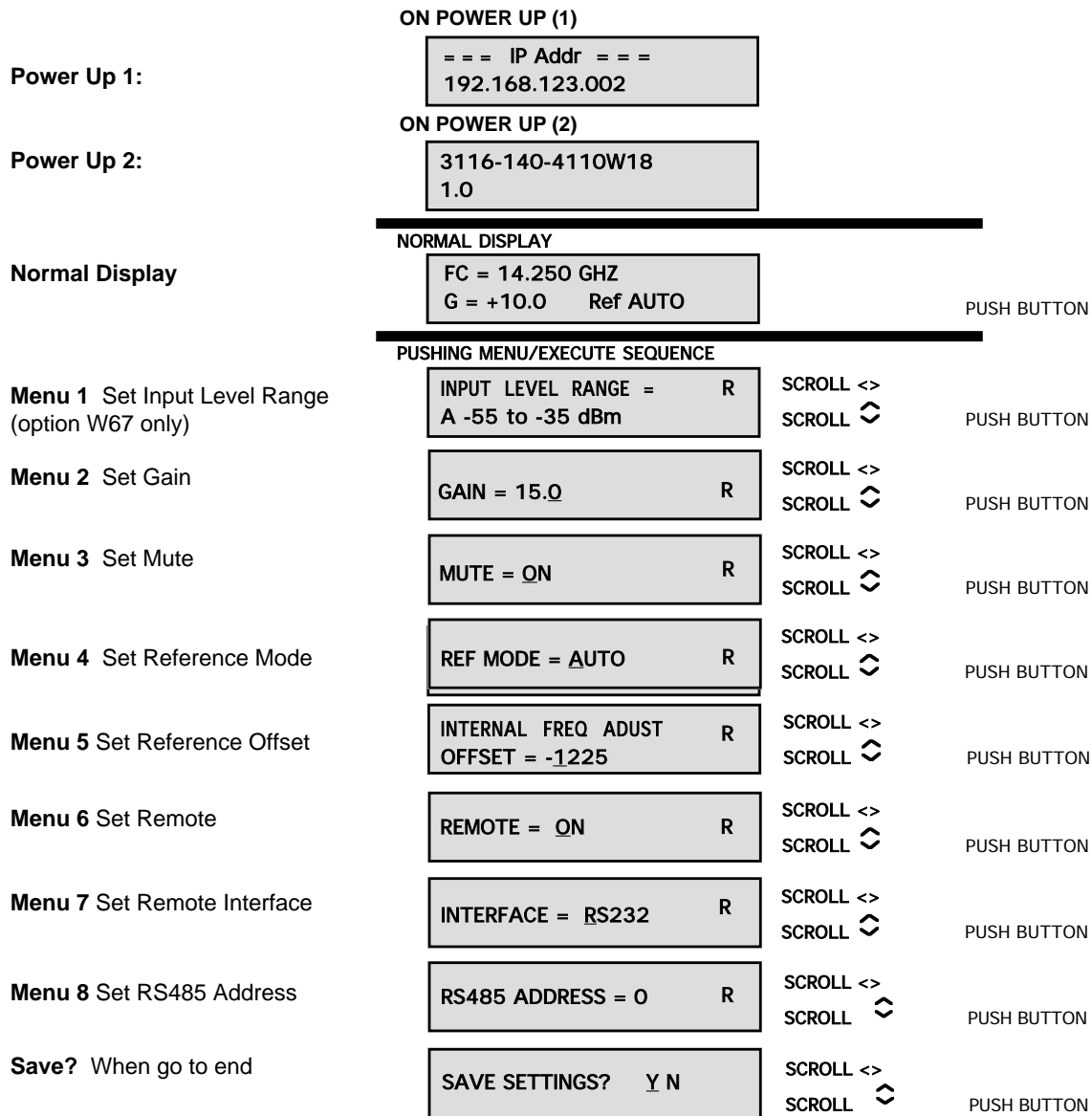
ON POWER UP (1)

Power Up 1:

```
= = =  IP Addr  = = =
192.168.123.002
```

ON POWER UP (2)

Power Up 2:

```
3116-140-4110W18
1.0
```

NORMAL DISPLAY

Normal Display

```
FC = 14.250 GHZ
G = +10.0     Ref AUTO
```
PUSH BUTTON

PUSHING MENU/EXECUTE SEQUENCE

Menu 1 Set Input Level Range
(option W67 only)

```
INPUT  LEVEL  RANGE  =      R
A -55 to -35 dBm
```
SCROLL <>
SCROLL ⬍   PUSH BUTTON

Menu 2 Set Gain

```
GAIN = 15.0              R
```
SCROLL <>
SCROLL ⬍   PUSH BUTTON

Menu 3 Set Mute

```
MUTE = ON               R
```
SCROLL <>
SCROLL ⬍   PUSH BUTTON

Menu 4 Set Reference Mode

```
REF MODE = AUTO         R
```
SCROLL <>
SCROLL ⬍   PUSH BUTTON

Menu 5 Set Reference Offset

```
INTERNAL  FREQ  ADUST    R
OFFSET = -1225
```
SCROLL <>
SCROLL ⬍   PUSH BUTTON

Menu 6 Set Remote

```
REMOTE =  ON            R
```
SCROLL <>
SCROLL ⬍   PUSH BUTTON

Menu 7 Set Remote Interface

```
INTERFACE =  RS232      R
```
SCROLL <>
SCROLL ⬍   PUSH BUTTON

Menu 8 Set RS485 Address

```
RS485 ADDRESS = 0       R
```
SCROLL <>
SCROLL ⬍   PUSH BUTTON

Save? When go to end

```
SAVE SETTINGS?     Y N
```
SCROLL <>
SCROLL ⬍   PUSH BUTTON

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 multiunit rack assembly, the operating ambient temperature of the rack may be greater than room ambient temperature. Therefore, consideration should be given to Tmra (Maximum Recommended Ambient Temperature).

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.
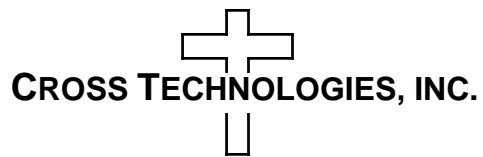
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