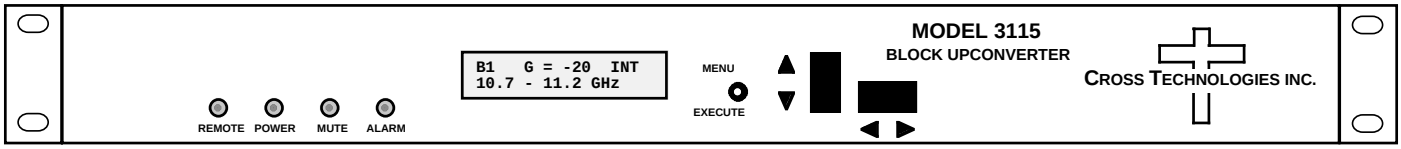
Instruction Manual

Model 3115-51

Block Upconverter/ 5 Band

June 2009, Rev. 0



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INSTRUCTION MANUAL

MODEL 3115-51 Block Upconverter/5 Band

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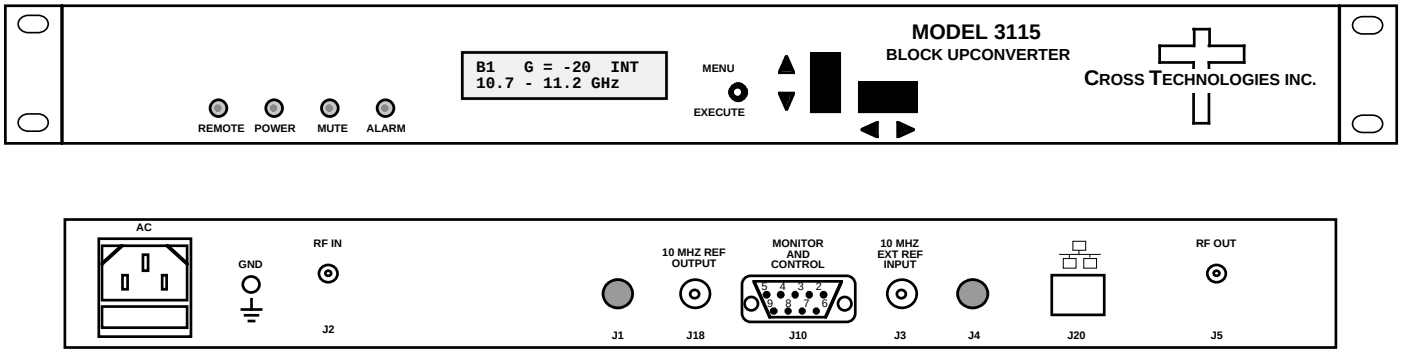
MODEL 3115-51 Block Upconverter/ 5 Band

1.0 General

1.1 Equipment Description

The 3115-51 Block Upconverter converts 0.95 - 1.45 GHz to one of five 500 MHz wide RF bands over the 10.7 to 12.75 GHz range. Push button switches select the RF band, gain, and other parameters. Front panel LEDs provide indication of DC power (green), remote operation (yellow), PLL alarm (red), or the TX carrier is muted (yellow). A variable attenuator at the RF output provides a gain range of 0 to -**20** dB as adjusted by the front panel pushbutton switches. Remote operation allows selection of frequency band and gain. Parameter selection and frequency band and gain settings appear on the LCD display. Connectors are SMA for the L-band input and the RF output (other connector configurations available), BNC female for the 10MHz reference input and output. The 3115-51 is powered by a 100-240 ±10% VAC power supply; and housed in a 1.75" X 19" X 16" rack mount chassis.



Model 3115-51 Block Upconverter Front Panel

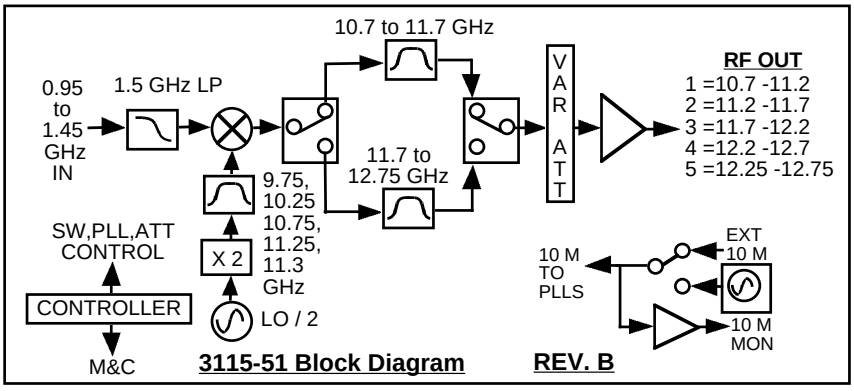


FIGURE 1 Model 3115-51 Block Upconverter Block Diagram

1.2 Technical Characteristics

TABLE 1.0 3115-51 Block Upconverter/ 5 Band*

Input Characteristics

Impedance/Return Loss	50 Ω /14 dB
Frequency	0.95 to 1.45 GHz
Noise Figure, max.	25 dB at max gain
Input Level	-20 to 0 dBm
Input 1dB Compression	+10 dBm

Output Characteristics

Impedance/Return Loss	50 Ω/14 dB (see TABLE 2.5.1 for connector options)
Frequency (GHz)	Band 1 - 10.7 to 11.2 Band 2 - 11.2 to 11.7 Band 3 - 11.7 to 12.2 Band 4 - 12.2 to 12.7 Band 5 - 12.25 to 12.75
Output Level Range	-20 to 0 dBm
Output 1dB Compression	+10 dBm

Channel Characteristics

Gain	0 ±2 dB, max. (0 to -20 dB variable in 1.0 dB steps)
Image Rejection	> 60 dB, min
Spurious, Inband	SIGNAL RELATED<-60 dBC in band, -15 to 0 dBm out; SIGNAL INDEPENDENT, <-60 dBm
Spurious, Out of band	<-50 dBC for two carriers each at -5 dBm out
Intermodulation	<-50 dBC for two carriers each at -5 dBm out
Frequency Response	±1.5 dB, over 500 MHz RF band; ± 0.5 dB, 40 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	Band Specific, 9.75, 10.25, 10.75, 11.25, 11.3 GHz
Frequency Accuracy	± 0.01 ppm max over temp internal reference; ext. ref. input

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

10 MHz Level	3 dBm +3dB

Controls, Indicators

Band/Gain Selection	direct readout LCD; pushbutton switches or remote
Power; Alarm; Remote; Mute	Green LED; Red LED; Yellow LED; Yellow LED
Remote	RS232C, 9600 baud (RS484, Ethernet Options

Other

RF Out, Mon. Connector	SMA (female), 50Ω
L-Band Connector	SMA (female), 50Ω
10 MHz connectors	BNC (female), 50Ω/75Ω
Status/Control Connector	DB9 - Not or NC contact closure on Alarm
Size	19 inch, standard chasis, 1.75” high x 16.0” deep
Power	100-240 ±10% VAC, 47 - 63 Hz, 45 watts max.

Available Options

Q -	RS485 Remote Interface
W8 -	Ethernet Interface
W8S -	Ethernet W/SNMP Remote Interface
Connector Options/Impedance	S7 - 50Ω SMA (RF), 75Ω BNC (L-Band) SF - 50Ω SMA (RF), 75Ω F-type (L-Band) SN - 50Ω SMA (RF), 50 N-type (L-Band)

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

1.3 M&C Commands

The following tables summarize the commands and status queries applicable to the 3115-51 Block Upconverter.

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

Table 2.0 Model 3115-51 M&C Commands

Table 2.0: Model 3115-51M&C Commands		
Command	**Syntax**	**Description**
Set Frequency Band	{aaCBx}	x = 1 to select band 1: in = (950 to 1450 MHz) out = (10700 to 11200 MHz)
		x = 2 to select band 2: in = (950 to 1450 MHz) out = (11200 to 11700 MHz)
		x = 3 to select band 3: in = (950 to 1450 MHz) out = (11700 to 12200 MHz)
		x = 4 to select band 4: in = (950 to 1450 MHz) out = (12200 to 12700 MHz)
		x = 5 to select band 5: in = (950 to 1450 MHz) Out = (12250 to 12750 MHz)
Set Gain	{aaCGxx}	where:
		xxx = 3 characters
		Range: -20 to 00 in 1.0 dB steps
Set Mute	{aaCMx}	where:
		x = 1 to mute the output
		x = 0 to unmute the output
Set External Reference	{aaCEx}	where:
		x = 1 to select external reference
		x = 0 to select internal reference

continued on page 6..

Table 2.1 Model 3115-51 M&C Commands

Table 2.1: Model 3115-51M&C Commands		
Command	**Syntax**	**Description**
Frequency Band	{aaSB}	Returns {aaSBx} where:
		x = 1 to select band 1: in = (950 to 1450 MHz) out = (10700 to 11200 MHz)
		x = 2 to select band 2: in = (950 to 1450 MHz) out = (11200 to 11700 MHz)
		x = 3 to select band 3: in = (950 to 1450 MHz) out = (11700 to 12200 MHz)
		x = 4 to select band 4: in = (950 to 1450 MHz) out = (12200 to 12700 MHz)
		x = 5 to select band 5: in = (950 to 1450 MHz) Out = (12250 to 12750 MHz)
Gain	{aaSG}	Returns {aaSGxxxx} where:
		xxx = 3 characters
		Range: (-20 to 00 in 1.0 dB steps
10 MHz reference	{aaSE}	Returns {aaSEx} where:
		x = 0 if Internal 10 MHz reference is selected
		x = 1 if External 10 MHz reference is selected
		x = 3 if Auto 10 MHz reference is selected
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
Model and firmware revision	{aaSV}	returns {aaSVxxxxxxxxyyyy} where:
		xxxxxxxx = unit model number
		yyyy = unit firmware rev.

2.1 Mechanical

The 3115-51 Block Downconverter consists of a controller board and RF plate assembly.

2.2 Rear Panel Input / Output Signals - Figure 2.2 shows the input and output connectors on the rear panel.

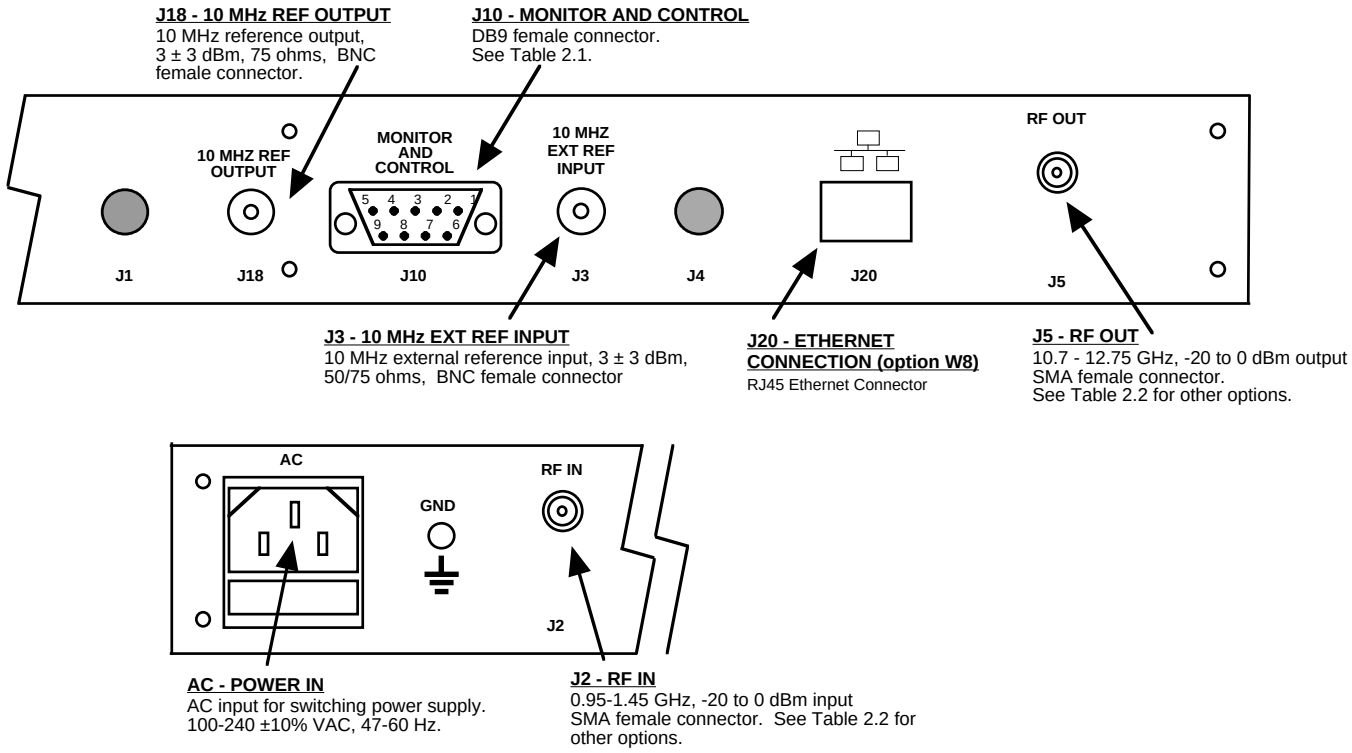


FIGURE 2.2 3115-51 Rear Panel Inputs and Outputs

TABLE 2.1 J10 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

TABLE 2.2 IF/RF Connector Options

Option	IF	RF
STD	BNC, 50Ω	Type N, 50Ω
-S	BNC, 50Ω	SMA, 50Ω
-N	BNC, 75Ω	Type N, 50Ω

*Interface: DB-9 Female
Protocol: RS485, RS422, or RS232C (selectable),
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.

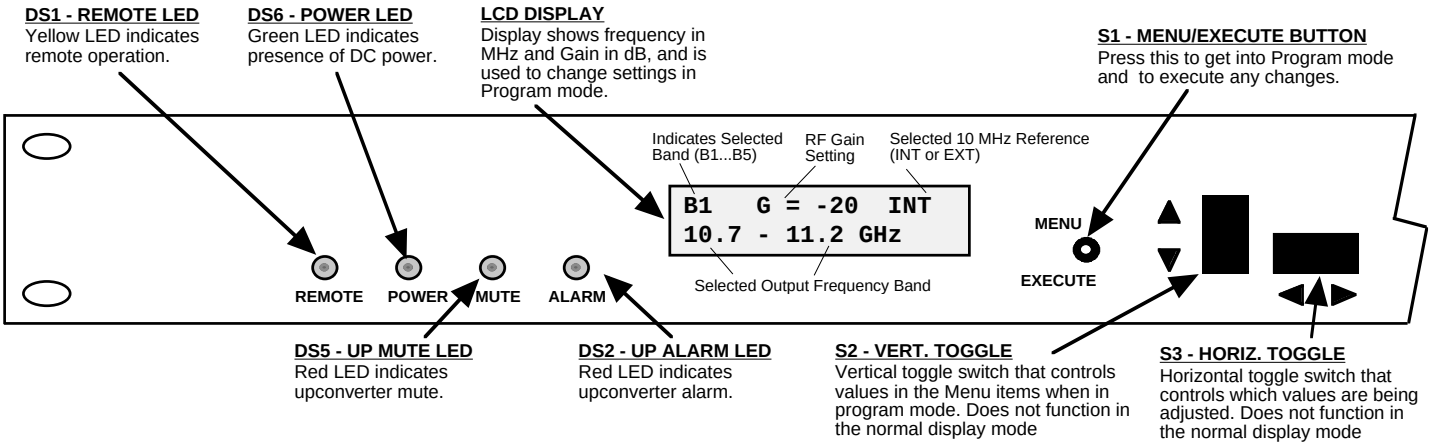


FIGURE 2.3 3115-51 Front Panel Controls and Indicators

2.0 Installation/Operation

Installing and Operating the 3115-51 Block Upconverter, 5 Band:

1. Connect a -20 dBm to 0 dBm signal to L-BAND INPUT, (Figure 2.4).
2. Connect the RF OUTPUT, to the external equipment.
3. Connect 100-240 ±10% VAC, 47 - 63 Hz to AC connector to the front panel.
4. Be sure DS6 (green, DC Power) is on and DS2 (red, Alarm) is off (Figure 2.3).
5. Set the gain for -20 to 0 dB insuring that the output level is always in the range of -20 to 0 dB.
6. Select either INT (for internal 10 MHz ref), or EXT (for external 10 MHz, +2 to +8 dBm ref that is inserted at J2).
7. AC Fuse - The fuse is a 1.25" x .25" - 1.5 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.

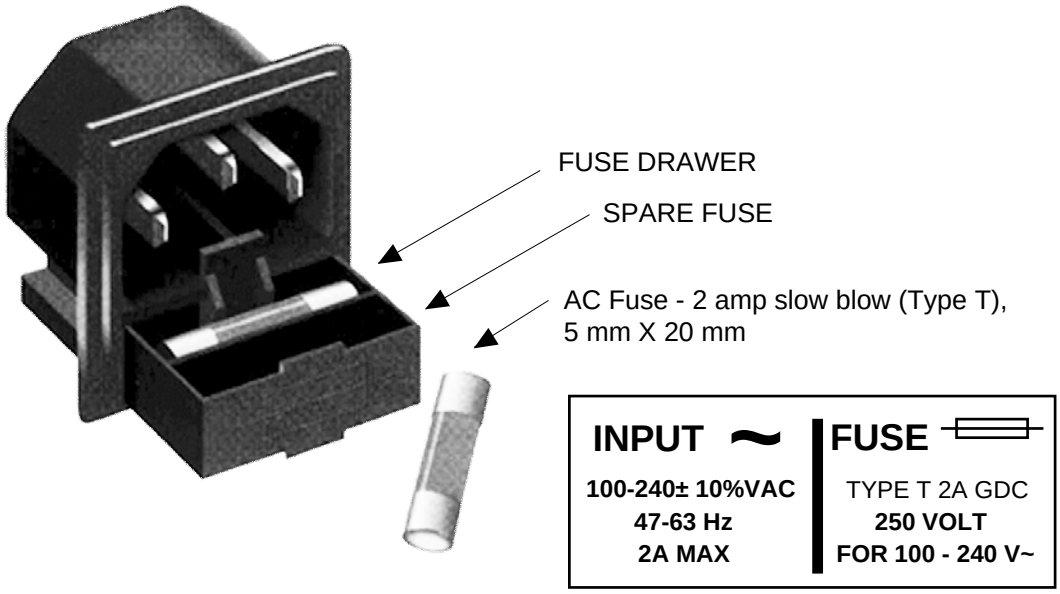


FIGURE 2.4 Fuse Location and Spare Fuse

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 Band (1 to 5)
Menu 2	Gain in dB (0 to -20)
Menu 3	Select External 10 MHz Reference
Menu 4	Mute TX Signal
Menu 5	Set Unit to Remote Operation
Menu 6	Select RS232, RS422, or RS485 Remote Operation (**option Q**) or Ethernet (**Option W8, W18**)
Menu 7	Select RS485 Remote Address for Unit (**option Q**)
Save Menu	When "R" is selected in any of the above menus or when operator reaches 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 12 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 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 software version will be displayed.

```
REV 1.00
```

3.The present band, gain, 10 MHz reference and output frequecy range are shown.

```
B1     G = -20      INT
10.7 - 11.2 GHz
```

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 as Mute on/off, the vertical switch will alternately turn the function on or off regardless of the direction operated.

2.5.4 Band 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 BAND:

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 upconverter's frequency load:

```
BAND = 1
10.7 - 11.2 GHz
```

Pressing the Up/Down switch down will select available frequency bands.

NOTE: CHANGES DO NOT TAKE PLACE ON BAND 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 the next item:

```
GAIN = -20              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 the default display:

```
B1     G = -20      INT
10.7 - 11.2 GHz
```

Figure 2.5 shows all 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.

NOTE: CHANGES TAKE PLACE ON LEVEL AND GAIN IMMEDIATELY BUT DO NOT GET SAVED UNTIL YOU GO TO THE SAVE MENU AND INDICATE YOU WANT TO SAVE THE CHANGES.

Press the Up/Down switch to change the level in 1 dB steps and then push the Menu/Execute switch to get to the Gain setting:

```
G = -10.0              R
```

Press the Up/Down switch to change the gain in 1 or 10 dB steps:

```
G = -20.0              R
```

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

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?   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:

```
B1     G = -20      INT
10.7 - 11.2 GHz
```

Figure 2.5 gives the menu items and how to make changes

2.5.6 Alarm Indications

An alarm condition will occur if the local oscillator phase lock loop (PLL) comes out of lock.
The Mute LED will light if you select to mute the Tx Signal and the Remote LED will light

when you select the Remote mode.

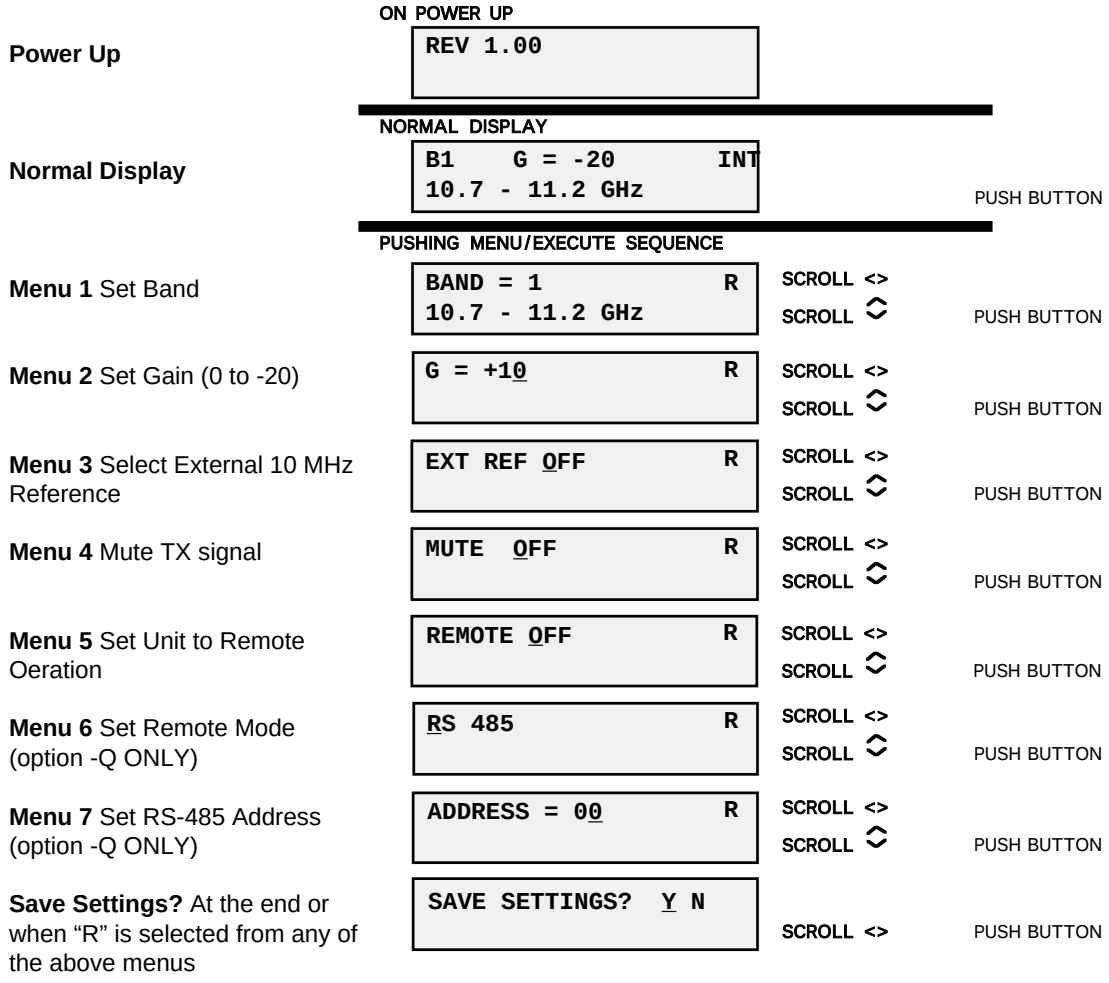
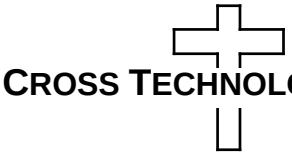


FIGURE 2.5 Menu Display and Sequence



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