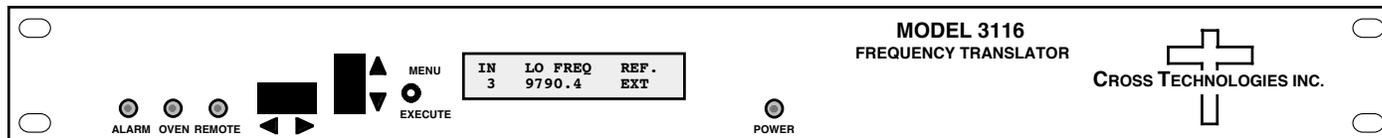


Instruction Manual

Model 3116-T291 Block Translator

October 11, Rev. B



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INSTRUCTION MANUAL

MODEL 3116-T291 Block Translator

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MODEL 3116-T291 Block Translator

1.0 General

1.1 Equipment Description

The 3116-T291 Translator converts one of three selected 27.6 - 29.1 GHz input bands to a 17.8 - 19.3 GHz output band via a three way **switch**. Front panel LEDs provide indication of PLL Alarm, internal OCXO oven Alarm, Remote operation, and DC Power. The RF to RF gain is **-29 ±3 dB**, fixed. Connectors are 2.92 mm for the RF in, Super SMA for the RF out and BNC female for the external reference input and reference output. In AUTO, the internal 100 MHz reference remains locked to the external 10 MHz at a +0 to +6 dBm level. Selected input channel, LO frequency (9.800 or 9.7904 GHz), and internal/external/Auto reference frequency selection are controlled by front panel push-button switches or remote selection (via RS 232C, standard; Ethernet Optional). The 3116-T291 is powered by a 100-240 ±10% VAC power supply and is in a 1.75" X 19" X 13" rack mount chassis.

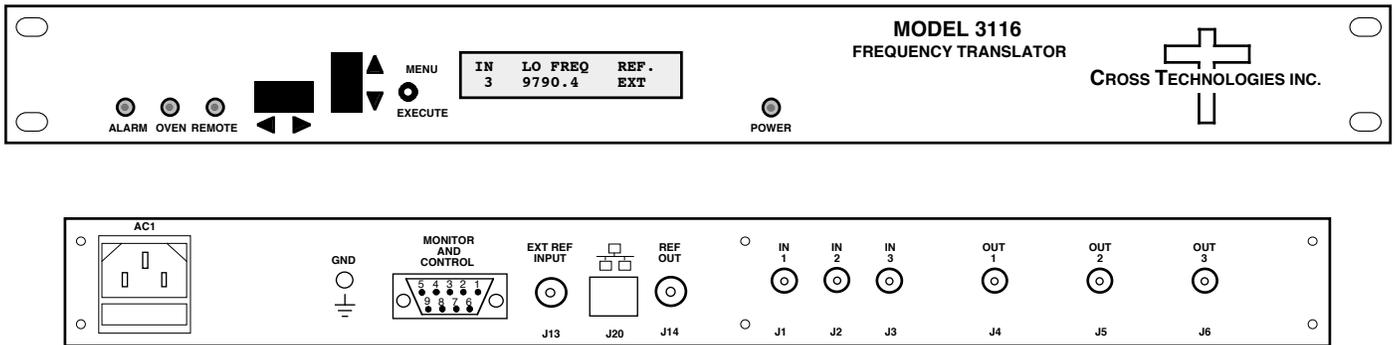


Figure 1.0 Model 3116-T291 Block Translator, Front & Rear Panels

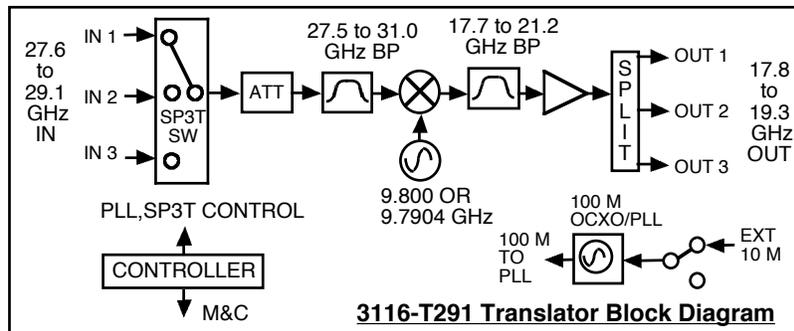


FIGURE 1A Model 3116-T291 Block Translator Block Diagram

1.2 Technical Characteristics

TABLE 1.0 3116-T291 Block Translator*

Input Characteristics

Impedance/Return Loss	50Ω /10 dB, min., 12 dB typical
Frequency	27.6 - 29.1 GHz
Noise Figure, Max.	38 dB max. gain
Input Level Range	-3 to +7 dBm
Input Level, no damage	+11 dBm

Output Characteristics

Impedance/Return Loss	50Ω /14 dB
Frequency (GHz)	17.8 - 19.3 GHz
Output Level Range	-32 to -22 dBm
Output 1dB Compression	-17 dBm

Channel Characteristics

Gain; Variation over temp	-29 ±3 dB; ±0.05 dB/degrees C
Input to output isolation	> 50 dB, min.
Spurious, Inband	SIGNAL RELATED <-50 dBC, typical -40 dBC max., -1 dBm IN; Spur >200 MHz from carrier
Spurious, Inband	SIGNAL INDEPENDENT <-80 dBm
Spurious, Out of band, 2XLO	<-45 dBm, at 19.6 GHz at the output
Intermodulation	<-50 dBC for two carriers each at -3 dBm IN
Frequency Response	±2 dB, over RF band; ± 1.0 dB, 250 MHz BW
Frequency Sense	Non-inverting

LO Characteristics

LO Frequency	9.800 or 9.7904 GHz
Frequency Accuracy	± 0.05 ppm max. over temp, ± 0.02 ppm /day; Internal reference; External reference = input specifications
10 MHz Level In/Mon	Remains locked to External for +0 to +6 dBm IN; Internal 100 MHz reference Output = +3 ±3 dB, 50Ω

Phase Noise @ F (Hz) >	10	100	1K	10K	100K	1M	10M	100M
9.800 GHz dBC/Hz	-45	-70	-85	-100	-100	-110	-130	-130
9.7904 GHz dBC/Hz	-45	-67	-82	-95	-95	-110	-130	-130
Ext 10 MHz Ref.	-127	-145	-150	-153	-153	-153	-153	-153

Controls, Indicators

IN Ch, LO, INT/EXT REF	Direct readout LCD; push-button switches or remote selection Ethernet or RS 232C (standard)
PLL Alarm	Red LED, External contact closure
Power; Remote; Oven	Green LED, Yellow LED, Yellow LED

Other

RF In / RF Out Con.	2.92 mm / Super SMA
10 M In/ 100 M Out Conn.	BNC (female), 50Ω
Size	19 inch standard chassis, 1.75" High X 13.0" Deep
Power	100-240 ±10% VAC, 47 - 63 Hz, 30 watts maximum

Options

W41	-20 to +50 degrees C Operation
M&C Interface	RS232 Standard
Q-	RS485 Remote Interface
W8	Ethernet - Web Browser Interface
W18	Ethernet - Web Browser with SNMP
W28	Ethernet - Direct TCP/IP and/or <i>Telnet</i> [®] addressability

*+10 to +40 degrees C Operating; -30 to +60 degrees C Non-operating; 95% Relative humidity, non-condensing;
(OPTION -W41 for -20 to +50 degrees C Operating). Specifications subject to change without notice.

1.3 Monitor & Control Interface

The following tables summarize the commands and status queries applicable to the 3116-T291 Block Translator.

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

Table 1.0 Model 3116-T291 M&C Commands

Table 1.0: Model 3116-T291 M&C Commands		
Command	Syntax	Description
Set Input Channel	{aaClx}	where:
		x = 1 to select Channel 1
		x = 2 to select Channel 2
		x = 3 to select Channel 3
Set Int. 100 MHz reference offset	{aaCOxxxxx}	where:
(Internal reference mode only)		xxxxx = 5 characters
		Range: +2000 to -2000
Set Int. 10 MHz reference mode	{aaCEx}	where:
		x = 1 to select internal reference
		x = 2 to select external reference
		x = 3 to select auto reference
Set LO Frequency	{aaCLx}	where:
		x = 1 to select LO = 9800 MHz
		x = 2 to select LO = 9790.4 MHz

2.3 M&C Queries

Table 1.1 Model 3116-T291 M&C Commands

Table 1.1: Model 3116-T291 M&C Queries		
Command	Syntax	Description
Input Channel	{aaSI}	Returns {aaSIx} where:
		x = 1 if channel 1 is selected
		x = 2 if channel 2 is selected
		x = 3 if channel 3 is selected
10 MHz reference	{aaSE}	Returns {aaSEx} where:
		x = 1 if Internal 10 MHz reference is selected
		x = 2 if External 10 MHz reference is selected
		x = 3 if Auto 10 MHz reference is selected
Int. 10 MHz reference offset	{aaSO}	Returns {aaSOxxxxx} where:
		xxxxx = 5 characters
		Range: +2000 to -2000
Summary Alarm	{aaSA}	Returns {aaSAx} where:
		x = 0 if no summary alarm, x = 1 if summary alarm
Model and firmware revision	{aaSV}	returns {aaSVxxxxxxxxxyyy} where:
		xxxxxxxx = unit model number
		yyy = unit firmware rev.
Unit Status	{aaSS}	returns {aaSSwxy} where:
		w = summary alarm: 0 = off, 1 = on
		x = reference source: 1 = internal, 2 = external
		y = oven status: 0 = normal, 1 = oven warmup
LO Frequency	{aaSL}	returns {aaSLx} where:
		x = 1 if select LO = 9800 MHz
		x = 2 if select LO = 9790.4 MHz

2.0 Installation

2.1 Mechanical - The 3116-T291 Block Translator consists of a controller board and RF plate assembly. A switching ± 12 , +24, +5 VDC power supply provides power for the assemblies. The 3116-T291 can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 3116-T291 is assembled.

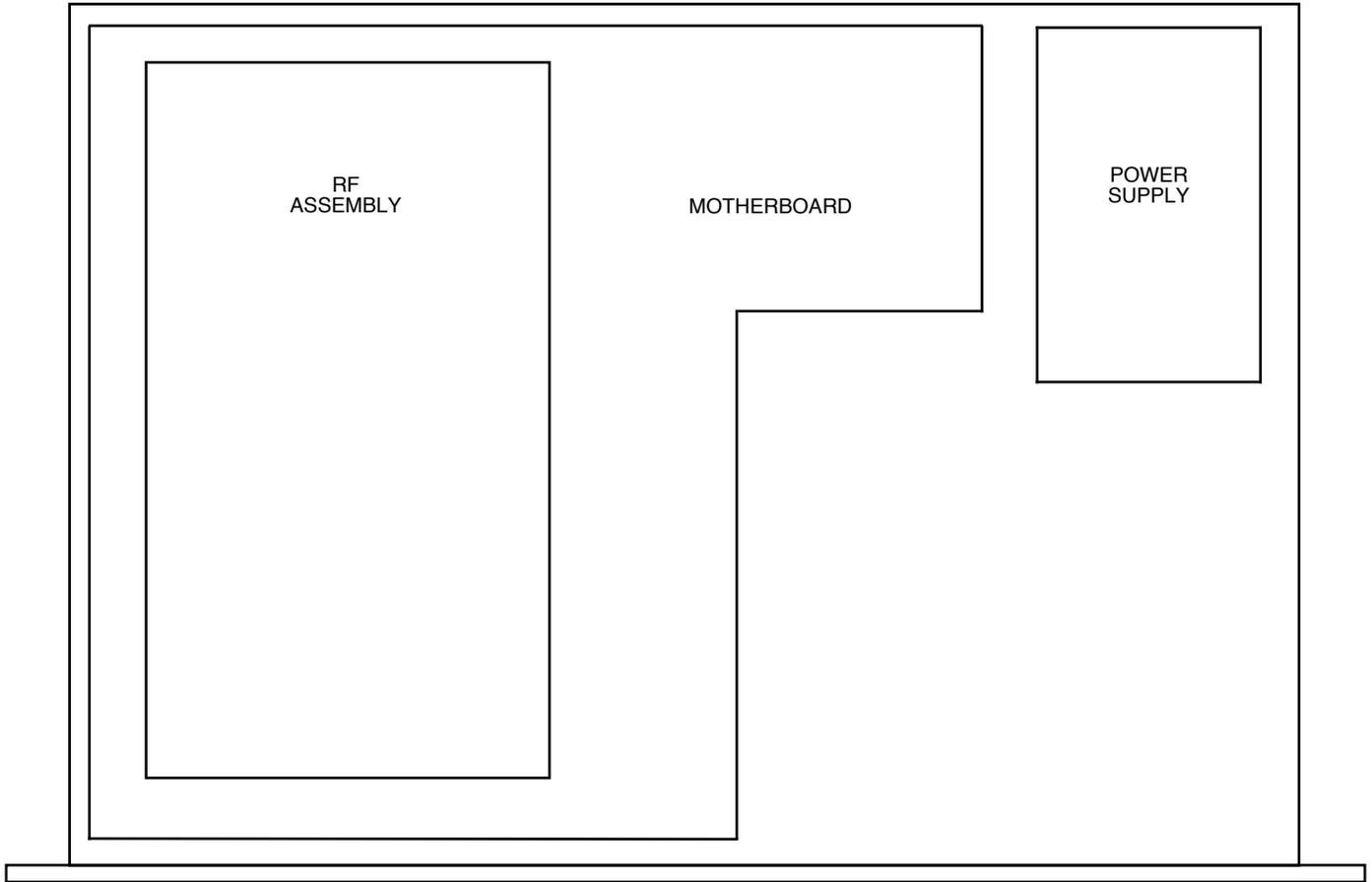


FIGURE 2.0 3116-T291 Mechanical Assembly

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

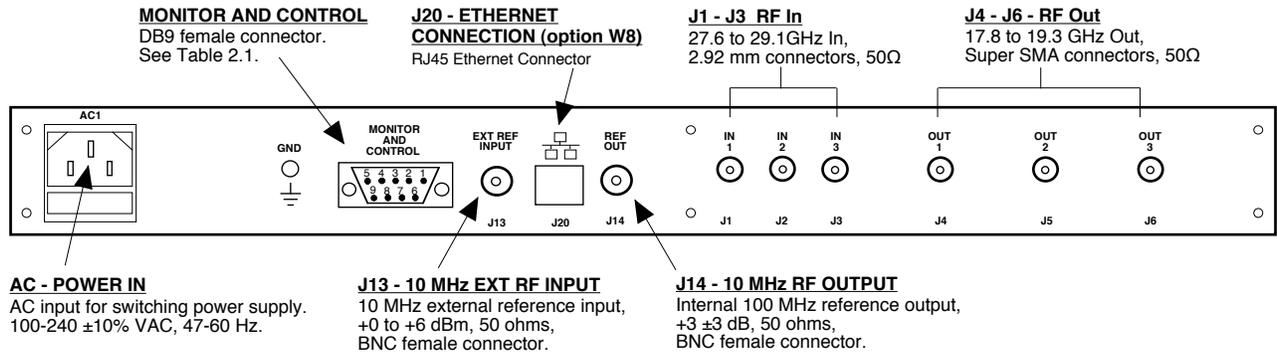


FIGURE 2.2 3116-T291 Rear Panel Inputs and Outputs

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.

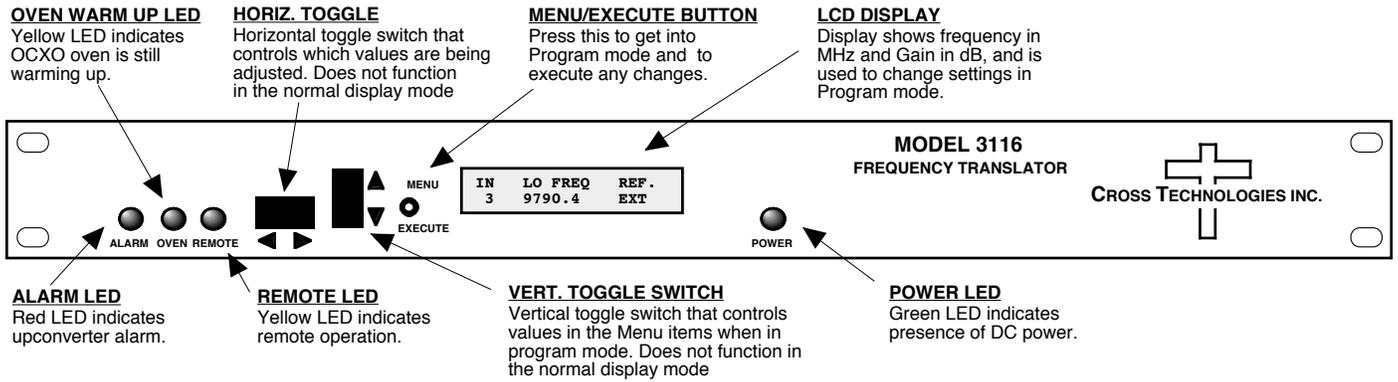


FIGURE 2.3 3116-T291 Front Panel Controls and Indicators

2.4 Installation/Operation

Installing and Operating the 3116-T291 Block Translator:

1. Connect -3 dBm to +7 dBm, 27.6 to 29.1 GHz signals to the RF INPUTS J1, J2 and J3 (Figure 2.2).
2. Connect the RF OUTPUTS (J4, J5 and J6), to the external equipment.
3. Connect 100-240 \pm 10% VAC, 47 - 63 Hz to AC connector to the back panel.
4. Be sure the green DC Power LED is on and the red Alarm LED is off (Figure 2.3).
5. AC Fuse - The fuse is a 1A/250V 1.25" x .25" (slow blow) and is inserted in the fuse F1 position.

NOTE: If a fuse continues to open, the power supply is most likely defective.

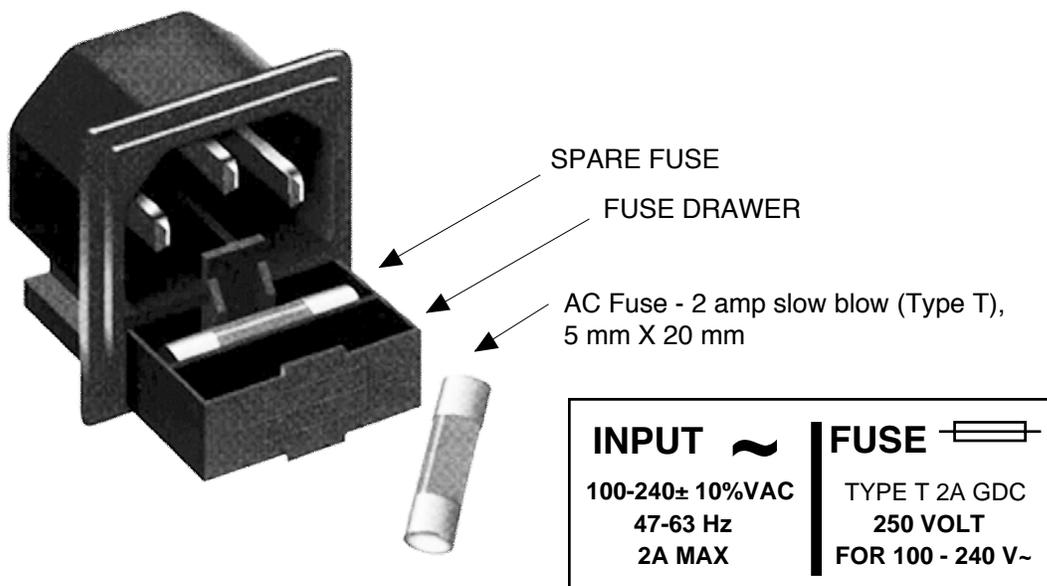


FIGURE 2.4 Fuse Location and Spare Fuse

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 2.3):

Power Up Normal Display

Menu 1	Set Input Channel
Menu 2	Set LO Frequency
Menu 3	Set Reference Mode
Menu 4	Select Internal 100 MHz Reference Offset
Menu 5	Enable or Disable Remote
Menu 6	Set Communications Interface
Menu 7	Set RS485 Address
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 2.3).

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.

3116-T291
4.01

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

IN	LO FREQ	REF
3	9790.4	EXT

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.

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? <u>Y</u> 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:

IN	LO FREQ	REF
3	9790.4	EXT

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

2.5.4 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.

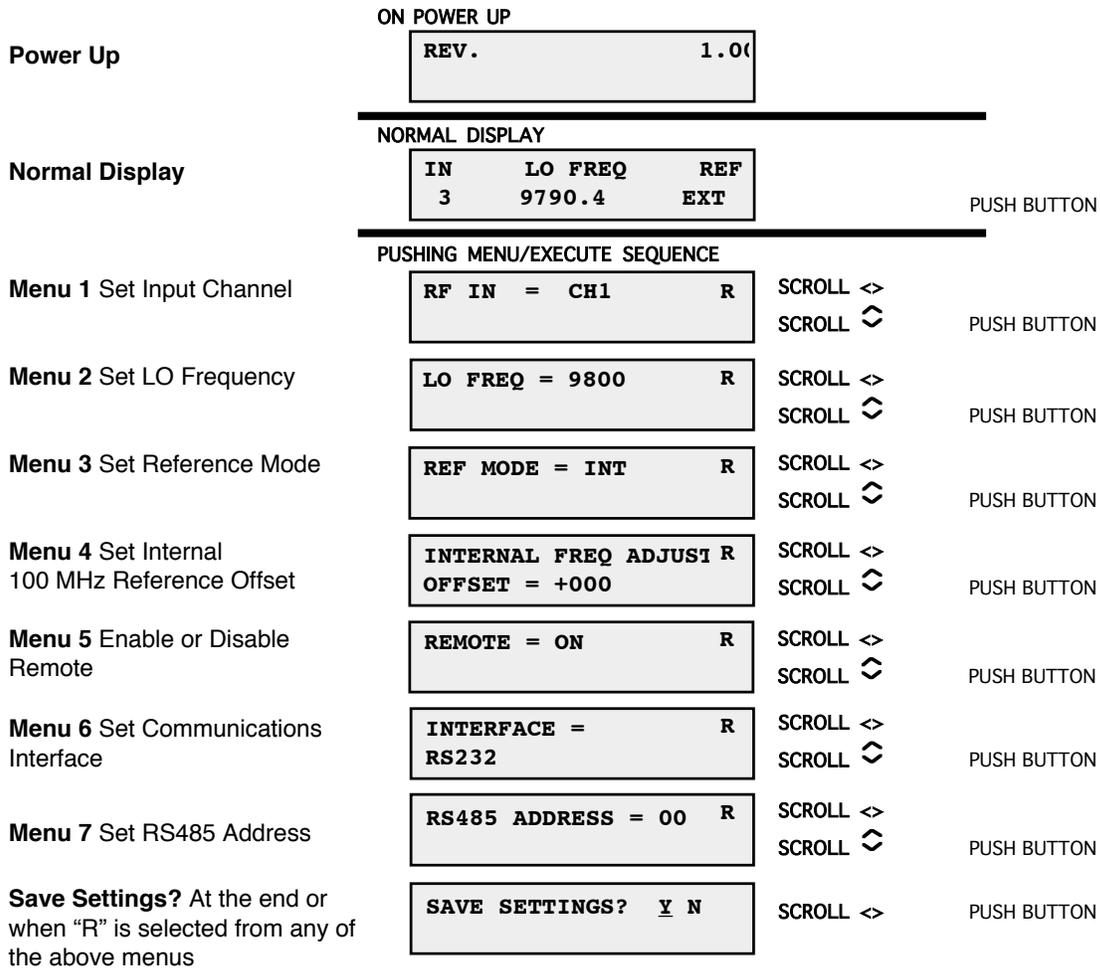


FIGURE 2.5 Menu Display and Sequence

2.6 10 MHz Reference Operation

2.6.1 AUTO Mode

When the reference mode is set to AUTO the unit will attempt to lock to a reference signal applied to the external reference input (EXT REF INPUT, J13) on the rear panel. The front panel will display AUTO-E to indicate that the unit is locked, or in the process of locking, to an external reference.

If no signal is detected on the EXT REF INPUT then the unit's internal reference will switch to internal control and the front panel will display AUTO-I to indicate internal control. If the unit's external reference is restored then the unit will restart the lock process and the front panel will display AUTO-E.

If the unit detects an external reference and is unable to lock to it after about 7 seconds the unit will switch to internal control (AUTO-I) and remain there until either the power is cycled, the external 10 MHz reference is removed and then reapplied, or the user goes into the REF MODE menu and toggles the reference mode and then reselects AUTO.

The external reference must be accurate to within +/- 0.5 ppm for the unit to be able to lock to it.

2.6.2 Internal Mode

When the unit is set to internal mode the frequency of the internal reference is controlled by the front panel Reference Frequency Offset adjustment. The frequency is adjustable to about +/- 0.5 ppm.

2.6.3 External Mode

When the unit is set to external mode the unit will lock to a reference signal applied to the external reference input. There is no automatic switchover to internal control when the unit is in external reference mode.

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.
- 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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