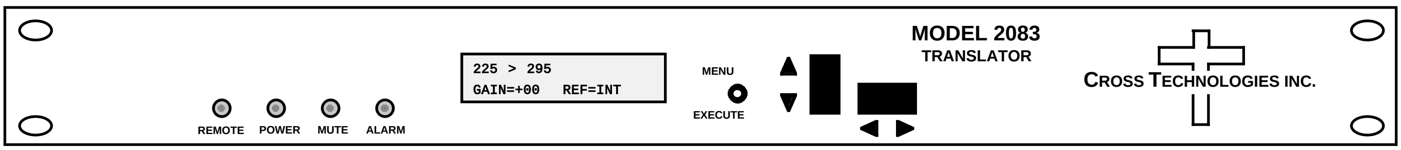
Instruction Manual

Model 2083-22

Frequency Translator

September 2009 Rev 0



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INSTRUCTION MANUAL

MODEL 2083-22 Frequency Translator

TABLE OF CONTENTS **PAGE**

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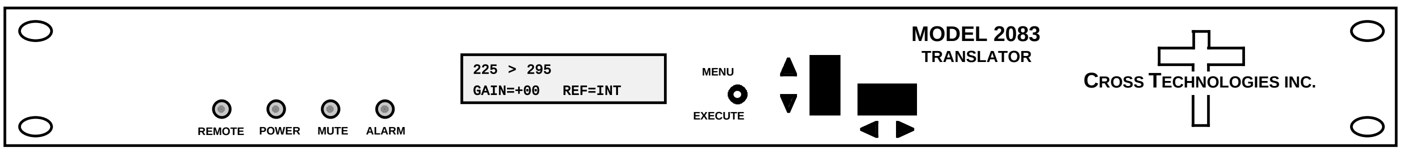
MODEL 2083-22 Frequency Translator

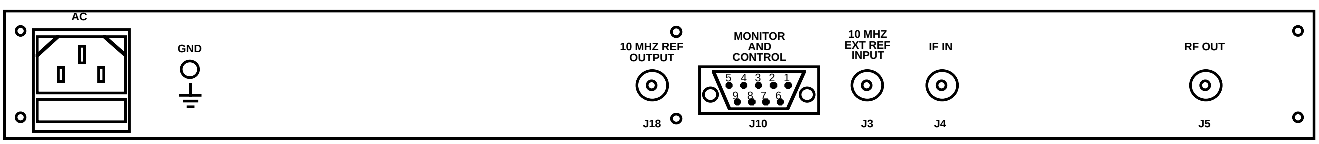
1.0 General

1.1 Equipment Description

The 2083-22 Frequency Translator converts 225-295 MHz to 950-1020 MHz with no spectrum inversion, low group delay, and flat frequency response. The input signal is mixed with synthesized local oscillator (LO) signals, first to 1750 MHz and finally to the output signal. Multifunction push button switches select the gain (-10 to +30 dB, adjustable), and 10 MHz reference. These settings appear on the LCD display. Front panel LEDs light when DC power is applied (green), a PLL alarm occurs (red), the signal is muted (yellow), or remote control is active (yellow). A 10 MHz input allows for connection of an external 10 MHz reference. The 10 MHz output contains the 10 MHz reference signal (be it internal or external). Connectors are BNC female for the input, output, 10 MHz input, and 10 MHz output. The 2083-22 is housed in a 1 3/4” X 19“ X 16“ deep rack mount chassis. Option -H provides a ±0.01 ppm high stability reference.

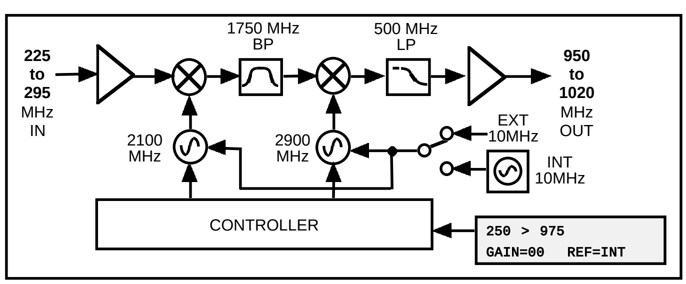


FRONT PANEL



REAR PANEL

FIGURE 1.1 Model 2083-22 Front and Rear Panels



2083-22 Block Diagram

FIGURE 1.2 Model 2083-22 Translator Block Diagram

1.2 Technical Characteristics

TABLE 1.0 2083-22 Frequency Translator Specifications*

Input Characteristics

Impedance/Return Loss	50 Ω /14 dB (see TABLE 2.2 for connector options)
Frequency	225 to 295 MHz
Input Level	-40 to -10 dBm
Input 1 dB Compression	0 dBm

Output Characteristics

Impedance/Return Loss	50 Ω/12 dB (see TABLE 2.2 for connector options)
Frequency	950 to 1020 MHz

Channel Characteristics

Gain range (adjustable)	-10 to +30 dB, 1 dB steps
Spurious Response	< -50 dBC
Bandwidth	±35 MHz, ±0.7 dB
Group Delay, max.	0.0035ns/MHz^2 parabolic; 0.03 ns/MHz linear; 1 ns ripple
10 MHz level	3 dBm, ± 3 dB
Frequency Sense	Non-inverting

Synthesizer Characteristics

Frequency Accuracy	± 1.0 ppm max. over temp (± 0.01 ppm option H) internal reference

Phase Noise @ Freq	100 MHz	1kHz	10kHz	100kHz	1MHz
dBC/Hz	-70	-70	-80	-95	-110

Controls, Indicators

Frequency Translation	Direct readout LCD Display
Gain Selection	Direct readout LCD Display; push-button switches or remote selection
Power	Green LED
Alarm	Red LED
Remote	Yellow LED; RS232C , 9600 baud
Mute	Yellow LED

Other

Input/Output Connectors	BNC (female), 50Ω (see TABLE 2.2 for other options)
10 MHz Conn. (In/Out)	BNC (female), 50/75 Ω
Alarm/Remote Connector	DB9 - NO or NC contact closure on Alarm
Size	19 inch, 1RU standard chassis 1.75” high X 16.0” deep
Power	100-240 ±10% VAC, 47-63 Hz, 45 watts max.

Options

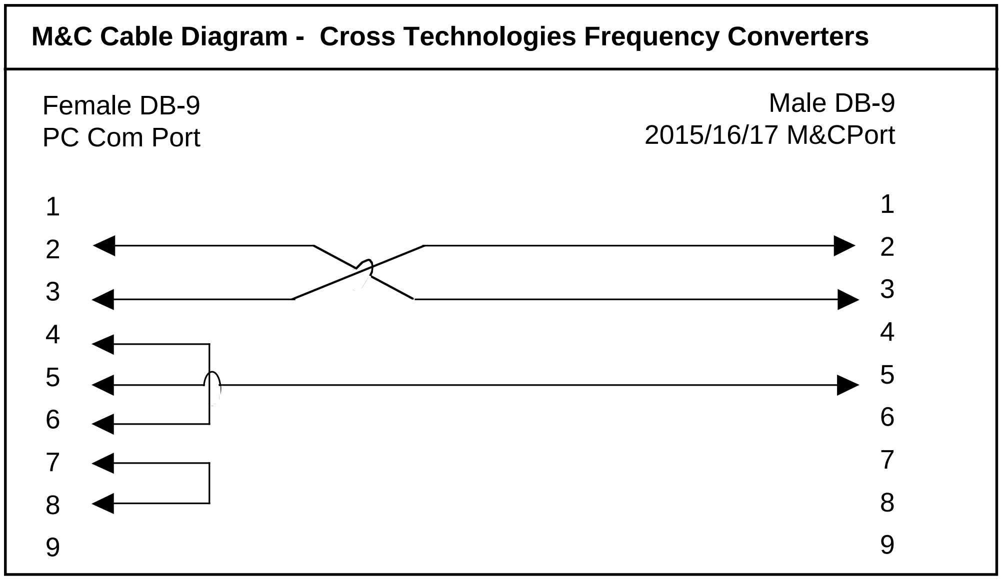
-H	High Stability (± 0.01 ppm) internal reference
Connector options	See TABLE 2.2

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

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 - **option Q**)



Connector: Rear panel, DB-9 female

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

B) Status Requests Table 1.1 lists the status requests for the 2083-22 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 2083-22 Status Requests

Command	**Syntax ***	**Description**
Command Status	{aaS1}	Returns {aaS1cccddAM} where:
		• ccc = Gain
		• dd = Input level (10 to 40 => -10 to -40 dBm)
		• A = 0 - summary alarm
		• M = Output Status (1 = Normal, 0 = Muted)
10 MHz Reference Status	{aaS2}	Returns {aaS2E} where:
		• E = Ext 10MHz Status (1 = on, 0 = off)

C) Commands Table 1.2 lists the commands for the 2083-22 and briefly describes them. After a command is sent the 2083-22 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-digit command or status number, 1 through 9
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 2083-22 Commands

Command	**Syntax***	**Description**
Set Input Level	{aaCIxx}	where:
		• xx = 2 characters
		• Range: -40 to -10 (-10 to -40 dBm, in 1 dB steps)
Set Gain	{aaC3xxx}	where:
		• xxx = 2 characters (0 to 30dB), 3 characters (-10 to -1dB)
		• Range: -10 to +30 (-10 dB to +30 dB, in 1 dB steps)
Enable Output	{aaCAx}	where x =:
		• 0 to disable Output Signal (Mute)
		• 1 to enable Output Signal
Enable External 10MHz	{aaCEx}	where x =:
		• 0 to disable External 10MHz ref signal
		• 1 to enable External 10MHz ref signal
Enable Remote	#	Just # sign
Disable Remote	{aaCR0}	{CR and zero}

2.0 Installation

2.1 Mechanical

The 2083-22 consists of one RF/Controller PCB housed in a 1 RU (1 3/4 inch high) by 16 inch deep chassis. A switching, ± 12, +24, +5 VDC power supply provides power for the assemblies. The 2083-22 can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 2083-22 is assembled.

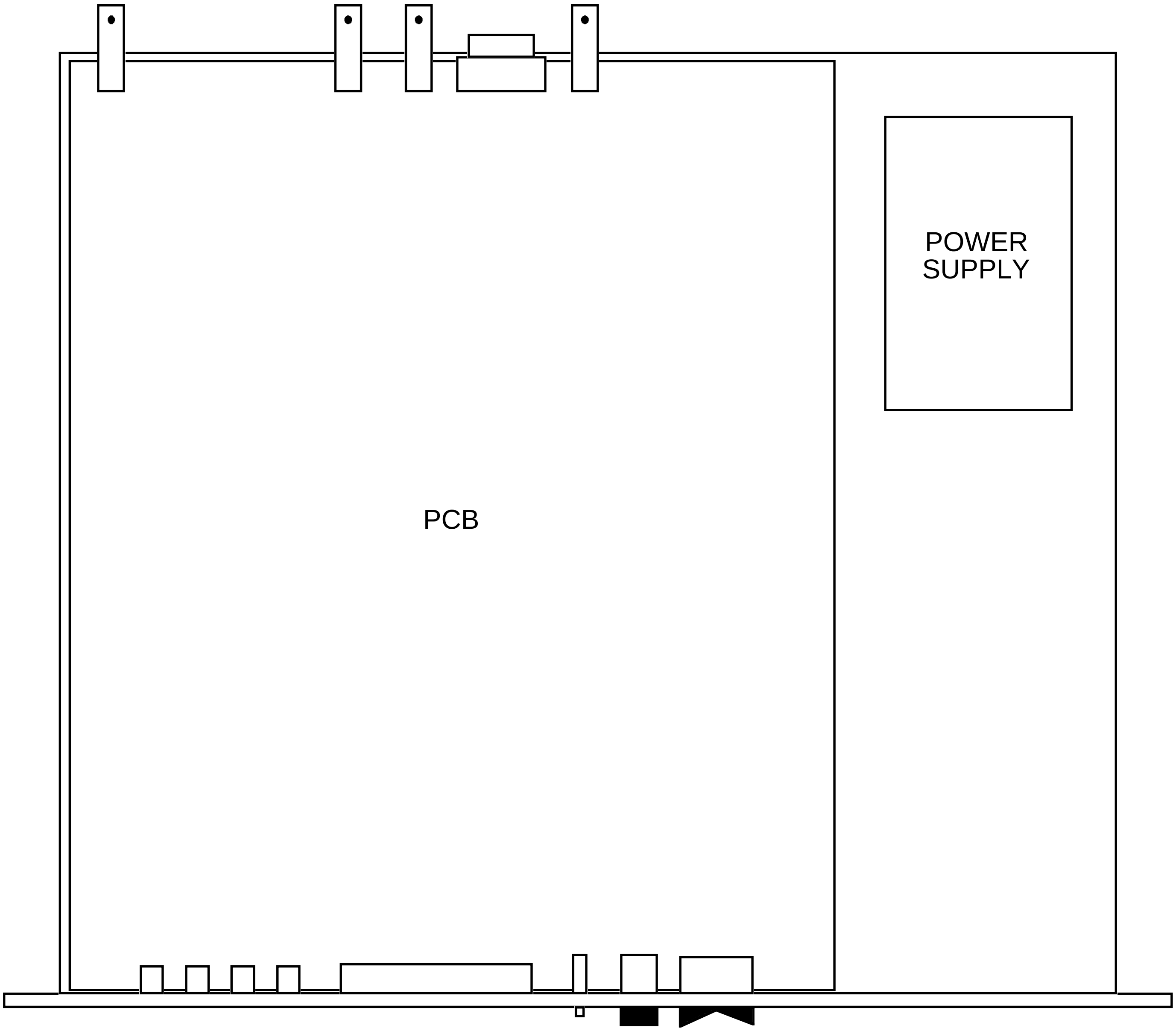


FIGURE 2.0 2083-22 Mechanical Assembly

2.2 Rear Panel Input/Output Signals - Figure 2.1 shows the input and output connectors on the rear panel.

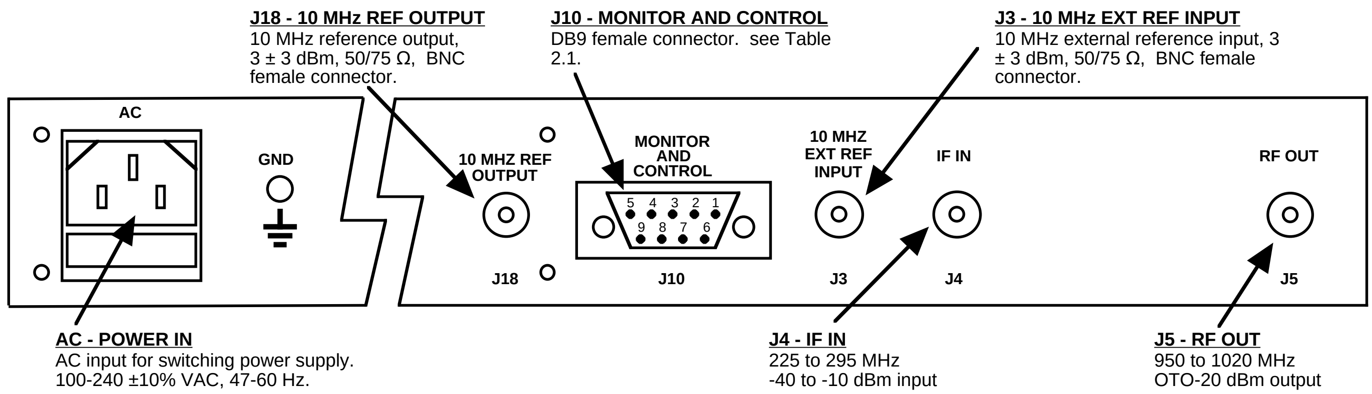


FIGURE 2.1 2083-22 Rear Panel I/O's

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

***Remote Serial Interface**

Interface: DB-9 Male

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

TABLE 2.2 IF/RF Connector Options		
Option	**IF**	**RF**
STD	BNC, 50Ω	BNC, 50Ω
B	BNC, 75Ω	BNC, 75Ω
C	BNC, 75Ω	BNC, 50Ω
F	Type F, 75Ω	Type F, 75Ω
J	BNC, 75Ω	Type F, 75Ω
K	BNC, 50Ω	BNC, 75Ω
M	BNC, 50Ω	Type N, 50Ω
N	BNC, 75Ω	Type N, 50Ω

2.3 Front Panel Controls and Indicators - The following are the front panel controls and indicators.

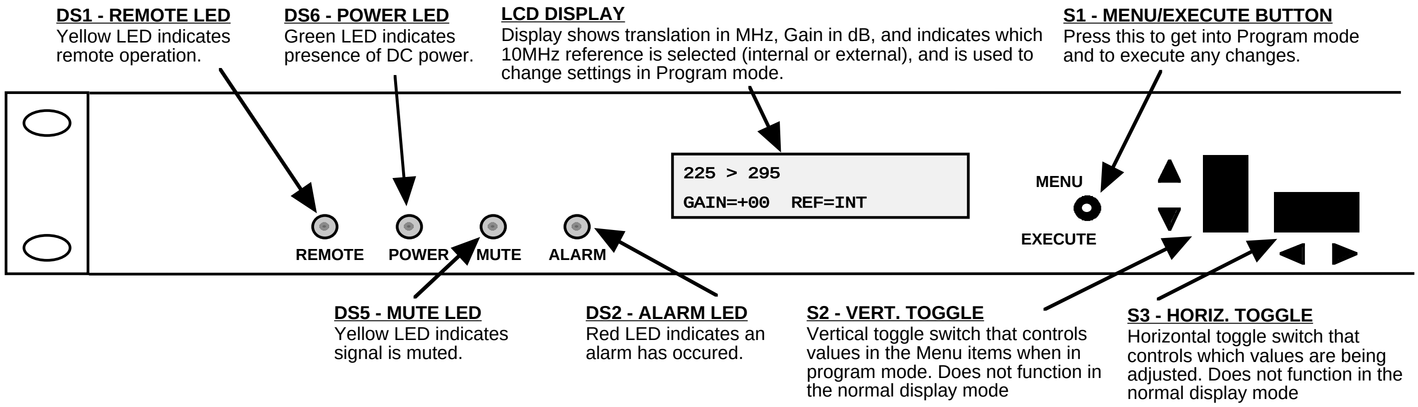


FIGURE 2.2 2083-22 Front Panel Controls and Indicators

2.4 Installation / Operation

2.4.1 Installing and Operating the 2083-22 Frequency Translator

1. Connect a -40 dBm to -10 dBm signal to IF IN, J4 (Figure 2.1).
2. Connect the RF OUT, J5, to the external equipment.
3. Connect 100-240 ±10% VAC, 47 - 63 Hz to AC input on the back panel.
4. Set the input level (See Section 2.5 Menu Settings).
5. Set the gain for -10 to +30 dB. Make sure the output stays within -10 to +30 dB with the gain selected and the input level provided. The firmware will prevent setting gain and input level outside this range. (See Section 2.5 Menu Settings).
6. Be sure DS6 (green, DC Power) is on and DS2 (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.

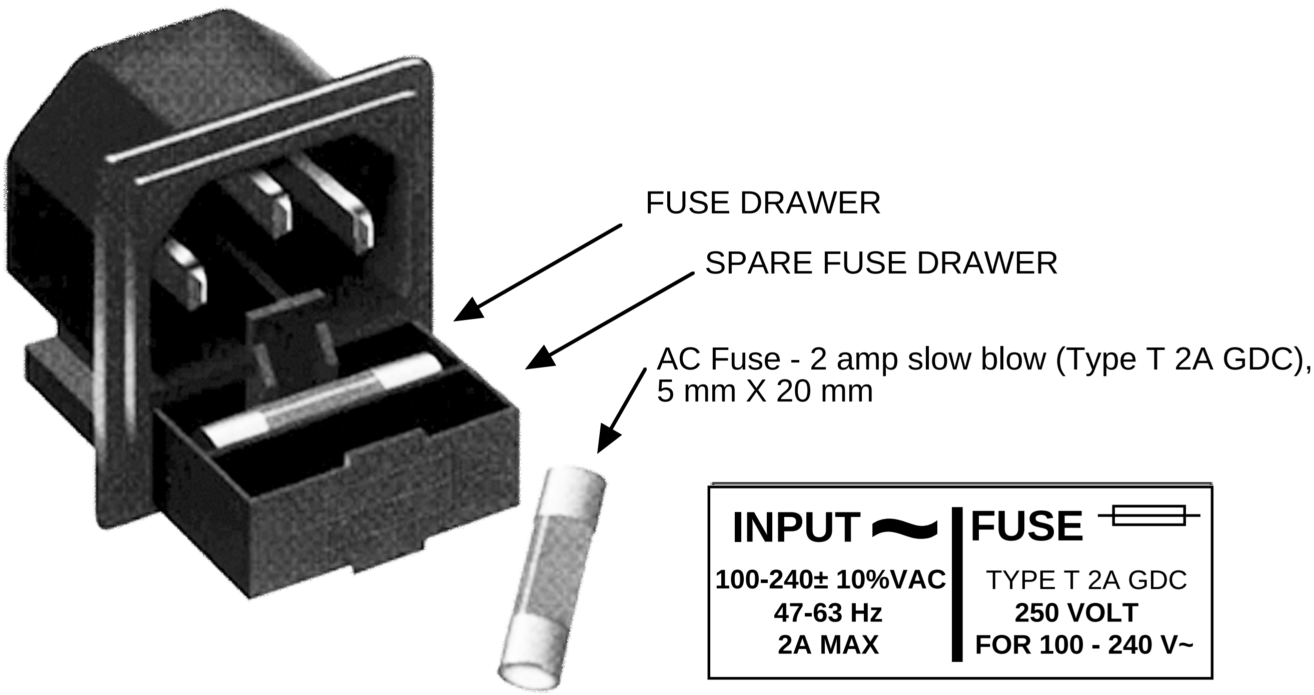


FIGURE 2.3 Fuse Location and Spare Fuse

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 Input Level (Set from -40 to -10)
Menu 2 Gain (-10 to +30, 1dB steps)
Menu 3 Mute On/Off
Menu 4 Set Unit to Remote Operation
Menu 5 Select External 10 MHz Ref On/Off
Menu 6 Set Remote mode (**option Q only**)
Menu 7 Set RS-485 address (**option Q only**)

Save Menu When go to 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 frequency translation and current gain of the translator is shown.

```
225 > 295
GAIN=+00    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 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 as 10MHz Reference selection, the vertical switch will alternately switch between the available options regardless of the direction operated.

2.5.4 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 12 seconds, and the system will return to the normal operating mode.

To change the UPCONVERTER GAIN, first push the Menu/Execute switch until you get to the gain setting:

The following display is for changing the upconverter input level. This is an important setting to optimize spurious and should be made as accurately as possible:

```
INLVL = -20            R
```

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 = 00                 R
```

Pressing the Up/Down switch to change the gain in 1 or 10 dB steps and then push the Menu/Execute switch to get to the Gain setting:

```
G = 10                 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.

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. DO NOT SET A GAIN THAT WOULD EXCEED 0 dBm OR HAVE LESS THAN -20 dBm OUTPUT LEVEL. THE FIRMWARE PREVENTS YOU FROM THIS.

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 the :

```
225 > 295
GAIN=+00    REF=INT
```

Figure 2.4 gives the menu items and how to make changes

2.5.5 Alarm Indications

An alarm condition for 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.

Power Up	ON POWER UP REV 1.00		
Normal Display	NORMAL DISPLAY 225 > 295 GAIN=+00 REF=INT		PUSH BUTTON
	PUSHING MENU/EXECUTE SEQUENCE		
Menu 1 Input Level	INLVL = -20 R	SCROLL <> SCROLL	PUSH BUTTON
Menu 2 Gain (-10 to +30)	G = +00 R	SCROLL <> SCROLL	PUSH BUTTON
Menu 3 Mute On/Off	MUTE OFF R	SCROLL <> SCROLL	PUSH BUTTON
Menu 4 Select Remote Operation	REMOTE OFF R	SCROLL <> SCROLL	PUSH BUTTON
Menu 5 Select External 10MHz Reference	EXT REF OFF R	SCROLL <> SCROLL	PUSH BUTTON
Menu 6 Select Remote Mode (**option Q only**)	RS 485 _ R	SCROLL <> SCROLL	PUSH BUTTON
Menu 7 Select RS-485 Address (**option Q only**)	ADDRESS = 00 R	SCROLL <> SCROLL	PUSH BUTTON
Save Settings? When "R" is selected in any of the above menus or at the 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.

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.

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