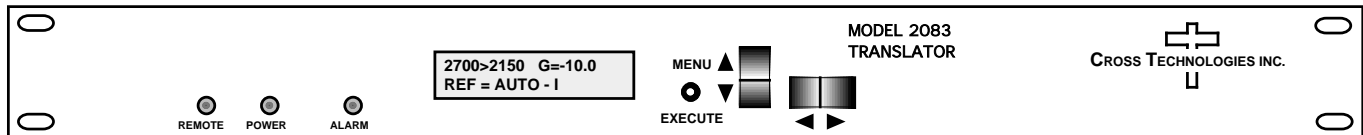


# Instruction Manual

# Model 2083-2821 Block Translator

April 2019, Rev. 0



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# INSTRUCTION MANUAL

## MODEL 2083-2821 Block Translator

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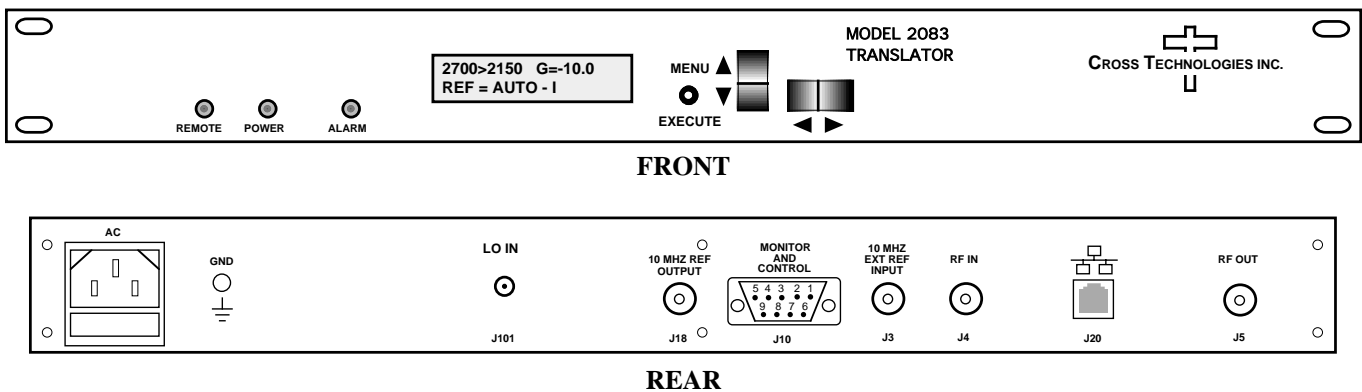
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# MODEL 2083-2821 Block Translator

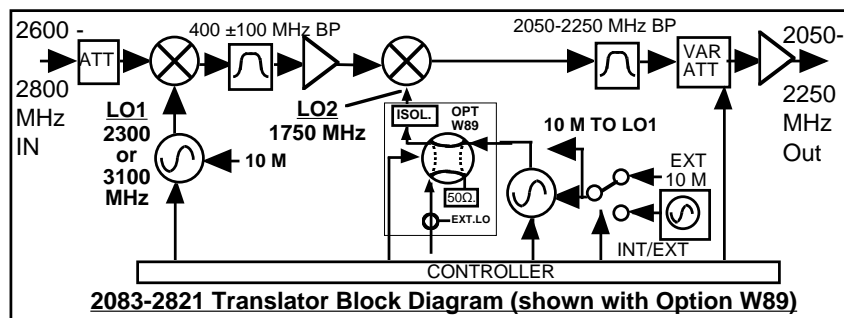
## 1.0 General

### 1.1 Equipment Description

The 2083-2821 Block Translator converts a 2600-2800 MHz block to 2050-2250 MHz block with or without spectrum inversion (selectable). The 2600-2800 MHz input is mixed with local oscillator (LO) signals, first (LO1) to a 400 MHz center frequency and finally (LO2) to the 2050-2250 MHz block output (Option W89 allows for an external LO2, switched & terminated, 50Ω, SMA, +8 to +12 dBm input signal). Gain can be set for 0 to -30 dB in  $0.5 \pm 0.5$  dB increments. The output translation is fixed (Option X5050 -  $\pm 50$  kHz LO1 tuning, 50 Hz steps). Multifunction switches select Gain and internal or External 10 MHz reference (and Options W89 and X5050 settings) which appear on the LCD display and can be adjusted remotely. Front panel LEDs indicate DC power (green), PLL alarm (red), and remote operation (yellow). Connectors are BNC female for RF and 10 MHz input and output. It is powered by a 100-240  $\pm 10\%$  VAC, 47-63 HZ input power supply and in a 1 3/4" X 19" X 16" rack mount chassis.



**2083-2821 Front and Rear Panels (Shown with optional Ethernet and W89)**



**FIGURE 1.2 Model 2083-2821 Translator Block Diagram**

## 1.2 Technical Characteristics

<b>TABLE 1.0 2083-2821 Block Translator Specifications**</b>					
<b>Input Characteristics</b>					
Input Impedance/RL	50Ω/14 dB				
Frequency	2600 - 2800 MHz				
Input Composite Level	-15 to 0 dBm				
<b>Output Characteristics</b>					
Impedance/RL	50Ω / 14 dB				
Frequency	2050 - 2250 MHz				
Output Level	-30 to -15 dBm				
Output 1 dB Compression	-5 dBm, at maximum gain				
<b>Channel Characteristics</b>					
Gain, Maximum; Adjustment	+0 dB ±1 dB, max. gain; 0 to -30 dB gain adjustment in 0.5 ± 0.5 dB Steps				
Spurious, Inband	< -55 dBC in band, signal dependent and signal independent; -15 dBm Out				
Spurious, Out of Band	< -50 dBm, 2050-500 MHz to 2050 MHz and 2250 to 2250+500 MHz Out				
Intermodulation	<-55 dBC for two carriers each at -20 dBm out				
Frequency Response	± 2.0 dB, 200 MHz bandwidth; ± 1.0 dB, any 100 MHz bandwidth; ± 0.5 dB, any 20 MHz increment				
Frequency Sense	Non-inverting or Inverting, selectable				
<b>Synthesizer Characteristics</b>					
Translation; Accuracy	± 1 ppm; Option H, ±0.01 ppm				
Reference	10 MHz Internal; Internal/ External Selection				
Phase Noise @ Frequency	100 MHz	1kHz	10kHz	100kHz	1MHz
dBC/Hz	-70	-80	-80	-95	-100
<b>Controls, Indicators</b>					
Gain (MGC)	Direct readout LCD; manual or remote selection				
External Reference	Direct readout LCD; manual or remote selection				
Power, Alarm; Remote	Green LED; Red LED; Yellow LED				
Remote	RS232C/RS485/422, 9600 baud (Ethernet Optional)				
<b>Other</b>					
RF In/RF Out Connector	BNC (female)				
10 MHz Connector	BNC (female), 75Ω, works with 50 or 75 ohms				
Alarm/Remote Connector	DB9 (female); No or NC contact closure on Alarm				
Size	19 inch Standard Chassis 1.75" high x 16.0" deep				
Power	100-240 (±10%) VAC, 47- 63 Hz, 30 watts maximum				
<b>Available Options (see page 5...)</b>					
**+10°C to +40°C; Specifications subject to change without notice.					<b>Cross Technologies, Inc. 2019</b>

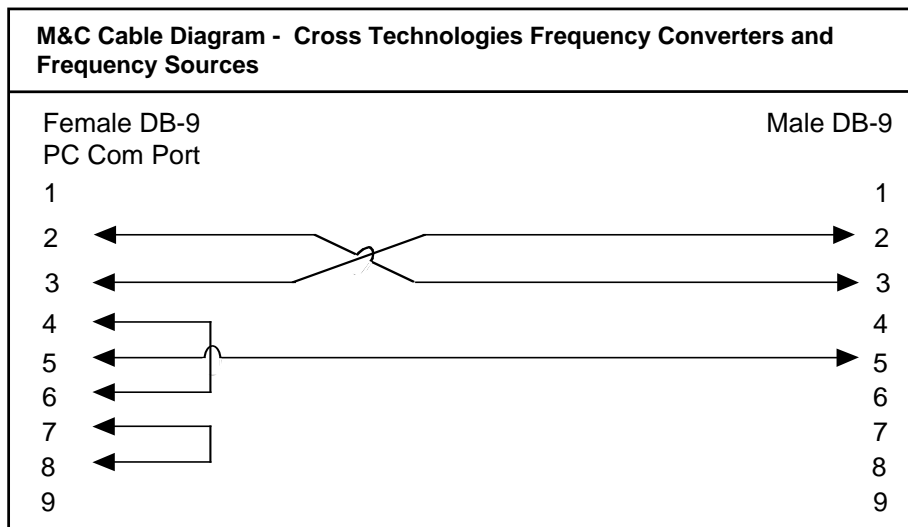
## 1.2 Technical Characteristics, continued...

<b>Available Options (2083-2821 Block Translator)</b>	
H -	High Stability ( $\pm 0.01$ ) Internal Reference
W-89	Ext. LO2, switched & terminated, 50 $\Omega$ , SMA, +8 to +12 dBm in.
X5050 -	$\pm 50$ kHz LO1 tuning, 50 Hz steps
<b>Communication Interface / Standard RS232</b>	
W8 -	Ethernet; with Web Browser
W18 -	Ethernet; with Web Browser & SNMP
W28 -	Ethernet; with TCP/IP, Telnet®
W828 -	Ethernet; with W18 + W28
<b>Connector /Impedance</b>	
Std. -	50 $\Omega$ BNC (RF IN), 50 $\Omega$ BNC (RF OUT)
NN -	50 $\Omega$ N (RF In), 50 $\Omega$ N (RF Out)
SS -	50 $\Omega$ SMA (RF IN), 50 $\Omega$ SMA (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 - option -Q**)



**Connector:** Rear panel, DB-9 male

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) Commands** - Table 1.0 lists the commands for the 2083-2821 and briefly describes them. After a command is sent the 2083-2821 sends a return “>” indicating the command has been received and executed.

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

{ = start byte

aa = address (**RS-485 only - option -Q**)

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 1.0 M&C Commands for Models 2083-2821		
Function	Format	Description
Set Gain	{aaCGxxxx}	where: aa = unit address, range = 0 to -30, only used if interface is RS485, otherwise omit. I = command code xxxx = gain in 0.5 ±0.5 dB steps, omit the decimal point Range: = -300 to 0 in 0.5 dB steps example: {CG-155} Will set the unit's gain to -15.5 dB. Note: The negative sign is assumed if not included, i.e. {CG155} is parsed the same as {CG-155}. The unit will reply with the '>' character if the command successfully processed.
Set Spectrum Invert	{aaCIx}	where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit I = command code x = 0 to set to internal reference, x = 1 to set to external reference, x = 2 to set to auto reference example: {CI1} Will set the reference mode to Auto. The unit will reply with the '>' character if the command is successfully processed.
Set Reference Mode	{aaCEx}	where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit E = command code x = 0 to set to internal reference, x = 1 to set to external reference, x = 2 to set to auto reference example: {CE2} Will set the reference mode to Auto. The unit will reply with the '>' character if the command is successfully processed.

TABLE 1.0 2083-2821 M&C Commands, Continued		
Function	Format	Description
Set Remote Off	{aaCRO}	where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit R = command code 0, ascii number zero. example: {CRO} Will disable the unit's serial M&C port. The unit will reply with the '>' character if the command is successfully processed. (Note: this command only affects the serial M&C port, the ethernet port is always on and will not be affected)
Set Remote On	#	Just the ascii pound sign, (0x23) Will enable the unit's serial M&C port. The unit will reply with the '>' character if the command is successfully processed. (Note: this command only affects the serial M&C port, the ethernet port is always on and will not be affected)
Set Translation Frequency (option X5050)	{aaCFxxxxxxxx}	where: xxxxxxxx= Translation Frequency in Hz Range: 549950000 to 550050000 in 50 Hz steps.
Set External LO (Option W89)	{aaCLx}	where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit. L = command code x = 0 to use internal LO, x=1 to use external LO example: {CL1} will set the unit to use the external LO input. The unit will reply with the '>' character if the command is successfully processed.



### C) Status Requests/Inquiries -

Table 2.0 lists the status requests for the 2083-2821 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 2.0 Status Request/Inquiries for Models 2083-2821		
	Function	Format
Gain Inquiry	{aaSG}	returns: {aaSGxxxx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		G = command code
		xxxx = gain in dB (decimal point omitted)
		The unit will append the '>' character if the command is successfully processed.
Spectrum Invert Inquiry	{aaSI}	returns: {aaSIxxxx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		I = command code
		x = 0 if spectrum is normal (non-inverted),
		x = 1 if spectrum is inverted
		The unit will append the '>' character if the command is successfully processed.
Reference Mode Inquiry	{aaSE}	returns: {aaSEx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		E = command code
		x = 0 if reference mode is internal, x = 1 if external,
		x = 2 if auto
		The unit will append the '>' character if the command is successfully processed.

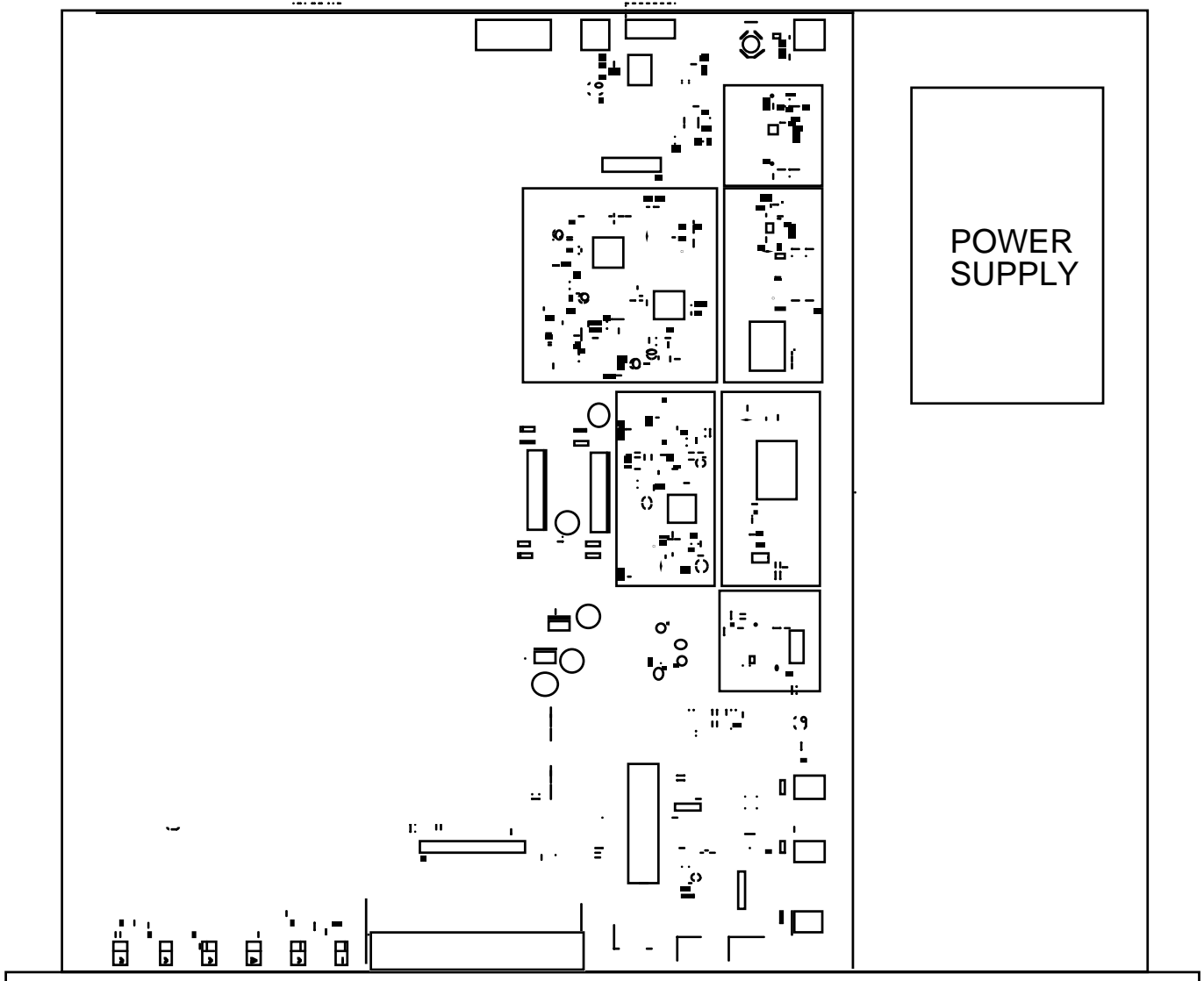
Continued on page 10...

**Table 2.0 Status Request/Inquiries for Models 2083-2821., Continued...**

Function	Format	Description
Reference Status Inquiry	{aaSB}	returns: {aaSBx} where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit. B = command code x = 1 if the unit is using the external reference, x = 0 if the unit is using the internal reference NOTE: this inquiry is useful if the reference mode is auto and the user wants to know if the unit has switched to the internal reference. The unit will append the '>' character if the command is successfully processed.
Alarm Inquiry	{aaSA}	returns: {aaSAx} where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit. A = command code x = 0 if alarm is off, x = 1 if alarm is on. The unit will append the '>' character if the command is successfully processed.
Product/Model Info Inquiry	{aaSV}	returns {aaSV2083-xxxx yyyy ver5.xx} where 2083-xxxx = product model yyyy = list of options, if any "ver" = separates model & options from firmware version 5.xx = firmware version
Translation Frequency Inquiry	{aaSF}	returns {aaSFxxxxxxxxx} where: {xxxxxxxxx}=Translation Frequency in Hz.
External LO Inquiry (Option W89)	{aaSL}	Returns {aaSLx} where: aa = unit address, range = 00 to 31, only used if interface RS485, otherwise omit. L = command code x = 0 if the unit's internal LO is in use. x = 1 if the unit's external LO is in use. The unit will append the '>' character if the command is successfully processed.

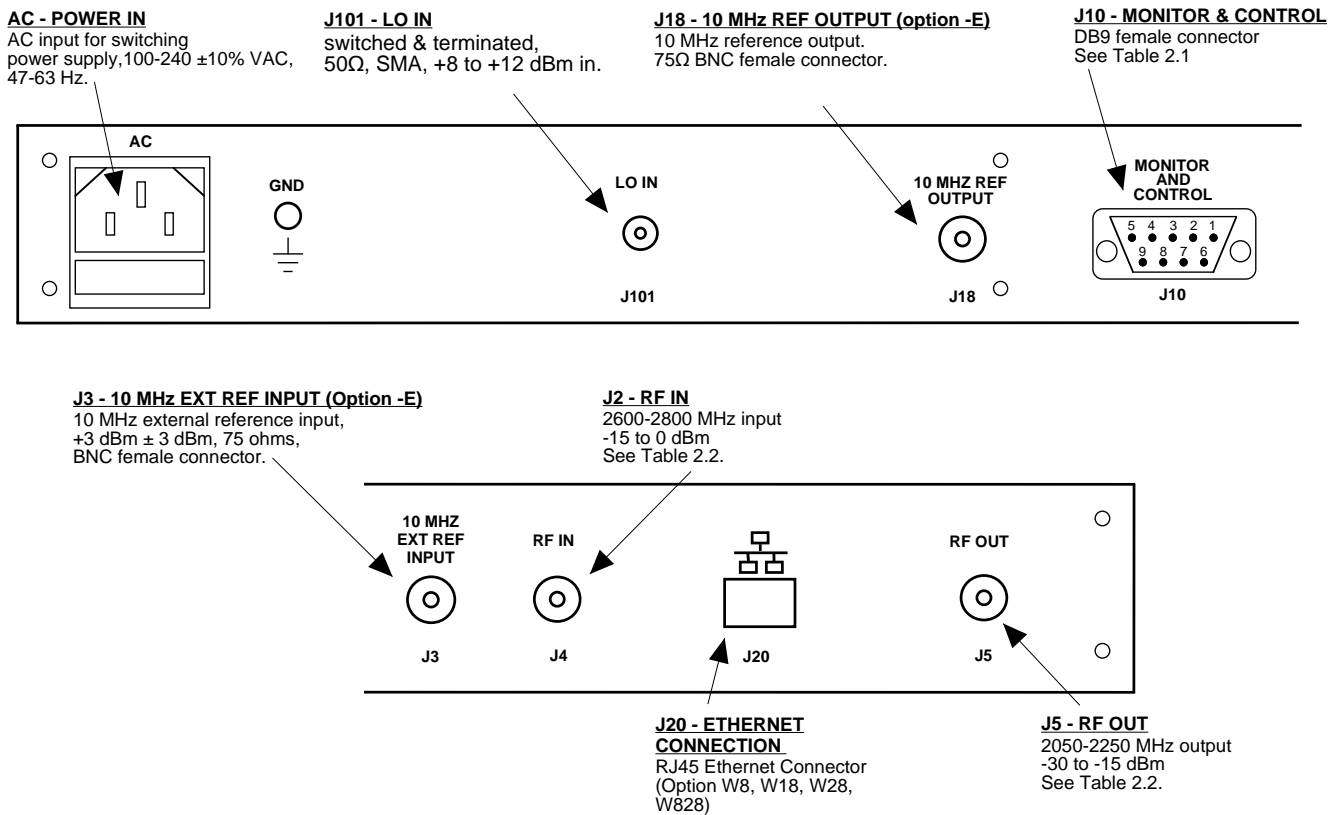
## 2.0 Installation

**2.1 Mechanical** - The 2083-2821 consists of one RF/Controller PCB housed in a 1 RU (1 3/4 inch high) by 16 inch deep chassis. A switching,  $\pm 12$ , +24, +5 VDC power supply provides power for the assemblies. The 2083-2821 can be secured to a rack using the 4 holes on the front panel. Figure 2.1 shows how the 2083-2821 is assembled.



**FIGURE 2.1 2083-2821 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 2083-2821 Rear Panel I/Os**

TABLE 2.1 J10 Pinouts (RS-232C*)	
Pin	Function
1	Not Used
2	Rx+ (RS-232C)
3	Tx+ (RS-232C)
4	Not Used
5	GND
6	Alarm Relay: Common
7	Alarm Relay: Normally Closed
8	Not Used
9	Alarm Relay: Normally Open

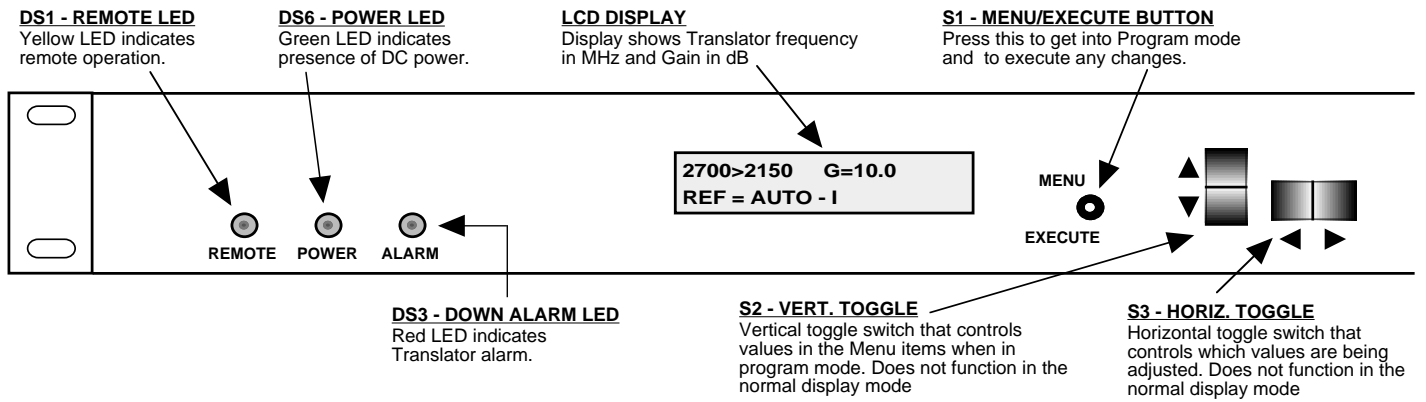
### \*Remote Serial Interface

Interface: DB-9 Male

Protocol: RS-232C, 9600 baud rate, no parity, 8 data bits, 1 start bit, 1 stop bit

TABLE 2.2 Connector/Impedance Options		
Option	RF Out	RF In
STD	50 $\Omega$ BNC	50 $\Omega$ BNC
-NN	50 $\Omega$ N	50 $\Omega$ N
-SS	50 $\Omega$ SMA	50 $\Omega$ SMA

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

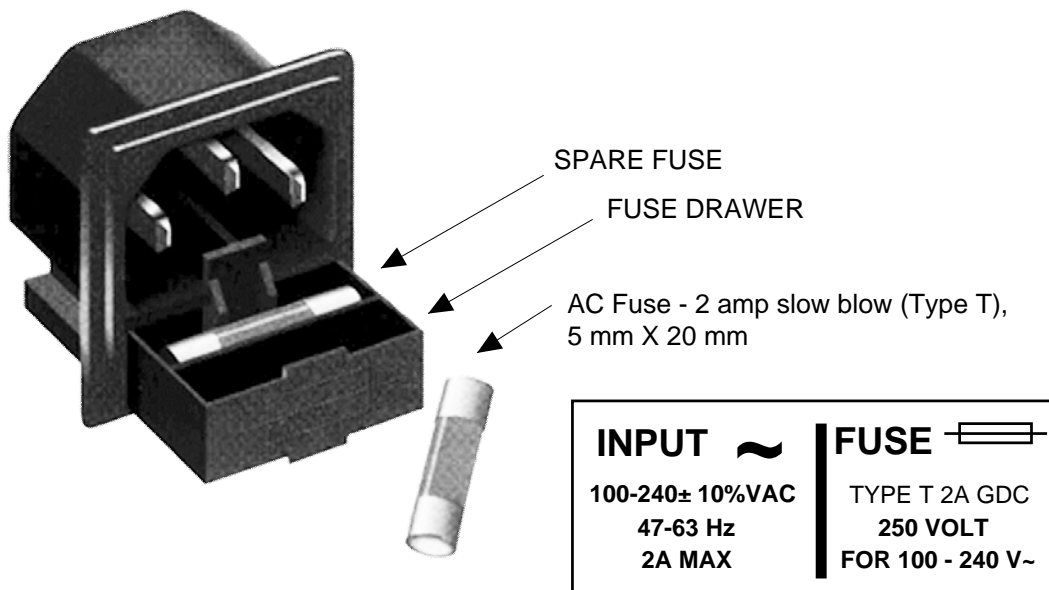


**FIGURE 2.3 2083-2821 Front Panel Controls and Indicators**

## 2.4 Operation

### 2.4.1 Installing and Operating the 2083-2821 Block Translator

1. Connect a -15 dBm to 0 dBm signal to RF IN, J4 (Figure 2.2)
2. Connect the RF OUT, J5, to the external equipment
3. Connect 100-240  $\pm$ 10% VAC, 47 - 63 Hz to AC on the back panel.
4. Set the gain for 0 to -30 dBm (See Section 2.5 Menu Settings).
5. Be sure DS6 (green, DC Power) is on and DS (red, Alarm) is off (Figure 2.3).
6. 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 2.4. There is a spare fuse in the near slot.  
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** Set Gain (0 to -30, 0.5 dB Steps)

**Menu 2** Set Unit to Remote Operation

**Menu 3** Set Interface

**Menu 4** Set RS-485 address

**Menu 5** Select External 10 MHz

**Menu 6** Set Spectrum Invert

**Save Menu** When go to “R” or at 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 IT'S PREVIOUS SETTINGS.**

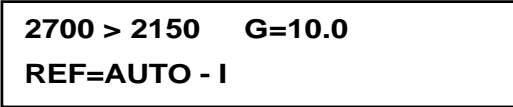
When power is first applied, the LCD display goes through three steps.

1. The LCD goes black to show all segments are functioning.
2. The software version will be displayed.



REV 1.00

3. The present frequency and gain of the down converter is shown.



2700 > 2150 G=10.0  
REF=AUTO - I

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



### 2.5.3 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 DOWNCONVERTER GAIN:

Push the Menu/Execute switch to get to the gain setting  
(See Figure 2.5 for the sequence of menu options):

<b>G = -<u>2</u>0</b>	<b>R</b>
-----------------------	----------

Pressing the Up/Down switch will change the gain in 1 or 10 dB steps depending on the cursor location:

<b>G = -<u>1</u>5</b>	<b>R</b>
-----------------------	----------

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

<b>G = -1<u>5</u></b>	<b>R</b>
-----------------------	----------

**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.**

When the display indicates the value desired you can push the Menu/Execute switch to get to the next item OR you can scroll to “**R**” and push the Menu/Execute switch to get to:

<b>SAVE SETTINGS?   <u>Y</u> N</b>
------------------------------------

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

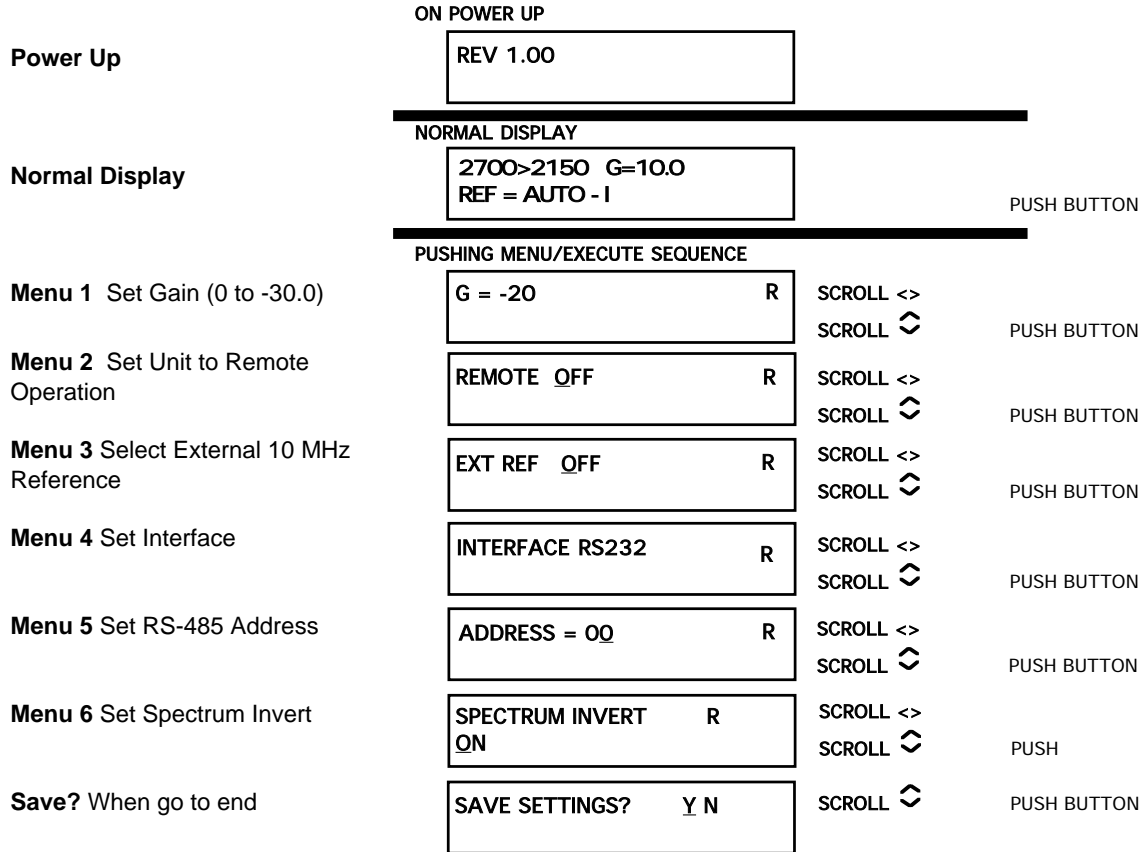
Pushing the Menu/Execute switch then takes you to this:

<b>2700 &gt; 2150   G=10.0</b>
<b>REF=AUTO - I</b>

Figure 2.5 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 Mute LED will light if you select Mute and the Remote LED will light when you select the Remote mode.



**FIGURE 2.5 Menu Display and Sequence**

## 2.5.6 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, J18. 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, J3. REF = EXT appears on the front panel display. The External 10 MHz Reference level must be +3dBm,  $\pm 3$ 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, J18.

**Auto Mode:** The unit defaults to the External 10 MHz Reference as long as the level meets the +3dBm,  $\pm 3$ 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, J18.

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, J18.

### 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 (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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