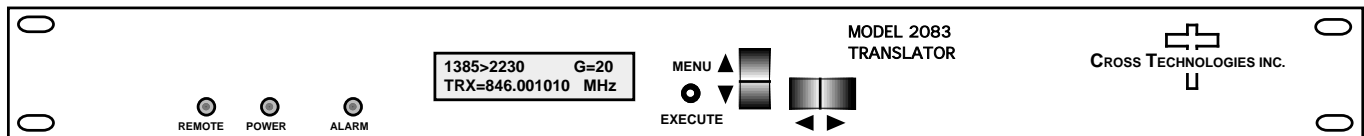


# Instruction Manual

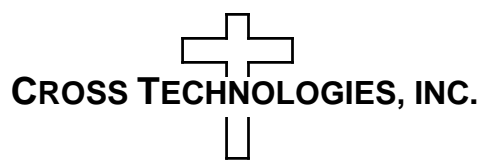
# Model 2083-21-1422 Block Translator

October 2018, Rev. A



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# INSTRUCTION MANUAL

## MODEL 2083-21-1422 Block Translator

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# MODEL 2083-21-1422 Block Translator

## 1.0 General

### 1.1 Equipment Description

**2083-21-1422 Block Translator** - The 2083-21-1422 Block Translator converts either a 1375-1395 MHz or a 1540-1560 MHz block to 2220-2240 MHz block with no spectrum inversion. The 1375-1395 or 1540-1560 MHz input is mixed with local oscillator (LO) signals, first to a 1750 MHz center frequency and finally to the 2220-2240 MHz block output. The gain can be set for 0 to +20 dB in 1 dB increments. The input 1385 and 1550 MHz translation center frequencies can be adjusted by  $\pm 10$  MHz in 1 MHz (10 Hz, Option - X10) increments. The output center frequency is fixed at 2230 MHz. Multifunction switches select the Gain, the translation frequency and internal or External 10 MHz reference (Option E) which appear on the LCD display and can be adjusted remotely. Front panel LEDs provide indication of DC power (green), PLL alarm (red), and remote operation (yellow). Connectors are BNC female for RF 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" 1RU chassis.

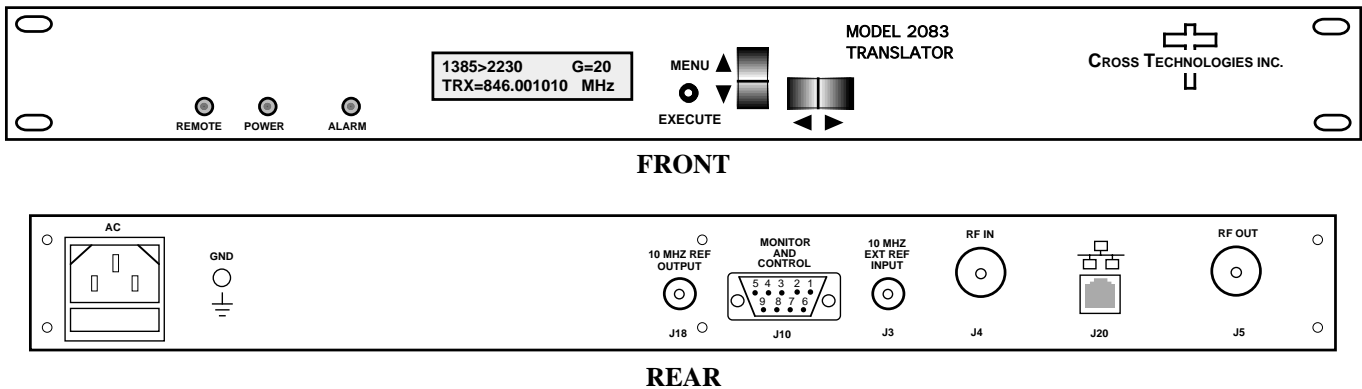


FIGURE 1.1 Model 2083-21-1422 Front and Rear Panels

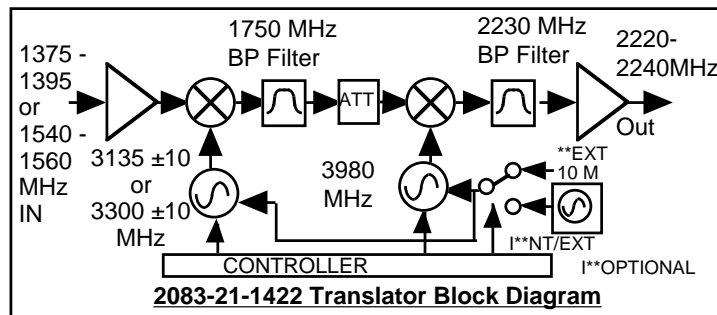


FIGURE 1.2 Model 2083-21-1422 Translator Block Diagram

## 1.2 Technical Characteristics

<b>TABLE 1.0 2083-21-1422 Block Translator Specifications**</b>					
<b>Input Characteristics</b>					
Input Impedance/RL	50Ω/12 dB				
Frequency (20 MHz BW)	Band 1 Fc=1375 - 1395 MHz 1385=Center				
	Band 2 Fc=1540 - 1560 MHz 1550=Center				
Input Composite Level	-70 to -50 dBm				
Input, maximum no damage	+15 dBm				
<b>Output Characteristics</b>					
Impedance/RL	50Ω / 12 dB				
Frequency	2220 - 2240 MHz, Bands 1 & 2				
Output Composite Level	-50 to -30 dBm				
Output 1 dB Compression	-20 dBm, at maximum gain				
<b>Channel Characteristics</b>					
Gain	0 to +20 dB, ±1 dB, selectable in 1±1 dB steps				
Frequency Response	±1.0 dB, 20 MHz bandwidth; ±0.5 dB, any 5 MHz increment				
Spurious, Inband	< -50 dBc in band, signal dependent and single independent; See *NOTE 1 below.				
Spurious, Out of Band	< -30 dBc, 1.6- 2.2 GHz and 2.3-3.0 GHz and Input feed through rejection; See *NOTE 1 below				
Group Delay, max.	0.03 ns/MHz <sup>2</sup> , parabolic, 0.1ns/MHz, linear, 1 ns ripple, 20 MHz BW				
Frequency Sense	Non-inverting				
	*NOTE 1: dBc is relative to the COMPOSITE Output Level				
<b>Synthesizer Characteristics</b>					
Translation Accuracy	1ppm; Option -H, ±0.01 ppm				
Reference	10 MHz Internal; Option -E, Internal / External Selection				
Frequency Step	1 MHz; ±10 MHz Translation adjustment: Option -X10, 10 Hz translation step adjustment.				
<i>Phase Noise @ F (Hz) &gt;</i>	<i>100 MHz</i>	<i>1kHz</i>	<i>10kHz</i>	<i>100kHz</i>	<i>1MHz</i>
<i>dBc/Hz</i>	<i>-70</i>	<i>-70</i>	<i>-80</i>	<i>-90</i>	<i>-100</i>
<b>Controls, Indicators</b>					
Frequency Translation	Direct readout LCD; manual or remote selection				
Gain (MGC)	Direct readout LCD; manual or remote selection				
External Reference (Option -E)	Direct readout LCD; manual or remote selection				
Power, Alarm; Remote	Green LED; Red LED; Yellow LED				
Remote	RS232C, 9600 Baud; RS485, Ethernet Options				
<b>Other</b>					
RF In/RF Out Connector	50Ω BNC (female)				
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.					
Cross Technologies, Inc. 2018					

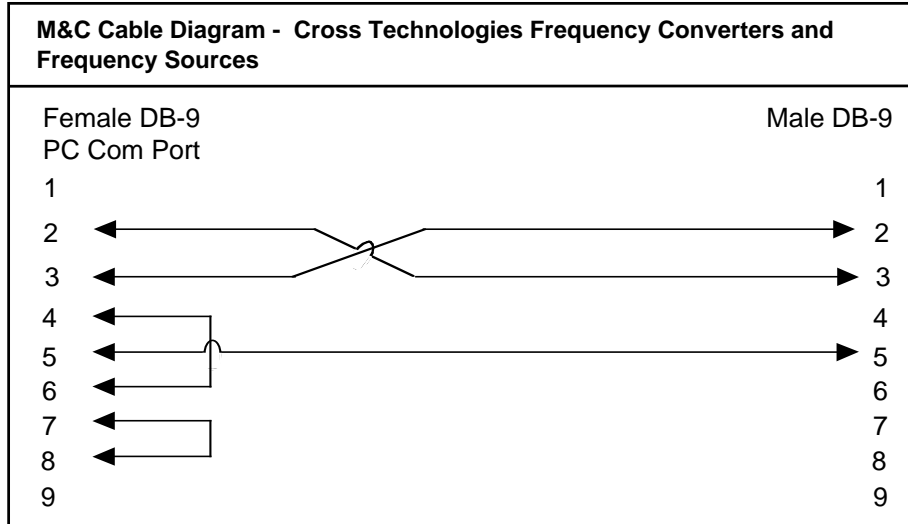
## 1.2 Technical Characteristics, continued...

<b>Available Options (2083-21-1422 Block Translator)</b>	
E -	External 10 MHz Input and Output
H -	High Stability ( $\pm 0.01$ ppm) Internal Reference
X10 -	10 Hz Tuning
<b>Communication Interface / Standard RS232</b>	
Q -	RS485 Remote Interface
W8 -	Ethernet; with Web Browser
W18 -	Ethernet; with Web Browser & SNMP
W28 -	Ethernet; with TCP/IP, Telnet®
<b>Connector /Impedance</b>	
B -	75 $\Omega$ BNC (RF In), 75 $\Omega$ BNC (RF Out)
NN -	50 $\Omega$ N (RF In), 50 $\Omega$ N (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) Status Requests/Inquiries -

Table 1.2 lists the status requests for the 2083-21-1422 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 1.2 2083-21-1422 Status Requests		
Command	Syntax*	Description
Band Inquiry	{aaSN}	returns: {aaSNx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		N = command code
		x = Input Frequency Band
		The unit will append the '>' character if the command is successfully processed.
Band1 Translation		
Frequency Inquiry	{aaS1}	returns: {aaS1xxxxxxxx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
Band 2 Translation		
Frequency Inquiry		returns: {aaS2xxxxxxxx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit.
		2 = command code
		xxxxxxxx = translation frequency (3 characters standard, 9 characters if the unit has option X10).
		The unit will append the '>' character if the command is successfully processed.
Gain Inquiry	{aaSG}	returns: {aaSGxx}
		where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		G = command code
		xx = gain in dB
		The unit will append the '>' character if the command is successfully processed.

Status Request continued on page 8...

**TABLE 1.2 2083-21-1422 Status Requests**

Command	Syntax*	Description
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.
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



**C) Commands** - Table 1.1 lists the commands for the 2083-21-1422 and briefly describes them. After a command is sent the 2083-21-1422 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 1.1 2083-21-1422 Commands		
Command	Syntax*	Description
Set Band	{aaCNx}	where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit N = command code x = Input Frequency Band: 1 = Band 1 : 1375 to 1395 MHz 2 = Band 2 : 1540 to 1560 MHz example: {CN2} Will set the unit's input frequency band to 2. The unit will append the '>' character if the command is successfully processed.
Set Band1		
Translation Frequency	{aaC1xxxxxxxx}	where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit. 1 = command code xxxxxxxx = Band1 Translation Frequency (3 characters standard, 9 characters if unit has option X10: Range=835 to 855 in 1 MHz steps (835000000 to 855000000 if unit has option X10). example (option X10): {C1845010000} Will set the unit's band1 frequency translation to 845.010000 MHz. The unit will reply with the '>' character if the command is successfully processed.

**Continued on page 10...**

**Table 1.1 2083-21-1422 Commands**

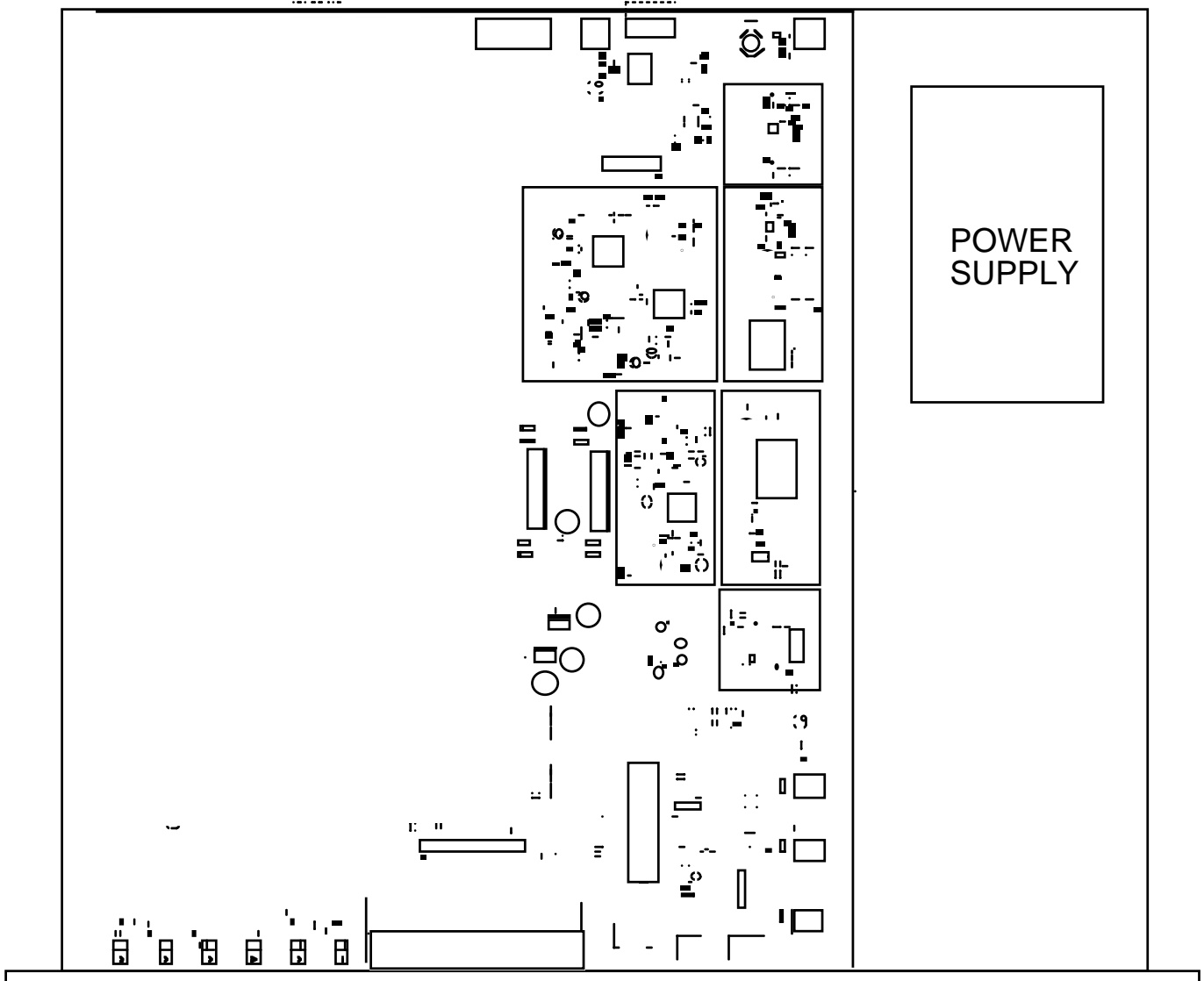
Command	Syntax*	Description
Set Band2		
Translation Frequency	{aaC2xxxxxxxx}	where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit. 2 = command code xxxxxxxx = Band2 Translation Frequency (4 characters standard, 9 characters if unit has option X10): Range=670 to 690 in 1 MHz steps (670000000 to 690000000 if unit has option X10). example (option X10): {C2681010000} Will set the unit's band2 frequency translation to 681.010000 MHz. The unit will reply with the '>' character if the command is successfully processed.
Set Gain	{aaCxx}	where: aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit. 2 = command code xx = gain Range=0 to 20 in 1 dB steps. example: {CG15} Will set the unit's gain to 15 dB. 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.

Continued from page 10...

Table 1.1 2083-21-1422 Commands		
Command	Syntax*	Description
Set Remote Off	{aaCRO}	where:
		aa = unit address, range = 00 to 31, only used if interface is RS485, otherwise omit
		R = command code
		O, ascii number zero.
		example: {CRO}
		Will disable the unit's serial M&C port.
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)

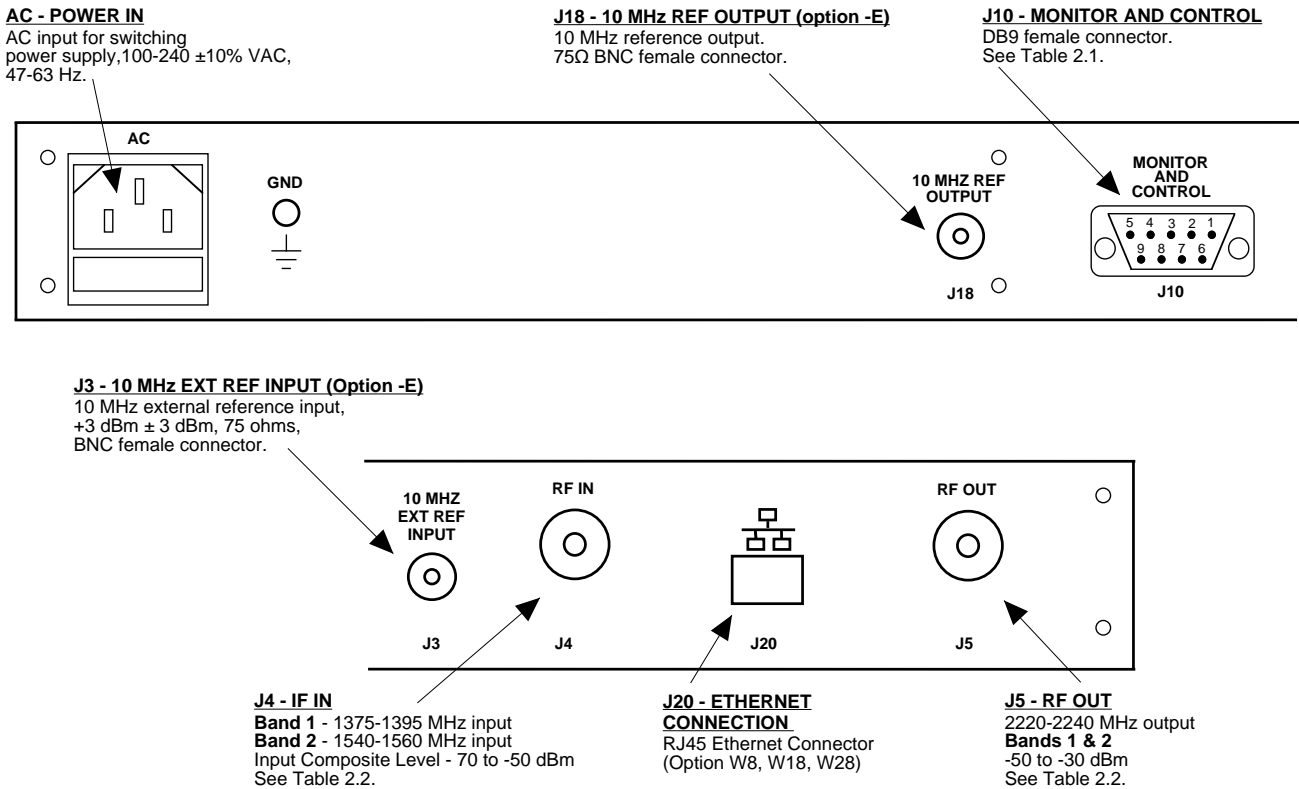
## 2.0 Installation

**2.1 Mechanical** - The 2083-21-1422 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 2083-21-1422 can be secured to a rack using the 4 holes on the front panel. Figure 2.1 shows how the 2083-21-1422 is assembled.



**FIGURE 2.1 2083-21-1422 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 2083-21-1422 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

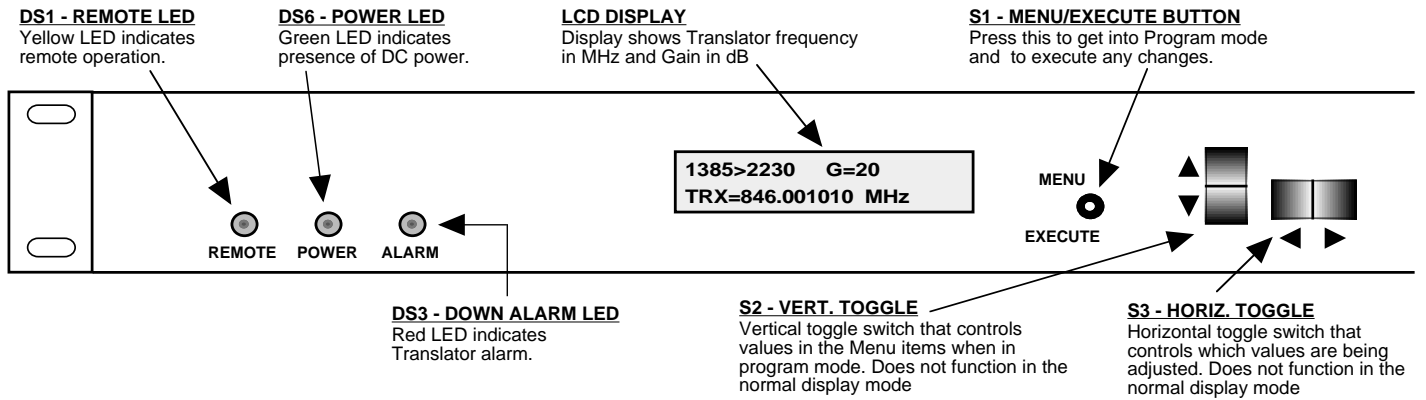
### \*Remote Serial Interface

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	IF Out	RF In
STD	BNC, 50 $\Omega$	BNC, 50 $\Omega$
-B	BNC, 75 $\Omega$	BNC, 75 $\Omega$
-NN	N for output	N for input

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

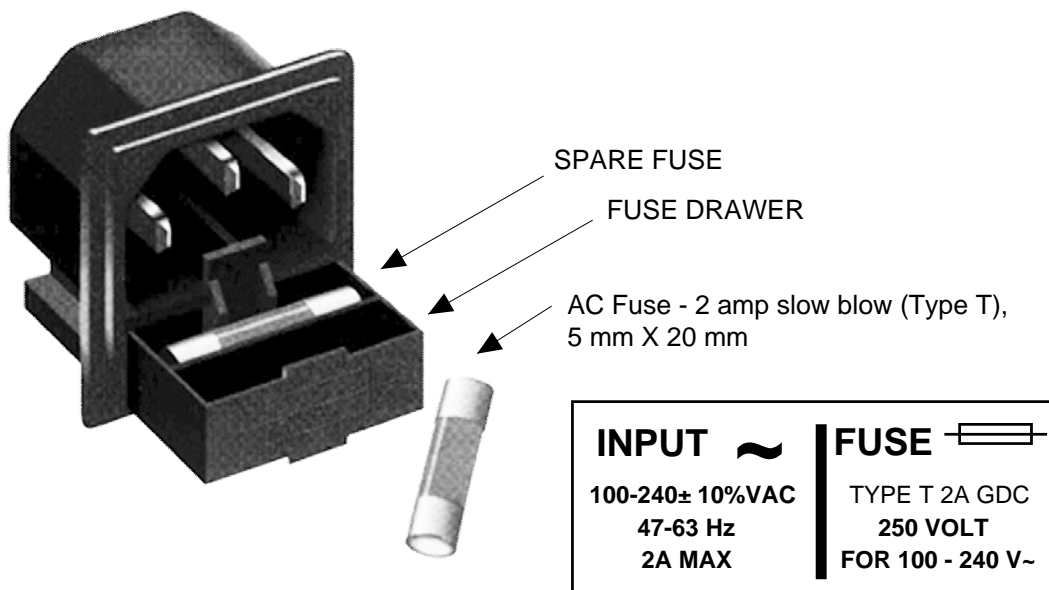


**FIGURE 2.3 2083-21-1422 Front Panel Controls and Indicators**

## 2.4 Operation

### 2.4.1 Installing and Operating the 2083-21-1422 Block Translator

1. Connect a -70 to -50 dBm signal to IF 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 Translation Frequency (See Section 2.5 Menu Settings).
5. Set the gain for 0 to +20 dBm (See Section 2.5 Menu Settings).
6. Be sure DS6 (green, DC Power) is on and DS (red, Alarm) is off (Figure 2.3).
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 2.4. 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** Translation Frequency in MHz
- Menu 2** Gain (0 to +20, 1±1 dB steps)
- Menu 3** Set Unit to Remote Operation
- Menu 4** Select External 10 MHz Reference (option -E)
- Menu 5** Set Remote mode (option -Q)
- Menu 6** Set RS-485 address (option -Q)

**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.**

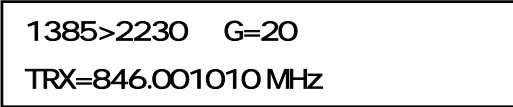
When power is first applied, the LCD display goes through three steps.

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



REV 5.20

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



1385>2230 G=20  
TRX=846.001010 MHz

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.

## 2.5.4 Frequency 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 12 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 FREQUENCY:

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 down converter frequency:

```
TRX = 846.010000MHz      R
```

Pressing the Up/Down switch down will toggle the display to:

```
TRX = 846.010010MHz      R
```

By using the horizontal rocker switch the cursor can be moved left or right .

```
TRX = 846.010210MHz      R
```

**NOTE: CHANGES DO NOT TAKE PLACE ON FREQUENCY UNTIL YOU GO TO THE SAVE MENU AND INDICATE YOU WANT TO SAVE THE CHANGES. THE CARRIER IS MUTED WHEN FREQUENCY IS CHANGED.**

When the display indicates the value desired you can push the Menu/Execute switch to get to the next item:

```
G = +20                  R
```

OR you can scroll to “R”, push the Menu/Execute switch to get to:

```
SAVE SETTINGS?  YN
```

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:

```
1385>2230  G=20  
TRX=846.001010MHz
```

Figure 2.5 gives 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 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):

```
G = +20      R
```

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

```
G = +15      R
```

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.

```
G = +15      R
```

**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:

```
SAVE SETTINGS?  YN
```

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

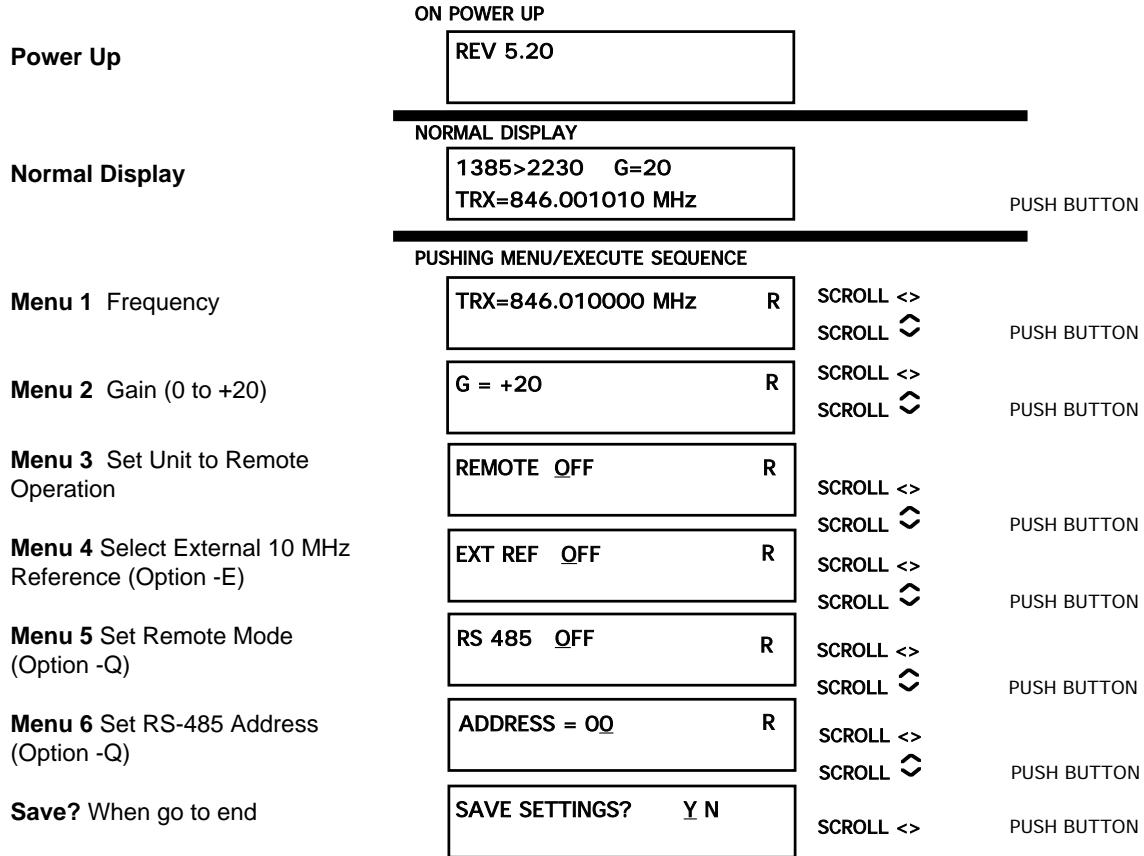
Pushing the Menu/Execute switch then takes you to this:

```
1385>2230  G=20  
TRX=846.001010 MHz
```

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**

### 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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