Instruction Manual

Model 2083-0915-2150
Block Translator

August 2022, Rev. 0

G 1= 11 G 2= 12	MODEL 2083
REF = AUTO - I	TRANSLATOR

MENU ▲
○ ▼
EXECUTE ◄ ►

CROSS TECHNOLOGIES INC.

REMOTE   POWER   ALARM
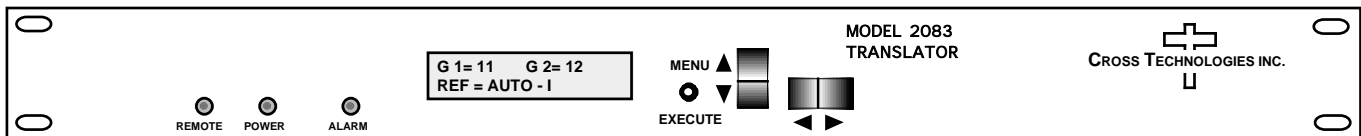
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INSTRUCTION MANUAL

MODEL 2083-0915-2150 Block Translator

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MODEL 2083-0915-2150 Block Translator (Inverted)/Combiner, 950-1450 to 1650-2150 MHz

1.0 General

1.1 Equipment Description

The 2083-0915-2150 Block Translator (Inverted)/Combiner converts a 950-1450 MHz block (CH2) to 1650-2150 MHz block with spectrum inversion, and combines it with a second 950-1450 MHz block (CH1) to provide a 950-2150 MHz combined spectrum. The 950-1450 MHz (CH2) input is mixed with synthesized local oscillator (LO) at 3100 MHz to generate the 1650-2150 MHz, spectrum inverted, block output. The CH1 950-1450 MHz block goes to an amplifier, variable attenuator and bandpass filter and then is summed in with the 1650-2150 MHz (CH2) block to provide the 950-2150 MHz combined spectrum. Each channel's gain can be adjusted form 0 to +20 dB in 1±1 dB increments. Multifunction switches adjust each channel's gain and internal or External (Option E) 10 MHz reference which appear on the LCD display and can be set remotely. Front panel LEDs provide indication of DC power (green), PLL alarm (red), and remote operation (yellow). Connectors are Type F female for RF input and output. It is powered by a 100-240 ±10% VAC, 47-63 HZ input power supply and in a 1 3/4" X 19" X 16" rack mount chassis.
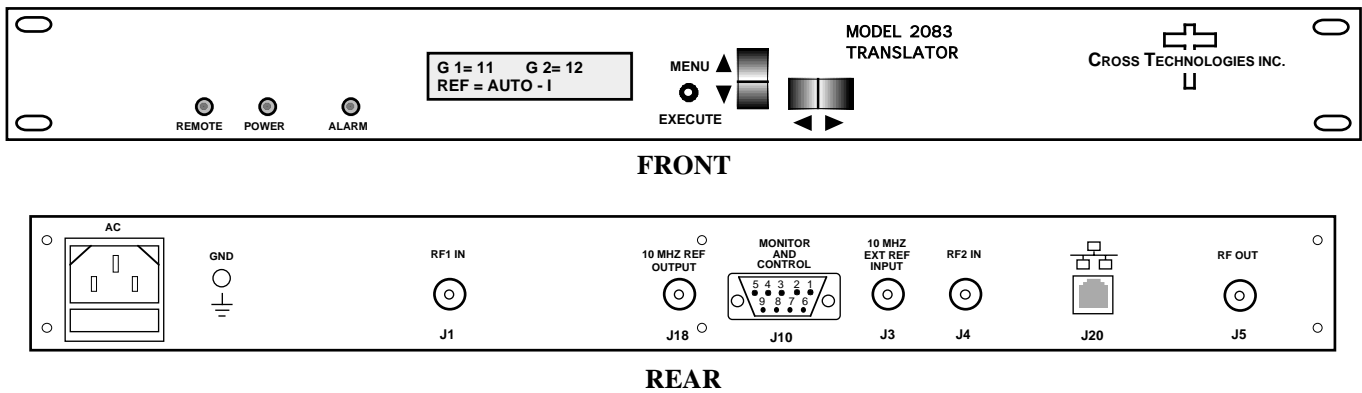
FIGURE 1.1   Model 2083-0915-2150 Front and Rear Panels
(Shown with optional Ethernet & Option E)
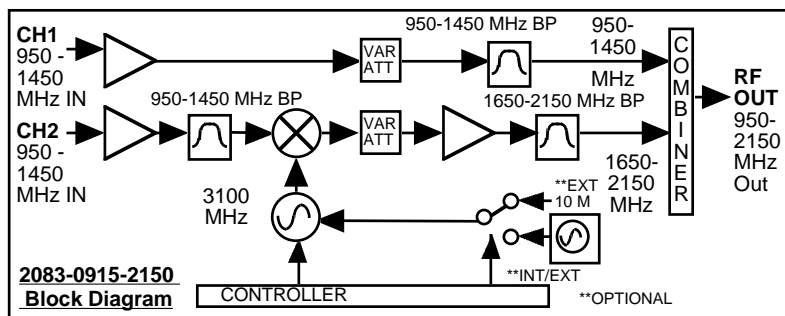
FIGURE 1.2   Model 2083-0915-2150 Translator Block Diagram

1.2 Technical Characteristics

TABLE 1.0	2083-0915-2150 Block Translator Specifications*
Input Characteristics/RL	
Input Impedance/RL	75Ω/12 dB
Frequency	950 - 1450 MHz
Input Composite Level	-30 to -50 dBm
Noise Figure, Maximum	15 dB at max gain
Input 1 dB compression	-20 dBm
Output Characteristics	
Impedance/RL	75Ω / 12 dB
Frequency	950 - 2150 MHz (CH1 + CH2)
Output Composite Level	-20 to - 40 dBm
Output 1 dB Compression	-10 dBm, at maximum gain
Channel Characteristics	
Gain, Max Adjustment	+20 ±2 dB at Fc; 0 to +20 dB, selectable in 1±1 dB steps
Frequency Response	± 1.5 dB, 500 MHz bandwidth; ± 0.5 dB, any 40 MHz increment
Spurious-In band (Note 1)	< -40 dBC in band, sig. dependent & sig. independent; -20 dBm out; See NOTE 1
Spurious-Out of Band (Note 2)	< -30 dBC, 0.5- 0.94 GHz and 2.2-2.6 GHz; -20 dBm out; See NOTE *1 below.
Frequency Sense	Inverting
Group Delay	< 2ns, band; < 1ns, any 65MHz
	***NOTE 1**: dBc is relative to the COMPOSITE Output Level
Synthesizer Characteristics	
Translation; Accuracy	1ppm; Option -H, ±0.01 ppm
Reference	10 MHz Internal; Option -E, Internal/ External selection; external level 3±3 dBm
Frequency Step	None, fixed frequency translation

Phase Noise @ Frequency	100 MHz	1kHz	10kHz	100kHz	
dBC/Hz	-70	-70	-80	-90	-100

Controls, Indicators	
Gain (CH1 and CH2)	Direct readout LCD; manual or remote selection
External Ref. (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
Other	
RF In/RF Out Connector	Type F (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
Available Options (see page 5...)	
**+10˚C to +40˚C; Specifications subject to change without notice.	**Cross Technologies, Inc. 2022**

1.2 Technical Characteristics, continued...

Available Options (2083-0915-2150 Block Translator)	
E -	External 10 MHz Input and Output
H -	High Stability (±0.01) Internal Reference
Communication Interface / Standard RS232	
Q -	RS485 Remote Interface
W8 -	Ethernet; with Web Browser
W18 -	Ethernet; with Web Browser & SNMP
W28 -	Ethernet; with TCP/IP, Telnet®
W828 -	Ethernet; W18 + W28
Connectors /Impedance	
Std. -	75Ω Type F (RF In and RF Out)
NN -	50Ω N (RF In), 50Ω N (RF Out)
SS -	50Ω SMA (RF In), 50Ω 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**)

M&C Cable Diagram - Cross Technologies Frequency Converters and Frequency Sources

Female DB-9   Male DB-9
PC Com Port

```
1                                                1
2  ◄─────────────────╲   ╱──────────────►  2
3  ◄─────────────────╱   ╲──────────────►  3
4  ◄────────╮                                4
5  ◄────────┤  ──────────────────────►     5
6  ◄────────┤                                6
7  ◄────────┤                                7
8  ◄────────╯                                8
9                                                9
```
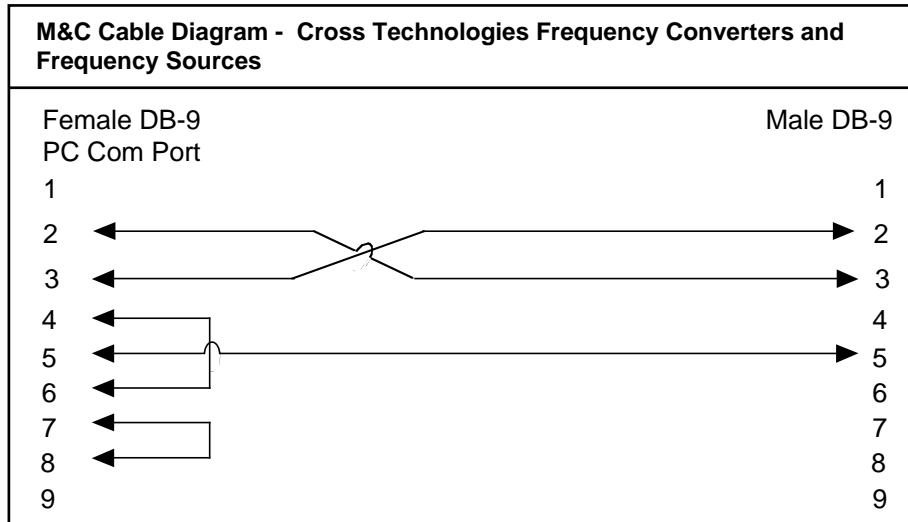
Connector: Rear panel, DB-9 male

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 Request/Inquiries -

Table 1.0 lists the Status Request/Inquiries for the **2083-0915-2150** and briefly describes them.

> **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}(OO-31) prefix, in the table below,
>   should be used ONLY when RS-485, (OPTION-Q), is selected.

TABLE 1.2 2083-0915-2150 Status Request/Inquiries		
Command	**Syntax***	**Description**
CH1 Gain Inquiry	{aaS1}	returns: {aaS1xxx}
		where:
		aa = unit address, range = OO to 31, only used if interface is
		RS485, otherwise omit
		1 = command code
		xxx = CH1 Gain in dB
		The unit will reply with the '>' character if the command is
		sucessfully processed.
CH2 Gain Inquiry	{aaS2}	returns: {aaS2xxx}
		where:
		aa = unit address, range = OO to 31, only used if interface is
		RS485, otherwise omit
		1 = command code
		xxx = CH2 Gain in dB
		The unit will reply with the '>' character if the command is
		sucessfully processed.
Reference Mode Inquiry	{aaSE}	returns: {aaSEx}
Option E only		where:
		aa = unit address, range = OO 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
		sucessfully processed.
Reference Status Inquiry	{aaSB}	returns: {aaSBx}
Option E only		where:
		aa = unit address, range = OO 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

Table 1.2, Status Request/Inquiries continued from page 7...

TABLE 1.2 2083-0915-2150 Status Request/Inquiries		
Command	Syntax*	Description
Reference Status Inquiry	{aaSB}	returns: {aaSBx}
Option E only		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
		The unit will append the '>' character if the command is
		sucessfully 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
		sucessfully processed.
Power Supply Status Inquiry	{aaSP}	returns: {aaSPxy}
		where:
		aa = unit address, range = 00 to 31, only used if interface is
		RS485, otherwise omit
		P = command code
		x = 0 if power supply 1 is off, x = 1 if power supply 1 is on.
		y = 0 if power supply 2 is off, y = 1 if power supply 2 is on.
		The unit will append the '>' character if the command is
		sucessfully 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 1.0 lists the M&C Commands for the **2083-0915-2150** and briefly describes them. After a command is sent the 2083-0915-2150 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 1.3 2083-0915-2150 M&C Commands		
Command Function	**Syntax***	**Command Description**
Set CH1 Gain	{aaC1xx}	where:
		aa = unit address, range = 00 to 31,
		only used if interface is RS485, otherwise omit
		1 = command code
		xx=CH1 Gain in dB
		Range: 0 to 20 in 1 dB steps
		example: {C115}
		Will set CH1 gain to 15 dB.
		The unit will reply with the '>' character if the command
		is sucessfully processed.
Set CH2 Gain	{aaC2xx}	where:
		aa = unit address, range = 00 to 31,
		only used if interface is RS485, otherwise omit
		2 = command code
		xx=CH2 Gain in dB
		Range: 0 to 20 in 1 dB steps
		example: {C220}
		Will set CH2 gain to 20 dB.
		The unit will reply with the '>' character if the command
		is sucessfully processed.

Table 1.3 2083-0915-2150 M&C Commands (continued)...		
Command	Syntax*	Description
Set Reference Mode	{aaCEx}	where:
Option E only		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
		externa lreference, 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 sucessfully processed.
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.
		The unit will reply with the '>' character if the command
		is sucessfully 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
		sucessfully 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

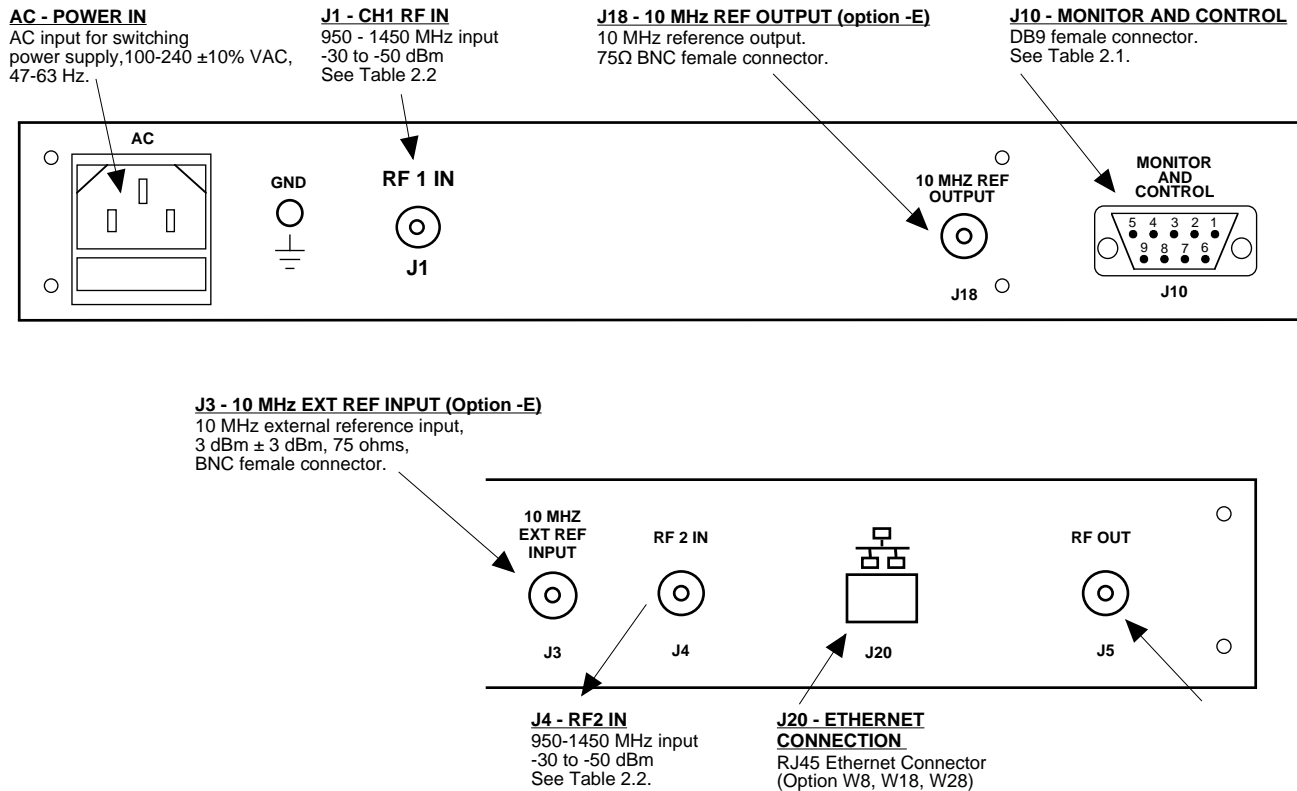**2.1 Mechanical** - The 2083-0915-2150 consists of one RF/Controller PCB housed in a 1 RU (1 3/4 inch high) by 16 inch deep chassis. A switching, ±12, +24, +5 VDC power supply provides power for the assemblies. The 2083-0915-2150 can be secured to a rack using the 4 holes on the front panel. Figure 2.1 shows how the 2083-0915-2150 is assembled.
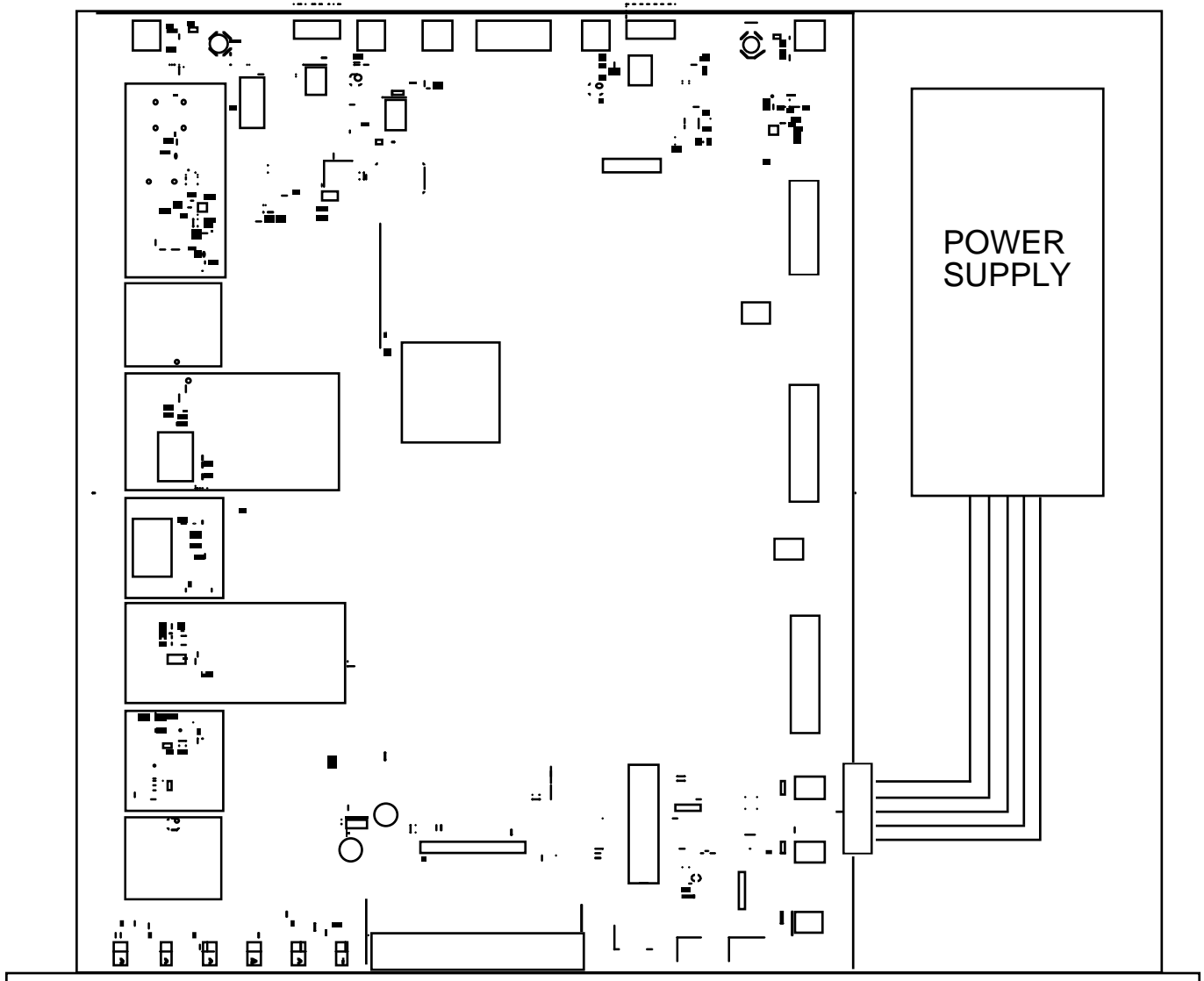
FIGURE 2.1   2083-0915-2150 Mechanical Assembly

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

AC - POWER IN
AC input for switching
power supply,100-240 ±10% VAC,
47-63 Hz.

J1 - CH1 RF IN
950 - 1450 MHz input
-30 to -50 dBm
See Table 2.2

J18 - 10 MHz REF OUTPUT (option -E)
10 MHz reference output.
75Ω BNC female connector.

J10 - MONITOR AND CONTROL
DB9 female connector.
See Table 2.1.

J3 - 10 MHz EXT REF INPUT (Option -E)
10 MHz external reference input,
3 dBm ± 3 dBm, 75 ohms,
BNC female connector.

J4 - RF2 IN
950-1450 MHz input
-30 to -50 dBm
See Table 2.2.

J20 - ETHERNET CONNECTION
RJ45 Ethernet Connector
(Option W8, W18, W28)

FIGURE 2.2   2083-0915-2150 Rear Panel I/Os

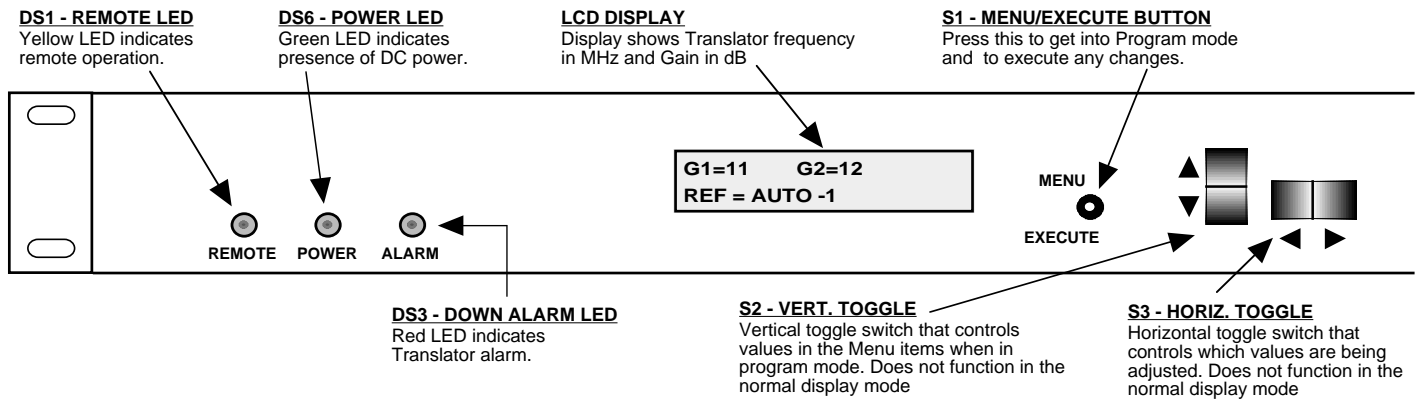| TABLE 2.1 J10 Pinouts (RS-232C*)	
Pin	Function
1	Not Used
2	Rx+ (RS-232C)
3	Tx+ (RS-232C)
4	Not Used
5	GND
6	Alarm Relay: Common
7	Alarm Relay: Normally Closed
8	Not Used
9	Alarm Relay: Normally Open

*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	75Ω F	75Ω F
-NN	50Ω N	50Ω N
-SS	50Ω SMA	50Ω SMA

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

DS1 - REMOTE LED
Yellow LED indicates
remote operation.

DS6 - POWER LED
Green LED indicates
presence of DC power.

LCD DISPLAY
Display shows Translator frequency
in MHz and Gain in dB

S1 - MENU/EXECUTE BUTTON
Press this to get into Program mode
and to execute any changes.

G1=11   G2=12
REF = AUTO -1

MENU

EXECUTE

REMOTE   POWER   ALARM

DS3 - DOWN ALARM LED
Red LED indicates
Translator alarm.

S2 - VERT. TOGGLE
Vertical toggle switch that controls
values in the Menu items when in
program mode. Does not function in the
normal display mode

S3 - HORIZ. TOGGLE
Horizontal toggle switch that
controls which values are being
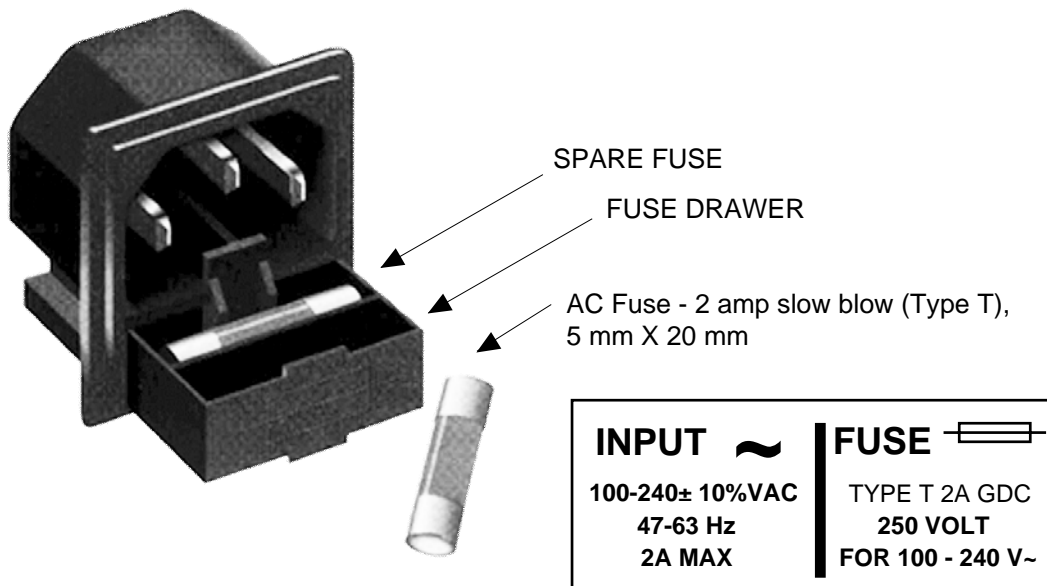adjusted. Does not function in the
normal display mode

FIGURE 2.3   2083-0915-2150 Front Panel Controls and Indicators

2.4 Operation

2.4.1 Installing and Operating the 2083-0915-2150 Block Translator

1. Connect a -30 dBm to -30 dBm signal to RF1 IN (J1) and to RF2 IN (J4) (Figure 2.2)
2. Connect the RF OUT, J5, to the external equipment
3. Connect 100-240 ±10% VAC, 47 - 63 Hz to AC on the back panel.
4. Set CH1 gain and CH2 gain for a composite output of -20 to -40 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.

SPARE FUSE

FUSE DRAWER

AC Fuse - 2 amp slow blow (Type T), 5 mm X 20 mm

INPUT ~	FUSE
100-240± 10%VAC	TYPE T 2A GDC
47-63 Hz	250 VOLT
2A MAX	FOR 100 - 240 V~

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 CH1 Gain
> **Menu 2**   Set CH2 Gain
> **Menu 3**   Set Remote
> **Menu 4**   Select Referene Mode (option -E)
> **Menu 5**   Reset Ethernet Settings
> **Menu 6**   Set Remote mode (option -Q)
> **Menu 7**   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. Reading IP Address

      2.The software version will be displayed.

```
READING IP ADDRESS

```

      3.The present gain and reference of the translator is shown.

```
G1 = +11     G2 = +12
REF=AUTO - 1
```

The unit is now operational and ready for any changes the operator may desire.

2.5.3 Control Switches

1. <u>Menu/Execute</u> - 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. <u>Horizontal Switch</u> - This switch is mounted so its movement is horizontal and moves the cursor left or right.

3. <u>Vertical Switch</u> - 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 CH1 and CH2 Gain

To change the CH1 gain or CH2 gain:

Push the Menu/Execute switch to get to the CH1 or CH2 gain menu(See Figure 2.5 for the sequence of menu options):

```
CH1 GAIN = +11                R
```

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

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:
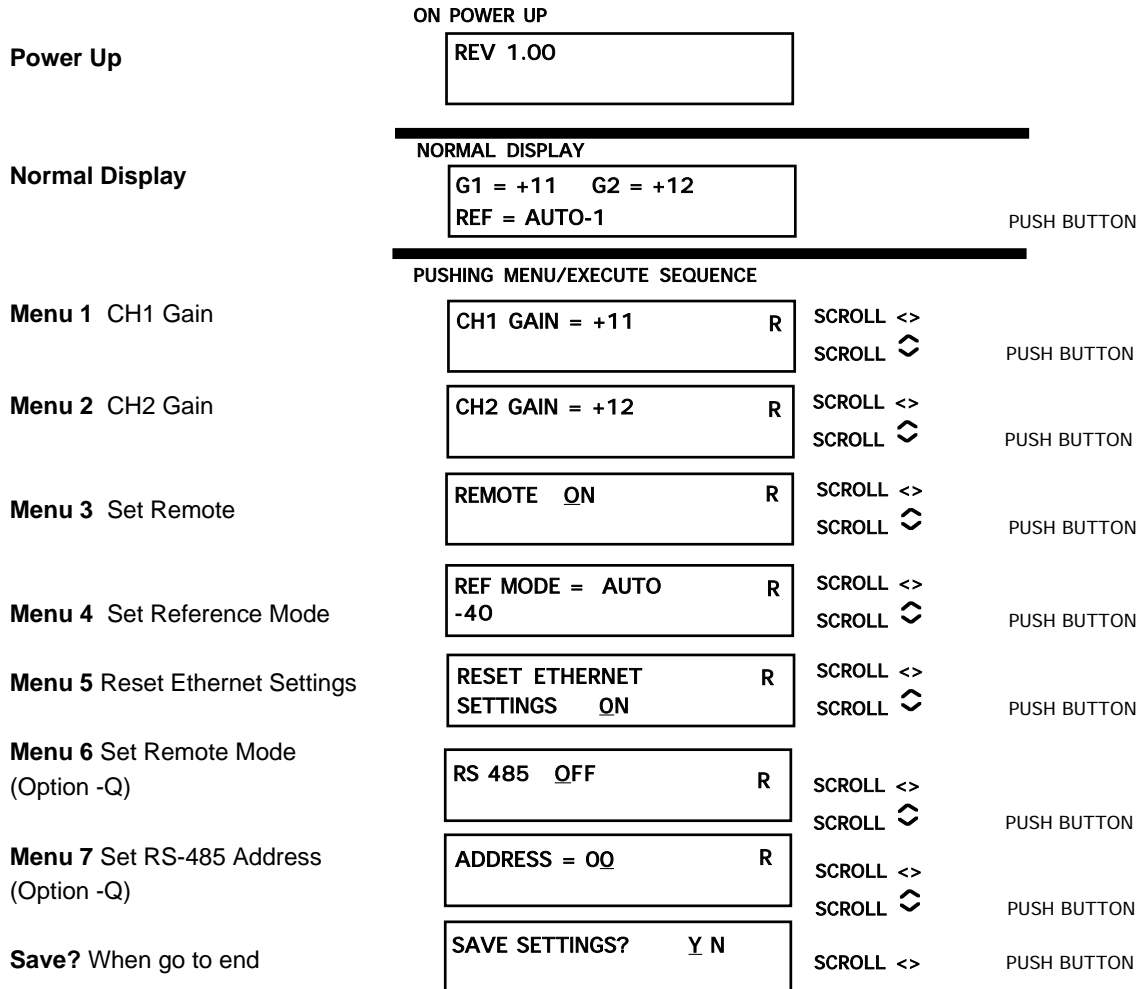
```
SAVE SETTINGS?     Y N
```

Selecting **Y** will save the new settings. Selecting **N** will revert to the previous settings. Pushing the Menu/Execute switch then takes you to this:

```
G1 = +11      G2 = +12
REF=AUTO - 1
```

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

2.5.4 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.OO
```

Normal Display

NORMAL DISPLAY

```
G1 = +11    G2 = +12
REF = AUTO-1
```
PUSH BUTTON

PUSHING MENU/EXECUTE SEQUENCE

Menu 1 CH1 Gain

```
CH1 GAIN = +11        R
```
SCROLL <>
SCROLL ⌃⌄   PUSH BUTTON

Menu 2 CH2 Gain

```
CH2 GAIN = +12        R
```
SCROLL <>
SCROLL ⌃⌄   PUSH BUTTON

Menu 3 Set Remote

```
REMOTE   ON           R
```
SCROLL <>
SCROLL ⌃⌄   PUSH BUTTON

Menu 4 Set Reference Mode

```
REF MODE =  AUTO      R
-4O
```
SCROLL <>
SCROLL ⌃⌄   PUSH BUTTON

Menu 5 Reset Ethernet Settings

```
RESET ETHERNET        R
SETTINGS    ON
```
SCROLL <>
SCROLL ⌃⌄   PUSH BUTTON

Menu 6 Set Remote Mode
(Option -Q)

```
RS 485   OFF          R
```
SCROLL <>
SCROLL ⌃⌄   PUSH BUTTON

Menu 7 Set RS-485 Address
(Option -Q)

```
ADDRESS = OO          R
```
SCROLL <>
SCROLL ⌃⌄   PUSH BUTTON

Save? When go to end

```
SAVE SETTINGS?     Y N
```
SCROLL <>   PUSH BUTTON

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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