Instruction Manual

Model 2584-31
Combiner

May 2011, Rev. A
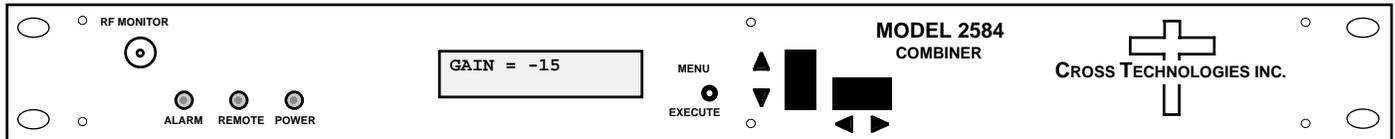
RF MONITOR ⊙	MODEL 2584 COMBINER
GAIN = -15	MENU / EXECUTE ▲ ▼ ◄ ►
ALARM REMOTE POWER	CROSS TECHNOLOGIES INC.

When ordering parts from Cross Technologies, Inc., be sure to include the equipment
model number, equipment serial number, and a description of the part.

CROSS TECHNOLOGIES, INC.

INSTRUCTION MANUAL

MODEL 2584-31 Combiner, 250 - 2150 MHz

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MODEL 2584-31 Combiner, 250 - 2150 MHz

1.0 General

1.1 Equipment Description

The 2584-31 Combiner has inputs for three 500 MHz bands, Ka A (1650-2150 MHz), Ku (950-1450 MHz), and Ka B (250-750 MHz) which are then combined into a composite 250-2150 MHz output. Attenuators on the inputs allow ±6 dB gain equalization of each band. Each band has a 0 dB gain (± 2 dB) monitor of the input (with input equalization gain set to 0 dB). These monitors can be used to drive external block upconverters. The gain to the composite output can be adjusted from 0 to -39 dB in 1 dB steps (with input equalization gain set to 0 dB). With a per carrier input of -15 dBm, the output can be adjusted over a -15 to -54 dBm per carrier level range. A -20 dB monitor of the maximum composite output (fixed level, does not vary with overall gain setting) is on the front panel. A rear panel SMA connector allows for the insertion of an external carrier within the 250-2150 MHz frequency range. The gain of this inserted signal is 0 dB when the overall gain is set for 0 dB. Front panel multi-function switches adjust the input equalization gains and overall gain. Front panel LEDs indicate DC power (green), alarm (red), and remote operation (yellow). Remote operation allows setting the overall gain. Input equalization gain during setup and overall gain settings during operation appear on the LCD display. Connectors are SMA except the RF monitor which is 50 ohm BNC, and the Ka A, Ku, Ka B Monitors and the Composite output which are Type F. Powered by a 100-240 ±10% VAC, 47-63 HZ power supply, it is housed in a 1 RU by 16" deep rack mount chassis.
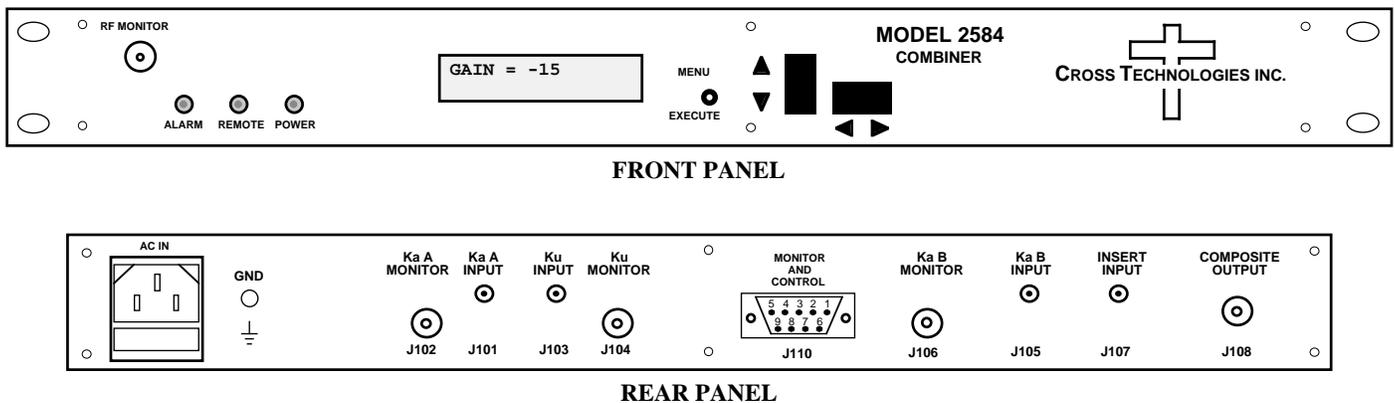
FIGURE 1.1   Model 2584-31 Front and Rear Panels
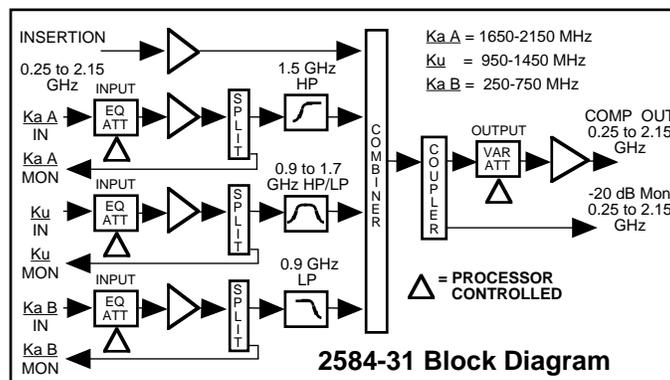
FIGURE 1.2   Model 2584--31 Combiner Block Diagram

1.2 Technical Characteristics

TABLE 1.0 2584-31 Combiner Specifications

Characteristics	Specifications*
Input Characteristics (IF)	
Impedance/Return Loss	50Ω / 12 dB
Input Level	-15 to -25 dBm per carrier
Frequency, Ka A	1650-2150 MHz
Frequency, Ku	950-1450 MHz
Frequency, Ka B	250-750 MHz
Frequency, Insertion	250-2150 MHz (Ka A, Ku, Ka B Bands)
Output Characteristics (RF)	
Impedance/Return Loss	75Ω / 12 dB
Frequency	250-2150 MHz
Output level/carrier	-15 to -25 dBm, 0 dB gain
Output 1 dB compression	+10 dBm, 0 dB gain
Ka A, Ku, Ka B Mon. Out	0 ± 2 dB gain of the input at 0 dB input equalization gain setting; Type F, 75Ω/12 dB return loss
Comp. Output Monitor	-20 dB of the output at the 0 dB gain setting, fixed level
Channel Characteristics	
Input Equalization Gain	-6 to +6, 1 dB steps for each band (Ka A, Ku, KaB)
Intermodulation	<-45 dBC for two carriers each at -15 dBm out (provides Carrier Intermods <-30 dBC, 39 ON, 1 OFF)
Frequency Response	±1.5 dB, 500 MHz BW; ±2.5 dB, 250-2150 MHz
Gain Range	0 to -39 dB in 1dB (±1dB accuracy) steps (input equalization gain is set to 0dB)
Controls, Indicators	
Power; Alarm; Remote	Green LED; Red LED; Yellow LED
Remote	RS232C / RS485, 9600 baud
Gain Selection	Direct readout LCD, front panel multi-function switches or remote selection
Other	
RF Connectors	Ka A, Ku, Ka B In, Insert port - SMA Composite Output, Ka A, Ku, Ka B Monitors - 75Ω Type F; RF Output Monitor - 50 ohm BNC (female)
Alarm/Remote Conn.	DB9 - NO or NC contact closure on Alarm; RS232C/RS485, 9600 Baud
Size; Power	19 inch, 1 RU standard chassis, 1.75" high X 16.0" deep; 100-240 ±10% VAC, 47-63 Hz, 30 watts max.
Options	
W8	Ethernet M&C Remote Interface

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

1.4 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

Female DB-9   Male DB-9
PC Com Port   2015/16/17 M&CPort

```
1                                                                1
2   ←——————————————⟍  ⟋——————————————→   2
3   ←——————————————⟋  ⟍——————————————→   3
4   ←——————┐                                                     4
5   ←———┐  │————————————————————————→   5
6   ←———┘  │                                                     6
7   ←———┐  │                                                     7
8   ←———┘——┘                                                     8
9                                                                9
```
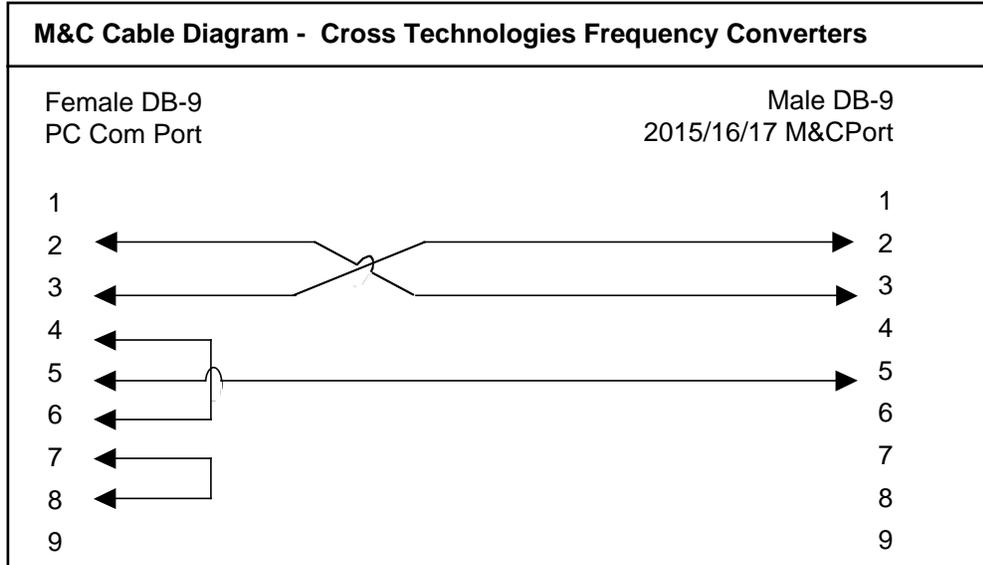
Connector: Rear panel, DB-9 female

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 2584-31 and briefly describes them.

* 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 1.1 2584-31 Status Requests		
Command	Syntax*	Description
Query Gain	{aaSG}	Returns {aaSGxxx} where:
		xxx = Gain
Query KaA Gain Equalization	{aaS1}	Returns {aaS1xxx} where:
		xxx = KaA Gain Equalization
Query Ku Gain Equalization	{aaS2}	Returns {aaS2xxx} where:
		xxx = Ku Gain Equalization
Query KaB Gain Equalization	{aaS3}	Returns {aaS3xxx} where:
		xxx = KaB Gain Equalization
Product Information	{aaSV}	Returns {aaSVxxxx-xxy.yy} where:
		xxxx-xx is the model number, y.yy is the firmware revision

C) Commands

Table 1.2 lists the commands for the 2584-31 and briefly describes them. After a command is sent the 2584-31 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**)
      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 2584-31 Commands		
Command	**Syntax***	**Description**
Set Gain	{aaCGxxx}	where:
		xxx = the desired gain in dB
		the gain rage is 0 to -39 dB
		example: Set gain command:
		{CG-10} Set the gain to -10 dB
Set KaA Gain Equalization	{aaC1xx}	where:
		xx = the desired gain equalization in dB
		the gain rage is -6 to +6 dB
		example: Set KaA Gain Equalization command:
		{aaC1-4} Set the gain equalization to -4 dB
Set Ku Gain Equalization	{aaC2xx}	where:
		xx = the desired gain equalization in dB
		the gain rage is -6 to +6 dB
		example: Set Ku Gain Equalization command:
		{aaC2-4} Set the gain equalization to -4 dB
Set KaB Gain Equalization	{aaC3xx}	where:
		xx = the desired gain equalization in dB
		the gain rage is -6 to +6 dB
		example: Set KaB Gain Equalization command:
		{aaC3-4} Set the gain equalization to -4 dB
Disable Remote	{aaCRO}	{CR and zero}
Enable Remote	#	Just # sign

2.0 Installation

2.1 Mechanical - The 2584-31 consists of one RF 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 2584-31 can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 2584-31 is assembled.

POWER
SUPPLY
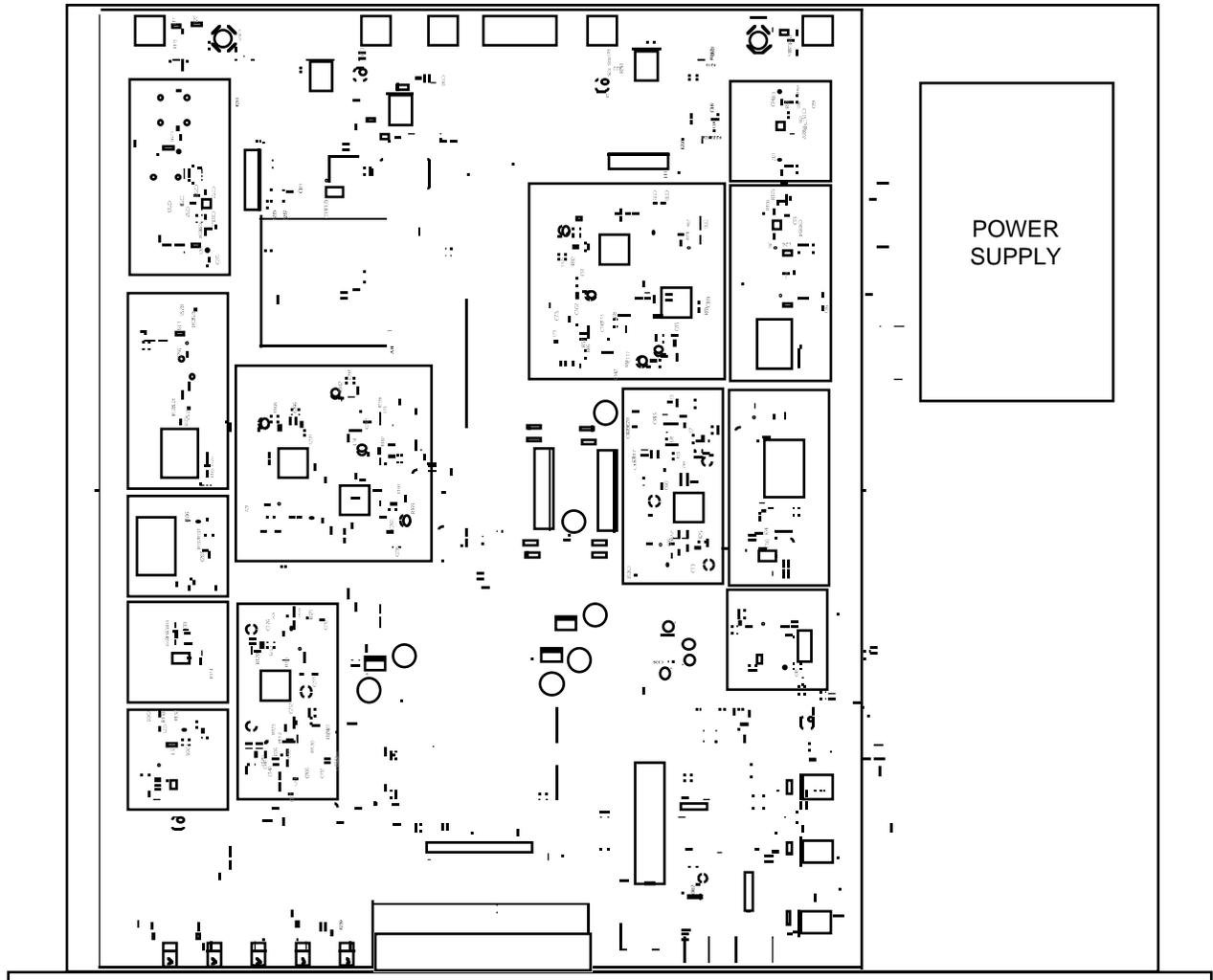
FIGURE 2.0   2584-31 Mechanical Assembly

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

J102 - Ka A MONITOR
1650 - 2150 MHz
Type F Connector

J101 Ka A INPUT
1650 - 2150 MHz
SMA Connector

AC1 - POWER IN
AC input for switching power supply.
100-240 ±10% VAC, 47-63 Hz.

J103 - Ku INPUT
950 -1450 MHz
SMA Connector

J104 - Ku Monitor
950 - 1450 MHz
Type F Connector

J110 - MONITOR AND CONTROL
DB9 female connector. See Table 2.0.

J106 - Ka B MONITOR
250 - 750 MHz, Type F Connector

J105 - Ka B INPUT
SMA Connector
250 - 750 MHz

J107 - INSERT / INPUT
SMA Connector
250 - 2150 MHz

J108 - COMPOSITE OUTPUT
75Ω/12 dB - 250 - 2150 MHz
Type F Connector

FIGURE 2.1   2584-31 Rear Panel Outputs
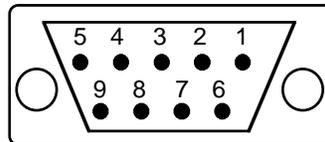
TABLE 2.1 J11 Pinouts (DB9)	
Pin	Function
1	Rx-
2	Rx+ (RS-232C)
3	Tx+ (RS-232C)
4	Tx-
5	GND
6	Alarm Relay: Common
7	Alarm Relay: Open=ALARM
8	Not Used
9	Alarm Relay: Closed=ALARM

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

RF MONITOR
50 Ω BNC

DS1 - REMOTE LED
Yellow LED indicates
remote operation.

LCD DISPLAY
Shows gain. Also used in
MENU mode.

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

```
RF MONITOR

                                    GAIN = -15              MENU

                                                            EXECUTE

ALARM    REMOTE    POWER
```

DS3 - ALARM LED
Red LED indicates alarm.

DS6 - POWER LED
Green LED indicates
presence of DC

S2 - VERT. TOGGLE
Vertical toggle switch that adjusts
values in the various menus when
in Program Mode. Does not
function in the normal display

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

FIGURE 2.2   2584-31 Front Panel Controls and Indicators

2.4 Installation / Operation

2.4.1 Installing and Operating the 2584-31 Combiner

1. Connect 1650 to 2150 MHz signal(s) to KaA INPUT.
2. Connect 950 to 1450 MHz signal(s) to Ku INPUT.
3. Connect 250 to 750 MHz signal(s) to KaB INPUT.
4. Connect 250 to 2150 MHz composite out signal(s) to external equipment.
5. Connect 100-240 ±10% VAC, 47 - 63 Hz to AC connector on the back panel.
6. Be sure DS6 (green, POWER) is on (Figure 2.2).
7. <u>AC Fuse</u> **-** 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.

FUSE DRAWER

SPARE FUSE DRAWER

AC Fuse - 2 amp slow blow (Type T 2A GDC),
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~**
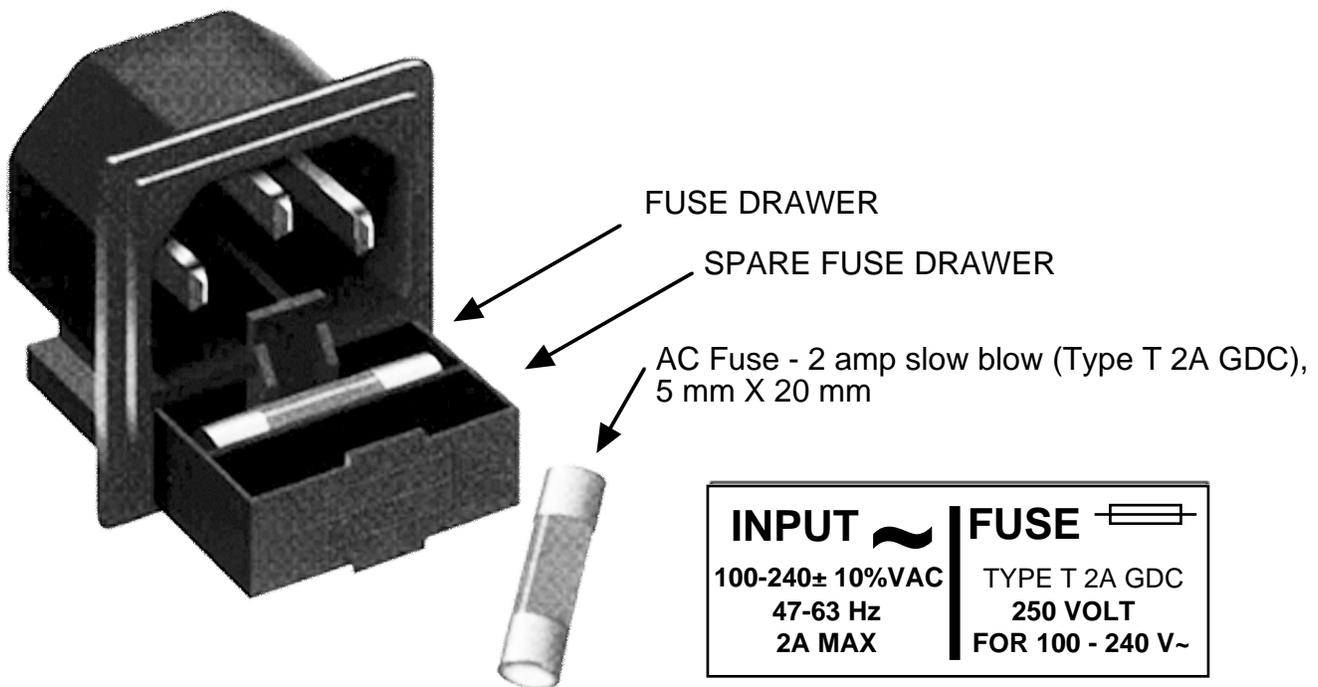
FIGURE 2.3   Fuse Location and Spare Fuse

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   Set Gain
Menu 2   Set KaA Gain Equalization
Menu 3   Set Ku Gain Equalization
Menu 4   Set KaB Gain Equalization
Menu 5   Set Remote On or Off
Menu 6   Set Remote Interface
Menu 7   Set RS-485 address (option Q)

Save Menu When "R" is selected from any above menu or at the end

Alarm indications appear on the front panel LED DS3 (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. No program changes will be evident until they are verified at the "**SAVE SETTINGS?**" Menu

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.

```
2584-31
4.01
```

     3. The present RX (LNB) and TX (SSPB) current and the 10 MHz RF insertion status is shown.

```
GAIN = -15
```

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

2.5.3 Control Switches (Figure 2.4)

     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 will alternately turn any ON/OFF function (such as REMOTE) on or off regardless of the direction operated. In the case of the INT/EXT/AUTO reference setting, the vertical switch will scroll between the three selections.

Power Up

ON POWER UP

```
2584-31
4.01
```

Normal Display

NORMAL DISPLAY

```
GAIN = -15
```

PUSH BUTTON

PUSHING MENU/EXECUTE SEQUENCE

Menu 1 Set Gain

```
GAIN = -15              R
```

SCROLL <>
SCROLL ⌄   PUSH BUTTON

Menu 2 Set KaA Gain Equalization

```
KaA                     R
GAIN EQ= -03
```

SCROLL <>
SCROLL ⌄   PUSH BUTTON

Menu 3 Set Ku Gain Equalization

```
Ku                      R
GAIN EQ= -03
```

SCROLL <>
SCROLL ⌄   PUSH BUTTON

Menu 4 Set KaB Gain Equalization

```
KaB                     R
GAIN EQ= -03
```

SCROLL <>
SCROLL ⌄   PUSH BUTTON

Menu 5 Set Remote Operation

```
REMOTE  OFF             R
```

SCROLL <>
SCROLL ⌄   PUSH BUTTON

Menu 6 Set Remote Interface

```
INTRFCE RS232
```

SCROLL <>
SCROLL ⌄   PUSH BUTTON

Menu 6 Set RS485 Address
     (Option Q)

```
RS485 ADDR 00           R
```

SCROLL <>
SCROLL ⌄   PUSH BUTTON

Save? When go to "R" or at end

```
SAVE SETTINGS?    Y N
```

SCROLL <>
SCROLL ⌄   PUSH BUTTON

Figure 2.4   Menu Display and Sequence

1.3 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.

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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