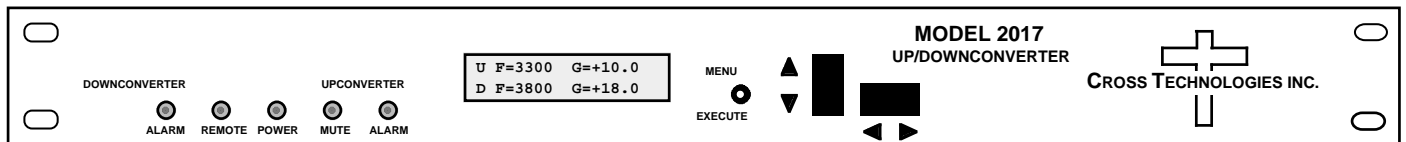


Instruction Manual

Model 2017-3338# Up/Downconverter

March 2022, Rev. 0



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INSTRUCTION MANUAL

MODEL 2017-3338# Up/Downconverter

<u>TABLE OF CONTENTS</u>	<u>PAGE</u>
Warranty	2
1.0 General	3
1.1 Equipment Description	3
1.2 Technical Characteristics	4
1.3 Monitor & Control Interface	5
2.0 Installation	8
2.1 Mechanical	8
2.2 Rear I/O's	9
2.3 Front Panel Controls, Indicators	10
2.4 Operation	11
2.5 Menu Settings	14
3.0 Environmental Use Information	19

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MODEL 2017-3338# Up/Downconverter

1.0 General

1.1 Equipment Description

The 2017-3338# Up/Downconverter converts a 20 MHz band from 2.40 GHz to 3.30 GHz and 3.80 GHz to 2.40 GHz. Multi-function switches select the gain (0 to +20 dB in 0.5 ± 0.5 dB steps), and other parameters. Front panel LEDs provide indication of DC power (green), PLL alarm (red), remote operation (yellow), and Upconverter mute (yellow). Remote operation allows selection of gain and external 10 MHz reference (option E). Gain settings appear on the LCD display. Connectors are BNC female for the optional external reference input and output (option E), and BNC female for RF IN and RF OUT. A high stability (± 0.01 ppm) option (H) is also available. It is powered by a 100-240 $\pm 10\%$ VAC power supply and in a 1.75" X 19" X 16" 1RU chassis.

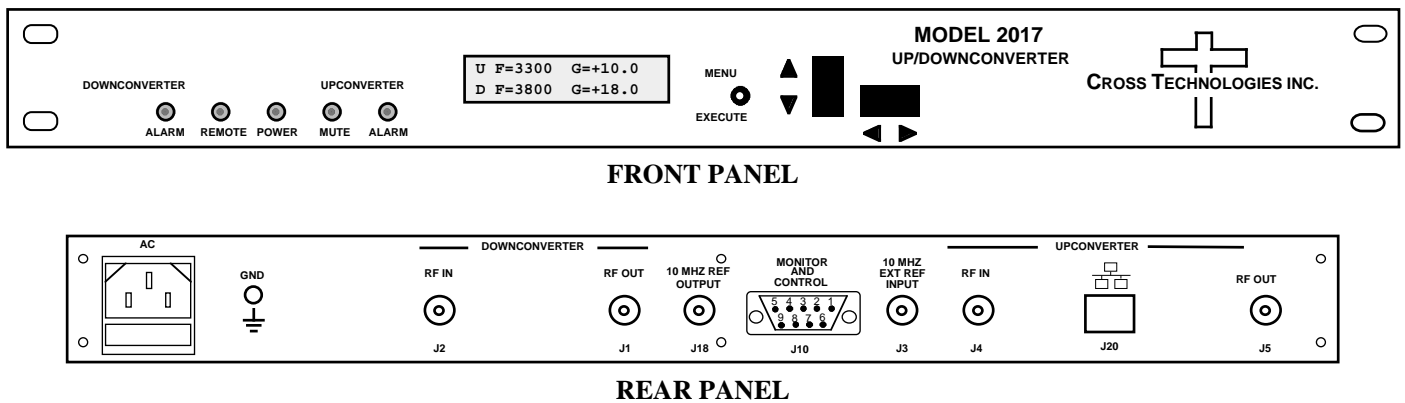


Figure 1.1 Model 2017-3338# Front and Rear Panels

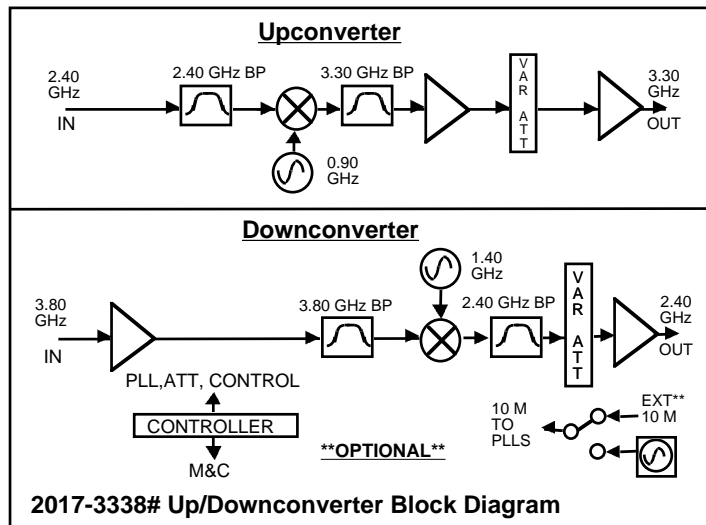


Figure 1.2 Model 2017-3338# Up/Downconverter Block Diagram

1.2 Technical Characteristics

TABLE 1.0 2017-3338# Up/Downconverter Specifications*

EQUIPMENT SPECIFICATIONS*		
Input Characteristics	UP, S	DOWN, L
Impedance/Return Loss	50Ω/14 dB	50Ω/14 dB
Frequency	2.40 GHz	3.80 GHz
Noise Figure, Max.	25 dB @ Gmax	15 dB @ Gmax
Input Level range	-20 to 0 dBm	-40 to -20 dBm
Output Characteristics		
Impedance/Return Loss	50 Ω /14 dB	50 Ω /14 dB
Frequency (GHz)	3.30 GHz	2.40 GHz
Output Level Range	-20 to 0 dBm	-20 to 0 dBm
1 dB comp, max gain	+10 dBm	+10 dBm
Channel Characteristics		
Gain, max. at Fc	+20 ±2 dB	+20 ±2 dB
Gain, range, 0.5±0.5 dB step:	+20 to 0 dB	+20 to 0 dB
Image Rejection	<-50 dBc, Gmax	<-50 dBc, Gmax
Spurious, Inband, sig. rel.	<-50 dBc, Gmax	<-50 dBc, Gmax
Spurious, Inband, sig. ind.	<-50 dBc, Gmax	<-50 dBc, Gmax
Spurious, Out of band	<-50 dBm, Gmax	<-50 dBm, Gmax
Intermod - 2 carriers 4MHz	<-50 dBc, Gmax	<-50 dBc, Gmax
Frequency Resp. 20 MHz BW	± 0.75 dB	± 0.75 dB
Frequency Sense	Non-Inverting	Non-Inverting

Available Options

E - External 10 MHz ref in & out,.

H - High Stability (±0.01 ppm) int. ref.

W31 - Ext. Temp 0C to +50C

Remote M&C Interfaces:

Q - RS485/422

W8 - Ethernet; w/Web Browser (WB)

W18 - Ethernet; w/WB & SNMP

W28 - Ethernet; w/TCP/IP, Telnet

W828 - W8 + W18 + W28

Connectors/Impedance

Std. - 50Ω BNC (RF), 50Ω BNC (IF)

M - 50Ω N-type (RF), 50Ω BNC (IF)

S- 50Ω, SMA (RF), 50Ω BNC (IF)

SS- 50Ω, SMA (RF), 50Ω SMA (IF)

Contact Cross for other options

Synthesizer Characteristics

Frequency Accuracy ± 1.0 ppm internal reference (±0.01 ppm, option H)

Frequency Step None; Fixed LOs, 0.90 GHz Up; 1.40 GHz Down

Phase Noise @ Freq	100 Hz	1kHz	10kHz	100kHz	1 MHz
dBc/Hz	-70	-80	-90	-100	-110

10 MHz In/Out Level 3 dBm ± 3 dB, 75 ohms (option E)

Controls, Indicators

Gain Selection direct readout LCD; pushbutton switches or remote selection

Power; Alarm; Remote Green LED; Red LED; Yellow LED

Remote RS232C, 9600 baud ; (RS485, option Q, Ethernet, optional)

Other

RF IN/RF OUT Connector

BNC (female)

10 MHz Connectors

50Ω/75Ω

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

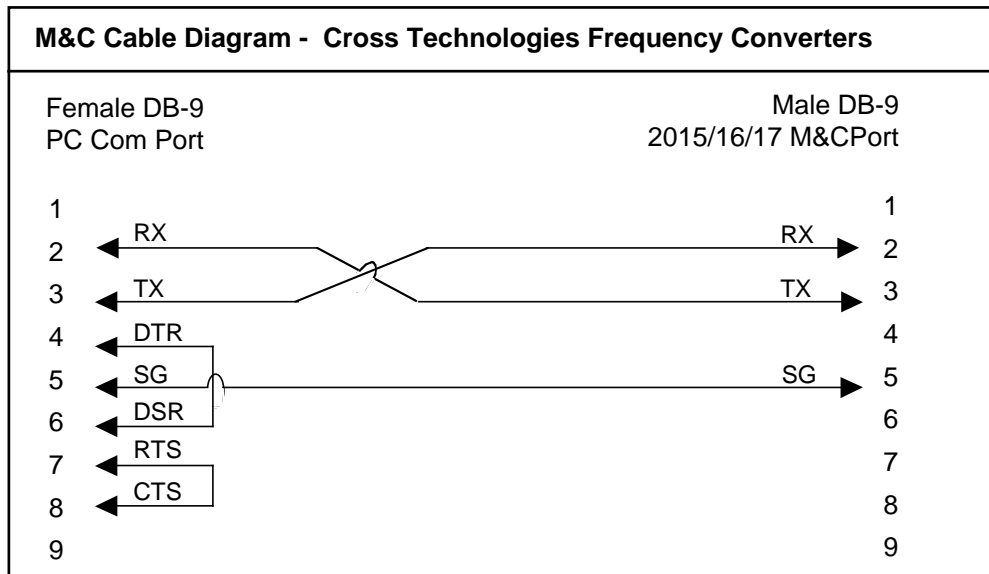
Connectors/Impedance See Table 2.2

*+10°C to +40°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 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

Table 1.1 lists the status requests for the 2017-3338# 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 2017-3338# Status Requests		
Command	Syntax*	Description
Status	{aaS1}	Returns {aaS1bbbccdefg} where: <ul style="list-style-type: none"> • bbb = Upconverter gain (000 to 200, 0 to 20.0 dB) • bbb = Downconverter gain (000 to 200, 0 to 20.0 dB) • d = Downconverter alarm (0 = alarm off, 1 = alarm on) • e = Upconverter alarm (0 = alarm off, 1 = alarm on) • f = Summary alarm (0 = alarm off, 1 = alarm on) • g = Upconverter mute status (1 = muted)
10 MHz reference mode/status	{aaS2}	Returns {aaS2bc} where: <ul style="list-style-type: none"> • b = 1 if internal reference mode is selected • b = 2 if external reference mode is selected • b = 3 if auto reference mode is selected • c = 0 if internal 10 MHz is active • c = 1 if external 10 MHz is active
IP Address (W8, W18, W28 only)	{aaSi}	Returns {aaSixxx.xxx.xxx.xxx} where: <ul style="list-style-type: none"> • x...x is the IP address
Subnet mask(W8,W18,W28 only)	{aaSs}	Returns {aaSsxxx.xxx.xxx.xxx} where: <ul style="list-style-type: none"> • x...x is the subnet mask
Unit ID	{aaSU}	Returns {aaSUx...x} where: <ul style="list-style-type: none"> • x...x is the unit ID character string (max. 16 characters)
Product Info	{aaSV}	Returns {aaSV2017-xxxx ver y.yy} where: 2017-xxxx is the model with options; yyy is the firmware Rev.

C) Commands

Table 1.2 lists the commands for the 2017-3338# and briefly describes them. After a command is sent the 2017-3338# 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 1.2 2017-3338# Commands		
Command	Syntax*	Description
Set Upconverter Gain	{aaC3xxx}	where:
		• xxx = 3 characters
		• Range: 0 to 200 (0 dB to 20.0 dB in 0.5 dB steps, omit decimal point.) Example: {C3155} sets the upconverter gain to 15.5 dB.
Set Downconverter Gain	{aaC4xxx}	where:
		• xxx = 3 characters
		• Range: 0 to 200 (0 dB to 20.0 dB in 0.5 dB steps, omit decimal point.) Example: {C4155} sets the downconverter gain to 15.5 dB.
Set Upconverter Mute	{aaCMx}	where:
		• x = 1 to mute the upconverter's output
		• x = 0 to unmute the upconverter's output
Set Ext Reference Mode	{aaCEx}	where:
		• x = 0 for internal reference
		• x = 1 for external reference
		• x = 2 for auto reference
Enable Remote	#	Just # sign
Disable Remote	{aaCRO}*}	{CR and zero}

2.0 Installation

2.1 Mechanical

The 2017-3338# consists of one RF/Controller PCB housed in a 1 RU (1 3/4 inch high) by 16 inch deep chassis. A switching, ± 12 , +5, +24 VDC power supply provides power for the assemblies. The 2017-3338# can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 2017-3338# is assembled.

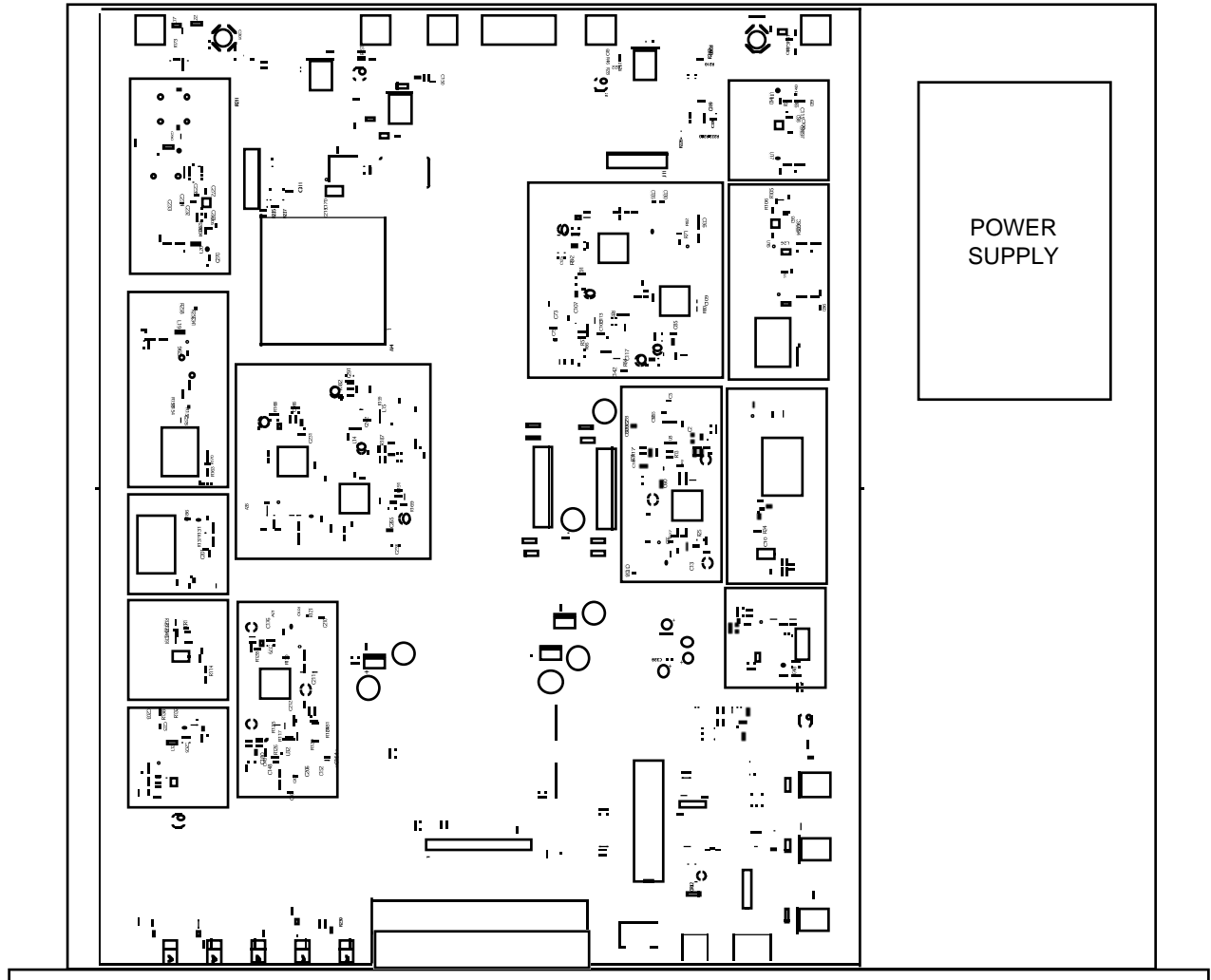


Figure 2.0 Model 2017-3338# Mechanical Assembly

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

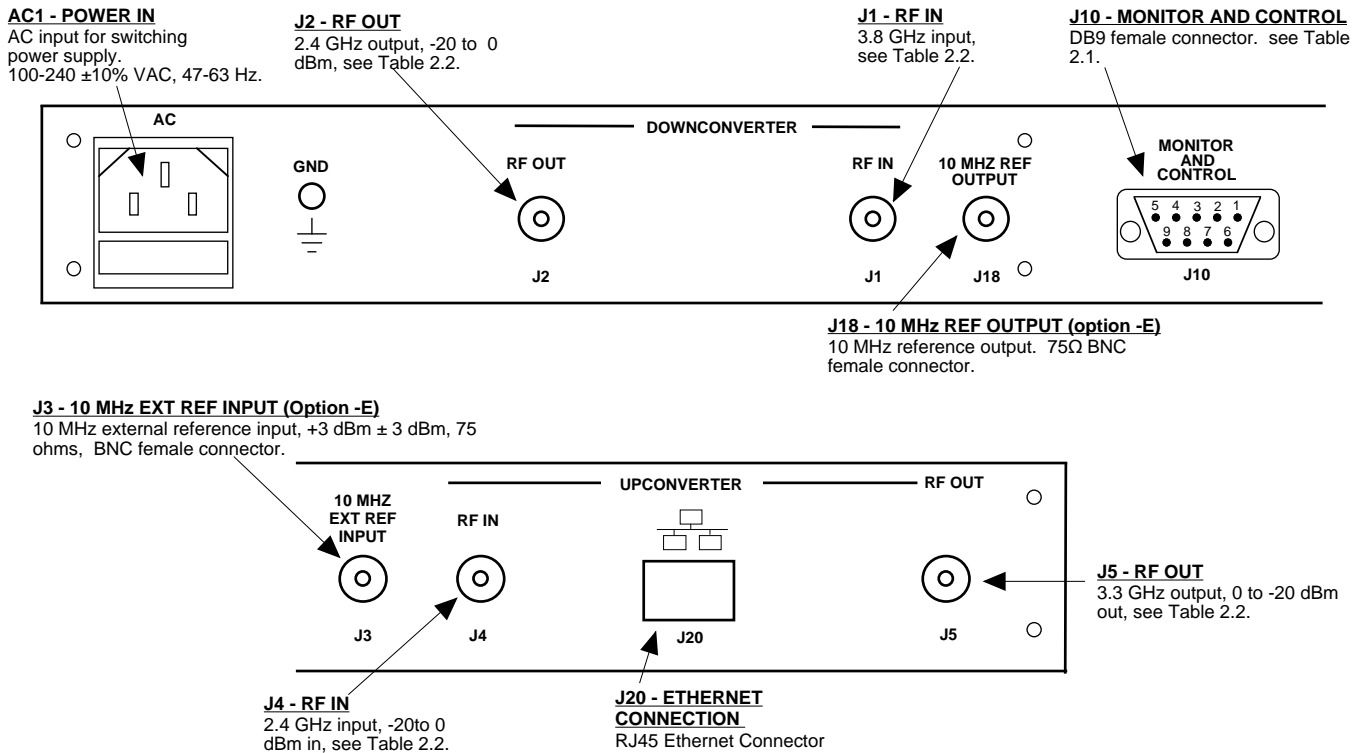


Figure 2.1 Model 2017-3338# Rear Panel I/O's

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, 75 Ω	Type F, 75 Ω
-B	BNC, 75 Ω	BNC, 75 Ω
-C	BNC, 75 Ω	BNC, 50 Ω
-D	BNC, 50 Ω	BNC, 50 Ω
-N	BNC, 75 Ω	Type N, 50 Ω
-M	BNC, 50 Ω	Type N, 50 Ω

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

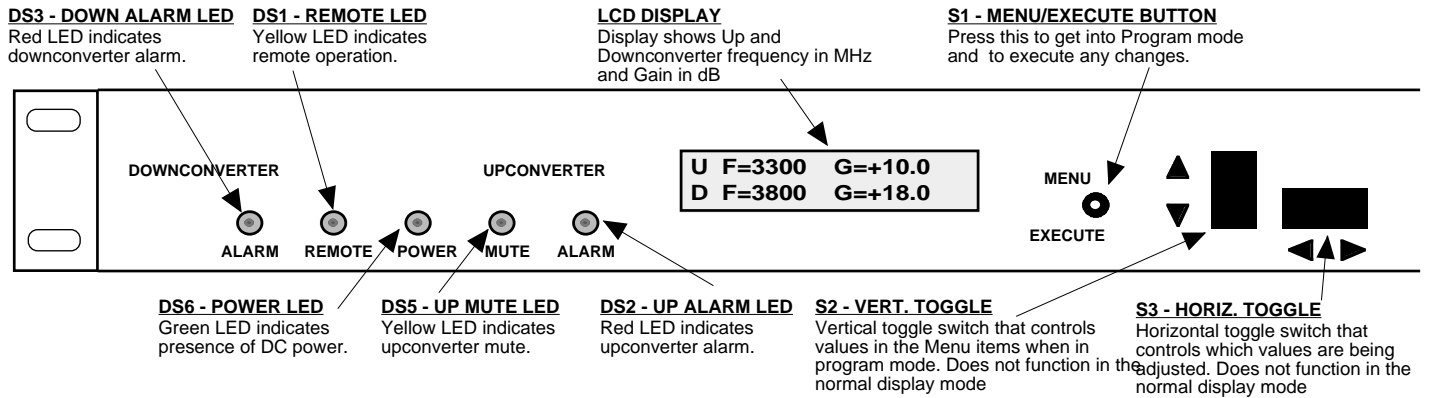


Figure 2.2 Model 2017-3338# Front Panel Controls and Indicators

2.4 Installation / Operation

2.4.1 Installing and Operating the 2017-3338#, Upconverter Section

- 1.) Connect a -20 dBm to 0 dBm signal to RF In, J4 (Figure 2.1).
- 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 (See Section 2.5 Menu Settings).
- 5.) Be sure DS6 (green, DC Power) is on and DS2 (red, Alarm) is off (Figure 2.2).

2.4.2 Installing and Operating the 2017-3338#, Downconverter Section

- 1.) Connect a -40 dBm to -20 dBm signal to RF In, J2 (Figure 2.1).
- 2.) Connect the RF OUT, J1, to the external equipment.
- 3.) Connect 100-240 \pm 10% VAC, 47 - 63 Hz to AC on the back panel.
- 4.) Set the gain to get the desired output level.
- 5.) Be sure DS6 (green, DC Power) is on and DS3 (red, Alarm) is off (Figure 2.2).
- 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 2.3. There is a spare fuse in the near slot. If a fuse continues to open, the power supply is most likely defective.

2.4.3 External 10 MHz Reference Operation

The External Reference Option is required if the unit is to synch to a 10 MHz reference from an *external* source. The unit will still have an internal 10 MHz reference as a ‘back-up’ should the external reference be removed or fail. The external reference modes operate as follows:

Internal Reference Mode

When the internal reference mode is selected, the unit's internal 10 MHz reference will become the ‘primary’ source and the unit’s synthesizers will lock to this internal 10 MHz reference. The unit will ignore any external 10 MHz signal present on the external reference input (J13). The unit will also buffer the internal 10 MHz signal and provide it on the Reference Out connector (J14) at +3 dBm, +/- 3 dB.

External Reference Mode

When the external reference mode is selected, the external 10 MHz reference (received on J13) will become the ‘primary’ source and the unit’s synthesizers will lock to this external 10 MHz reference. The unit *must* have a 10 MHz signal connected to the external reference input (J13) on the rear panel. The external 10 MHz signal must be +3 dBm, +/- 3 dB. The unit will also buffer the external 10 MHz signal and provide it on the Reference Out connector (J14) at +3 dBm, +/- 3 dB.

Auto Reference Mode

When in auto mode the unit will detect and select the external 10 MHz signal if it is present and at least +3 dBm. If the external 10 MHz signal falls below 1 dBm (+/- 1 dB) the unit will automatically switch to the internal 10 MHz reference. The reference out connector (J14) provides a buffered rendition of the selected 10 MHz signal at +3 dBm, +/- 3 dB.

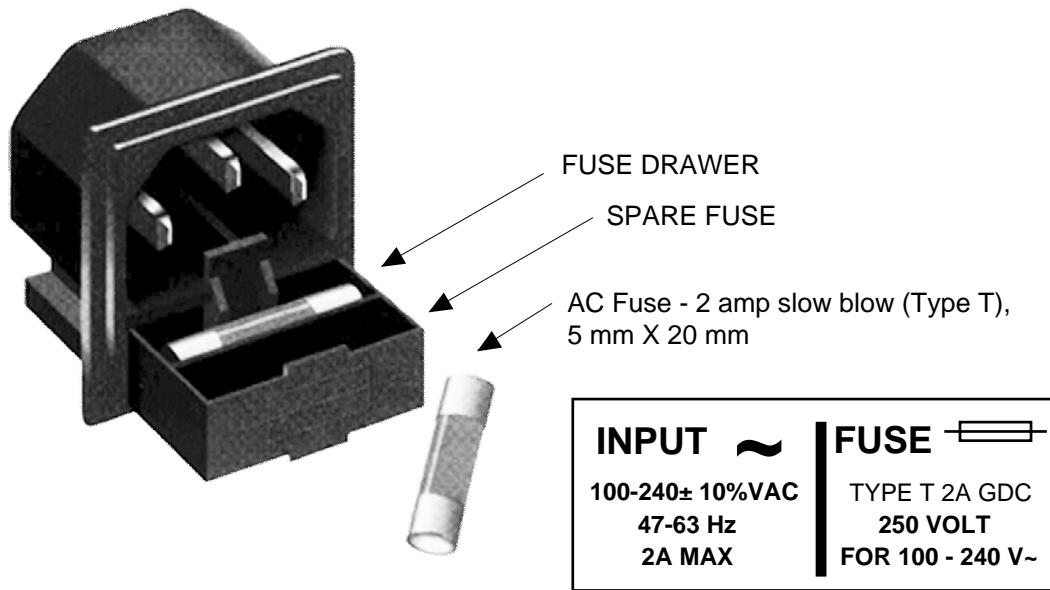


Figure 2.3 Fuse Location and Spare Fuse

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 2.2):

Power Up

Normal Display

Menu 1	Upconverter Gain (0 to 20.0 dB in 0.5 dB steps)
Menu 2	Downconverter Gain (0 to 20.0 dB in 0.5 dB steps)
Menu 3	Upconverter Mute
Menu 4	Remote On/Off
Menu 5	Serial Remote Interface (Option Q)
Menu 6	RS485 Address (Option Q)
Menu 7	10 MHz Reference Mode
Menu 8	Reset Ethernet Settings

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 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 the following steps.

1. The LCD goes black to show all segments are functioning.
2. The model number with options software version will be displayed.
3. The ethernet IP address is read and displayed (if an ethernet option is installed).

U	F = 3300	G = +10.0
D	F = 3800	G = +18.0

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, input level 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 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 30 seconds, and the system will return to the normal operating mode.

2.5.4.1 Upconverter Gain

To set the upconverter gain, first push the Menu/Execute switch to get to the gain setting:

Pressing the Up/Down switch to change the gain in 0.5 dB steps:

UP G = +14.5	R
--------------	---

By using the horizontal rocker switch the cursor can be moved left or right .
Press the Up/Down switch until you have the desired gain.

NOTE: THE GAIN WILL CHANGE 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 A 0 dBm OUTPUT LEVEL.

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?	<u>Y</u> 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 :

U F=3300	G=+10.0
D F=3800	G=+18.0

Figure 2.4 shows all the menu items and how to make changes.

2.5.4.2 Downconverter Gain

To set the downconverter gain, first push the Menu/Execute switch to get to the gain setting:

Operate the Menu/Execute switch until you get to the menu item you want to change. See Figure 2.4 for the sequence of menu options.

The following display is for changing the downconverter gain. Set the gain to provide an appropriate output level.

DN G = +12.5	R
--------------	---

Press the Up/Down switch to change the level in 0.5 dB steps. 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 CHANGE 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 the next item OR you can scroll to “R”, push the Menu/Execute switch to get to:

SAVE SETTINGS?	<u>Y</u> 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 :

U F=3300	G=+10.0
D F=3800	G=+18.0

Figure 2.4 shows all 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.

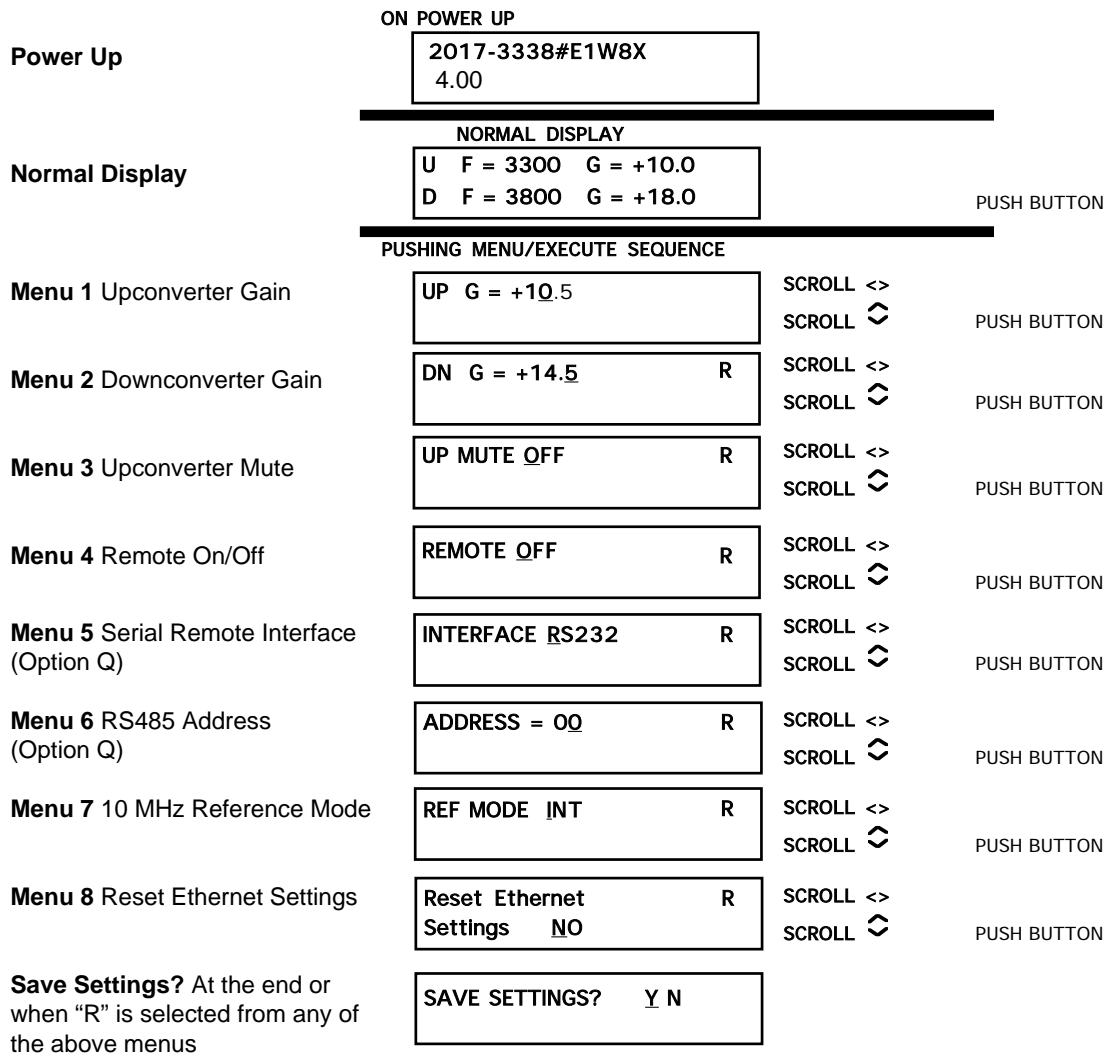


Figure 2.4 Menu Display and Sequence

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 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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