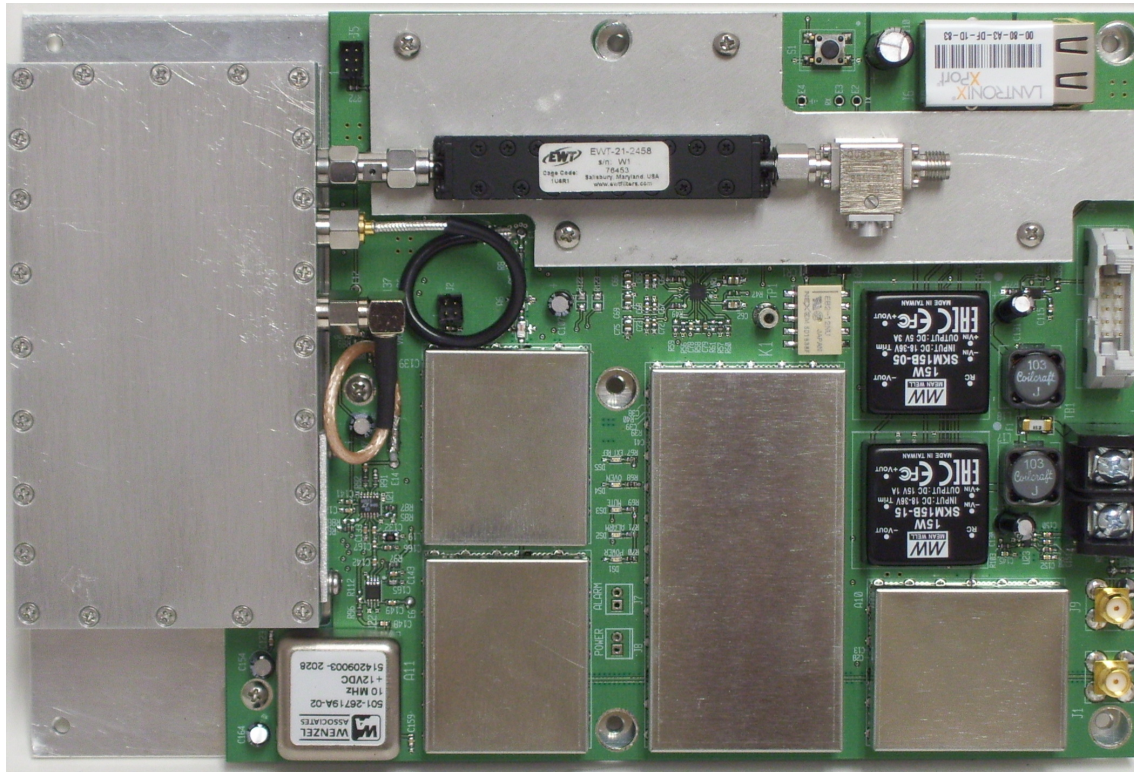


Instruction Manual

Model 1015-154-130

Upconverter

August 2020, Rev. 0



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INSTRUCTION MANUAL

MODEL 1015-154-130 Upconverter

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MODEL 1015-154-130 Upconverter

1.0 General

1.1 Equipment Description

The Model 1015-154-130 Upconverter converts 130 ± 18 MHz to 14.75 to 15.4 GHz in 125 kHz steps. Synthesized local oscillators (LO) provide low phase noise, with ± 0.05 ppm frequency stability. RF frequency, gain, and other parameters are set by the Monitor and Control (M&C), which also provides indication of PLL alarm, TX carrier Mute, Output frequency, and gain (range of 0 to +15 dB) settings. Connectors are SMA female for the RF Out, IF In, and external 10 MHz reference input (+3 dBm \pm 3 dB level). A 10-pin header for the M&C (Ethernet Optional) is provided. The Upconverter is powered by an external 18 to 36 VDC power source, and is mounted on an 9.0" long X 6.0" wide aluminum plate with seven mounting holes for securing to a heat sinking surface. The module height is 1.50" maximum.

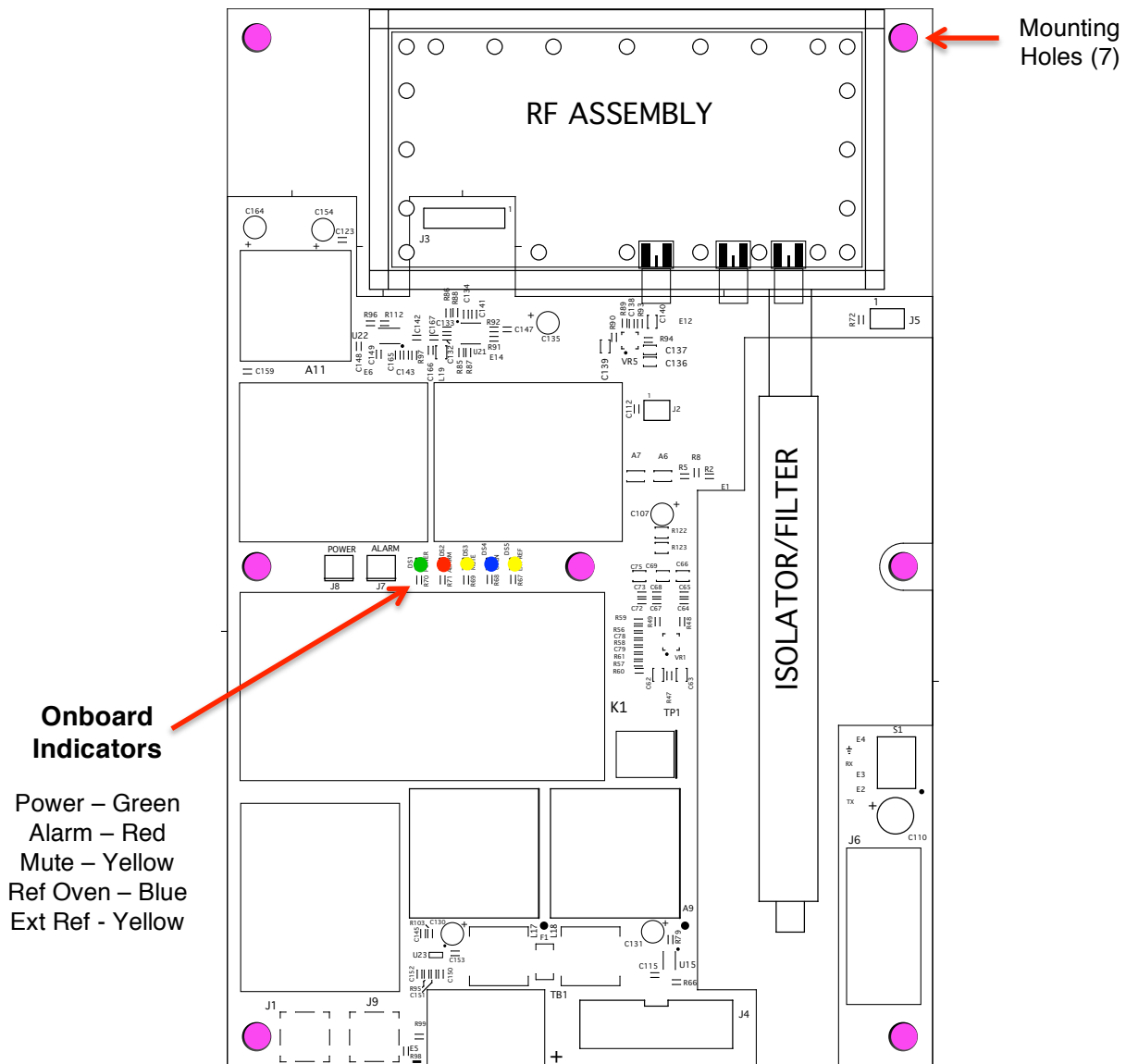


FIGURE 1.1 TOP VIEW - Showing Onboard Indicators and Mounting Holes

1.1 Equipment Description Continued...

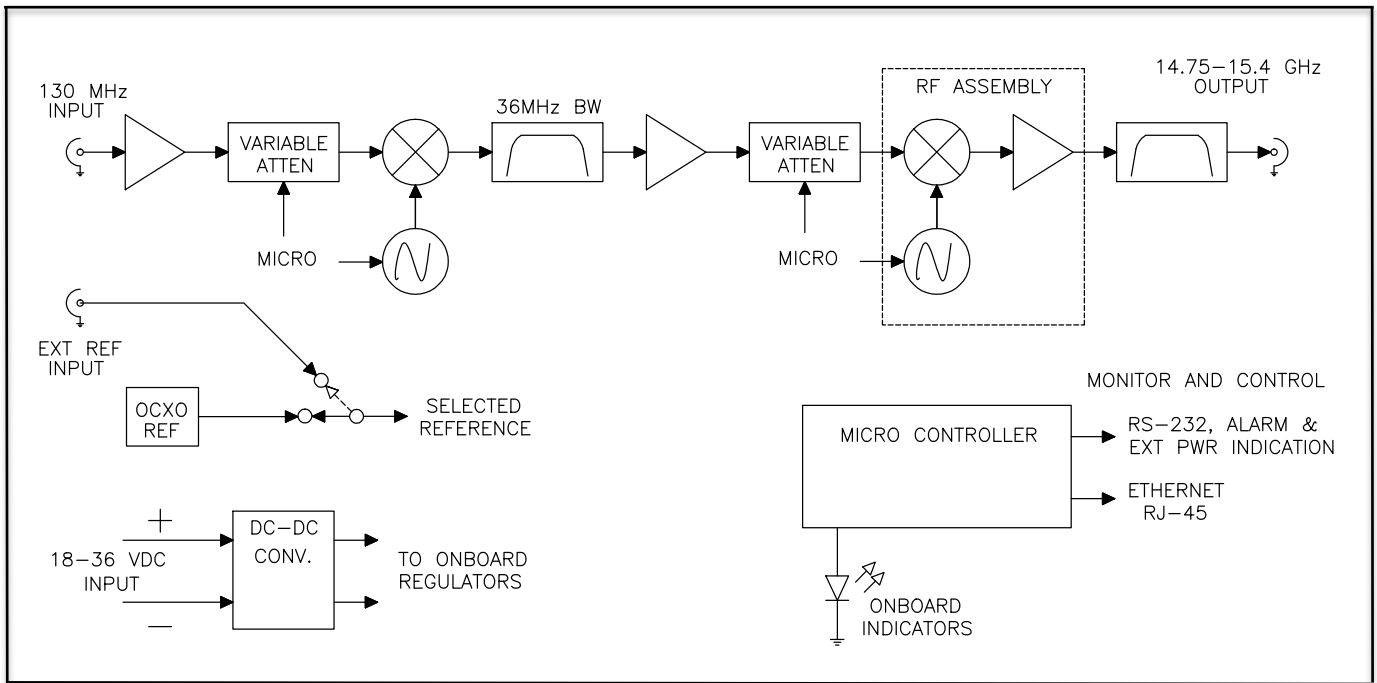


FIGURE 1.2 1015-154-130 Upconverter

Block Diagram

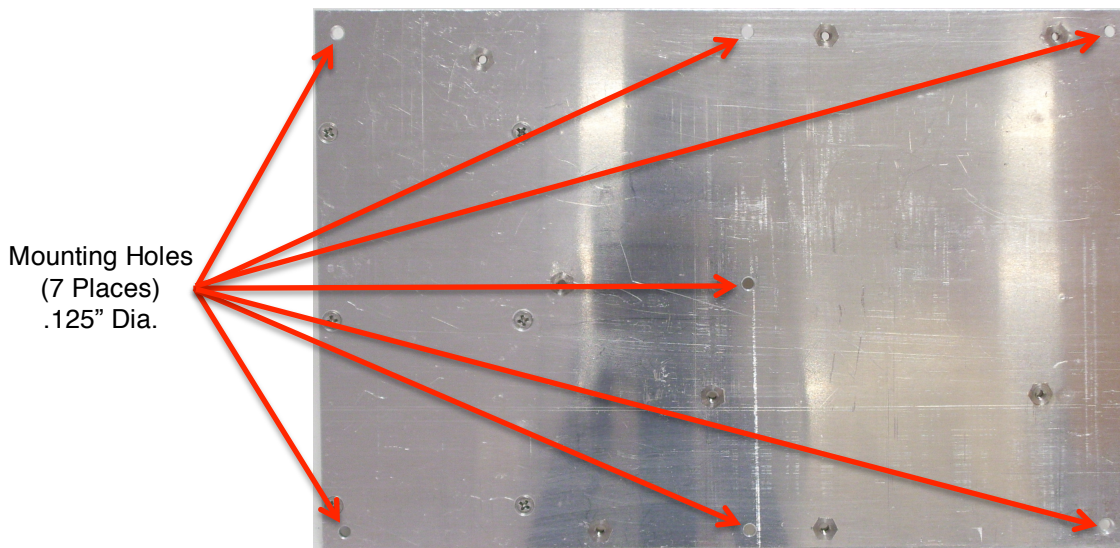


FIGURE 1.3 1015-154-130 Upconverter

(Bottom View showing Heat sink area and mounting holes)

1.2 Technical Characteristics

Table 1.0 Model 1015-154-130 Upconverter Equipment Specification*						
DC Input Characteristics						
Voltage	18VDC - 36VDC					
Optional Voltages	9VDC - 18VDC and 36VDC - 72 VDC Optional					
Input Power	20 Watts Maximum					
RF Input Characteristics						
Input Impedance/Return Loss	50Ω/18 dB					
Frequency	130 ± 18 MHz					
Level Range	-10 to 0 dBm					
RF Output Characteristics						
Output Impedance/Return Loss	50Ω/14 dB					
Frequency	14.75 - 15.4 GHz					
Level Range	-5 to +5 dBm					
Output 1 dB Compression	+15 dBm @ Maximum Gain					
Mute	> 60 dB @ +5dBm Output					
Channel Characteristics						
Gain	+15.0 ± 1 dB at Fc, adjustable 0 to +15 dB in .5 dB steps					
Spurious Inband	< -50 dBc, at max. gain, +5dBm out					
Spurious Out of Band	< -50 dBm, 10.0 - 14.75 and 15.4 - 20 GHz, at max. gain					
Intermodulation	< -45 dBc for two carriers spaced at Fc ± 2 MHz each @ 0 dBm out, at max. gain					
Frequency Response	± 1.0 dB 14.75 - 15.4 GHz out; ± 0.5 dB 40 MHz BW					
Frequency Sense	Non-Inverting					
Synthesizer Characteristics						
Frequency Accuracy	± 0.05 ppm max. -20 to +50°C					
Frequency Step	125 kHz					
Phase Noise @	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	
dBc/Hz	-70	-75	-80	-95	-105	
External Reference Requirements						
Frequency	10 MHz					
Input Level	+3 dBm ± 3 dB					
Phase Noise @	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	
dBc/Hz	-140	-155	-160	-160	-160	
Onboard Indicators						
Power (Green)	DC Power is applied to the unit					
Alarm (Red)	One or Both Phase Lock Loops are unlocked					
Alarm (Red Flashing)	Thermal Alarm					
Mute (Yellow)	Output signal is muted (unit is also muted when alarmed)					
Reference Oven (Blue)	Internal OCO oven is operating during warm-up					
External Reference (Yellow)	External Reference is selected					

1.2 Technical Characteristics Continued....

Table 1.0 Model 1015-154-130 Upconverter Equipment Specification* (continued)			
Physical Characteristics			
Size	6" Wide X 9" Long X 1.5" High		
Weight	< 3.0 Lbs. (1.4 kg.)		
Mounting	Aluminum Plate with quantity 7 mounting holes (.125" Dia.)		
Environmental			
Temperature	+10°C to +40°C		
Temperature Option W31	0°C to +50°C		
Temperature Option W41	-20°C to +50°C		
Humidity	< 90%, Non-condensing		
*Specifications are subject to change without notice			

Table 1.1 Model 1015-154-130 Upconverter I/O Connectors			
Signal	I/O Connectors	Mating Connectors	
DC Input - 2 Pos Term. Block	Molex 38630-7802	Wire Leads	
RF Input	SMA Female	SMA Male	
RF Output	SMA Female	SMA Male	
External Reference Input	SMA Female	SMA Male	
Ethernet	RJ-45 Female	RJ-45 Male	
M&C I/O	FCI 71918-110LF	3M 3473-7600**	
** 3M Part Number 3448-3014 strain relief is also required for latching function			
M&C Connector Pinout ***	10-Pin FCI	DB-9	
External Power LED Anode	1	1	
Alarm Common	2	6	
RS-232 RX	3	2	
Alarm Normally Open	4	7	
RS-232 TX	5	3	
N/C	6	8	
External Power LVTTTL Indication	7	4	
Alarm Normally Closed	8	9	
Ground	9	5	
N/C	10	N/C	
*** M&C Connector Notes:			
1 The M&C Connector is intended to be used with a 9-pin Ribbon Cable and a DB-9 IDC Connector			
2 The External Power LED Anode is a 120 Ω Resistor tied to +3.3VDC			
3 The External Power LVTTTL signal, +3.3V = On, 0V = Off			
4 The alarm contact states shown are with the relay energized.			

2.0 Installation

2.1 Mechanical/Mounting

Figure 2.1 shows how the 1015-154-130 is mounted via the seven .125" holes. The mounting plate must be afforded good thermal conductivity to the heat-sinking surface.

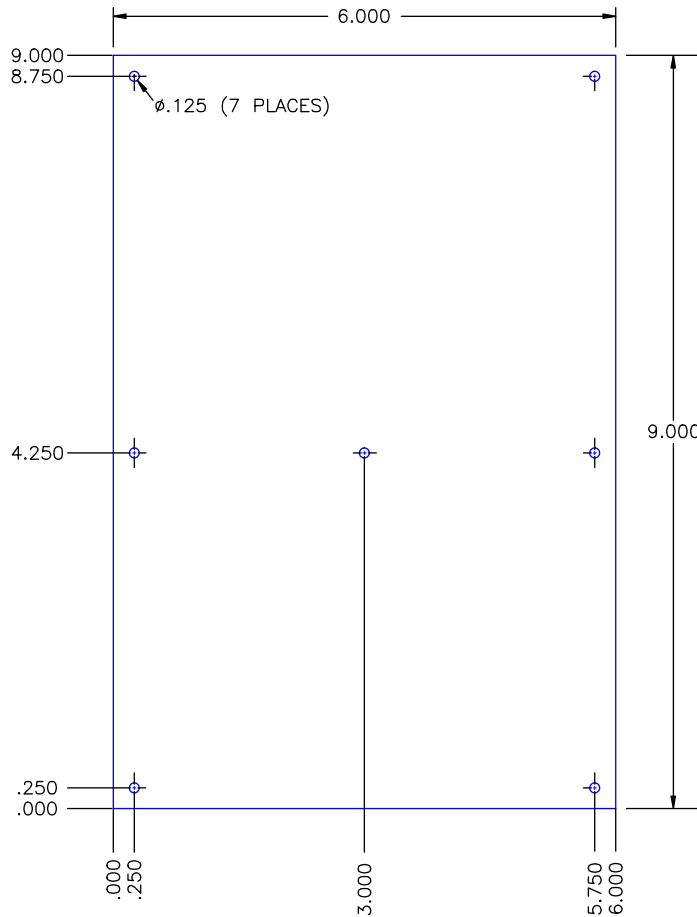


FIGURE 2.1 1015-154-130 Mounting Pattern

2.2 Environmental Use Information

A. Reduced Heat Sinking - Installation of the equipment in a manner that doesn't allow for proper thermal conduction of the heat sink plate or ambient temperatures above 50°C may cause performance degradation and/or reliability problems leading to failure. The 2015-154-130 is designed to be operated at elevated temperatures but must be installed properly so that heat removal will be adequate.

B. Condensation/Moisture – The 2015-154-130 assembly cannot be exposed to condensation or moisture. Any moisture or condensation may impact the functionality and/or reliability of the unit.

2.3 Top Inputs and Outputs

Figure 2.2 shows the input and output signals on the top of the 1015-154-130 Assembly.

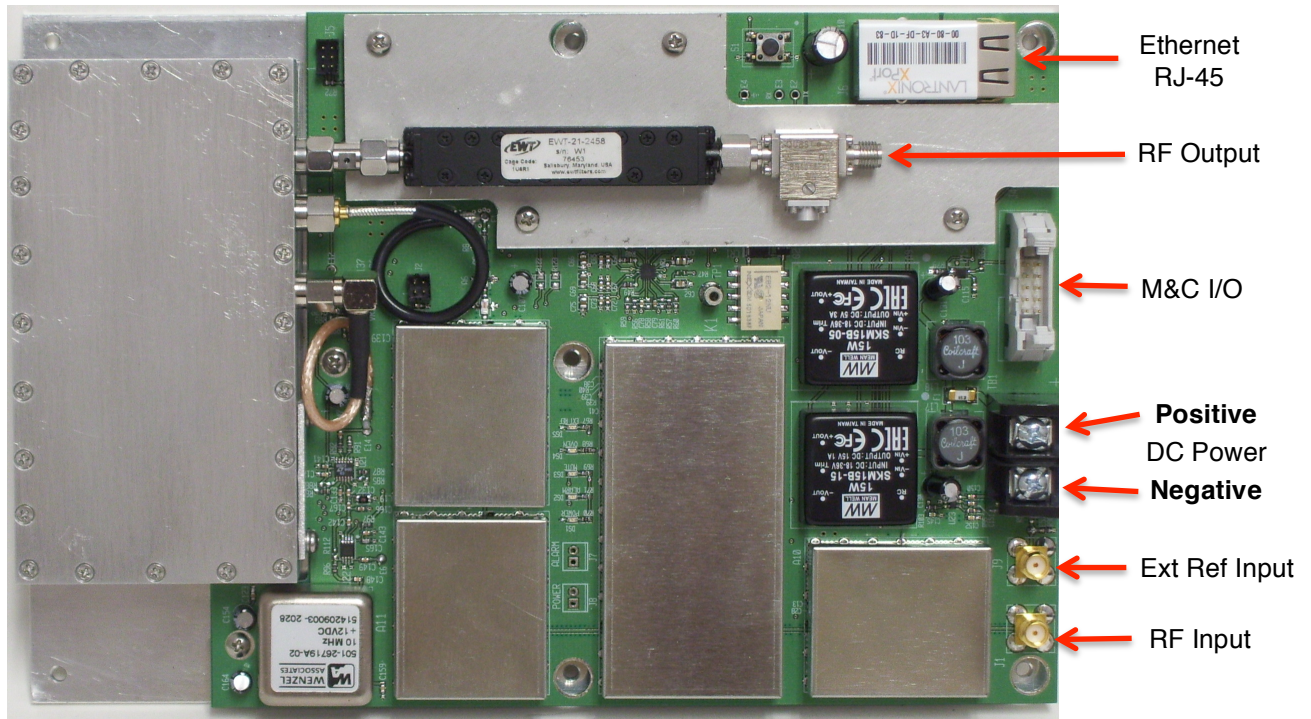


FIGURE 2.2 Top View Connections

2.4 Installation / Operation 1015-154-130 Upconverter

1. Connect the DC Input to the Terminal Block with appropriate wire gauge. Make sure to note the polarity (“+” and “-“ on PWB silkscreen). The inputs are not referenced to ground so either a +VDC or –VDC relative to ground can be used but the polarity must be correct with reference to each other.
2. Connect the M&C serial RS-232 interface to J4 and/or an Ethernet cable (Option W8, W18, W28, W828) to the RJ-45 Jack and to your network/computer interface.
3. Connect the RF input and the RF output cables and the External Reference Input if desired.
4. Power up the unit and verify the Power (Green LED) is on and the Alarm (Red LED) is off. If using the Internal Reference the Oven Warm-up (Blue LED) should be on for no more than five minutes and the External Reference (Yellow LED) should be off. If the Mute (Yellow LED) is off, the unit should provide the appropriate output signal.
5. Be sure to set the RF input level according to your input level for best spurious and linearity performance.
6. Monitor the temperature frequently upon initial installation to ensure the unit has proper heat sinking. The temperature should never read above +70°C. If the temperature exceeds the +70°C threshold, the Alarm LED will flash, until the temperature drops below +65°C, which clears the alarm. Operating the unit above +70°C may exceed the specifications of certain devices and may affect performance and reliability.

Table 2.1 Model 1015-154-130 Upconverter Troubleshooting

	Problem	Action
	Power	Verify Input Voltage and Polarity
	PLL Alarm	If using an External Reference, check the input level and frequency of signal
	RF Output	Verify input signal and input level setting as well as Gain setting
	Thermal Alarm	Check mounting plate installation and ambient temperature

Note: The DC input has a fuse. This fuse should never blow unless there has been a catastrophic failure of some sort, including DC input power polarity reversal. If the unit does not indicate power on, after checking the input DC voltage, or if any of the other checks shown above are verified to be OK and the unit is still not functioning properly, the unit must be returned to Cross Technologies, Inc. for repair.

3.0 Ethernet Interface Operation

1015-154-130 Upconverter

3.1 ETHERNET Interface Installation and Operation

The 1015-154-130 Upconverter is equipped with a 10/100 Base-T compatible Ethernet interface for control and monitoring of its operating parameters. An HTML script interface allows the user to monitor and control the converter using a standard web browser (Option W8). SNMP (Simple Network Management Protocol) is also supported (Option W18). Contact Cross Technologies for the SNMP MIB file.

3.1.1 Methods of Connection

Directly Connected to a PC:

For control from a local PC, attach the 1015-154-130's Ethernet port to the Ethernet network connector on the PC using a crossover RJ-45 cable or a standard RJ-45 cable for PC ports that have autosensing.

LAN Connection

For LAN connections, attach the 1015-154-130 Ethernet port to the LAN using a normal RJ-45 cable. Use any PC on the LAN to connect to the 1015-154-130.

3.1.2 Ethernet Configuration

Each 1015-154-130 must be configured with an appropriate IP address, Subnet mask, and Gateway assigned by your network manager. The 1015-154-130 is set at the factory with a static address that is **192.168.50.21**. The device server in the unit has a built in HTTP based configuration manager that is used to configure network settings. To access the configuration manager open a web browser and enter the IP address of the 1015-154-130 in the browser's address field. The window shown in Figure 3.0 will appear. As delivered, there is no password set. Choose your user name and password here or leave those fields blank and click OK to proceed to the configuration manager web page.



FIGURE 3.0 Password Screen

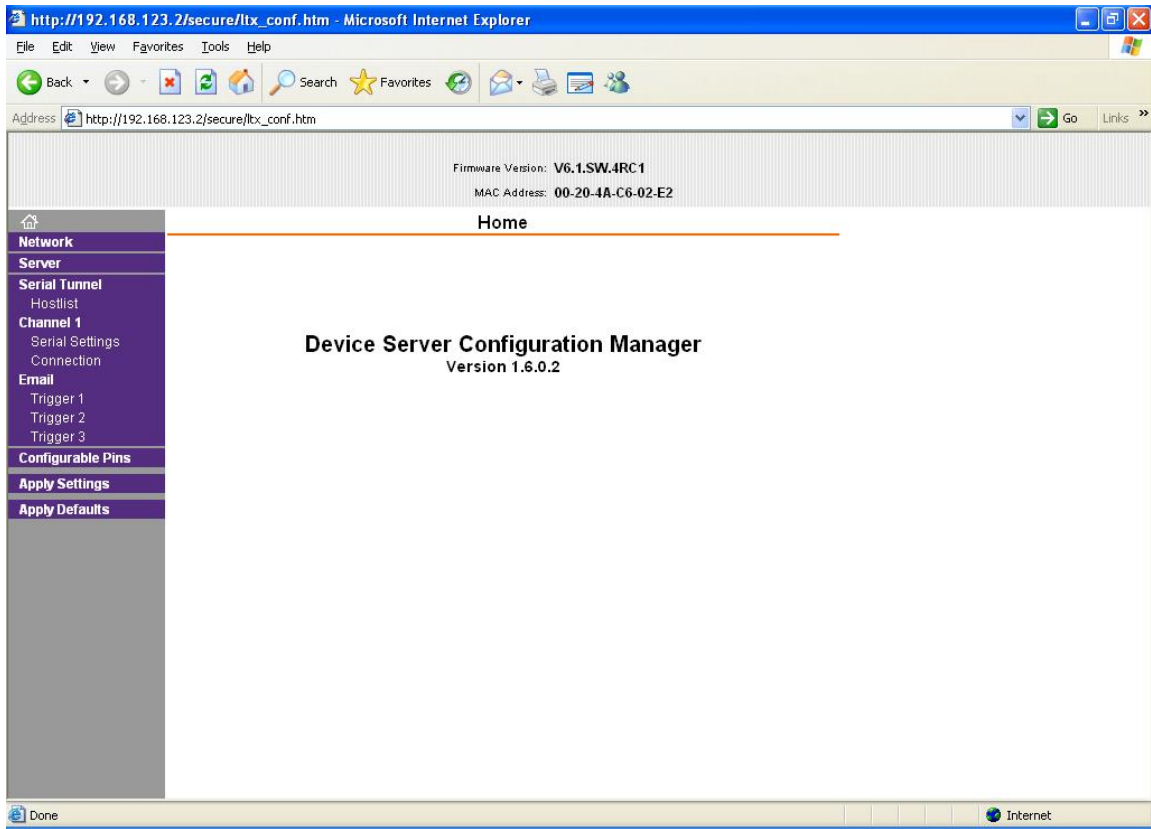


FIGURE 3.1 Configuration Manager Screen

In the left frame of the configuration manager click on Network to display the Network Settings screen. Enter the IP address, Subnet mask, and Gateway address with delimiter dots (example: 192.168.192.47). Click to apply settings in the left frame to apply the new settings in the network device.

3.1.3 Web Page M&C (W8 or W18 Options)

Enter the following address in a web browser to access the M & C Web page: <http://<ip address>/serial/0/setup.htm> Where <ip address> is the IP address of the unit. Figure 3.2 shows a typical webpage for Cross Technologies’ products.

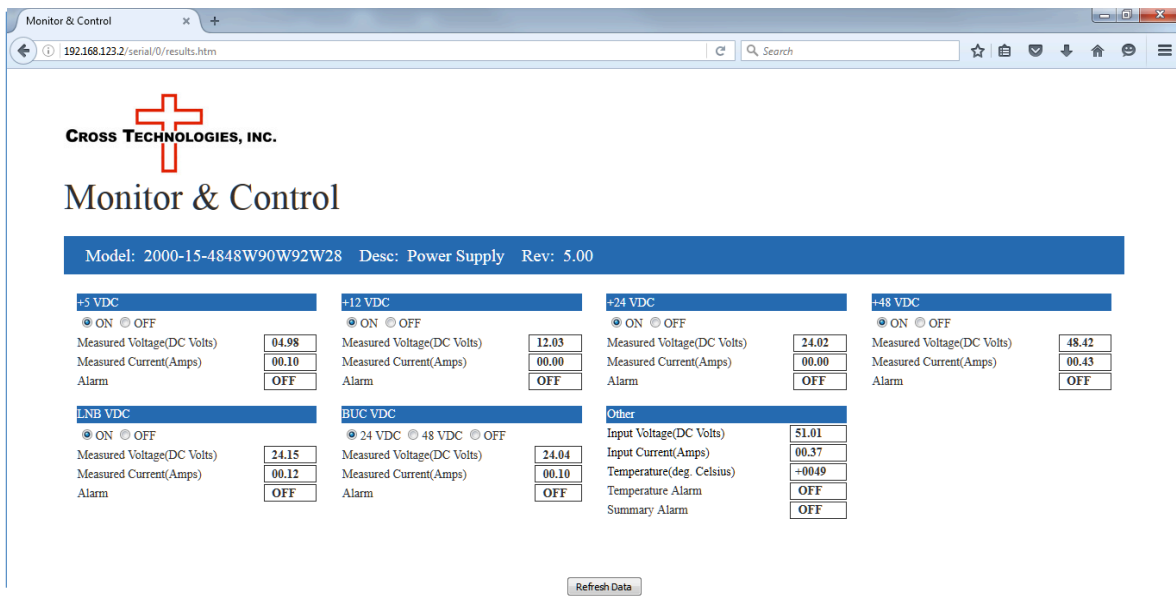


FIGURE 3.2 Typical Cross Technologies M&C Web Page

3.2 M&C Telnet® Interface (W28 Option)

3.2.1 Product Control

The following example illustrates how to establish a telnet connection to port 10001 using Windows XP's HyperTerminal utility. Many other terminal emulator programs and operating systems may be used in a similar fashion. Any software program, including custom applications, may be used as long as they are capable of opening a communications socket to port 10001.

Start the Hyper Terminal application and select "New Connection" from the "File" drop down menu. The next screen is a "Connect To" dialog box. Select TCP/IP (Winsock) from the "Connect" drop down menu.

Enter the IP address of the product in the "Host address:" field and 10001 in the "Port number" field.

Figure 1-E shows an example of the Hyper Terminal settings required to access the unit.

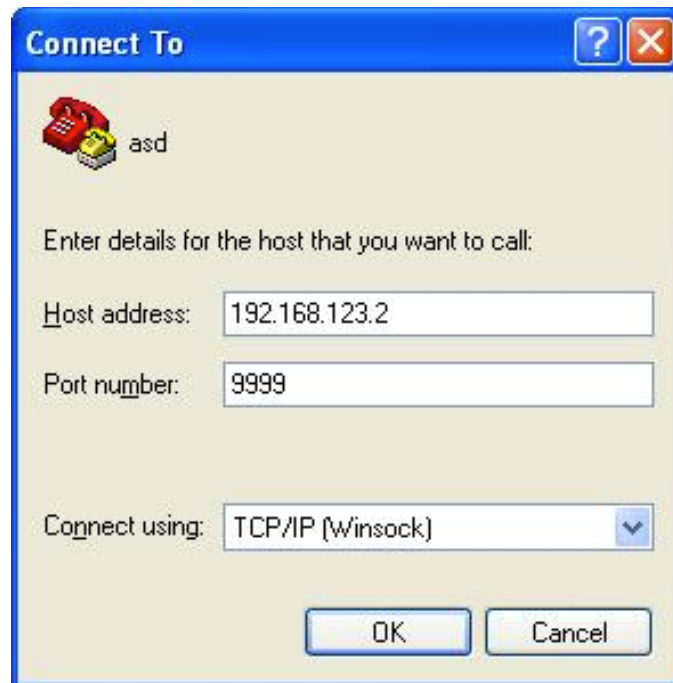


Figure 3.3 Telnet® Settings in Hyper Terminal

Once the *Telnet*® connection is established you can monitor and control your product with standard M&C commands as described in your specific product's manual. All commands begin with the open bracket character "{" and end with the close bracket character "}".

Table 3.0 lists the commands for the 1015-154-130 Upconverter and briefly describes them. After a command is sent the 1015-154-130 sends a return ">" indicating the command has been received and executed.

3.2 M&C Telnet Interface (W28) (continued...)

Table 3.0 lists the commands for the 1015-154-130 Upconverter and briefly describes them. After a command is sent the 1015-154-130 sends a return “>” indicating the command has been received and executed.

Table 3.0 M&C Commands for Model 1015-154-130		
Command Function	Command Format	Command Description
Set Frequency	{CFxxxxxxx}	where: F = command code xxxxxxx = desired output frequency in kHz. This value must be a multiple of 125 kHz. Range: 14750000 to 15400000 example: {CF15250375} Will set the output frequency to 15250.375 MHz The unit will reply with the '>' character if the command is successfully processed.
Set Gain	{CGxxx}	where: G = command code xxx = Gain in dB. This value must be in 0.5 dB steps. The decimal may be omitted. Range: 0 to 15.0 dB in 0.5 dB steps. example: {CG125} Will set the gain to 12.5 dB. The unit will reply with the '>' character if the command is successfully processed.
Set Input Level	{CIxx}	where: I = command code xx = Input level in dBm. Range: -10 to 0 dBm in 1 dB steps. example: {CI-5} Will set the input level to -5 dBm. The unit will reply with the '>' character if the command is successfully processed.
Set Mute	{CMx}	where: M = command code x = 0 or 1. A value of 0 will enable (un-mute) the output signal. A value of 1 will disable (mute) the output signal. example: {CM1} Will disable (mute) the output signal. The unit will reply with the '>' character if the command is successfully processed.
Set External Reference	{CEx}	where: E = command code x = 0 or 1. A value of 0 will disable the external reference and set the unit to Internal reference mode. A value of 1 will enable the external reference and set the unit to External reference mode. example: {CE0} Will disable the external reference. The unit will use its internal reference. The unit will reply with the '>' character if the command is successfully processed.

3.2 M&C Telnet Interface (W28) (continued...)

Table 3.1 lists the status inquiries for the 1015-154-130 Upconverter and briefly describes them.

Table 3.1 M&C Status/Inquiry for Model 1015-154-130		
Status/Inquiry Function	Inquiry Format	Inquiry Description
Get Unit Settings	{S1}	returns: {S1bbbbbbbbbcccdMEdEA} 1 = command code bbbbbbbb = output frequency in kHz. ccc = input level in dBm. dddd = gain in dB. M = Tx output status (1 = normal, 0 = muted). E = External Reference Status (1 = external reference on, 0 = external reference off). A = Alarm Status (0 = no alarm, 1 = alarm). The unit will append the '>' character if the command is successfully processed.
Get Frequency	{SF}	returns: {SFxxxxxxx} F = command code xxxxxxx = output frequency in kHz. The unit will append the '>' character if the command is successfully processed.
Get Gain	{SG}	returns: {SGxxxxx} G = command code xxxxx = gain in dB. The unit will append the '>' character if the command is successfully processed.
Get Input Level	{SI}	returns: {SIxxx} I = command code xxx = input level in dBm. The unit will append the '>' character if the command is successfully processed.
Get Temperature	{ST}	returns: {STxxx} where: T = command code xxx = unit temperature in degrees celsius. The unit will append the '>' character if the command is successfully processed.
Get Alarm Status	{SA}	returns: {SAx} A = command code x = Alarm status: 0 = off, 1 = on. The unit will append the '>' character if the command is successfully processed.
Get Mute Status	{SM}	returns: {SMx} where: M = command code x = 1 if the output is muted. x = 0 if the output is un-muted. The unit will append the '>' character if the command is successfully processed.
Get External Reference Status	{SE}	returns: {SEx} where: E = command code x = 1 if the external reference is selected. x = 0 if the internal reference is selected. The unit will append the '>' character if the command is successfully processed.

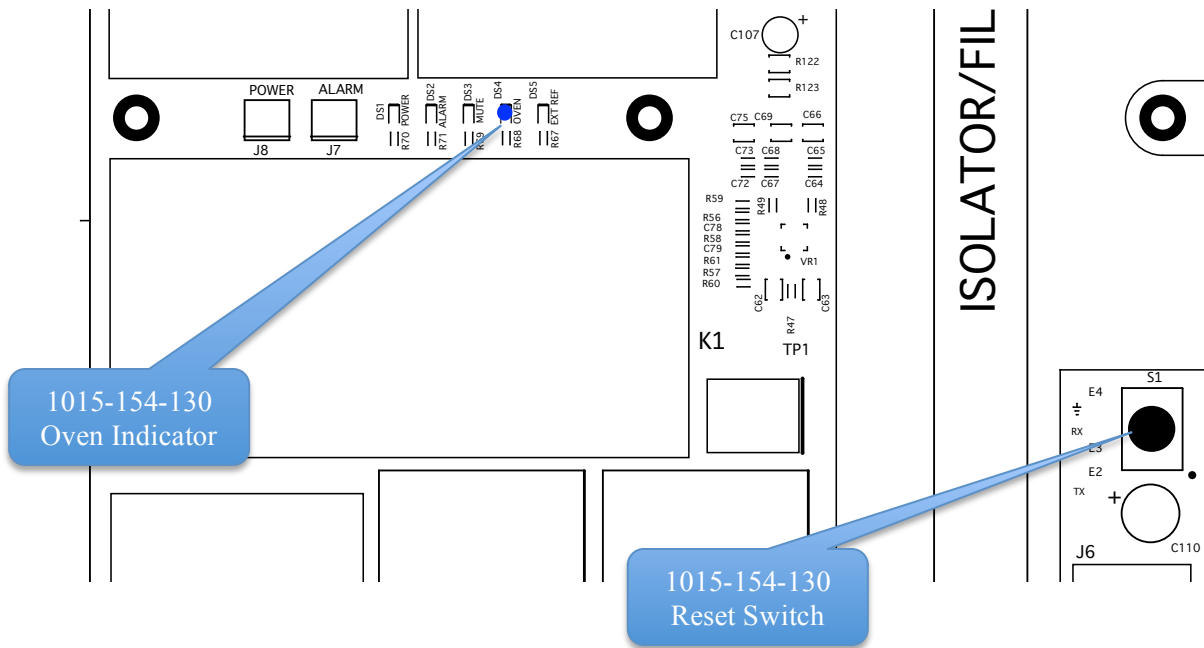
Table 3.1 M&C Status/Inquiry for Model 1015-154-130 (continued)

Get Oven Warmup Status	{SW}	returns: {SWx} where: W = command code x = 1 if the oven warmup indicator is on, up, x = 0 if the oven warmup indicator is off. The unit will append the '>' character if the command is successfully processed.
Get Highest Temperature	{St}	returns: {Stxxx} where: T = command code xxx = unit temperature in degrees celsius. The unit will append the '>' character if the command is successfully processed.
Get Temperature Alarm Status	{SX}	returns: {Sxx} where: X = command code x = Temperature Alarm Status 0 = off, 1 = on The unit will append the '>' character if the command is successfully processed.
Get IP Address <i>(Ethernet Option only)</i>	{Si}	returns: {Sixxx.xxx.xxx.xxx} where: i = command code xxx.xxx.xxx.xxx = unit IP Address The unit will append the '>' character if the command is successfully processed.
Get Subnet Mask <i>(Ethernet Option only)</i>	{Ss}	returns: {Ssxxx.xxx.xxx.xxx} where: s = command code xxx.xxx.xxx.xxx = unit Subnet Mask The unit will append the '>' character if the command is successfully processed.

3.3 Ethernet Settings Reset Procedure

1. Press and hold the Factory Reset switch S1 for five seconds until the onboard Blue Oven LED begins to blink.
2. The Factory Reset switch may be released at this point.
3. The Oven indicator will continue to blink for about 60 seconds during the Factory Reset process.
4. When the Oven indicator stops blinking the reset procedure is complete and the Ethernet device is reset to factory defaults.

Please note that the IP address will be set to **192.168.50.21**



1015-154-130 Factory Reset Switch and Alarm Indicator



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