

# Instruction Manual

# Model 2115-178-500

## Block Upconverter

March 2014, Rev. 0



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# INSTRUCTION MANUAL

## MODEL 2115-178-500 Block Upconverter

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All Cross Technologies, Inc. products are warranted against defective materials and workmanship for a period of one year after shipment to customer. Cross Technologies, Inc.'s obligation under this warranty is limited to repairing or, at Cross Technologies, Inc.'s option, replacing parts, subassemblies, or entire assemblies. Cross Technologies, Inc. shall not be liable for any special, indirect, or consequential damages. This warranty does not cover parts or equipment which have been subject to misuse, negligence, or accident by the customer during use. All shipping costs for warranty repairs will be prepaid by the customer. There are not other warranties, express or implied, except as stated herein.



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# MODEL 2115-178-500 Block Upconverter

## 1.0 General

### 1.1 Equipment Description

The 2115-178-500 Block Upconverter converts 0.25 - 0.75 GHz to 17.3 - 17.8 GHz with a local oscillator at 17.05 GHz. Front panel LEDs provide indication of DC Power, External 10 MHz, and PLL Alarm. The L-band to RF gain is  $0 \pm 1$  dB at Fc. Connectors are SMA female for the RF and BNC female for the L-Band and external reference input and reference output. A three-way switch controls which 10 MHz reference is being used. In the INT position, the internal reference is used, in the EXT position, the external reference is used, and in the AUTO position, the internal reference is used unless a 3 dBm  $\pm$  3 dB, 10MHz reference signal is connected to the external reference input. It is powered by a 100-240  $\pm$  10% VAC power supply, and is in a 1 3/4" X 19" X 14" rack mount chassis.

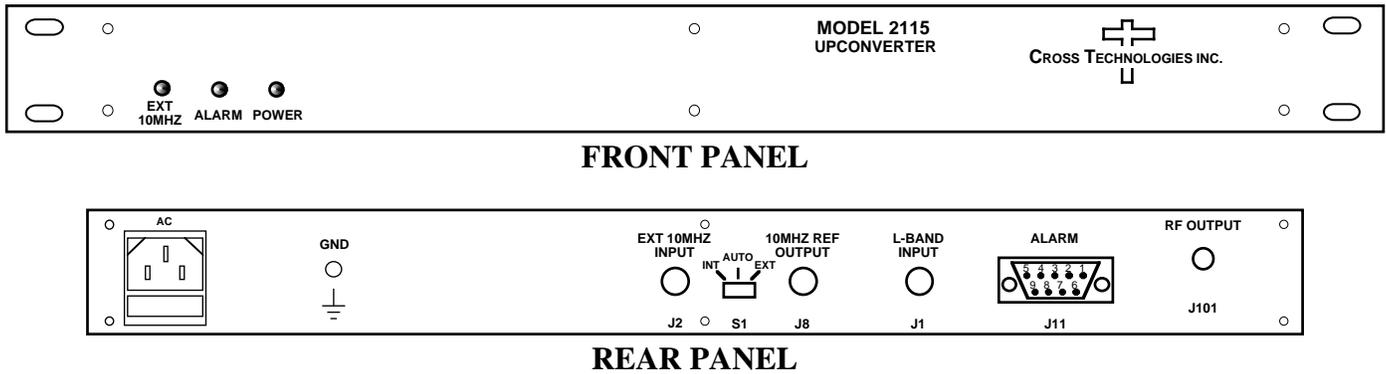


FIGURE 1.1 Model 2115-178-500 Front and Rear Panels

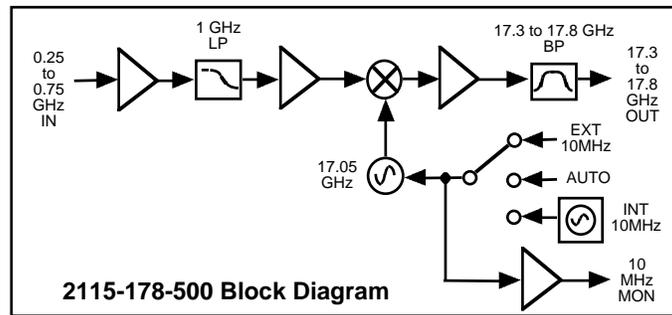


FIGURE 1.2 Model 2115-178-500 Upconverter Block Diagram

## 1.2 Technical Characteristics

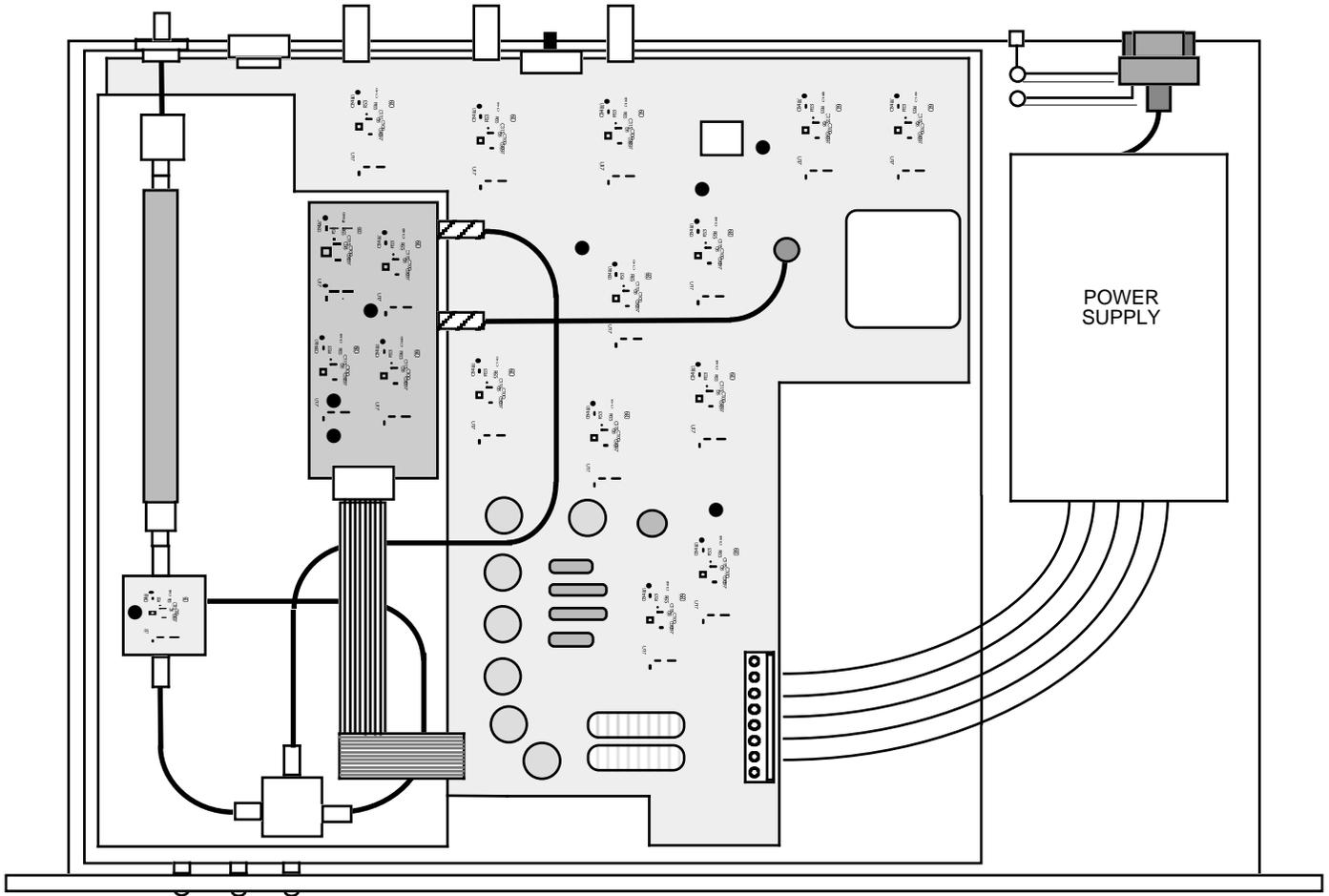
**TABLE 1.1 2115-178-500 Block Upconverter Specifications\***

<b>Input Characteristics</b>					
Impedance / Return Loss	50Ω / 14 dB				
Frequency	0.25 to 0.75 GHz				
Noise Figure, Maximum	20 dB maximum gain				
Input Level Range	-10 to -30 dBm				
Input 1 dB Compression	+5 dBm				
<b>Output Characteristics</b>					
Impedance / Return Loss	50Ω / 14 dB				
Frequency	17.3 to 17.8 GHz				
Output Level Range	-10 to -30 dBm				
Output 1 dB Compression	+5 dBm				
<b>Channel Characteristics</b>					
Gain @ Fc	+ 0 ± 1 dB				
Image Rejection	> 60 dB, minimum				
Spurious, Inband	SIGNAL RELATED <-50 dBC in band,-10 dBm out; SIGNAL INDEPENDENT,<-70 dBm				
Spurious, Out of Band	<-60 dBm, 16.3 - 17.3 and 17.8 - 20.8 GHz				
Intermodulation	< -50 dBC for two carriers each at -13 dBm out				
Frequency Response	±1.5 dB, 17.3 - 17.8 GHz out; ± 0.5 dB, 40 MHz BW				
Frequency Sense	Non-inverting				
<b>LO Characteristics</b>					
LO Frequency	17.05 GHz				
Frequency Accuracy	± 0.01 ppm maximum over temp internal reference; external reference input				
10 MHz Level	3 dBm, ± 3 dB, 75 ohms, External In or Internal Out				
Phase Noise @ F (Hz) >	100 MHz	1kHz	10kHz	100kHz	1MHz
dBC/Hz	-65	-75	-80	-100	-115
<b>Controls, Indicators</b>					
INT / AUTO / EXT Switch	Selects Internal or External 10 MHz (Rear Panel DP3T Switch)				
External 10 MHz	Yellow LED, Indicates External 10 MHz Reference Selected				
PLL Alarm	Red LED, External Contact Closure				
Power	Green LED				
<b>Other</b>					
RF Connector	SMA (female), 50Ω, Standard				
L-Band Connector	BNC (female), 50Ω, Standard				
10 MHz Connectors	BNC (female), 75Ω Connector; Works with 50Ω or 75Ω				
Alarm Connector	DB9 - NO or NC Contact Closure on Alarm				
Size	19 inch, Standard Chassis 1.75" high X 14.0" deep				
Power	100-24 ±10% VAC, 47-63 Hz, 25 watts maximum				
<b>Available Options</b>					
- S7	50Ω SMA (RF), 75Ω BNC (L-Band)				
- SF	50Ω SMA (RF), 75Ω F-Type (L-Band)				
- SN	50Ω SMA (RF), 50Ω N-Type (L-Band)				
- SS	50Ω SMA (RF), 50Ω SMA (L-Band)				
*+0 to +50 degrees C; Specifications subject to change without notice.				© 2014 Cross Technologies, Inc.	

## 2.0 Installation

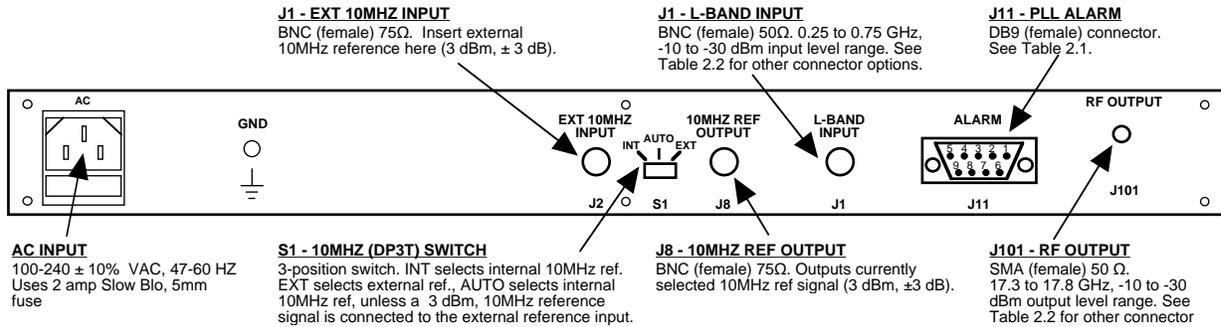
**2.1 Mechanical** - The 2115-178-500 consists of one RF PCB housed in a 1 RU (1 3/4 inch high) by 14 inch deep chassis. A switching,  $\pm 12$ ,  $+24$ ,  $+5$  VDC power supply provides power for the assemblies.

The 2115-178-500 can be secured to a rack using the 4 holes on the front panel. Figure 2.0 shows how the 2115-178-500 is assembled.



**FIGURE 2.0 2115-178-500 Mechanical Assembly**

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

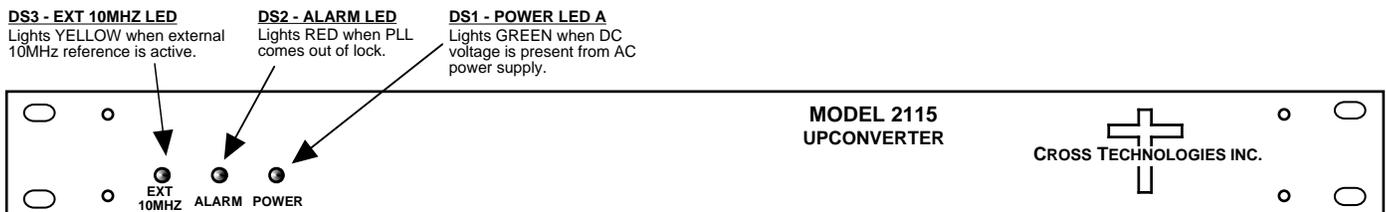


**FIGURE 2.1 2115-178-500 Rear Panel I/O's**

TABLE 2.1 J11 Pinouts (DB9)	
Pin	Function
1	Not Used
2	Not Used
3	Not Used
4	Not Used
5	GND
6	Alarm Relay: Common
7	Alarm Relay: Normally Open
8	Not Used
9	Alarm Relay: Normally Closed

TABLE 2.2 Connector Options	
L-Band	RF
BNC, 75Ω (STD)	SMA, 50Ω (STD)
F-Type, 75Ω	SMA, 50Ω
N-Type, 50Ω	SMA, 50Ω
SMA, 50Ω	SMA, 50Ω

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

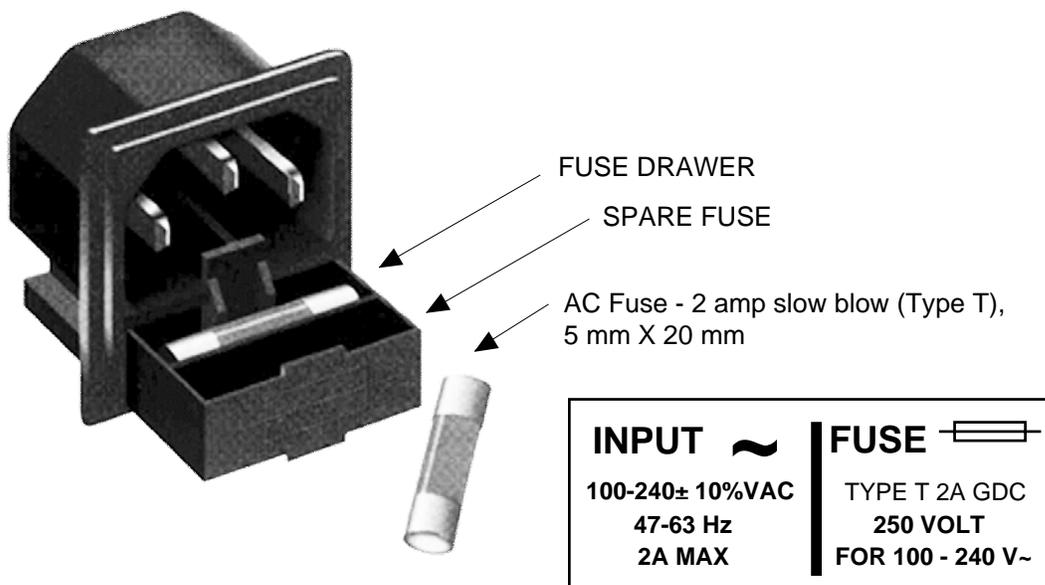


**FIGURE 2.2 2115-178-500 Front Panel Controls and Indicators**

## 2.4 Installation / Operation

### 2.4.1 Installing and Operating the 2115-178-500 Upconverter

1. Connect a -10 dBm to -30 dBm signal to L-BAND INPUT, J1 (Figure 2.1).
2. Connect the RF OUTPUT, J101, to the external equipment.
3. Connect 100-240  $\pm$ 10% VAC, 47 - 63 Hz to AC connector on the back panel.
4. Be sure DS1 (green, DC Power) is on and DS2 (red, Alarm) is off (Figure 2.2).
5. Select either INT (for internal 10MHz ref), AUTO (for internal 10MHz ref UNLESS a external 10MHz, 3 dBm signal is connected to J2), or EXT (for external 10MHz, 3 dBm ref that is inserted at J2) on rear panel switch S1 (Figure 2.1).
6. If EXT is selected or AUTO is selected and there is a 10MHz, 3 dBm signal at J2, check that DS3 (yellow, Ext 10MHZ) is on (Figure 2.2).
7. Check that a 10MHz, 3 dBm  $\pm$ 3 dB signal is present at the 10MHZ REF OUTPUT (J8) (Figure 2.1).
8. 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.



**FIGURE 2.3 Fuse Location and Spare Fuse**

## 2.5 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 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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