

INSTRUCTION MANUAL

MODEL 2089-24A DOWNCONVERTER

Data, drawings, and other material contained herein are proprietary to Cross Technologies, Inc., but may be reproduced or duplicated without the prior permission of Cross Technologies, Inc. for normal operation related purposes.

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

First Edition, **December 2002**

**CROSS TECHNOLOGIES, INC.
6170 SHILOH ROAD
ALPHARETTA, GEORGIA 30005**

**(770) 886-8005
FAX (770) 886-7964
Toll Free 888-900-5588**

**WEB www.crosstechnologies.com
E-MAIL info@crosstechnologies.com**

**INSTRUCTION MANUAL
MODEL 2089-24A 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
2.0 Installation	5
2.1 Mechanical	5
2.2 Rear Panel Inputs, Outputs	6
2.3 Front Panel Controls, Indicators	6
2.4 Operation	7

WARRANTY - The following warranty applies to all Cross Technologies, Inc. products.

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.

**CROSS TECHNOLOGIES, INC.
6170 SHILOH ROAD
ALPHARETTA, GEORGIA 30005**

**(770) 886-8005
FAX (770) 886-7964
Toll Free 888-900-5588**

**WEB www.crosstechnologies.com
E-MAIL info@crosstechnologies.com**

MODEL 2089-24A DOWNCONVERTER

1.0 General

1.1 Equipment Description - The 2089-24A Downconverter converts 2.0 - 2.4 GHz IF signal to a 70 MHz IF with no spectrum inversion, low group delay, and flat frequency response. The 2.0 - 2.4 GHz input is mixed with synthesized local oscillator (LO) signals, first to 600 MHz and finally to 70 MHz. The frequency is selected using four front panel BCD switches, and is selectable in 1 MHz increments. The reference oscillator is a 25 MHz internal oscillator. Front panel LEDs light when DC power is applied (green) or when a PLL alarm occurs (red). Gain is selectable to be either manually adjustable (MGC) or automatically adjusted (AGC). Front panel test points allow for monitoring the AGC voltage (and corresponding AGC gain) when in AGC mode, and a front panel potentiometer allows for gain adjustment when in MGC mode. The MGC gain is adjustable from 20 to 50 dB. Connectors are Type N female for the RF input and BNC female for the IF output. A terminal strip is mounted on the rear panel and provides a closure to ground when the PLL is out of lock. The 2089-24A Downconverter is housed in a 1 3/4" X 19" X 14" deep rack mount chassis.

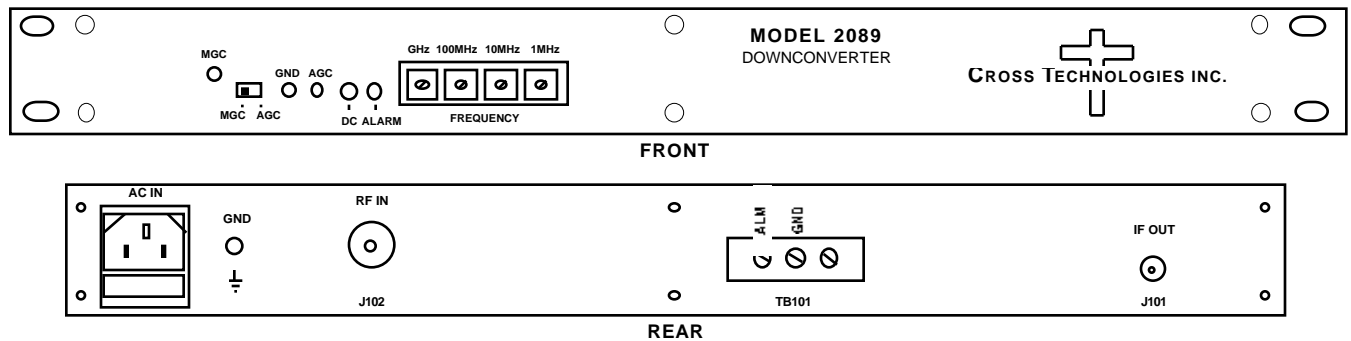


FIGURE 1.1 Model 2089-24A Front and Rear Panels

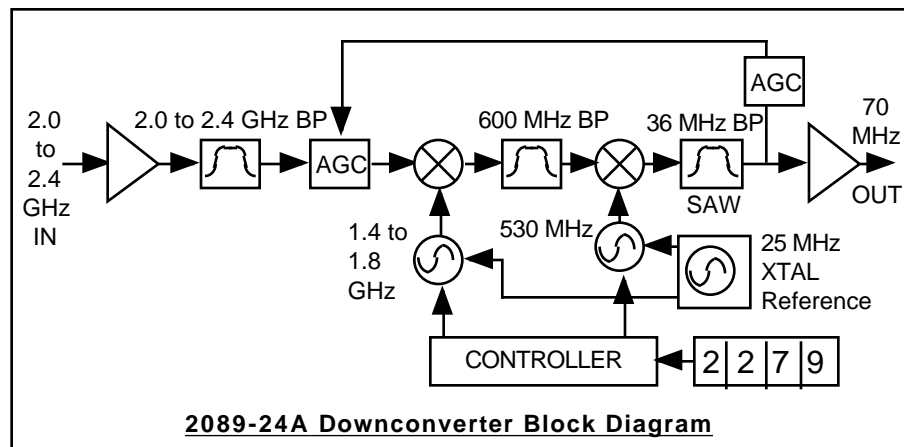


FIGURE 1.2 Model 2089-24A Block Diagram

1.2 Technical Characteristics

TABLE 1.1 2089-24A DOWNCONVERTER SPECIFICATIONS*

Input Characteristics	
Impedance/RL	50 /10 dB
Frequency	2.0 to 2.4 GHz
Noise Figure, Max.	15 dB, maximum gain
Input Level range	-30 to -70 dBm
Input 1 dB compression	-20 dBm
Output Characteristics	
Impedance/RL	75 /15 dB
Frequency	70 ± 10 MHz
Output Level, AGC mode	-20 dBm
Output 1 dB compression	-5 dBm minimum
Channel Characteristics	
Gain	10 to 50 dB (automatically adjusted in AGC mode, manually adjustable in MGC mode)
AGC Reaction Time	~ 2 sec, 10 to 50 dB gain change on step input
Image Rejection	> 45 dB, min.
Spurious Response	< -40 dBC in band
Frequency Response	± 1.5 dB, entire band; ± 0.5 dB, any 10 MHz increment
Synthesizer Characteristics	
Frequency Accuracy	±25 kHz max over temp
Phase Noise(dBC/Hz)	-75, 10 kHz; -90, 100 kHz; -100, 1 MHz
Controls	
Frequency	BCD Switches select input center frequency in 1 MHz steps
Gain select	Front panel slide switch selects MGC or AGC
Gain adjust	Front panel potentiometer adjusts gain in MGC mode
Indicators	
DC Power	Green LED
PLL Alarm	Red LED
Other	
Connectors, IF, RF	BNC, female; Type N, female
Connector, Alarm	Terminal Strip - Open collector to ground (30 ma, max) on Alarm
Size	19 inch standard chassis 1.75"high X 14.0" deep
Power	90 - 260 VAC, 47 - 63 Hz, 40 watts max.

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

2.0 Installation

2.1 Mechanical - The 2089-24A consists of two RF Assemblies housed in a 1 RU (1 3/4 inch high) by 14 inch deep chassis. A switching, ± 15 VDC power supply provides power for the assemblies. The 2089-24A can be secured to a rack using the 4 holes on the front panel. Figure 2.1 shows how the 2089-24A is assembled.

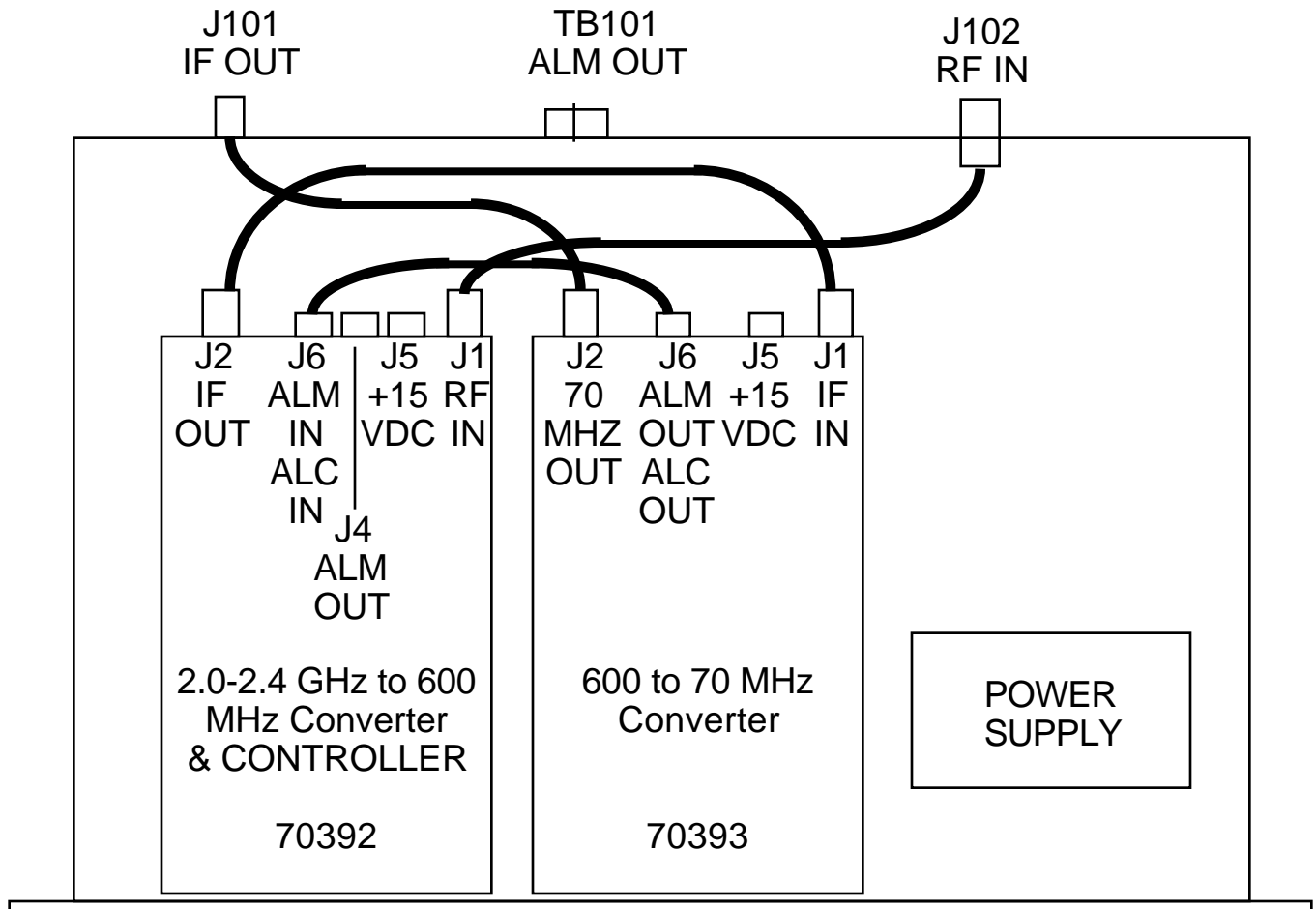


FIGURE 2.1 2089-24A Mechanical Assembly

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

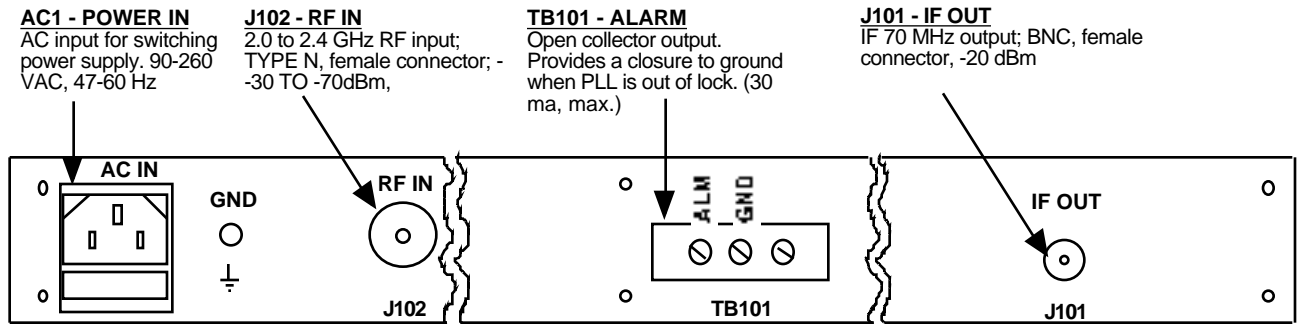


FIGURE 2.2 2089-24A Rear Panel I/Os and Level Control

2.3 Front Panel Controls and Indicators - Figure 2.3 shows the controls and indicators located on the front panel.

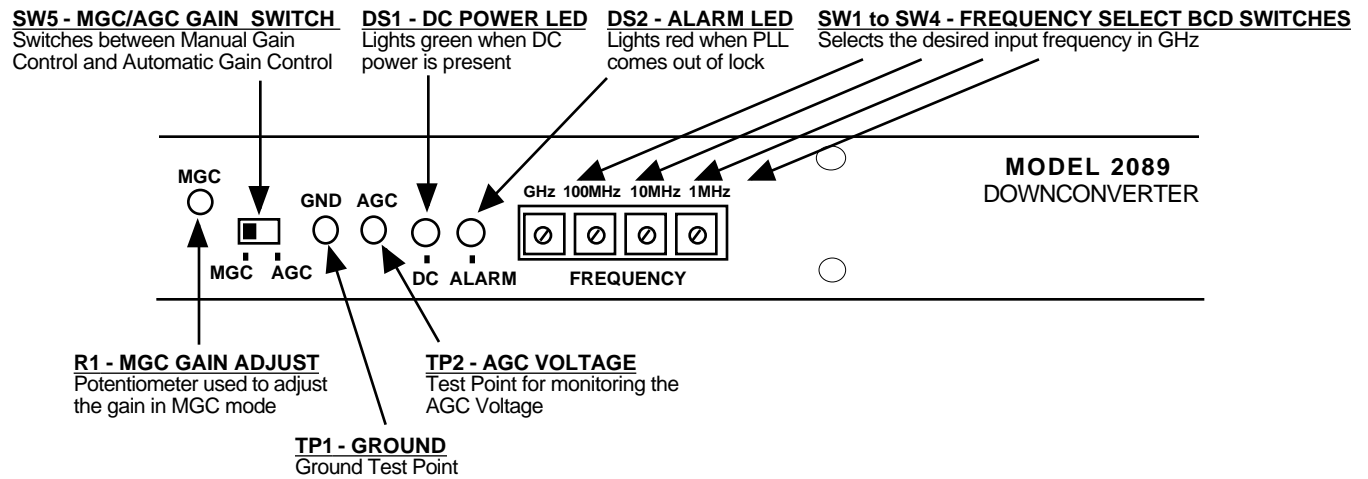


FIGURE 2.3 2089-24A Front Panel Controls and Indicators

2.4 Installation / Operation

2.4.1 Installing and Operating the 2089-24A

- 1.) Connect a -30 dBm to -70 dBm signal to RF In, J102 (Figure 2.2).
- 2.) Select MGC or AGC with toggle switch SW5 (Figure 2.3).
- 3.) Connect the IF OUT, J101, to the external equipment (Figure 2.2).
- 4.) Set BCD switches SW1 to SW4 to the desired input frequency (Figure 2.3).

CAUTION!!! Be sure to set the BCD switches to a valid frequency from 2.000 to 2.400 GHz. If set to a frequency outside this range the LO will tune to either one end of the frequency range or the other but the alarm will NOT turn on.

- 5.) Connect 90 - 260 VAC, 47 - 63 Hz to AC1 on the back panel (Figure 2.2).
- 6.) Be sure DS1 (green, DC Power) is on and DS2 (red, Alarm) is off (Figure 2.3).
- 7.) If in MGC mode adjust MGC gain (R1) for -20 dBm output level (Figure 2.3).
- 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.

2.4.2 Frequency Setting, SW1 to SW4 - The RF output frequency is selected by setting the BCD switches (SW1 to SW4) using a small blade screwdriver on the front panel to the desired frequency. The frequency displayed on the BCD switches is the desired input frequency for 70 MHz IF center frequency output. There is no muting of the output carrier during frequency selection. If the switches are set to an invalid frequency, alarm LED DS2 will light.

CAUTION!!! Be sure to set the BCD switches to a valid frequency from 2.000 to 2.400 GHz. If set to a frequency outside this range the LO will tune to either one end of the frequency range or the other but the alarm will NOT turn on.

2.4.3 AGC voltage relating to Gain - The 2089-24A Downconverter operates over a -30 to -70 dBm input. In Automatic Gain Control (AGC) (with SW5 to AGC), the gain is adjusted automatically to provide a constant -20 dBm output level over the entire -30 to -70 dBm input. In Manual Gain Control (MGC) (with SW5 to MGC) the gain is adjusted by potentiometer R1 on the front panel. Test points TP1 and TP2 can be monitored to determine the approximate gain in MGC and the approximate input level (and corresponding gain) in AGC as Table 2.1 shows.

AGC Monitor Nom. DC Volts	AGC/MGC Gain	AGC'd Input Level (dBm)
0.22	0	-20
0.47	5	-25
0.68	10	-30
0.90	15	-35
1.24	20	-40
1.76	25	-45
2.40	30	-50
2.78	35	-55
2.99	40	-60
3.16	45	-65
3.30	50	-70

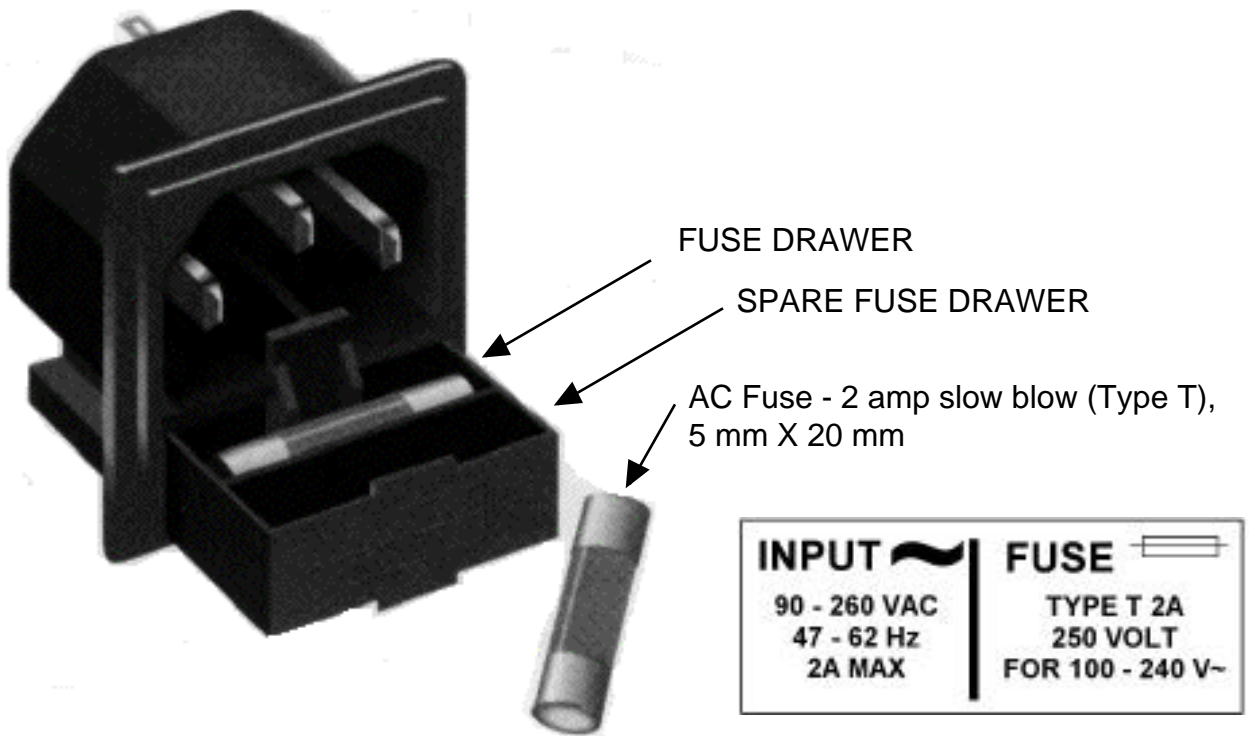


FIGURE 2.3 Fuse Location and Spare Fuse