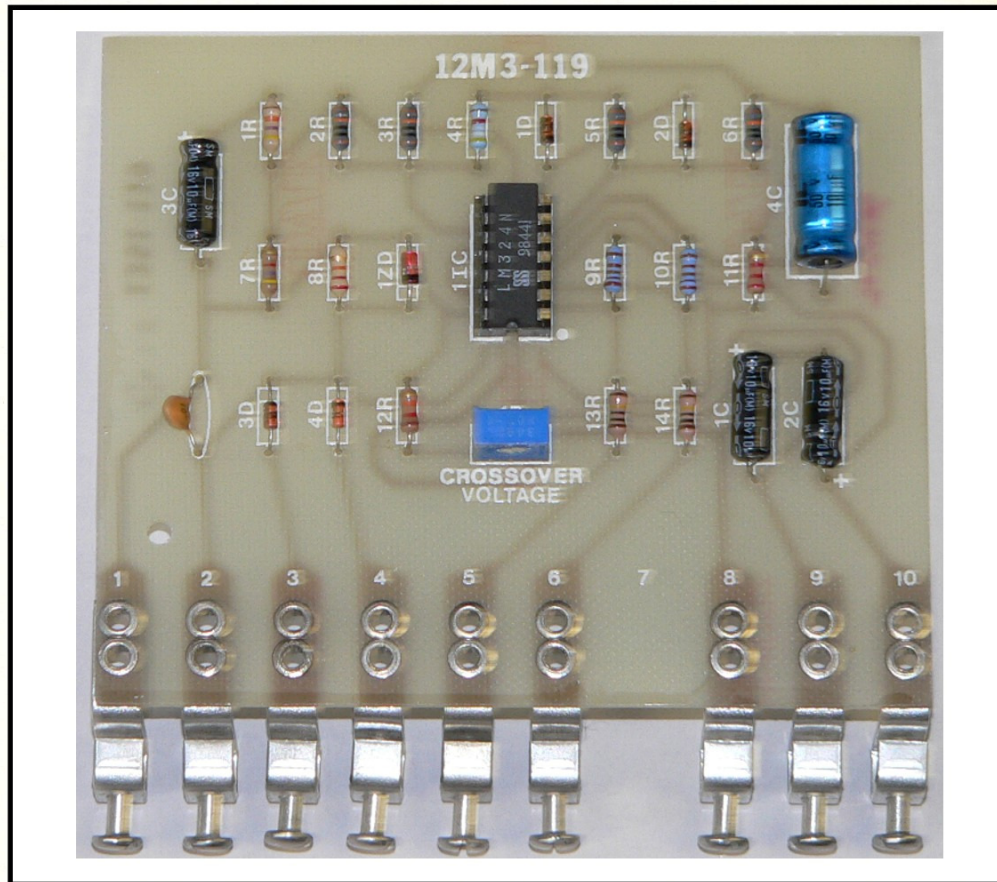




Trouble-shooting Manual MODEL 223 CROSSOVER ASSEMBLY PART NUMBER 12M03-00119-01



BENCH TEST

1. Apply +15 VDC to terminal 10 and -15 VDC to terminal 9, using terminal 8 for common.
2. Connect one end of each of two 15K, ½ Watt resistors to +15 VDC and the other ends to terminals 3 and 4.
3. Apply 120 VAC to the AC terminals of a full-wave bridge rectifier and the ± output of the bridge to terminals 5 and 6.
4. Monitor terminal 2 with a scope and a digital voltmeter (terminal 8 common). Adjust the "CROSSOVER VOLTAGE" potentiometer from full CCW to full CW. The voltage should vary from approximately -0.66 VDC to +6.6 VDC. Ripple on the scope should reach maximum at about 50% of the pot travel and not exceed 2.0 Volts Peak-to-Peak.
5. Reverse the rectified 120 VAC input at terminals 5 and 6. Repeating step 4 should find the voltage and ripple readings within 5% of those taken in step 4.
6. With "CROSSOVER VOLTAGE" potentiometer at full CW, measure DC levels at terminals 3 and 4. They should read 0.6 to 0.75 VDC more positive than the -0.66 VDC reading of step 5.

TEST MATERIAL REQUIRED:

- 2 - 15K, ½ Watt resistors (01P01-15301-02)
- 1 - Rectifier bridge 200V (05P01-00003)
- 1 - Oscilloscope (Tektronix 2213 or equal)
- 1 - Digital Voltmeter (Beckman HD-110 or equal)
- 8 - Clip leads
- 1 - Power supply ± 15V DC @ 20 mA
- 1 - 120 VAC cord with plug

VOLTAGE CHECKS

1. Read 15 volts positive (from external source) between terminal 10 and 8 (common).
2. Read 15 volts negative (from external source) between terminal 9 and 8 (common).

GEMINI MODEL 223 CROSSOVER ASSEMBLY

PART NUMBER 12M03-00119-01
SCHEMATIC DIAGRAM 12M03-00119-01

I. SPECIFICATIONS

SUPPLY

- Positive and negative 15 volts DC at 20 mA maximum

AMBIENT TEMPERATURE

- 0° to 40°C (32° to 104°F)
- 50°C in cabinet

INPUT

- 180 to 250 volts DC from motor armature circuit

OUTPUT

- Positive 6 to negative 0.6 volts DC nominal (at terminal 2)

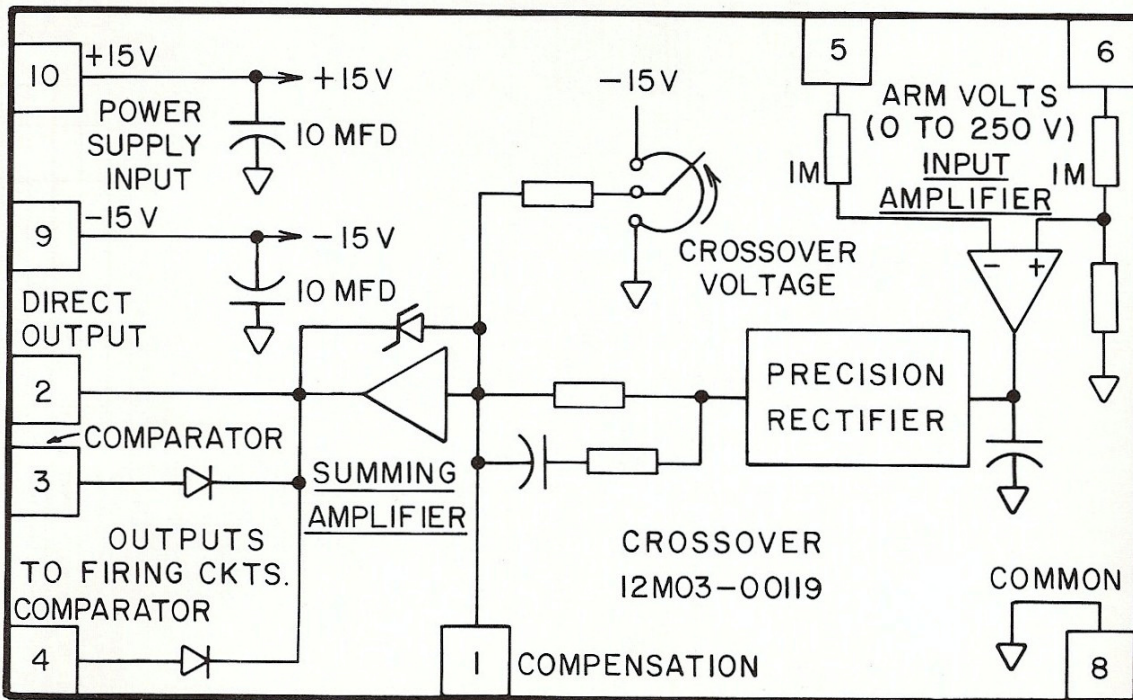


FIGURE 1 SIMPLIFIED SCHEMATIC

II. THEORY OF OPERATION

The Model 223 Crossover Assembly is designed to provide extended speed range of a DC Motor Drive when used with the Model 201 Field Exciter (with or without a Model 220 Bi-directional Output Adaptor).

It consists of several elements as shown in the Simplified Schematic Diagram (Figure 1).

1. Power Supply
2. Input Amplifier
3. Precision Rectifier
4. Summing Amplifier

1. **Power Supply** – Positive and negative 15 volts DC are obtained from one of the assemblies associated with this module. Two 10 MF capacitors filter the incoming positive and negative 15 volt lines.

2. Input Amplifier – Differential amplifier, 1IC(A), is impedance isolated from the armature power loop by 1 megohm input resistors, 13R and 14R. Its nominal 5 volt output at 250 volts input is filtered and applied to the input of a Precision Rectifier.

To maintain clearance requirements dictated by national codes, the input voltage on terminals 5 and 6 must be limited to 250 volts.

3. Precision Rectifier – An absolute value amplifier consisting of 1IC(B) and 1IC(C) and associated components provides a maximum output of positive 1 mA to the summing junction at pin 13 of the Summing Amplifier, 1IC(D), regardless of polarity of the armature voltage.

4. Summing Amplifier – The “Crossover Voltage” potentiometer, 1P, provides a reference current of approximately zero to negative 1 mA to the summing junction at pin 13 of 1IC(D). When the output of the Precision Rectifier exceeds this input reference, the output of the Summing Amplifier swings negative. There is no change in output until the armature voltage reaches a value determined by the setting of the “Crossover Voltage” potentiometer, usually rated armature voltage of the DC motor.

When used with a Field Reversing Regenerative DC Drive, care must be used in adjusting the “Crossover Voltage” potentiometer. It should *never* be changed if the motor is running more than 20% above base speed.

The maximum output is limited to positive 6 volts nominal by the clamping action of zener diode 1ZD. The output terminals 3 and 4, with respect to system common terminal 8, are connected to the “Crossover” input terminals of the Model 201 Field Firing (terminal 13) and the Model 220 Bi-directional Output Adaptor (terminal 15) assemblies. The negative signal from the Crossover circuit applied to the Comparator in each of these assemblies, retards the firing angle of the thyristors in the Power Converter, reducing field current by an amount proportional to the output of the Crossover assembly.

COMPONENT LIST - ASSEMBLY #12MO3-00119-01

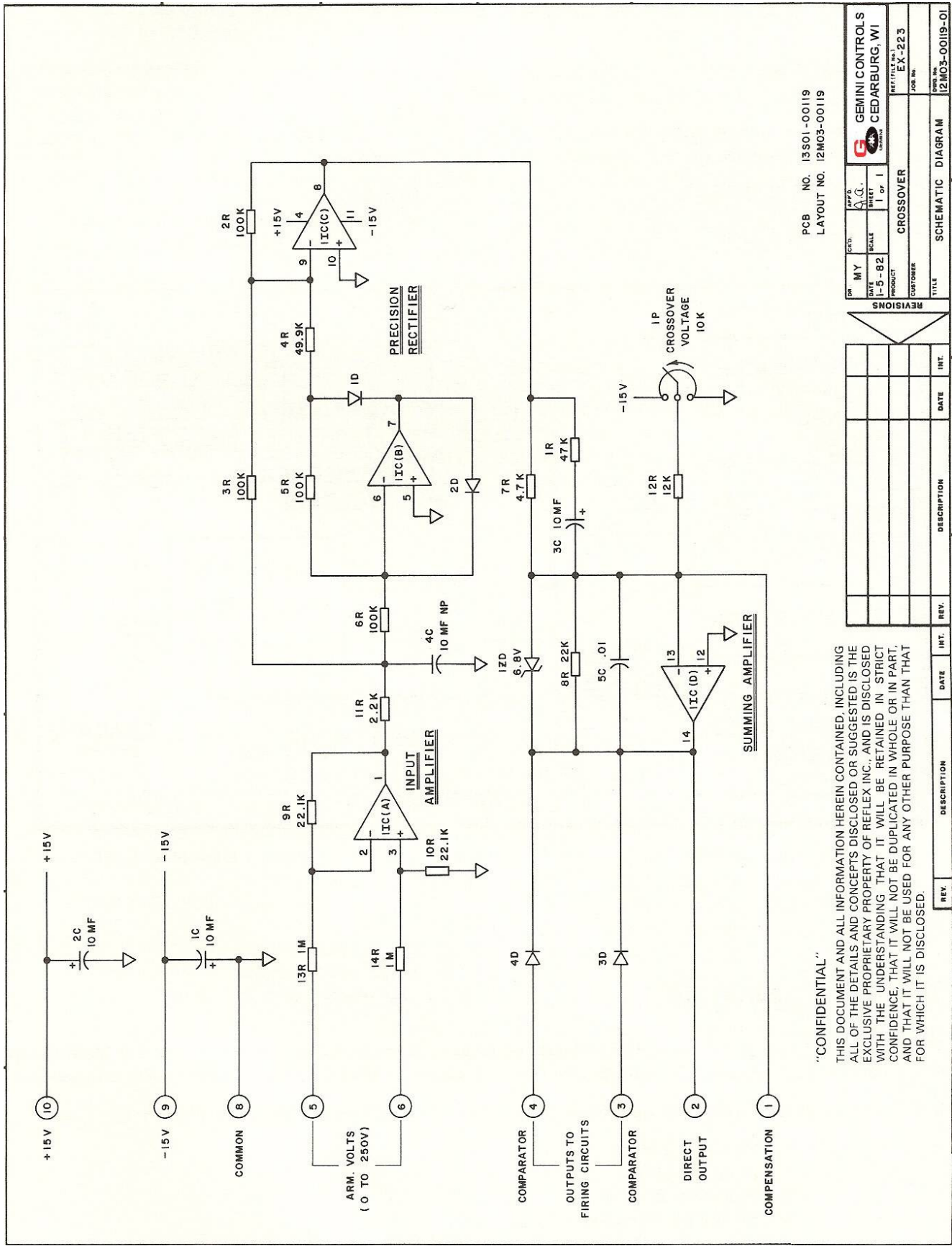
Symbol	Part #	Description (Acceptable Substitute)*	Symbol	Part #	Description (Acceptable Substitute)*
1D-4D	05P02-00001	Diode-Signal, 50mA, 200 PIV (1N4148)	1R	01P01-47300-02	Resistor-47K, ¼W, 5%
1ZD	05P03-00005	Zener Diode-6.8V, 500mW, 10% (1N5235B)	2, 3		
1IC	05P08-00001	Quad Op-Amp (National-LM324)	5, 6R	01P02-10031-01	Resistor-100K, ½W, 1%
1P	02P04-10301-00	Potentiometer-10K, ½W (Beckman 72XR10K)	4R	01P02-49921-01	Resistor-49.9K, ½W, 1%
1C-3C	03P01-10001-00	Capacitor-10MF, 16V, Electrolytic	7R	01P01-47200-02	Resistor-4.7K, ¼W, 5%
4C	03P02-10002-00	Capacitor-10MF, 25V, NP, Electrolytic	8R	01P01-22300-02	Resistor-22K, ¼W, 5%
5C	03P06-10305-00	Capacitor-0.01MF, 50V, Ceramic	9R, 10R	01P02-22121-01	Resistor-22.1K, ½W, 1%
			11R	01P01-22200-02	Resistor-2.2K, ¼W, 5%
			12R	01P01-12300-02	Resistor-12K, ¼W, 5%
			13R, 14R	01P02-10041-01	Resistor-1.0M, ½W, 1%

* OR EQUAL



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REV.	DESCRIPTION	DATE	INT.	REV.	DESCRIPTION	DATE	INT.

REV. 6	SCALE 1 of 1	DATE 1-5-82	PRODUCT CROSSOVER	CUSTOMER	TITLE SCHEMATIC DIAGRAM
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