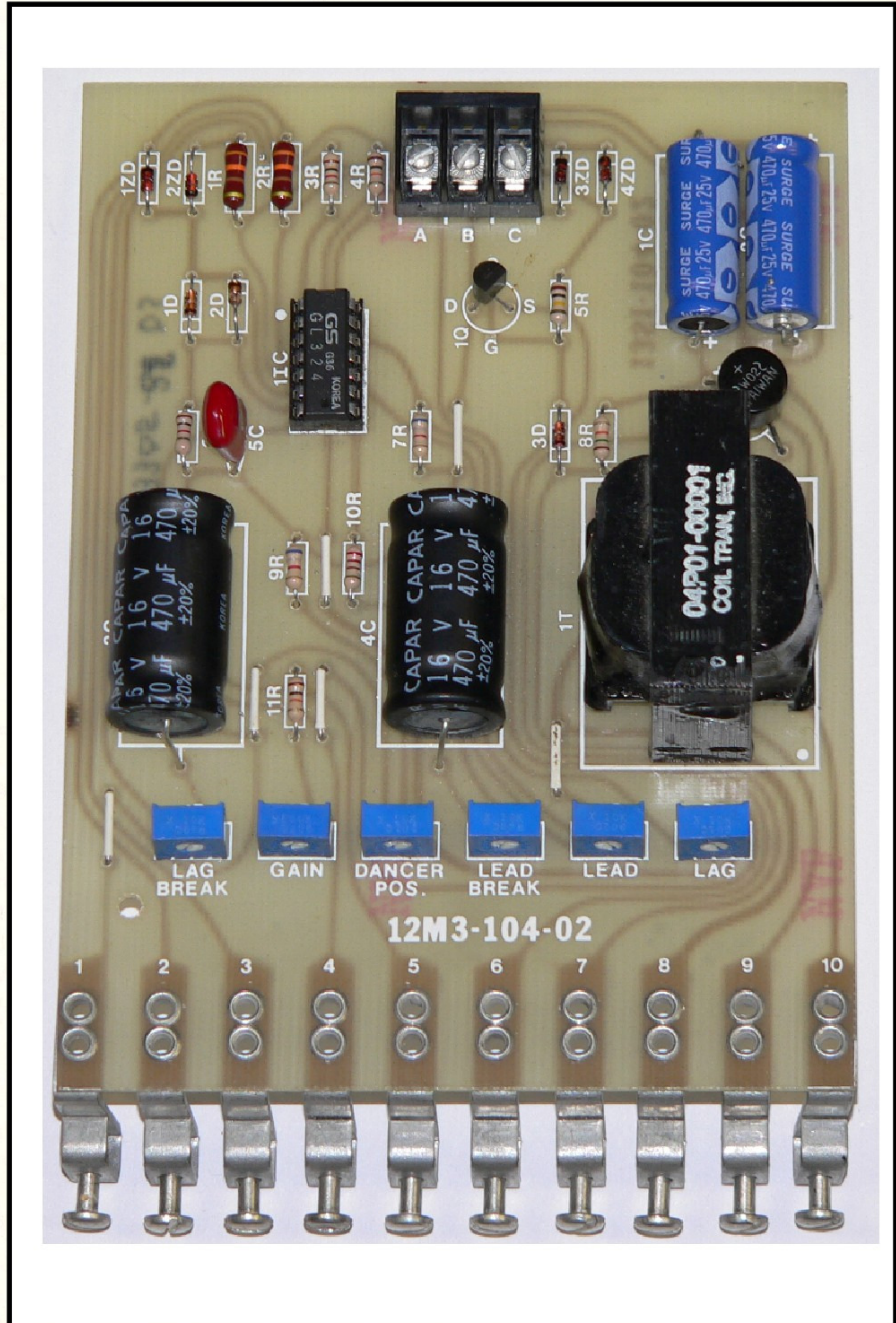




Trouble-shooting Manual Model 204 DANCER POSITION REGULATOR

BENCH TEST

1. Connect an Oscilloscope and a Digital Voltmeter to output terminals 4 and 8, with 8 the common lead for each. Set the scope for 5 volts per division on DC and the meter for 20 volts full scale AC.
2. Turn all pots fully CCW except the "Lead Break", which should be fully CW. Jumper terminals 6 and 7.
3. Connect a 100K, ½ watt resistor between terminals 3 and 8. Connect one end of a 1.0 MF capacitor to terminal 3.
4. Apply 0.5V AC, 60 HZ between terminal 8 and through the 1.0 MF capacitor to terminal 3.
5. Apply 115 volts AC between terminals 9 and 10.
6. Read a sinusoidal output between terminals 4 and 8 of 0.60 to 0.75 volts AC.
7. Turn "Gain" full CW. Output should rise to 1.8 to 2.3 volts AC.
8. Turn "Lead" full CW. Output should increase to 2.9 to 3.6 volts AC.
9. Turn "Gain" CCW. Output should drop to 1.0 to 1.2 volts AC.
10. Turn "Dancer Position" full CW. The output DC level should rise smoothly to approximately 10 volts. Return this pot to zero (CCW).
11. Turn "Lead Break" CCW. Output should rise smoothly, and saturate into a square wave with approximately 10 volts peak, both positive and negative.
12. Turn "Lag" to full CW. Output voltage should drop to 2.0 to 2.25 volts AC.
13. Advance "Lag Break" to 100%. Output voltage should increase and saturate into a trapezoidal wave of 20 volts peak-to-peak.
14. Jumper terminals "A" and "B". The positive half should now saturate near zero. Remove jumper. Jumper terminals "B" and "C". The negative half should now saturate near zero. Remove jumper.
15. Remove jumper from terminal 6 to terminal 7. The output should go to zero.



GEMINI MODEL 204 DANCER POSITION REGULATOR

PART NUMBER 12M03-00104-02
SCHEMATIC DIAGRAM 12M03-00104-02

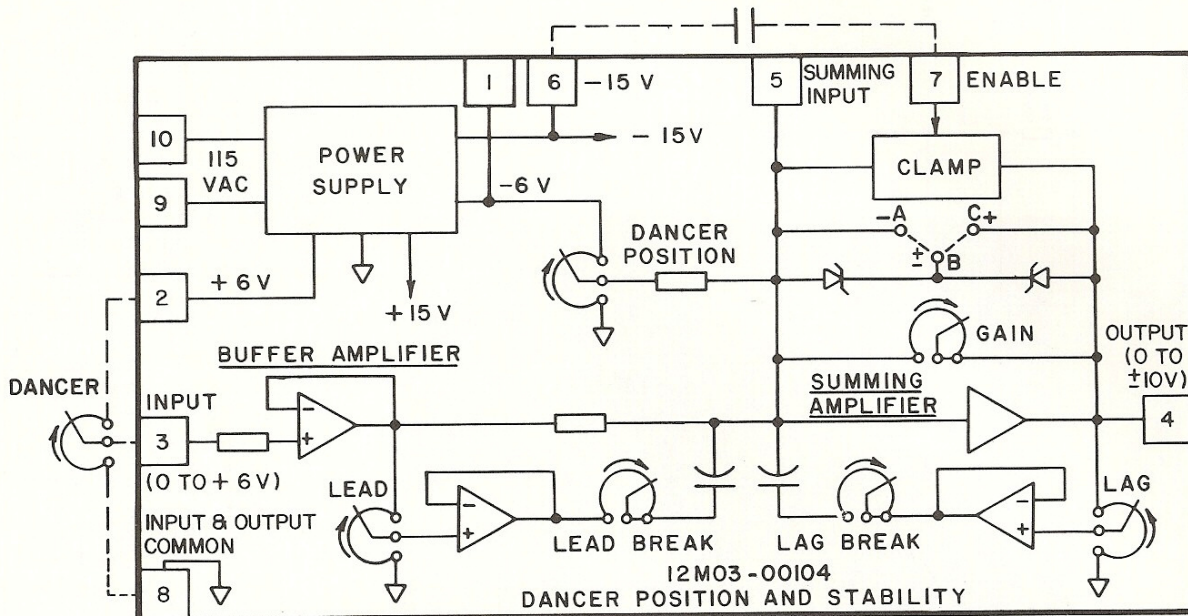


FIGURE 1 SIMPLIFIED SCHEMATIC

I. SPECIFICATIONS

SUPPLY

- 120 Volts AC $\pm 10\%$
- 50/60 HZ, Single phase

AMBIENT TEMPERATURE

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

INPUT

- Potentiometer (1K to 50K ohms) between terminals 2 and 8 with wiper connected to terminal 3
- Signal of up to positive and negative 10 volts between terminals 3 and 8 from another source such as the Reflex® Model 206 Demodulator

OUTPUT

- Zero to positive and negative 10 volts DC at 5 mA maximum depending on position and motion of input potentiometer or other signal. Uni-directional polarity selectable by on-board jumper.

II. THEORY OF OPERATION

The Model 204 Dancer Position Regulator is used to regulate the steady-state position of a dancer by measuring its position with a potentiometer or other similar position transducer and comparing this position to the desired position as selected by an on-board "Dancer Position" potentiometer.

The Dancer Position Regulator consists of the following elements as shown in the Simplified Schematic Diagram (Figure 1).

1. Power Supply
2. Position Reference
3. Buffer Amplifier
4. Summing Amplifier

1. **Power Supply** – The power supply uses a center-tapped transformer with 10 volts on each side of center together with a bridge rectifier and two 470 MF filter capacitors to provide a nominal positive and negative unregulated 15 volts DC with respect to the transformer center-tap which is connected to circuit common.

Additionally, a regulated positive and negative 6 volts nominal is obtained from the positive and negative 15 volt supplies using zener diodes 1ZD and 2ZD respectively.

2. **Position Reference** – A 10K potentiometer connected between the negative 6 volt supply and circuit common provides a nominal zero to negative 1 mA reference current into the Summing Amplifier 1 IC(B), pin 6.
3. **Buffer Amplifier** – Op amp 1 IC(D) acts as a buffer so that the input at terminal 3 is relatively insensitive to signal impedances, and provides a nominal zero to positive 1 mA feedback current into the Summing Amplifier 1 IC(B), pin 6.

A Lead Network on the output of the Buffer Amplifier tends to prevent overshoot of the Dancer by providing an additional feedback proportional to the rate-of-change of the Dancer through Op-amp 1 IC(C).

4. **Summing Amplifier** – Op-amp 1 IC(B) provides up to positive or negative 10 volts at the output terminal 4, depending on the difference between the Dancer Position Reference and Feedback Signals. If the Reference signal is greater than the Feedback the output will be positive.

A very small difference between Reference and Feedback signals causes the output to rise to a value regulated by the zener diode clamps 3ZD and 4ZD (nominally plus or minus 10 volts). A "Gain" adjustment is provided to vary the accuracy as required by the application.

The output polarity is selected by a jumper on 1TB for positive (jumper B to C), negative (jumper A to C), or bi-directional (no jumper) output. Clamping the output prevents the amplifier from swinging in the wrong direction with possible delays in response.

The Lag Network provides an adjustable integrating action for the Summing Amplifier. Higher adjustments of the Lag potentiometer will allow transient motion of the Dancer without causing excessive reaction by the drive (as when winding an eccentric roll). It will also reduce noise output from the assembly.

To allow operation of the Summing Amplifier, a negative 15 volts DC from any source with respect to circuit common must be applied to the "Enable" terminal 7. When this negative 15 volts is removed, field-effect switching transistor 1Q conducts, clamping the output of the Summing Amplifier to zero. This insures that the output is initially at zero on powering up.

COMPONENT LIST - ASSEMBLY #12MO3-00104

Symbol	Part #	Description (Acceptable Substitute)*
1T	04P01-00001	Transformer – 120V AC PRI, two 10V AC SEC @ 220 mA (Signal-PC20-220)
1REC	05P01-00003	Rectifier Bridge – 50V, 1A (EDI-PF50)
1-3D	05P02-00001	Diode – Signal, 50 mA, 200V PIV (1N4148)
1, 2ZD	05P03-00005	Zener Diode – 6.8V, 500 mW, 10%
3, 4ZD	05P03-00006	Zener Diode – 10V, 500 mW, 10%
1Q	05P05-00001	Transistor – N Channel JFET (2N4093)
1IC	05P08-00001	Quad Op-Amp (National-LM324)
1, 3-6P	02P04-10301-00	Potentiometer – 10K, ½W (Beckman 72XR10K)
2P	02P04-50401-00	Potentiometer – 500K, ½W (Beckman 72XR500K)
1C, 2C	03P01-47102-01	Capacitor – 470MF, 25V, Electrolytic
3C, 4C	03P02-47101-00	Capacitor – 470MF, 16V, NP Electrolytic
5C	03P07-10410-00	Capacitor – 0.1MF, 100V, Film
1, 2R	01P01-18101-02	Resistor – 180 ohm, ½W, 5%
3, 6R	01P01-10200-02	Resistor – 1.0K, ¼W, 5%
4, 11R	01P01-10300-02	Resistor – 10K, ¼W, 5%
5R	01P01-10400-02	Resistor – 100K, ¼W, 5%
7, 9R	01P01-68200-02	Resistor – 6.8K, ¼W, 5%
8R	01P01-15300-02	Resistor – 15K, ¼W, 5%
10R	01P01-22100-02	Resistor – 220 ohm, ¼W, 5%
		* OR EQUAL



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