

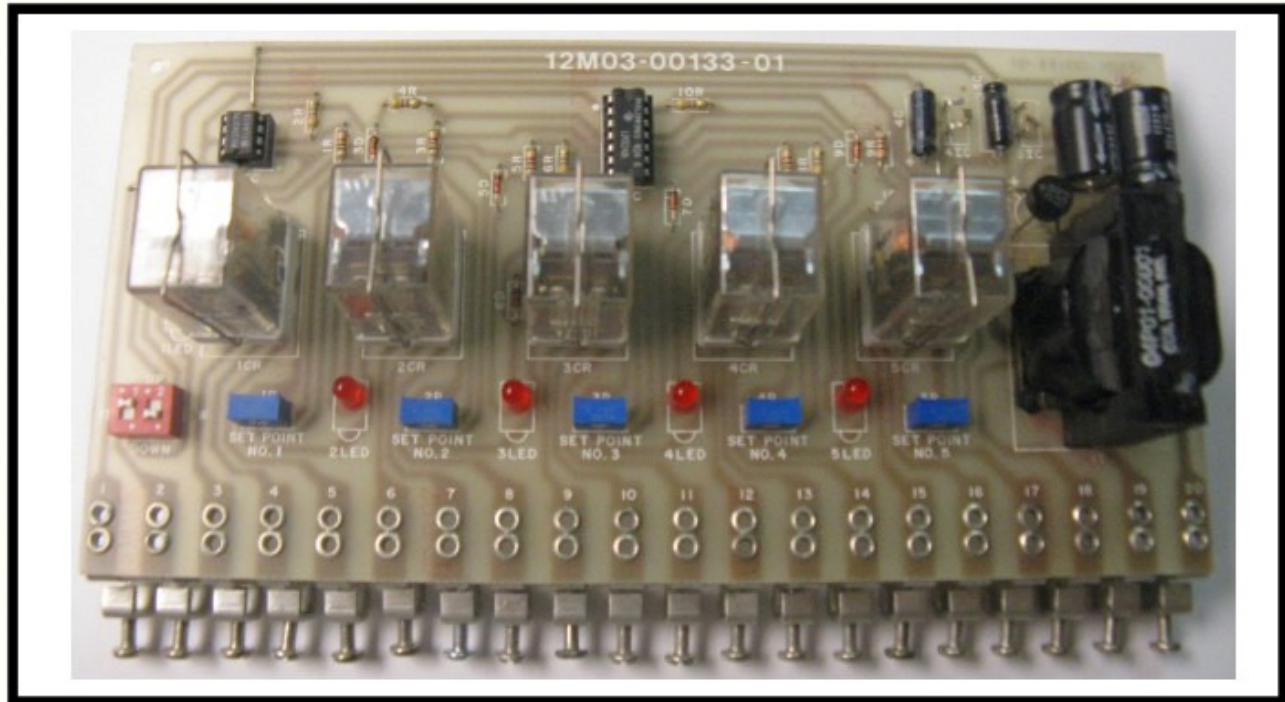


Trouble-shooting Manual

MODEL 230A SOLID STATE

CAM SWITCH

PART NUMBER 12M03-00133-01



BENCH TEST

TEST MATERIAL REQUIRED:

- 1 - 10V DC power supply (a 9V DC battery will do).
 - 1 - 5K potentiometer
 - 1 - VOM (Simpson 260 or equal)
 - 1 - 115V AC line cord with spade lugs load end
 - 4 - clip leads
1. Connect the power supply positive to the CW end of the 5K potentiometer and the negative end to terminal 18. Connect the CCW end of the potentiometer to terminal 18 and connect the wiper to terminal 1. Set the voltage for +3.0V.
 2. Put 1SW in "Down" position, 2SW in "Up" position, and all potentiometers full CCW.
 3. With an ohmmeter, verify the following conditions between terminals listed.

Open Circuit	Continuity
TERMINALS 3-4	3-5
TERMINALS 6-7	6-8
TERMINALS 9-10	9-11
TERMINALS 14-12	14-13
TERMINALS 17-15	17-16

4. Apply 115V AC to terminals 19 and 20. All 5 LEDs should light.
5. With an ohmmeter, verify the following conditions between terminals listed.

Open Circuit	Continuity
TERMINALS 3-4	3-5
TERMINALS 6-7	6-8
TERMINALS 9-10	9-11
TERMINALS 14-12	14-13
TERMINALS 17-15	17-16

6. Adjust all "Set Point" potentiometers CW until associated LEDs just extinguish. It should be about 55%.
7. Put 2SW in "Down" position and all LEDs should come back on.
8. Reverse leads on the 10V power supply and adjust Set Point potentiometers CCW until LEDs just go out. It should be about 45%.

GEMINI MODEL 230A SOLID STATE CAM SWITCH

PART NUMBER 12M03-00133-01
SCHEMATIC DIAGRAM 12M03-00133-01

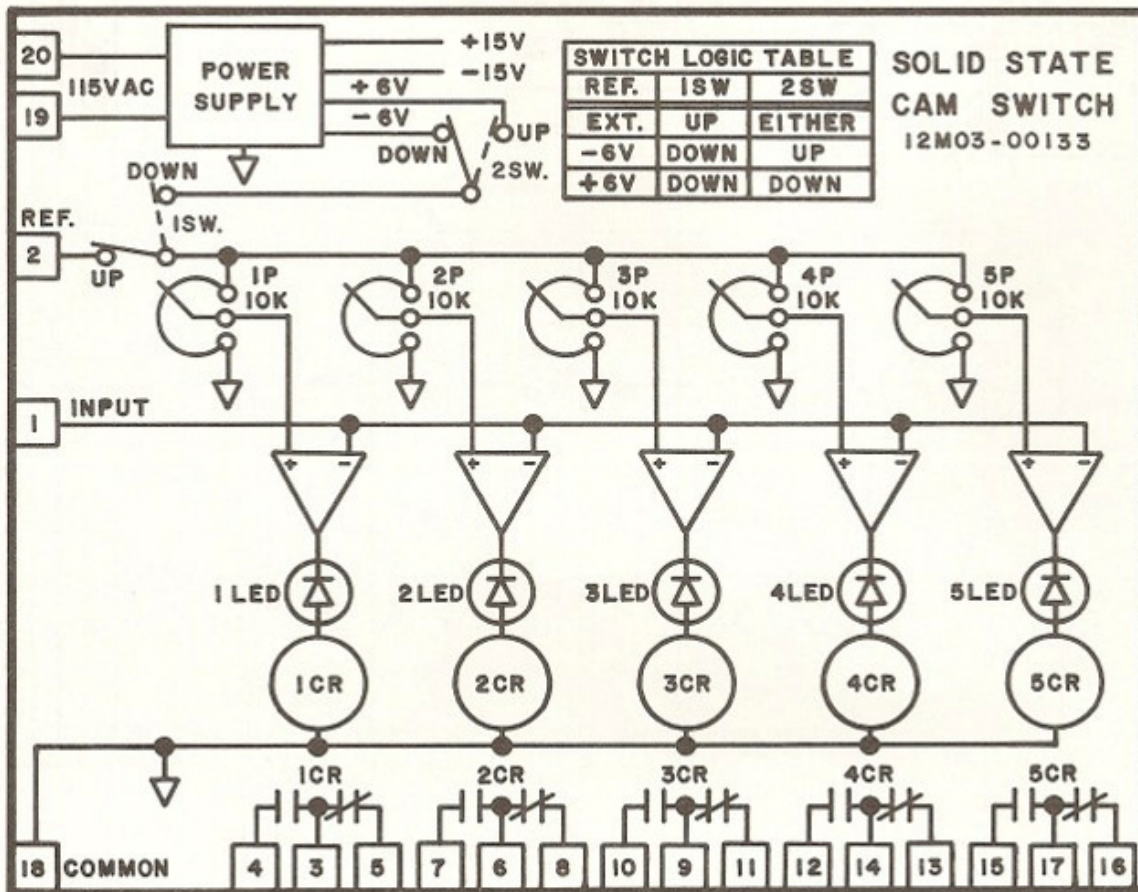


FIGURE 1. SIMPLIFIED SCHEMATIC

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

INPUTS:

- Reference to ± 10 volts DC
- Signal to ± 10 volts DC
- On-board references of positive or negative 6 volts regulated are selectable with two SPDT DIP Switches.

OUTPUTS:

- Relay contact closure. Five separately adjustable relays each with form C contacts. Contact rating 2A at 115V AC, 3A at 26V AC. Red LED indicating relay energized.
- Pick-up or drop-out point independently adjustable on each from 0 to 100% of reference voltage with a differential between pick-up and drop-out of .05%.

II. THEORY OF OPERATION

The REFLEX® Model 230A Solid State Cam Switch is a set of five voltage sensitive relays for use wherever relay contact closure is required in response to analog signals up to 10 volts DC either positive or negative.

It may be used with the Model 210 Solid State MOP to provide additional relay contact closures in multiples of five for use as a Multiple Cam Switch Timer.

Alternatively, the reference may be obtained from on-board positive or negative regulated six volt supplies permitting independent operation wherever relay contact closures at different set points are required from one external zero to six volt DC signal.

It consists of the following elements as shown in the Simplified Schematic Diagram (Figure 1):

1. Power Supply
2. Voltage Sensitive Relays (5)

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 DC is obtained from the positive and negative 15 volt supplies, using regulators 5IC and 4IC, each with a 10MF filter capacitor.

2. Voltage Sensitive Relays — Five Op-Amps (single Op-Amp 1IC and quad Op-Amp 2IC A, B, C, and D) are configured as comparators to measure the difference between the "INPUT" signal at terminal 1 and as a percentage of the "REFERENCE" at terminal 2.

The "SETPOINT" potentiometers 1P through 5P determine the "INPUT" level at which the relays change state. This is a percentage of the "REFERENCE" voltage.

For positive references the relay will be deenergized below the setpoint and will energize as the output exceeds the setpoint. For negative references the opposite is true and the relay will be energized until the setpoint is exceeded.

VOLTAGE CHECK

1. The primary voltage of 1T, leads 1 and 2 (terminals 20 and 19) should be 120V AC.
2. The secondary voltage of 1T, leads 3 to 4 and leads 5 to 6 should be 10V AC. These can be measured between circuit common, terminal 8 (leads 4 and 5), and each AC input to the bridge rectifier 1REC (leads 3 and 6). Voltage at the AC input to the bridge rectifier (leads 3 to 6) should be 20V AC.
3. +15V DC nominal between the positive end of capacitor 1C and terminal 18 (common).
4. -15V DC nominal between the negative end of capacitor 2C and terminal 18 (common).
5. +6V DC nominal between the positive end of capacitor 3C and terminal 18 (common).
6. -6V DC nominal between the negative end of capacitor 4C and terminal 18 (common).

COMPONENT LIST — ASSEMBLY #12M03-00133-01

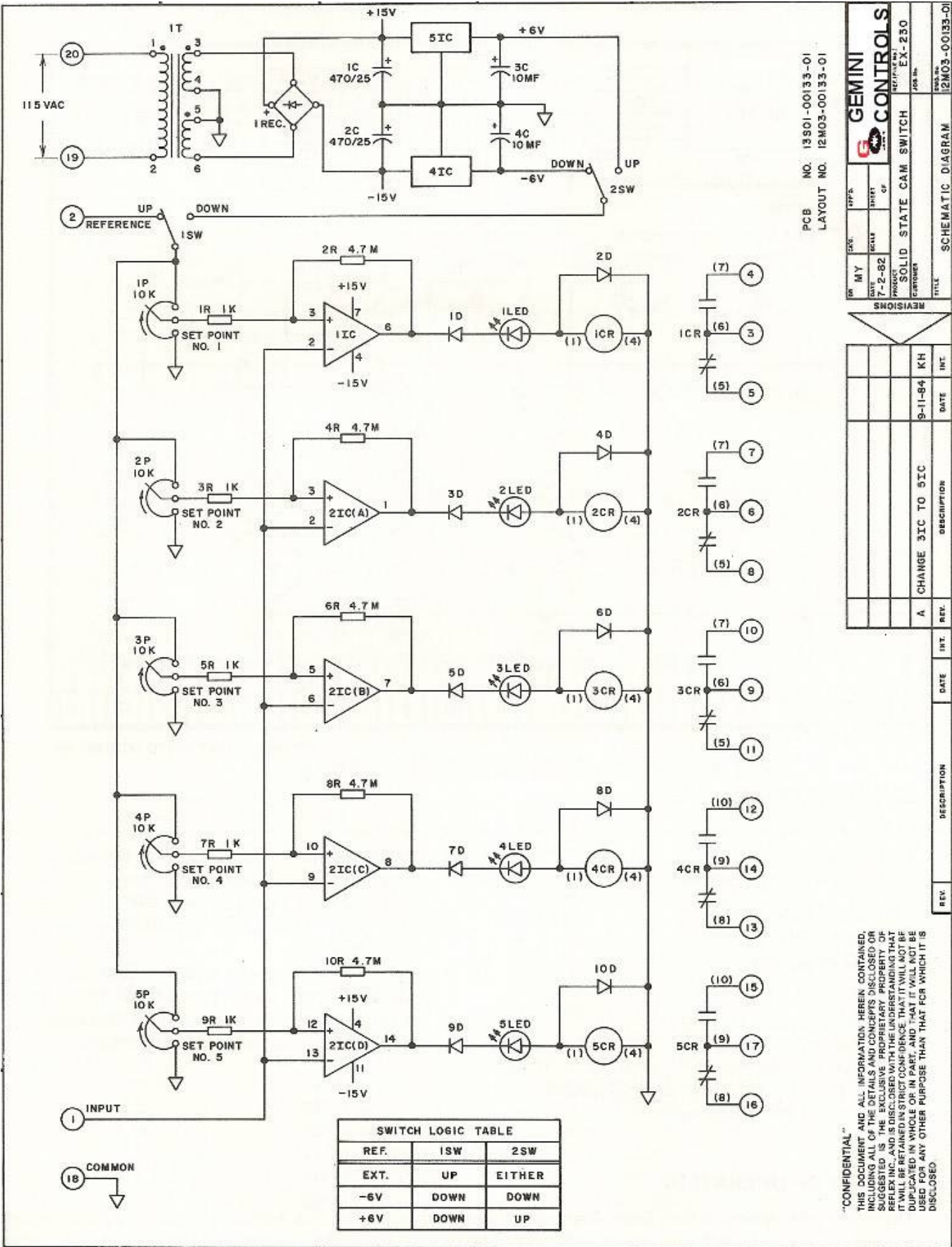
Symbol	Part #	Description (Acceptable Substitute)*
1T	04P01-00001	Transformer - 120V AC PRI, two 10V SEC @ 220 mA (Signal-PC20-220)
1REC	05P01-00003	Rectifier Bridge - 50V, 1A (EDI-PF50)
1-10D	05P02-00001	Diode Signal, 50mA, 200 PIV (1N4148)
1-5LED	07P04-00003	Diode-Light emitting (Litronix-RL-440)
1IC	05P08-00011	Op-Amp (LM741)
2IC	05P08-00001	Quad Op-Amp (National-LM324)
4IC	05P08-00007	-6 Volt Regulator (7906)
5IC	05P08-00006	+6 Volt Regulator (7806)
1-5P	02P05-10301-02	Potentiometer-10K, 1/2W 25 turn (Beckman 67ZR10K)
1-5CR	06P01-00002	Relay, 12V DPDT (Potter Brumfield-R10E1Y2S)
1, 2C	03P01-47102-01	Capacitor-470MF, 25V, Electrolytic
3, 4C	03P01-10001-00	Capacitor-10MF, 16V, Electrolytic
1, 3, 5, 7, 9R	01P01-10200-02	Resistor-1K, 1/4W, 5%
2, 4, 6, 8, 10R	01P01-47500-02	Resistor-4.7 Meg, 1/4W, 5%
1, 2 SW	09P01-00006	SPDT DIP Switch (Grayhill-78J02)

* OR EQUAL



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REF.	ISW	2SW
EXT.	UP	EITHER
-6V	DOWN	DOWN
+6V	DOWN	UP

PCB NO. 13S01-00133-01
LAYOUT NO. 12M03-00133-01

GEMINI
CONROLS

DATE: 7-2-82
REVISED BY: [blank]
PRODUCED BY: [blank]
JOB NO.: [blank]

115 VAC
19
20

1T
1
2
3
4
5
6

1REC

+15V
+6V
-15V
-6V

1C 470/25
2C 470/25
3C 10MF
4C 10MF

5IC
4IC
2SW

UP
DOWN

2
REFERENCE
UP
DOWN
1SW

1P 10K
IR 1K
SET POINT NO. 1

2P 10K
3R 1K
SET POINT NO. 2

3P 10K
5R 1K
SET POINT NO. 3

4P 10K
7R 1K
SET POINT NO. 4

5P 10K
9R 1K
SET POINT NO. 5

1
INPUT
18
COMMON

2R 4.7M
4R 4.7M
6R 4.7M
8R 4.7M
10R 4.7M

1IC
2IC(A)
2IC(B)
2IC(C)
2IC(D)
4IC

1D
3D
5D
7D
9D

1LED
2LED
3LED
4LED
5LED

2D
4D
6D
8D
10D

1CR
2CR
3CR
4CR
5CR

(7) 4
(6) 3
(5) 5

(7) 7
(6) 6
(5) 8

(7) 10
(6) 9
(5) 11

(10) 12
(9) 14
(8) 13

(10) 15
(9) 17
(8) 16

REVISIONS

REV.	DATE	DESCRIPTION
A	9-11-84 KH	CHANGE 3IC TO 5IC

TITLE: SCHEMATIC DIAGRAM

REV. INT. DATE DESCRIPTION

REV. INT. DATE DESCRIPTION

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