INSTRUCTIONS

GEK-86070

SOLID STATE OVERCURRENT RELAY

TYPE SLC54A

GENERAL ELECTRIC

CONTENTS

SOLID STATE OVERCURRENT RELAY

TYPE SLC54A

DESCRIPTION

The Type SLC54A is a static, three phase, overcurrent relay, which provides line open indication. Four identical circuits are provided to monitor four three phase lines. This relay is packaged in a single rack unit case as shown in Figure 1. Internal component locations are shown in Figure 2, and the relay internal connections are shown in Figure 3.

The SLC54A relay is not intended for use by itself but rather as part of a complement of equipment that forms a complete protective scheme. The SLC54A relay outputs are DC logic signals that are fed into the SLA logic relay, the circuitry of which depends upon the overall protection scheme. These static circuits require plus or minus 15 volts DC, which is obtained from the SSA power supply. For a complete description of the overall scheme in which this relay is employed, refer to the overall logic diagram which is supplied with each terminal of equipment.

Included in each SLC54A are four three-phase overcurrent functions (I3Ø).

APPLICATION

The I3Ø functions included in the SLC54A are typically used in a scheme which is designed to detect whether or not a particular line is in service. If the current in the line is above the level of the charging current for that line, then the line is considered in service. For this application, the I3Ø functions should be set to at least 125 percent of the maximum charging current for the associated line.

If the SLC54A relay is employed as part of a different scheme, the settings of the I3Ø will be determined by that particular application.

RATINGS

The SLC54A relays are designed for use in an environment where the air temperature outside the relay case is between minus 20°C and plus 65°C.

Current circuits of this relay have a continuous rating of ten amperes, and a one-second rating of 300 amperes.

The range of adjustment for the I3Ø function is 0.2 to 3.0 amperes.

BURDENS

The current burden measured at five amperes line current is as follows:

Phase current burden - R = 0.020, X = 0.013, Z = 0.024 ∠ 33°

OPERATING PRINCIPLES AND CHARACTERISTICS

The I3Ø function in the SLC54A relay has an adjustable non-directional characteristic which operates on the highest delta (I_1, I_2 , etc.) current.

CIRCUIT DESCRIPTION

The internal connection diagram of the SLC54A relay (Figure 3) shows the current inputs on the left side; the small squares denote the specific points on the RA, RB, RC or RD terminal boards at the rear of the unit. The double arrow points on the right side represent the plug connections between the relay units.

Input currents are routed through transactors, the outputs of which are voltages controlled by secondary loading, that are set at the factory. These voltages are filtered, full wave rectified, and fed to a user adjustable level detector. The detector output pulses are stretched to provide continuous output logic signals routed to the SLA logic unit via cable C071.

CONSTRUCTION

The SLC54A relay is packaged in a metal enclosure designed for mounting on a 19 inch rack. The relay is four rack units high (one rack unit is 1-3/4 inches) and has a 90 degree hinged front cover and removable top cover. It contains the magnetics, filtering and printed circuit cards required to provide the phase and ground overcurrent functions previously listed.

The operating level of each overcurrent function is adjustable via a potentiometer mounted on the printed circuit card associated with the function. The card identification, such as D101, and its position, denoted by the letter in the small square in the lower right corner, is shown on the unit internal connection diagram, Figure 3. One test card is included at the extreme right position, "T." TP1 at the top

of the card is connected to relay reference; TP10 at the bottom of the card is connected to the plus 15 volt DC bus. Other test points are located at selected points within the logic circuitry to permit test measurement of the various functions and facilitate troubleshooting.

The potentiometers, P1 to P12, located on the rear of the relay, are factory set to provide the range of operation of the associated overcurrent function.

RECEIVING, HANDLING AND STORAGE

These relays will normally be supplied as part of a static relay equipment, mounted in a rack or cabinet with other static relays and test equipment. Immediately upon receipt of a static relay equipment, it should be unpacked and examined for any damage sustained in transit. If damage resulting from rough handling is evident, file a damage claim at once with the transportation company and promptly notify the nearest General Electric Sales Office.

Reasonable care should be exercised in unpacking the equipment. If the equipment is not to be installed immediately, it should be stored indoors in a location that is free from moisture, dust, metallic chips, and severe atmospheric contaminants.

Just prior to final installation the shipping support bolt should be removed from each side of all relay units to facilitate possible future unit removal for maintenance. These shipping support bolts are approximately eight inches back from the relay front panel. STATIC RELAY EQUIPMENT, WHEN SUPPLIED IN SWING RACK CABINETS, SHOULD BE SECURELY ANCHORED TO THE FLOOR OR TO THE SHIPPING PALLET TO PREVENT THE EQUIPMENT FROM TIPPING OVER WHEN THE SWING RACK IS OPENED.

INSTALLATION TESTS

The Type SLC54A relay is usally supplied from the factory mounted and wired in a static relay equipment.

NECESSARY ADJUSTMENTS

The following checks and adjustments should be made by the user in accordance with the procedures given below under DETAILED TESTING INSTRUCTIONS, before the relays are put into service. Some of the following items are checks of factory calibrations and settings, and installation connections, and normally do not require readjustment in the field. Other items cover settings or adjustments which depend on installation conditions and must be made on installed equipment.

GENERAL TESTING INSTRUCTIONS

Input Circuits

The Type SLC54A relay has four terminal blocks on the rear of the unit identified as RA, RB, RC and RD. The terminal block is usually wired to the test panel test receptacle (XLB), where test currents can be supplied through the standard Type XLA

test plug. Input connections at the test receptacle can be determined by referring to the equipment elementary diagram.

Output Signals

Output signals are measured with respect to the reference bus or TP1. Outputs are continuous signals of approximately plus 12 to plus 15 volts for the ON condition, and zero volts for the OFF condition. This output can be monitored with an oscilloscope, a portable high impedance DC voltmeter, or with the test panel voltmeter if available. To connect the test panel voltmeter, place the test lead in the proper test point pin jack and the other end in the pin jack on the test panel.

DETAILED TESTING INSTRUCTIONS

Required Adjustments

The overcurrent function settings may be made and tested using a single phase test source. A possible test circuit is shown in Figure 4 with the input connections for the SLC54A given below in Table I. To change the operating point, apply the desired current level and adjust the potentiometer on the level detector card of the circuit being tested.

TABLE I

CIRCUIT	FUNCTION	CONNECT RELAY TERMINALS TO TEST CIRCUIT POINTS			MONITOR OUTPUT AT
		A	B	JUMPER	
1	I3Ø Ø1-2 I3Ø Ø2-3 I3Ø Ø3-1	RA2 RA4 RA6	RA4 RA6 RA2	RA3-RA5 RA5-RA7 RA7-RA3	TP4
2	I3Ø Ø1-2 I3Ø Ø2-3 I3Ø Ø3-1	RB2 RB4 RB6	RB4 RB6 RB2	RB3-RB5 RB5-RB7 RB7-RB3	TP6
3	I3Ø Ø1-2 I3Ø Ø2-3 I3Ø Ø3-1	RC2 RC4 RC6	RC4 RC6 RC2	RC3-RC5 RC5-RC7 RC7-RC3	TP12
4	I3Ø Ø1-2 I3Ø Ø2-3 I3Ø Ø3-1	RD2 RD4 RD6	RD4 RD6 RD2	RD3-RD5 RD5-RD7 RD7-RD3	TP14

I3Ø level detectors operate on the highest phase-to-phase current input; if operating point differences are observed, calibration procedure is described below:

CALIBRATION

The SLC54A relay calibration may be checked by applying a single phase current per Figure 4 and Table II.

CIRCUIT	FUNCTION	CONNECT RELAY TERMINALS TO TEST CIRCUIT POINTS A	B	JUMPER	AMPS	ADJUST POT	MEASURE 0.12 Vo-PK AT
1	I3Ø Ø1-2	RA2	RA4	RA3-RA5	0.2	1	TP3
	I3Ø Ø2-3	RA4	RA6	RA5-RA7	0.2	2	
	I3Ø Ø3-1	RA6	RA2	RA7-RA3	0.2	3	
2	I3Ø Ø1-2	RB2	RB4	RB3-RB5	0.2	4	TP5
	I3Ø Ø2-3	RB4	RB6	RB5-RB7	0.2	5	
	I3Ø Ø3-1	RB6	RB2	RB7-RB3	0.2	6	
3	I3Ø Ø1-2	RC2	RC4	RC3-RC5	0.2	7	TP11
	I3Ø Ø2-3	RC4	RC6	RC5-RC7	0.2	8	
	I3Ø Ø3-1	RC6	RC2	RC7-RC3	0.2	9	
4	I3Ø Ø1-2	RD2	RD4	RD3-RD5	0.2	10	TP13
	I3Ø Ø2-3	RD4	RD6	RD5-RD7	0.2	11	
	I3Ø Ø3-1	RD6	RD2	RD7-RD3	0.2	12	

MAINTENANCE

PERIODIC CHECKS

For any periodic testing of Type SLC54 relays, the trip coil circuit of the circuit breaker should be opened by opening the disconnect switches or other test switches provided for this purpose.

TROUBLESHOOTING

Test points are provided at selected points in the SLC54A relay to observe outputs if troubleshooting is necessary. The use of a card adapter will make the pins on any one card available for testing.

For the physical location of components and cards, refer to Figure 2, the component location diagram.

SPARE CARDS

The number of spare cards to be stocked depends on the total number of static relays using similar cards at the same location or serviced by the same test group. For each type of card (different code designation) a suggested minimum number of spare cards would be:

One spare for	1 to 25 cards
Two spares for	25 to 75 cards
Three spares for	76 to 150 cards

CARD DRAWINGS

Details of the circuits of the printed circuit cards can be obtained in the printed circuit card instruction book, GEK-34148.

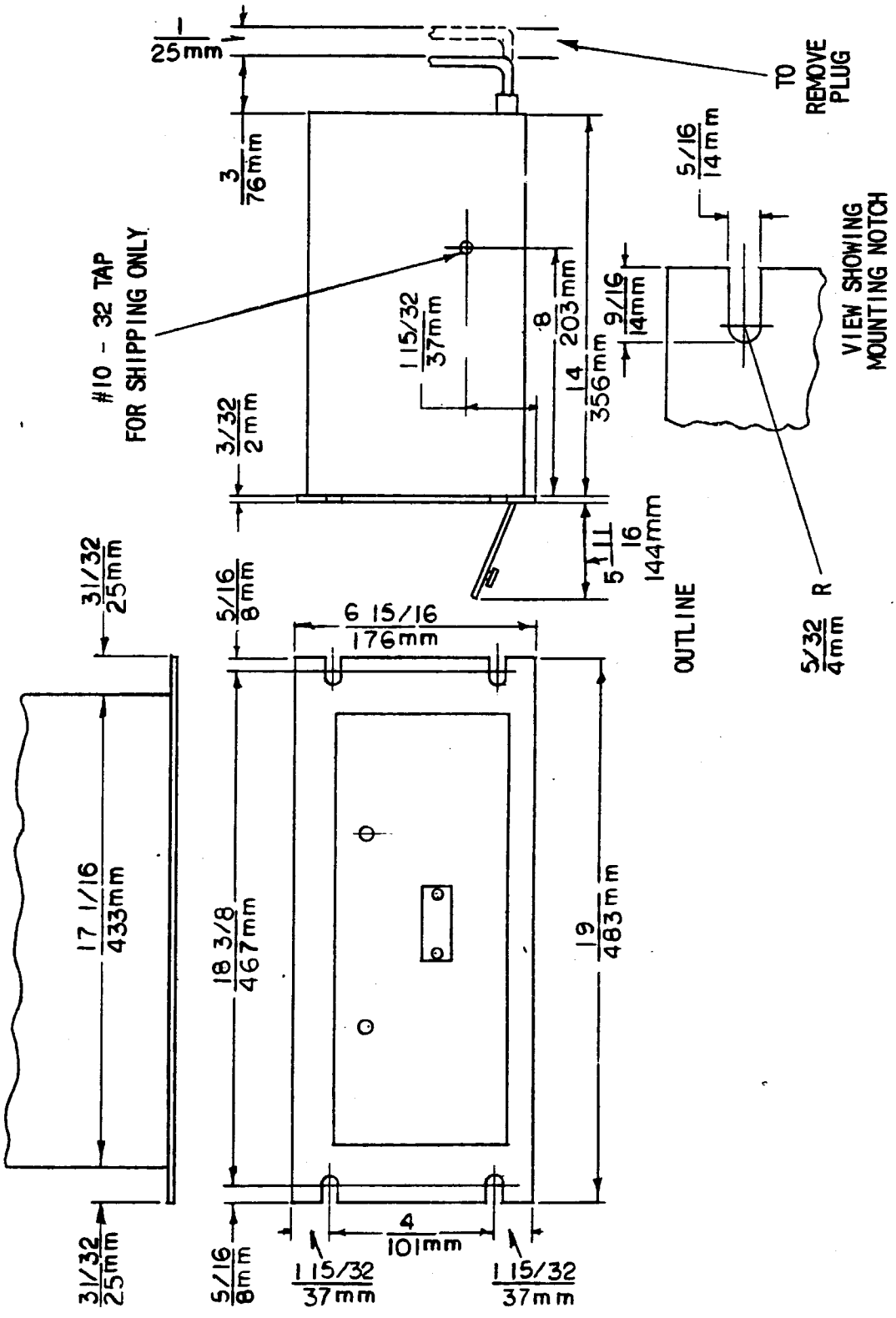

Figure 1 (0227A2037-0) Outline and Mounting Dimensions for the SLC54A Relay

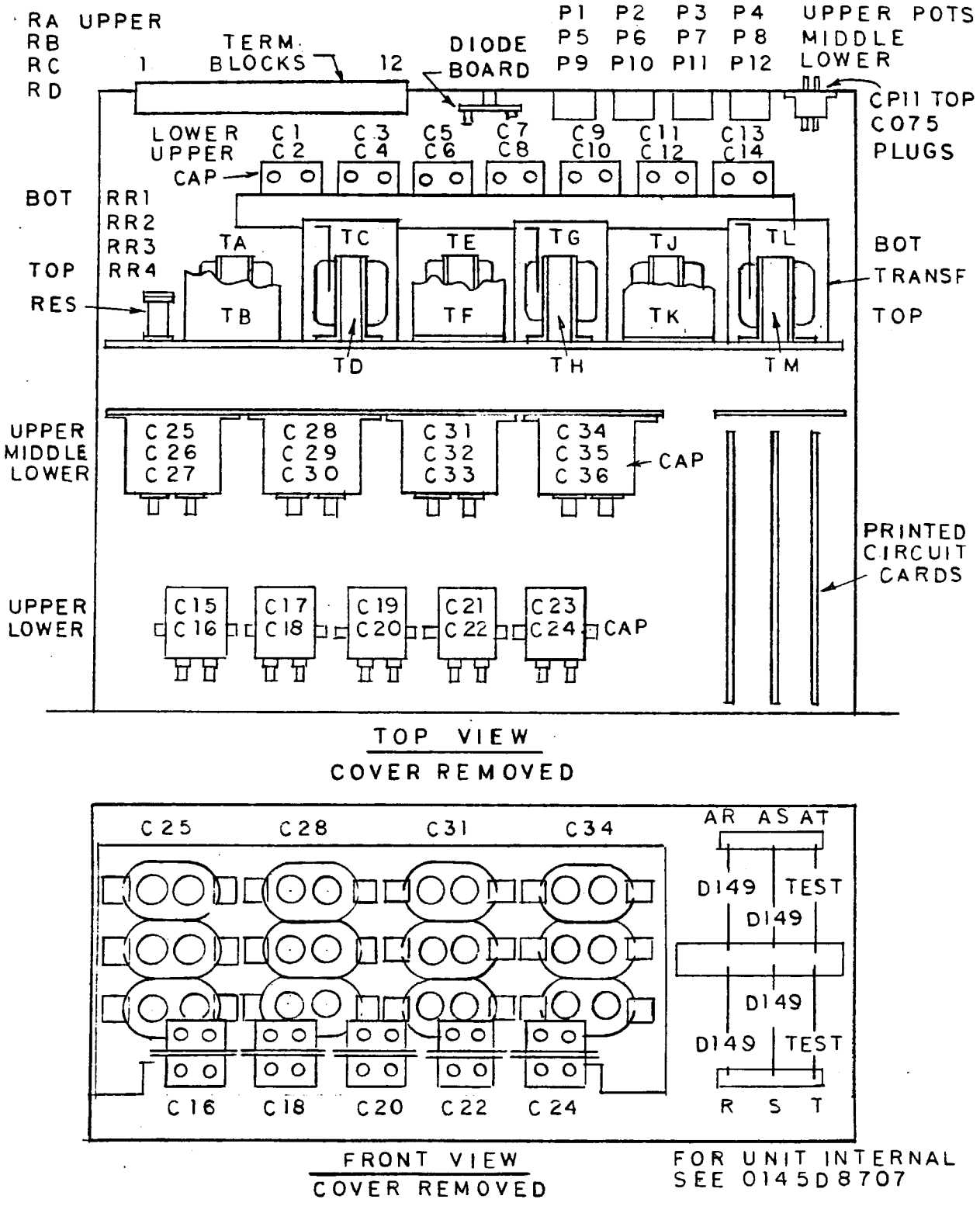

Figure 2 (0285A6223) Component Location Diagram
for the SLC54A Relay

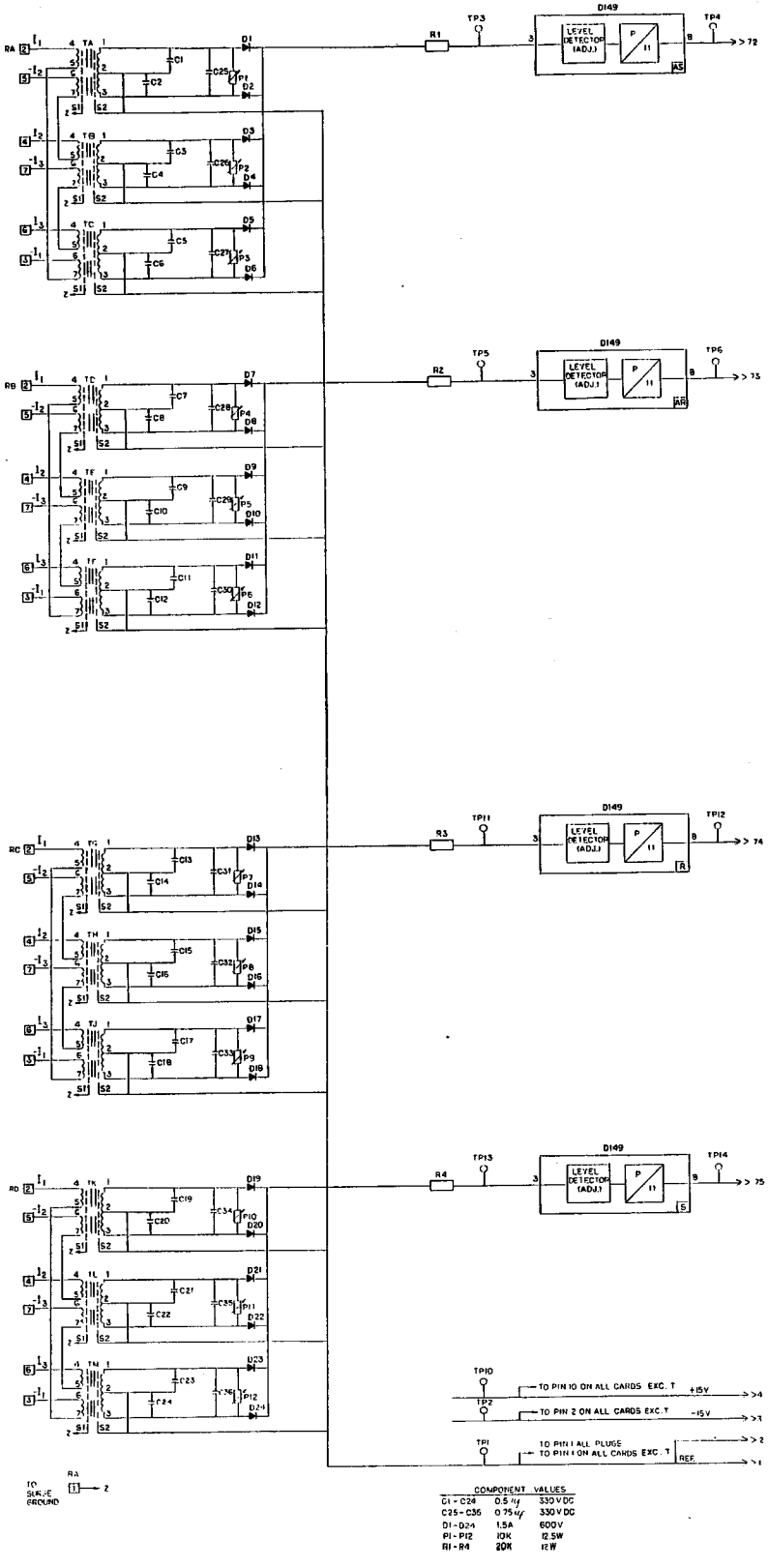

Figure 3 (0145D8707-0) Internal Connections Diagram for the SLC54A Relay

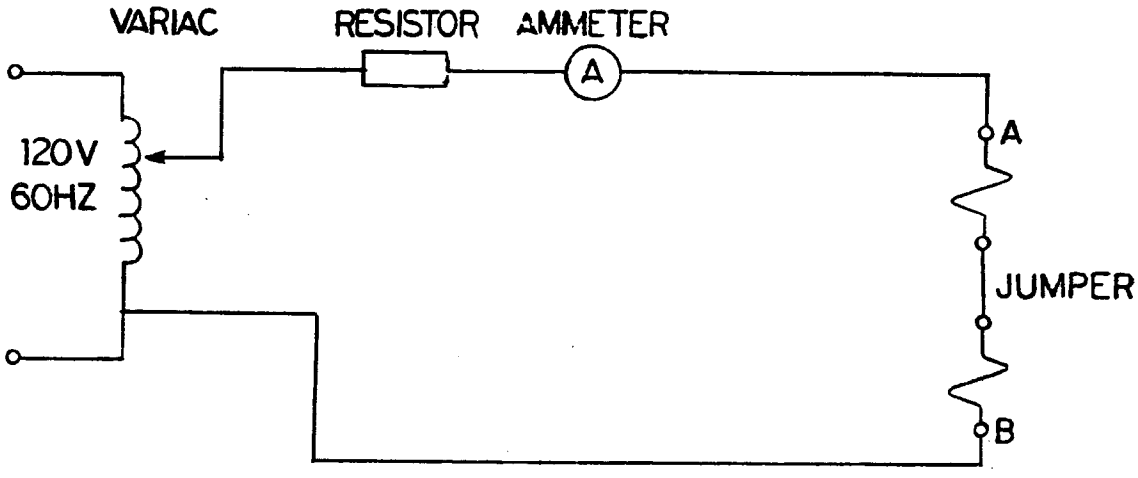

Figure 4 (0285A7028-0) Test Circuit for the SLC54A Overcurrent Functions