



**INSTRUCTIONS**

**GEK-86082**

***STATIC OUTPUT AND TRIPPING UNIT***

***TYPE SLAT54T***

---

**GENERAL  ELECTRIC**

CONTENTS

PAGE

<b>DESCRIPTION</b> .....	3
<b>RATINGS</b> .....	3
<b>BURDENS</b> .....	3
<b>FUNCTIONS</b> .....	4
OUTPUT CIRCUITS .....	4
TABLE I .....	4
<b>LOGIC CIRCUITS</b> .....	4
<b>CALCULATION OF SETTINGS</b> .....	4
<b>CONSTRUCTION</b> .....	4
<b>RECEIVING, HANDLING AND STORAGE</b> .....	5
<b>TEST INSTRUCTIONS</b> .....	5
CAUTION .....	5
GENERAL .....	6
OPERATIONAL CHECKS .....	6
TEST CARD ADAPTER .....	6
TIMER ADJUSTMENTS AND TEST .....	6
<b>MAINTENANCE</b> .....	7
PERIODIC TESTS .....	7
TROUBLESHOOTING .....	7
SPARE PARTS .....	7

**STATIC OUTPUT AND TRIPPING UNIT**

**TYPE SLAT54T**

**DESCRIPTION**

The Type SLAT54T relay is a static output and tripping unit. The relay is not intended to be used by itself, but rather as part of a complement of equipment that forms a protective relaying scheme. For a complete description of the overall scheme in which this relay is employed, refer to the overall logic diagram and its associated logic description that is supplied with each terminal of equipment.

The SLAT54T relay is packaged in a four rack unit (one rack unit equals 1-3/4 inches) enclosed metal case suitable for mounting in a 19-inch rack. The outline and mounting dimensions are shown in Figure 1. The internal connections for the relay are shown in Figure 2. The component and card locations are shown in Figure 3.

**RATINGS**

The Type SLAT54T relay is designed for use in an environment where the air temperature outside the relay case is between minus 20°C and plus 65°C.

The Type SLAT54T relay requires a plus and minus 15 volt DC power source which can be obtained from a Type SSA power supply.

Output contacts of the telephone-type relays that are used in this relay will make and carry three amperes continuously, and will interrupt up to 0.5 ampere (inductive) at 125 volts DC.

**BURDENS**

The SLAT54T relay presents a maximum burden to the Type SSA power supply of:

- 300 milliamperes from the plus 15 volts DC supply
- 175 milliamperes from the minus 15 volts DC supply

Each target lamp draws 80 milliamperes from the minus 15 volt DC supply.

The contact converters, when energized, draw ten milliamperes each from the station battery.

*These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the General Electric Company.*

*To the extent required the products described herein meet applicable ANSI, IEEE and NEMA standards; but no such assurance is given with respect to local codes and ordinances because they vary greatly.*

**FUNCTIONS**

OUTPUT CIRCUITS

TABLE I

FUNCTION	CONTACTS			SEAL IN	TARGET LAMP
	N.O.	N.C.	TRANSFER		
CC1A	1	1		x	L1
74-1	1	1		x	L1
74-2	2			x	L2
XT	3	3	1		

Each of the above contacts are electrically separate, except the transfer (C) contact of the XT function. The pickup time is 17 milliseconds after the relay coil is energized. Dropout time of the XT function is 17 milliseconds after the coil is de-energized.

**LOGIC CIRCUITS**

The functions of the Type SLAT54T involve basic logic (AND, OR, and NOT) where the presence or absence of signals, rather than their magnitude, controls the operation. Signals are measured with respect to a reference bus accessible at TP1. In general, a signal below one volt DC represents an OFF or LOGIC ZERO condition; an ON or LOGIC ONE is represented by a signal of approximately plus 15 volts DC.

**CALCULATION OF SETTINGS**

The SLAT54T is an integral part of an overall scheme, and reference should be made to the overall logic diagram description for both application and setting information.

**CONSTRUCTION**

The SLAT54T relay is packaged in an enclosed metal case with hinged front cover and removable top cover. The outline and mounting dimensions of the case and the physical location of the components are shown in Figure 1 and 3, respectively.

The SLAT54T relay contains printed circuit cards identified by a code number such as: A120, T158, L106, where A designates an auxiliary function, T designates a time-delay function, and L designates a logic function. The printed circuit cards plug in from the front of the unit. The sockets are marked with letter designations or "addresses" (E, F, G, etc.), which appear on the guide strips in front of each socket, on the component location drawings, on the unit internal connection diagram, and on the printed circuit card. The test points (TP1, TP2, etc.) shown on the

internal connections diagram are connected to instrument jacks on the test card in position T with TP1 at the top of the AT card. TP1 is tied to reference; TP10 is tied to plus 15 volts DC through a 2.2K resistor. The resistor limits the current when TP10 is used to supply a logic signal to a card.

The SLAT54T relay receives its inputs from an associated unit. These units are interconnected by ten conductor shielded cables. The sockets for these cables are located on the rear panel of the unit. The SLAT54T output functions are connected to 12 point terminal strips, which are also located on the rear of the unit.

A window is provided in the hinged cover of the relay to allow the light targets to be seen. Push buttons are also provided to reset the targets without opening the cover.

### RECEIVING, HANDLING AND STORAGE

The SLAT54T relay 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 injury or 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.

### TEST INSTRUCTIONS

#### CAUTION:

THE LOGIC SYSTEM SIDE OF THE DC POWER SUPPLY USED WITH MOD III STATIC RELAY EQUIPMENT IS ISOLATED FROM GROUND. IT IS A DESIGN CHARACTERISTIC OF MOST ELECTRONIC INSTRUMENTS THAT ONE OF THE SIGNAL INPUT TERMINALS IS CONNECTED TO THE INSTRUMENT CHASSIS. IF THE INSTRUMENT USED TO TEST THE RELAY EQUIPMENT IS ISOLATED FROM GROUND, ITS CHASSIS MAY HAVE AN ELECTRICAL POTENTIAL WITH RESPECT TO GROUND. THE USE OF A TEST INSTRUMENT WITH A GROUNDED CHASSIS WILL NOT AFFECT THE TESTING OF THE EQUIPMENT. HOWEVER, A SECOND GROUND CONNECTION TO THE EQUIPMENT, SUCH AS A TEST LEAD INADVERTENTLY DROPPING AGAINST THE RELAY CASE, MAY CAUSE DAMAGE TO THE LOGIC CIRCUITRY. NO EXTERNAL TEST EQUIPMENT SHOULD BE LEFT CONNECTED TO THE STATIC RELAYS WHEN THEY ARE IN PROTECTIVE SERVICE, SINCE TEST EQUIPMENT GROUNDING REDUCES THE EFFECTIVENESS OF THE ISOLATION PROVIDED.

IF THE SLAT54T RELAY THAT IS TO BE TESTED IS INSTALLED IN AN EQUIPMENT WHICH HAS ALREADY BEEN CONNECTED TO THE POWER SYSTEM, DISCONNECT THE OUTPUTS TO THE SYSTEM DURING TEST.

### GENERAL

The SLAT54T relay is supplied from the factory either as a separate unit, or mounted in a static relay equipment associated with measuring relays, a Type SSA power supply, and some form of channel equipment. All relay units for a given terminal of static relaying equipment are tested together at the factory, and each unit will have the same summary number stamped on its nameplate.

In general, when a time range is indicated on the internal connections diagram, the timer has been factory set at a mid-range value. Timers should be set for the operating or reset times indicated on the associated overall logic diagram. Where a time range is indicated on the overall logic diagram, the timer should be set for the value recommended for that function in the descriptive writeup accompanying the overall logic diagram. Where a setting depends upon conditions encountered on a specific application, this is so stated and the factors influencing the choice of setting are described. The procedure for checking and setting the timers is described in a later section.

### OPERATIONAL CHECKS

Operation of the SLAT54T unit can be checked by observing the signals at the ten test points (TP1 to TP10) in the SLAT54T by observing the operation of the associated channel equipment, or by observing the output functions. The test points are located on the test card in position AT, and are numbered 1 to 10 from top to bottom. TP1 is the reference bus for the logic circuit, TP10 is at plus 15 volts DC. The remaining points are located at various strategic points throughout the logic as shown in the internal connection diagram (Figure 2). Test point voltages can be monitored with a portable high impedance voltmeter, the voltmeter on the test panel of the associated equipment, or an oscilloscope.

### TEST CARD ADAPTER

The test card adapter provides a convenient means of gaining access to any pin of a particular card. Detailed information on the use of the test adapter card is included in the printed circuit card instruction book GEK-34158.

### TIMER ADJUSTMENTS AND TESTS

When the time-delay cards are to be adjusted or checked, an oscilloscope that can display two traces simultaneously, and that has a calibrated horizontal sweep, should be used.

In order to test the timer cards, it is necessary to remove the card previous to the timer and to place the timer card in a card adapter. The card adapter allows access to the input and output of the timer if they are not brought out on test points. The timer test circuit is shown on Figure 4. Opening the normally closed contact causes the output to step up to plus 15 volts DC after the pickup delay of

the timer. To increase the pickup time, turn the upper potentiometer on the timer card clockwise; to decrease the time, turn it counterclockwise. Closing the contact causes the timer output to drop out after the reset time-delay setting of the card. If the timer card is provided with a variable reset delay, it can be adjusted by the lower potentiometer on the timer card (clockwise increases reset time).

## MAINTENANCE

### PERIODIC TESTS

It should be sufficient to check the outputs produced at test points in the SLAT54T when periodic calibration tests are made on the associated measuring units, for example, the phase and ground relays in line relaying scheme. No separate periodic tests on the SLAT54T itself should be required.

### TROUBLESHOOTING

In any troubleshooting of equipment, it should first be established which unit is functioning incorrectly. The overall logic diagram supplied with the equipment shows the combined logic of the complete equipment and the various test points in each unit. By signal tracing, using the overall logic diagram and the various test points, it should be possible to quickly isolate the trouble.

A test adapter card is supplied with each static relay equipment to supplement the prewired test points on the test cards. Use of the adapter card is described in the printed circuit card instruction book GEK-34158.

A dual trace oscilloscope is a valuable aid to detailed troubleshooting, since it can be used to determine phase shift, operate and reset times as well as input and output levels. A portable dual-trace oscilloscope with a calibrated sweep and trigger facility is recommended.

### SPARE PARTS

To minimize possible outage time, it is recommended that a complete maintenance program should include the stocking of at least one spare card of each type. It is possible to replace damaged or defective components on the printed circuit cards, but great care should be taken in soldering, so as not to damage or bridge-over the printed circuit buses, or overheat the semiconductor components. The repaired areas should be recovered with a suitable hi-dielectric plastic coating to prevent possible breakdowns across the printed buses due to moisture and dust. The wiring diagrams for the cards in the SLAT54T relay are included in the printed circuit card instruction book GEK-34158.

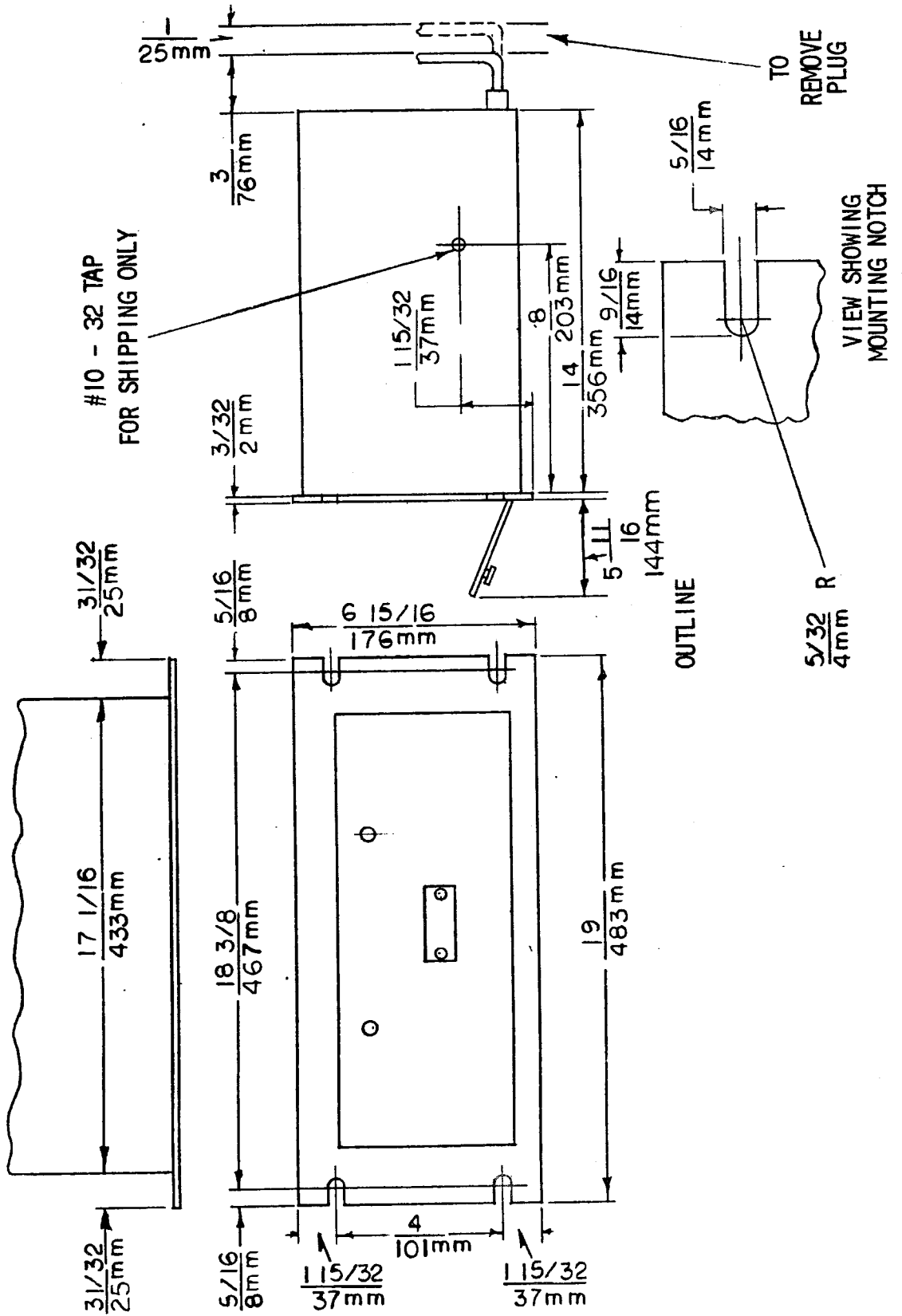


Figure 1 (0227A2037-0) Outline and Mounting Dimensions



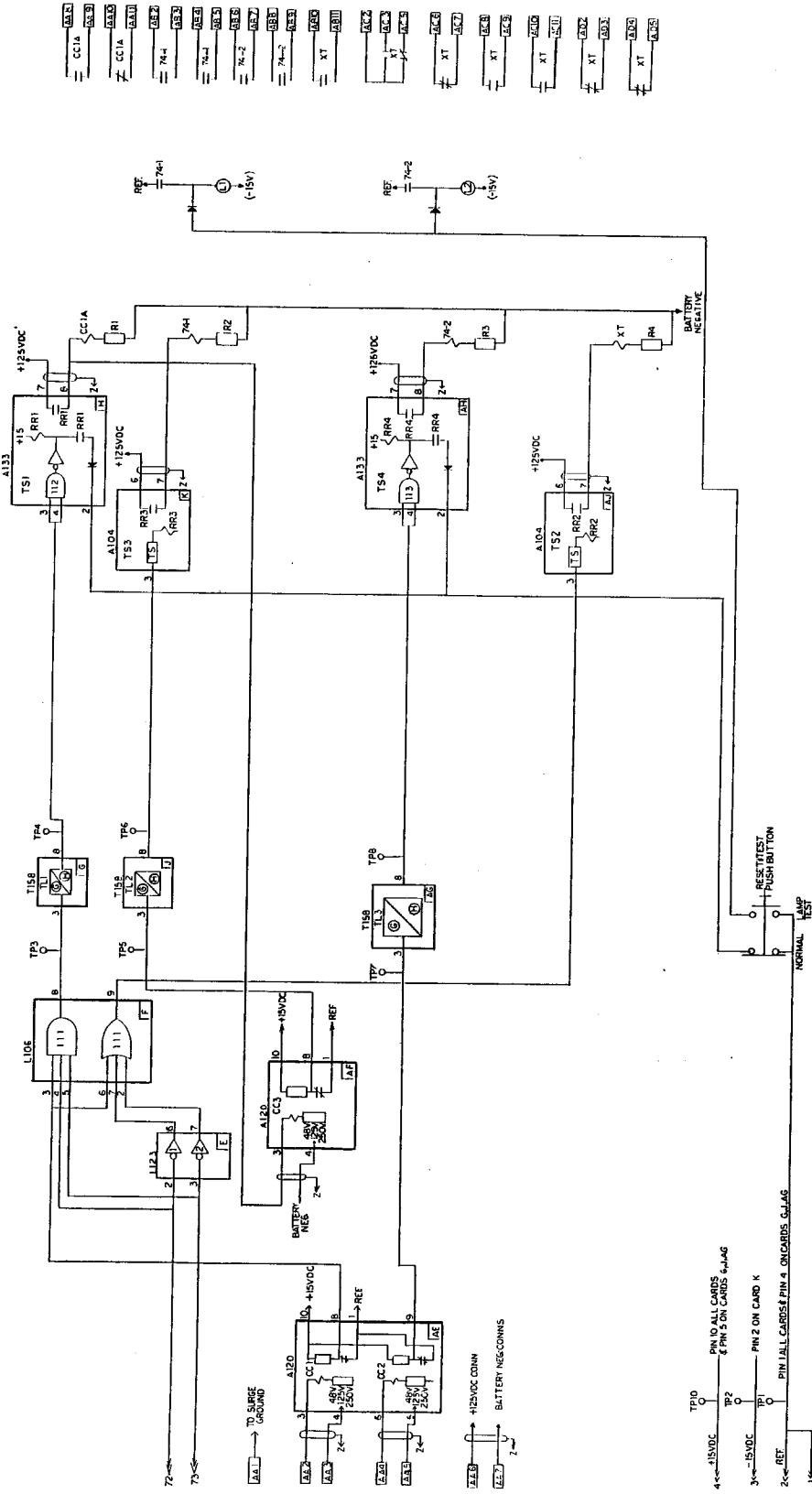


Figure 2 (0153D6008-0) Internal Connections for the Type SLAT54T Relay

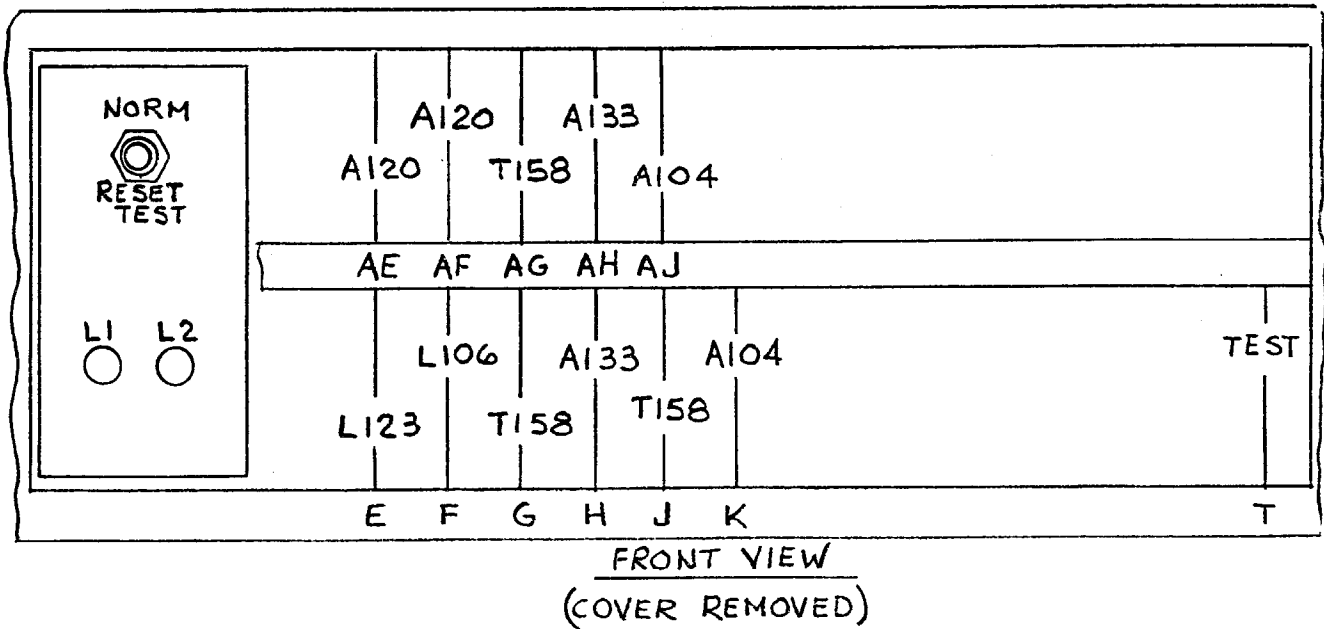
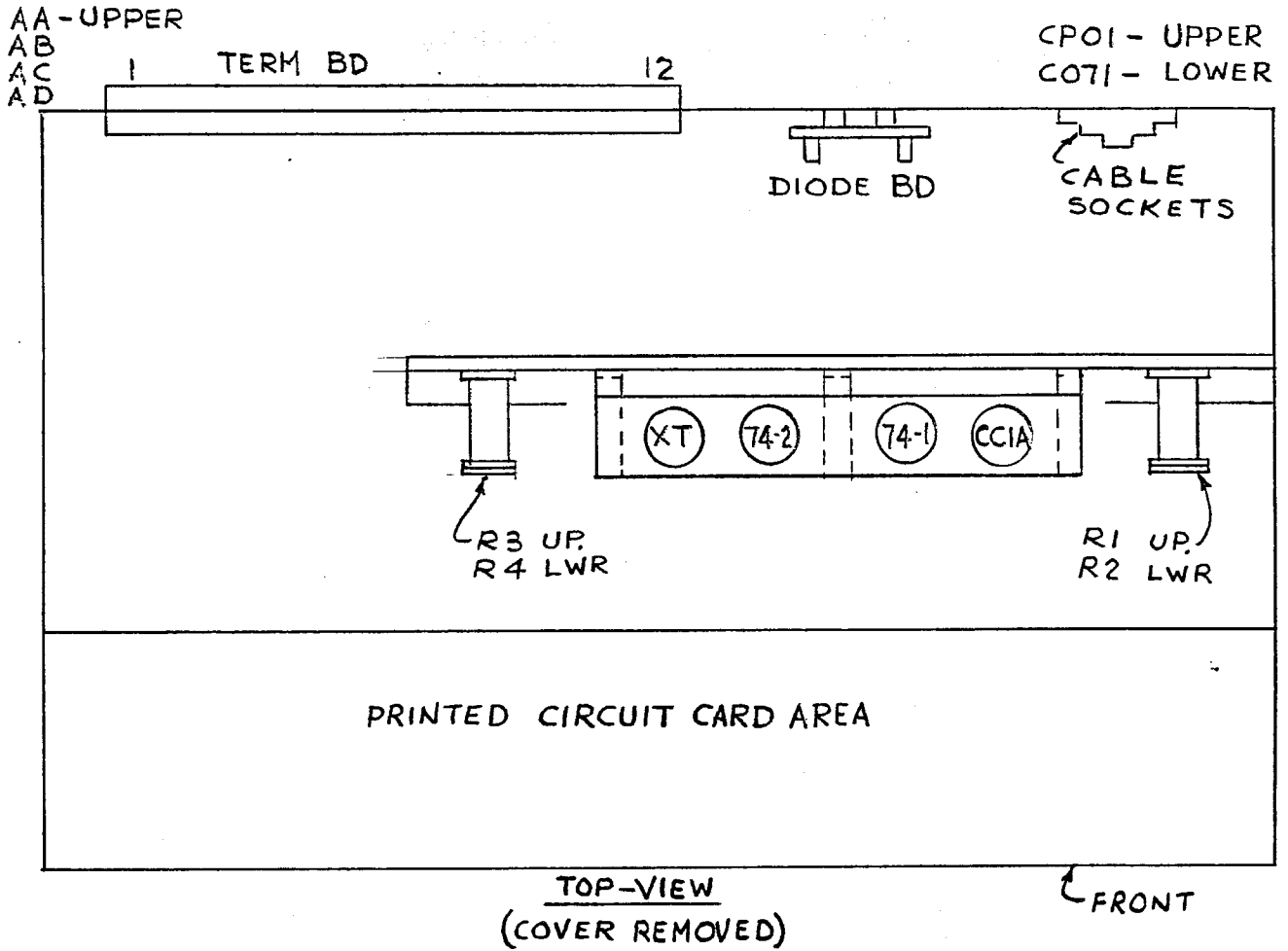
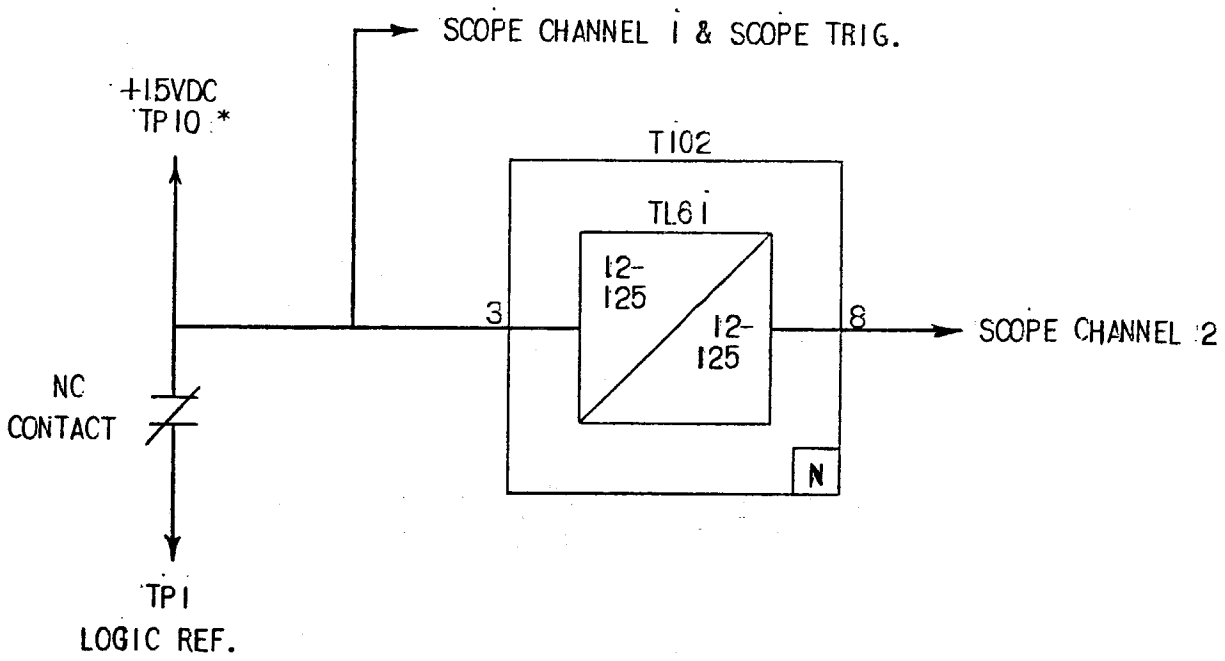


Figure 3 (0285A7047-0) Component Location Diagram



\* THE 15VDC SIGNAL AT PIN 10 HAS A CURRENT LIMITING RESISTOR MOUNTED ON THE TEST CARD.

Figure 4 (0246A7987-0) Logic Timer Test Circuit

**GENERAL ELECTRIC COMPANY  
POWER SYSTEMS MANAGEMENT BUSINESS DEPT.  
MALVERN, PA 19355**

**GENERAL  ELECTRIC**