INSTRUCTIONS

GEK-86697

AUXILIARY LOGIC UNIT

TYPE SLA52U

GENERAL ELECTRIC

CONTENTS

AUXILIARY LOGIC UNIT

TYPE SLA52U

DESCRIPTION

The SLA52U is an auxiliary logic relay for use in schemes using frequency shift channel equipment. It is usually used with a Type SLYP positive-sequence distance unit, a Type SLCN negative-sequence directional overcurrent unit, a Type SLAT output tripping unit, a Type SSA power supply, and a test panel.

The SLA52U has appropriate interconnections for use with a Type SLAT54 auxiliary and tripping unit when applied in single pole tripping and reclosing schemes.

The SLA52U is designed with considerable flexibility to accomodate various types of schemes such as blocking, unblocking, permissive transfer tripping, or combined schemes such as an unblocking scheme combined with a direct transfer trip scheme. Provision is made for various auxiliary tripping circuits which may be supplied initially or easily added later in the field. These optional circuits include direct tripping overcurrent and distance functions, line "pickup" circuitry, "weak infeed" trip circuitry, out-of-step tripping or blocking circuitry, and second zone back-up timing circuitry.

APPLICATION AND SETTINGS

Because of the flexibility of the Type SLA52U, the application and settings will vary with the particular type of scheme in which it is used. Refer to the overall logic diagram description for application and setting information for the particular scheme in which the SLA52U is used.

RATINGS

The Type SLA52U relay is designed for use in an environment where the ambient temperature outside the relay case is between -20°C and +65°C.

The Type SLA52U relay requires a ± 15 volt DC power source which can be obtained from a Type SSA power supply.

Each contact converter in this relay has a link for selecting the proper voltage for the coil circuit of the contact converter. The three available voltage taps are for 48 VDC, 125 VDC or 250 VDC.

BURDENS

The SLA52U relay presents a burden of 400 mA to the +15 VDC supply of the Type SSA power supply.

Each contact converter, when energized, will draw approximately 10 mA from the station battery, regardless of the station battery voltage.

OPERATING PRINCIPLES

The functions included in the Type SLA52U relay involve basic logic operations (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 VDC represents an OFF or LOGIC ZERO condition; an ON or LOGIC ONE condition is represented by a signal of approximately +15 VDC.

The symbols used on the internal connection diagram (Fig. 1) are explained by the legend shown in Fig. 2.

The purpose of the contact converters (CC1, CC2, CC3, CC4) included in the Type SLA52U relay is to convert a contact operation into a signal that is compatible with the logic circuitry of the relay. The function of each contact converter depends upon the particular relaying scheme in which it is employed.

The undervoltage level detector functions operate from single inputs from the individual phase-to-neutral connected relay potential transformers. The level detectors operate on magnitude only, and are independent of phase angle. The undervoltage level detectors have intentional time delay before resetting when the phase-to-neutral input voltage drops below the pickup level. The drop out levels are adjusted by the P1 pots on the D152 cards in positions A, B and C. The drop-out range for the undervoltage level detectors is 5 to 85 volts phase to neutral.

Settings for the undervoltage level detectors are discussed in the overall logic description for the particular equipment involved.

CONSTRUCTION

The SLA52U relay is packaged in an enclosed metal case with hinged front covers and removable top cover. The outline and mounting dimensions of the case and the physical location of the components are shown in Fig. 3 and 4, respectively.

The SLA52U relay contains printed circuit cards identified by a code number, such as A120, T157, L102 where A designates auxiliary function, T designates time-delay function, and L designates logic function. The printed circuit cards plug in from the front of the unit. The sockets are marked with letter designations or "addresses" (D, E, F, etc.) which appear on the guide strips in front of each socket, on the component location drawing, on the internal connection diagram, and on the printed circuit card. The test points (TP1, TP2, etc.) shown in the internal connection diagram are connected to instrument jacks on a test card in position T or AT with TP1 at the top of the AT card. TP10 is tied to +15 VDC through a 2.2K resistor. This resistor limits the current when TP10 is used to supply a logic signal to a card.

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 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.

INSTALLATION TESTS

If the SLA52U relay that is to be tested is installed in an equipment which has already been connected to the power system, disconnect the outputs in the associated Type SLAT relay from the system.

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.

GENERAL

The SLA52U relay is supplied from the factory either mounted in a static relay equipment or as a separate unit 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.

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 write-up 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 SLA52U unit can be checked by observing the signals at the twenty test points (TP1 to TP20) in the SLA52U, by observing the operation of the associated channel equipment, or by observing the output functions in the associated Type SLAT tripping relay. The test points are located on two test cards in positions T and AT and are numbered 1 to 20 from top to bottom. TP1 is the reference bus for the logic circuit; TP10 is at +15 VDC. The remaining points are located at various strategic points throughout the logic as shown on the internal connection diagram, Fig. 1. 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.

Operation of any logic function may be checked by supplying the correct inputs to the card. This is accomplished by placing the card under test in a card extender, removing the cards which normally supply the input signals, and then connecting the card inputs to either TP10 or TP1. An output should be produced when the proper combination of inputs is supplied.

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 card adapter is included in the 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 which supplies the input 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 in Fig. 5. Opening the normally closed contact causes the output to step up to +15 VDC 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 the potentiometer on the timer card 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).

UNDERVOLTAGE ADJUSTMENTS AND TESTS

1. A single-phase voltage test source is required for these tests.

2. Set the applied test voltage to the desired dropout level.

3. Connect an oscilloscope input to the proper test point for the level detector being checked or tested per Table I. Connect scope reference to TP1.

4. Adjust pot P1 on the card under test (per Table I) to just get the required dropout. Turning P1 clockwise increases drop out level.

Note: For testing ϕA, connect voltage source to AN2-AN3; for ϕB, use AN4-AN5; and for ϕC, use AN6-AN7.

TABLE I

FUNCTION RANGE	CARD LOCATION	OUTPUT TEST POINT	RANGE ϕ-N VOLTS(RMS)
U/V ϕA	A	TP12	5-85
U/V ϕB	B	TP14	5-85
U/V ϕC	C	TP16	5-85

OVERALL EQUIPMENT TESTS

After the SLA52U relay and the associated static relay units have been individually calibrated and tested for the desired settings, a series of overall operating circuit checks is advisable.

The elementary, overall logic, and logic description for the specific job will be useful for determining the overall operation of the scheme.

Overall equipment tests can be performed by applying alternating current to the measuring units at the voltages specified in the instruction book for the measuring units, and checking that proper outputs are obtained from the associated SLAT when the measuring units operate.

MAINTENANCE

PERIODIC TESTS

It should be sufficient to check the outputs produced at test points in the SLA52U when periodic calibration tests are made on the associated measuring units, for example, the phase and ground relay in the line relaying scheme. No separate periodic tests on the SLA52U itself should be required.

TROUBLESHOOTING

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.

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 isolate the trouble quickly .

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 card instruction book, GEK-34158.

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 area should be re-covered with a suitable high-dielectric plastic coating to prevent possible breakdowns across the printed buses due to moisture and dust. The wiring diagrams for the cards in the SLA52U relay are included in the card book, GEK-34158.

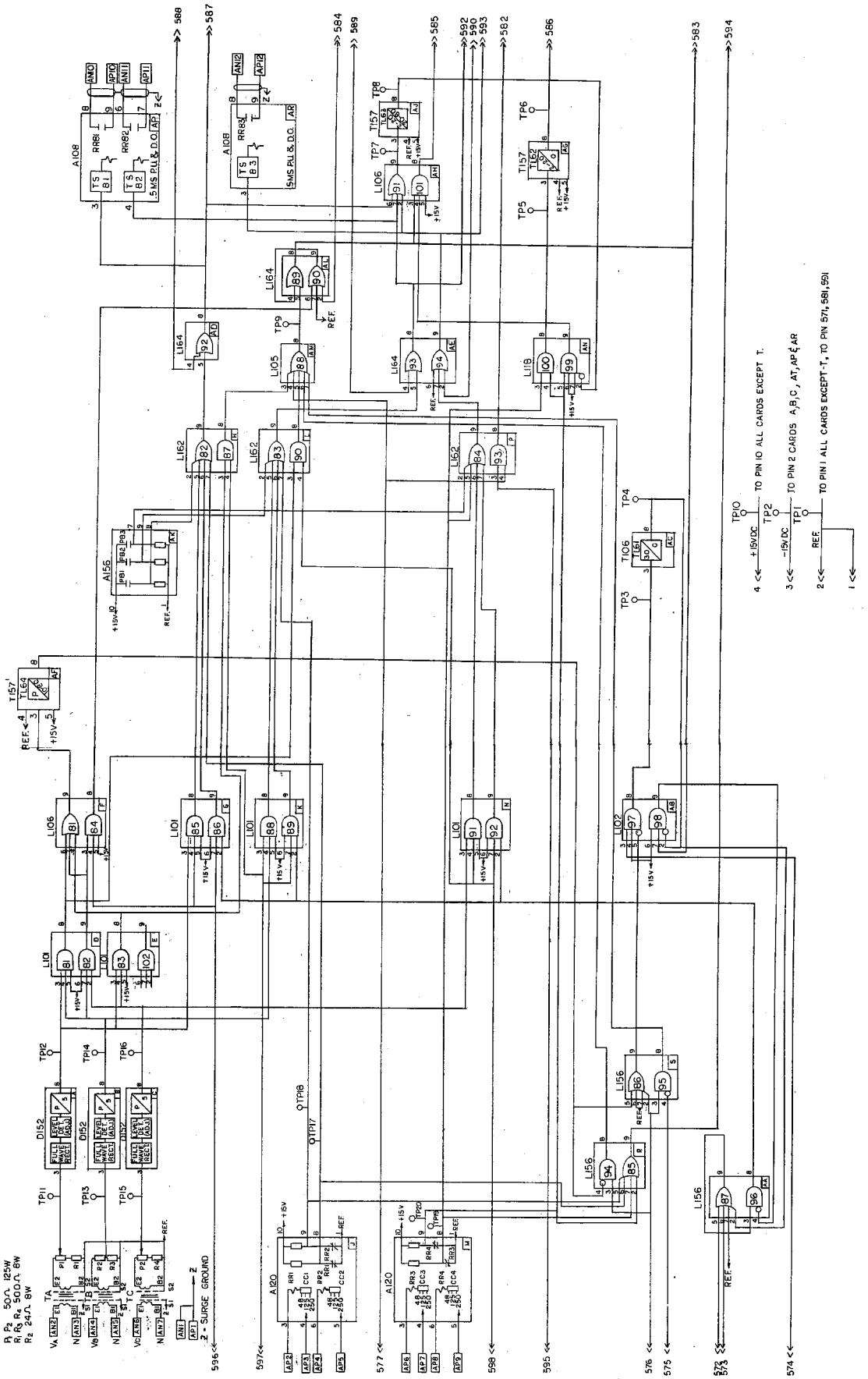


Fig. 1 (0153D6931-0) Internal Connections Diagram for the Type SLA52U Relay

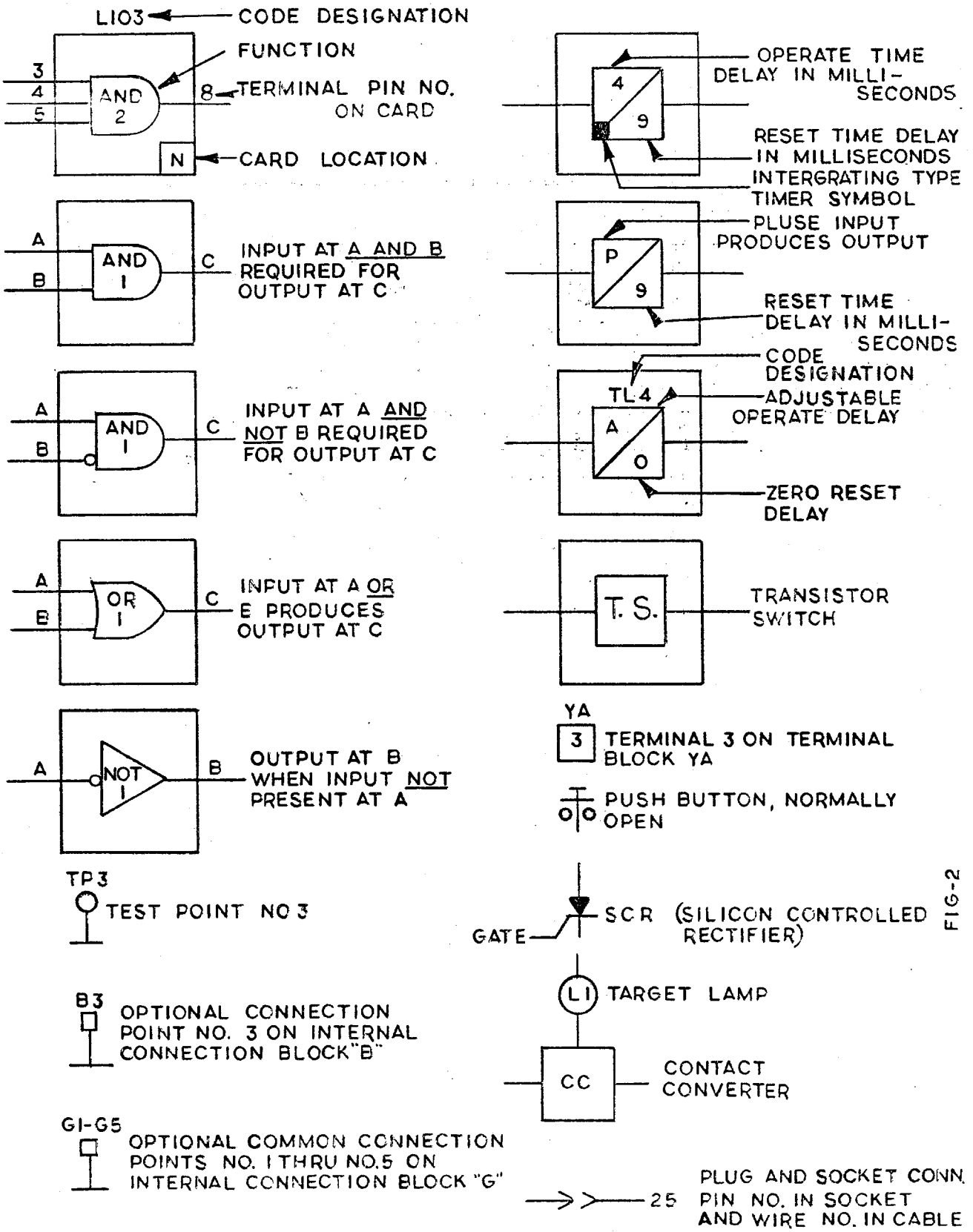


Fig. 2 (0227A2047-1) Internal Connection Diagram Legend

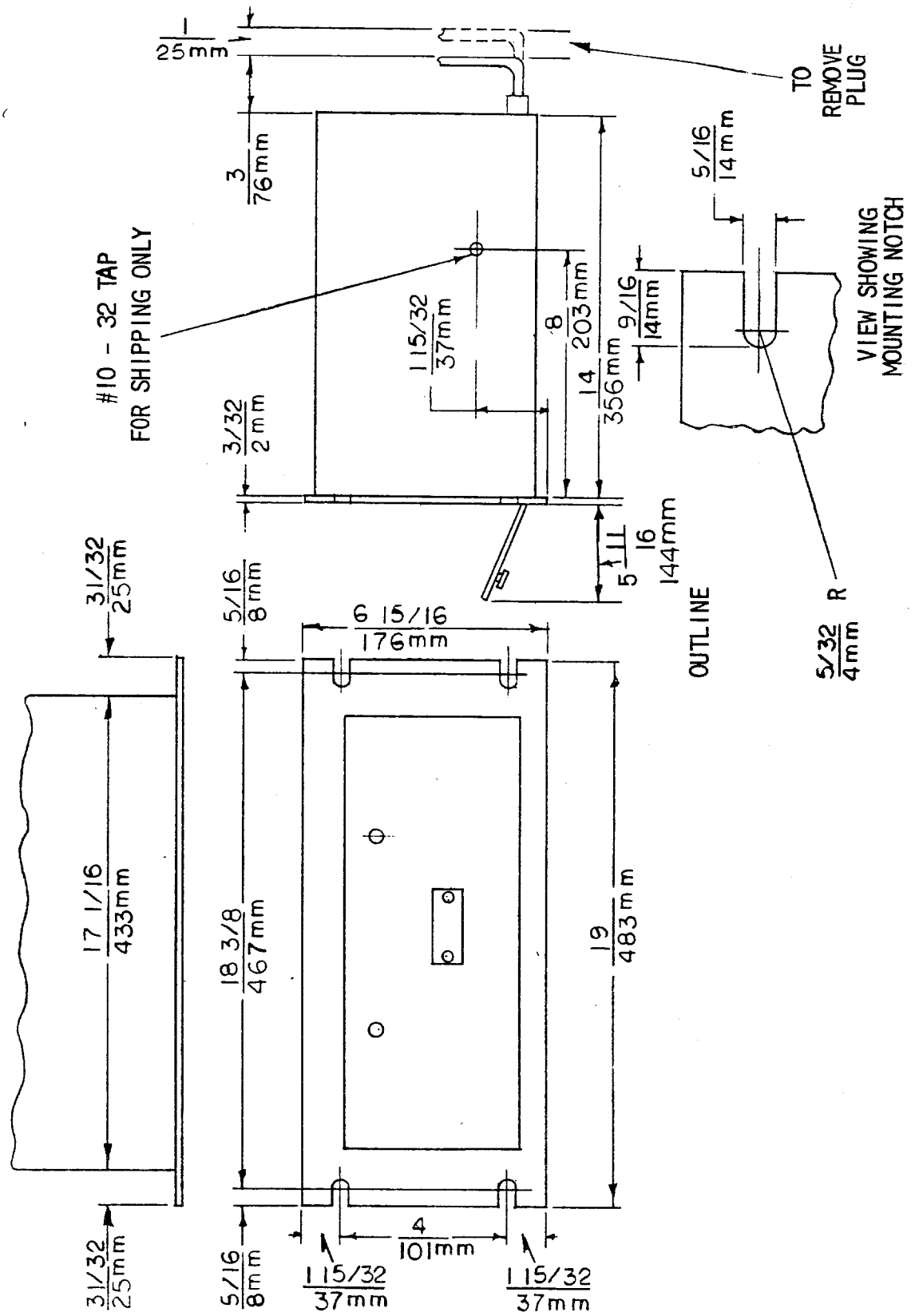


Fig. 3 (0227A2037-0) Outline and Mounting Dimensions
for the Type SLA52U Relay

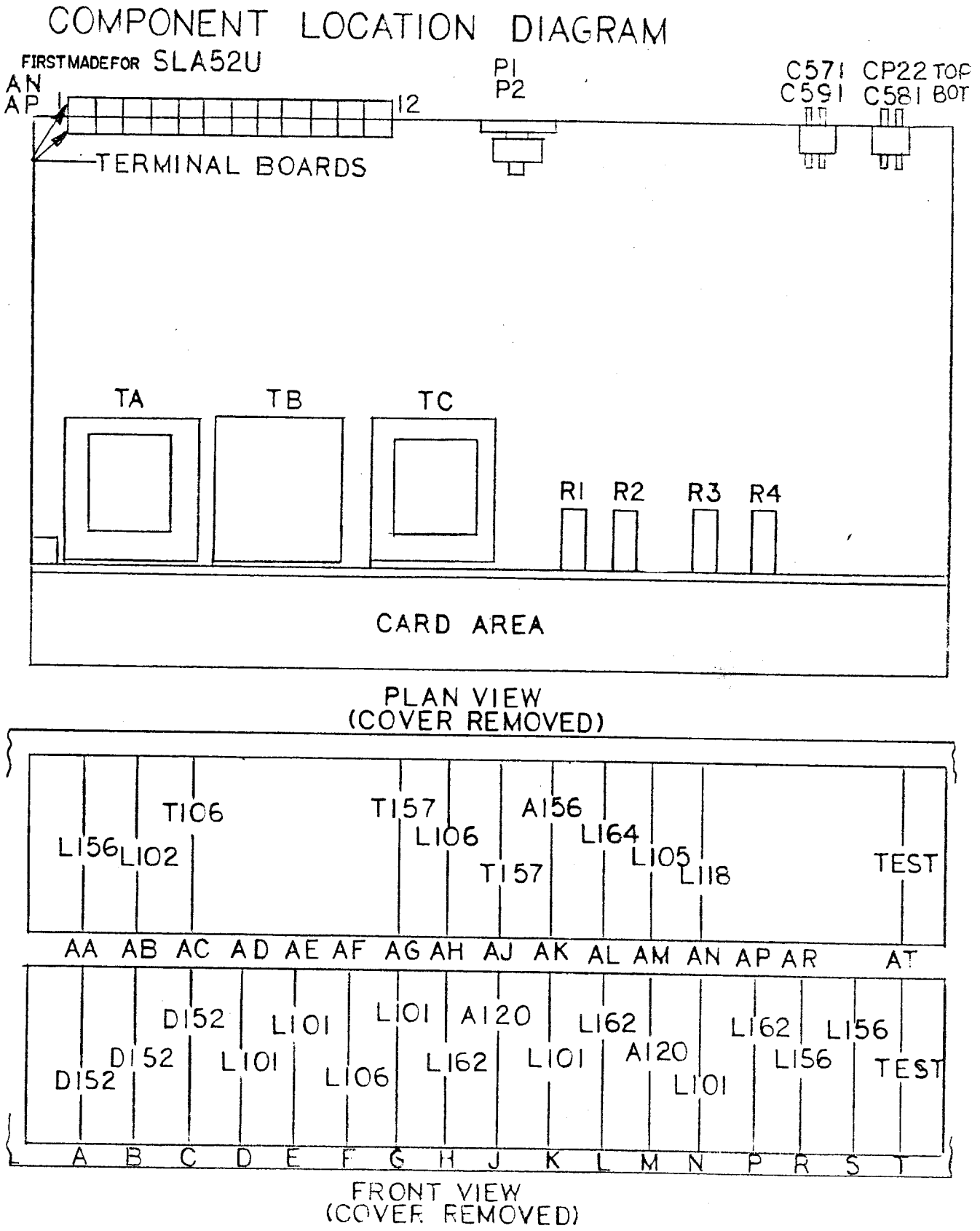
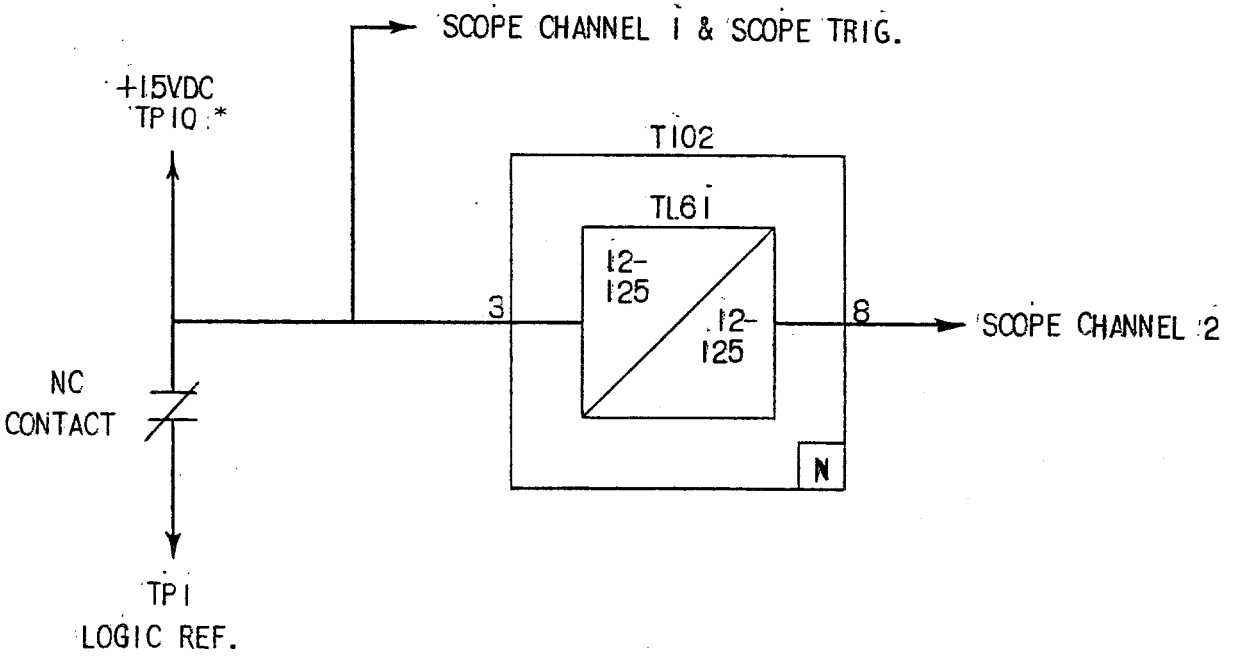


Fig. 4 (0285A9199-0) Component and Card Location



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

Fig. 5 (0246A7987-0) Logic Timer Test Circuit

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