



INSTRUCTIONS

GEK-65690A
Supersedes GEK-65690

AUXILIARY LOGIC UNIT

TYPE SLA52S

GENERAL  ELECTRIC

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AUXILIARY LOGIC UNIT**TYPE SLA52S****DESCRIPTION**

The SLA52S unit is an auxiliary logic unit 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 SLA52S has appropriate interconnections for use with a Type SLAT54 auxiliary and tripping unit when applied in a single pole tripping and reclosing scheme.

The SLA52S is designed with considerable flexibility to accommodate 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 SLA52S, 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 SLA52S is used.

RATINGS

The Type SLA52S relay is designed for use in an environment where the ambient temperature outside the relay case is between minus 20°C or plus 65°C.

The Type SLA52S relay requires a plus or minus 15 volt DC power source which can be obtained from a Type SSA50/51 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.

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.

BURDENS

The SLA52S relay presents a burden of 350 milliamperes to the plus 15 VDC supply of the Type SSA power supply.

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

OPERATING PRINCIPLES

The functions included in the Type SLA52S relay involve basic logic operations (AND, OR, 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 plus 15 VDC.

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

The matrix blocks shown in the internal connections diagram of the SLA52S relay are connected by jumpers at the factory. These connections are used to implement the logic arrangement shown on the associated overall logic diagram. These matrix jumpers are listed on the associated option chart. A typical option chart for the Type SLA52S relay is shown in Fig. 3. Some of the matrix block connections may be customer options. These connections will then be shown as optional connections on the overall logic and must be selected by the user before the unit is placed in service.

The purpose of the contact converters (CC1, CC2, CC3, CC4, CC5, CC6) included in the Type SLA52S relay is to convert a contact operation into a signal that is compatible with the logic circuitry of the relay. When the external contact is closed, a plus 15 VDC signal is produced by the contact converter. The function of each contact converter depends upon the particular relaying scheme in which it is employed.

The Type SLA52S relay has provisions for up to 18 outputs suitable for driving a Type DLA data logging amplifier unit. Any matrix block point which is not used as a logic connection may be monitored by connecting a lead from the 411 or 421 socket to the block. All 411 and 421 socket pins have two leads with taper tips which are used to replace the logic jumper. This provides the logic signal path and also a signal for the DLA unit. Any factory selected DLA points are listed on the option chart and the overall logic diagram.

The Type SLA52S relay includes an isolation interface between the relaying equipment and the associated channel. When required, the internal connections of the interface card are shown in Fig. 4. The circuitry of the isolation interface provides a signal path but maintains metallic isolation. This feature makes it possible to maintain isolation between the DC power supply used for the relays and that employed by the channel.

CAUTION: Since this equipment uses sinking logic, namely the output stage of each printed circuit card is normally on, all externally supplied signals must be current limited. TP10 in each relay unit should be used exclusively for this purpose.

CONSTRUCTION

The SLA52S 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. 5 and 6, respectively.

The SLA52S relay contains printed circuit cards identified by a code number, such as A111, T102, L104 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 test cards in position T or AT with TP1 at the top of the AT card. TP10 is tied to plus 15 VDC through a 1.5K resistor. This resistor limits the current when TP10 is used to supply a logic signal to a card.

Logic options in the SLA52S relay are selectable by means of jumper wires with taper tip pins on each end which are used to interconnect the matrix block points. These matrix blocks are located in the rear of the unit as shown in Fig. 6. The top cover of the relay must be removed to make the blocks accessible. The taper tip jumpers should be inserted and removed using the special tools which are supplied with each equipment. The green (G), black (B), white (W), violet (V), orange (O), blue (BL), natural (NA) and brown (BR) matrix blocks have 20 individual matrix points. The red (R) block has 20 points, which are grouped in ten pairs. The yellow (Y) block has 20 points which are grouped in two sets of ten common points; Y1 to Y10 are connected to plus 15 VDC, Y11 to Y20 are connected to reference.

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 SLA52S 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 A 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 SLA52S 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 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 SLA52S unit can be checked by observing the signals at the twenty test points (TP1 to TP20) in the SLA52S, 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 plus 15 VDC, and TP2 is at minus 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 card which normally supplies 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 adapter card 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 signal to the timer. If there are no test points at the input and output of the timer card under test, it is necessary to place it in a card adapter. This allows access to the inputs and outputs of the timer. A timer test card (catalog number 0172C5151G-1, see Fig. 8) can be used to supply an input signal to the timer, and at the same time trigger a scope or timing device. The timer card output is connected to stop the timing device, or display a step function on the scope. The pickup and drop-out times can be adjusted to the desired values. An alternative to the timer test card is the test circuit of Fig. 7. A bounceless mercury switch is recommended.

OVERALL EQUIPMENT TESTS

After the SLA52S 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 and voltages to the measuring units as 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 SLA52S 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 SLA52S itself should be required.

TROUBLESHOOTING

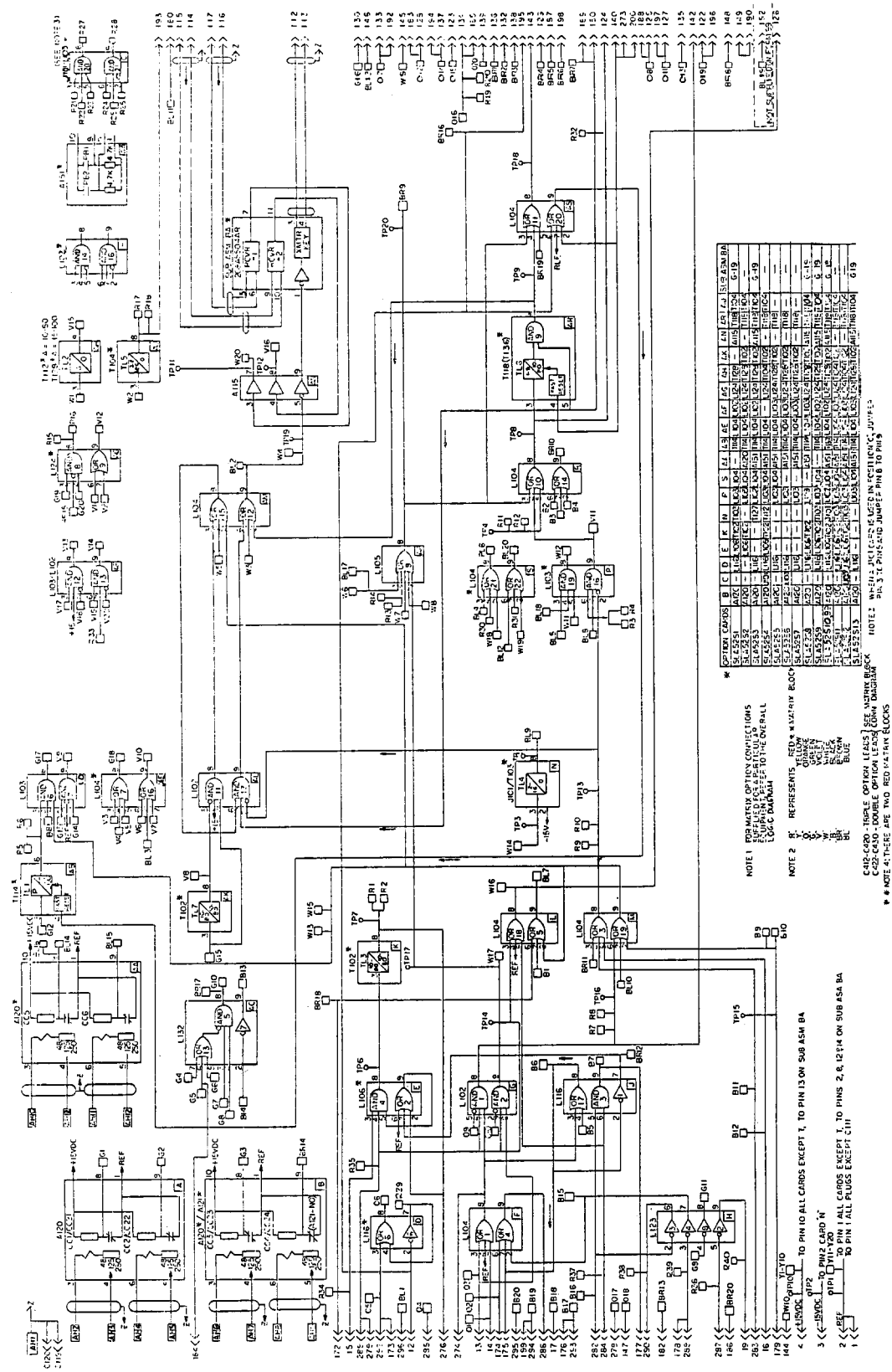
In any troubleshooting of equipment, it should first be established which unit is functioning incorrectly. The overall logic diagram supplied with the equipment shows the combined logic of the complete equipment and the various test points in each unit. By signal tracing, using the overall logic diagram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

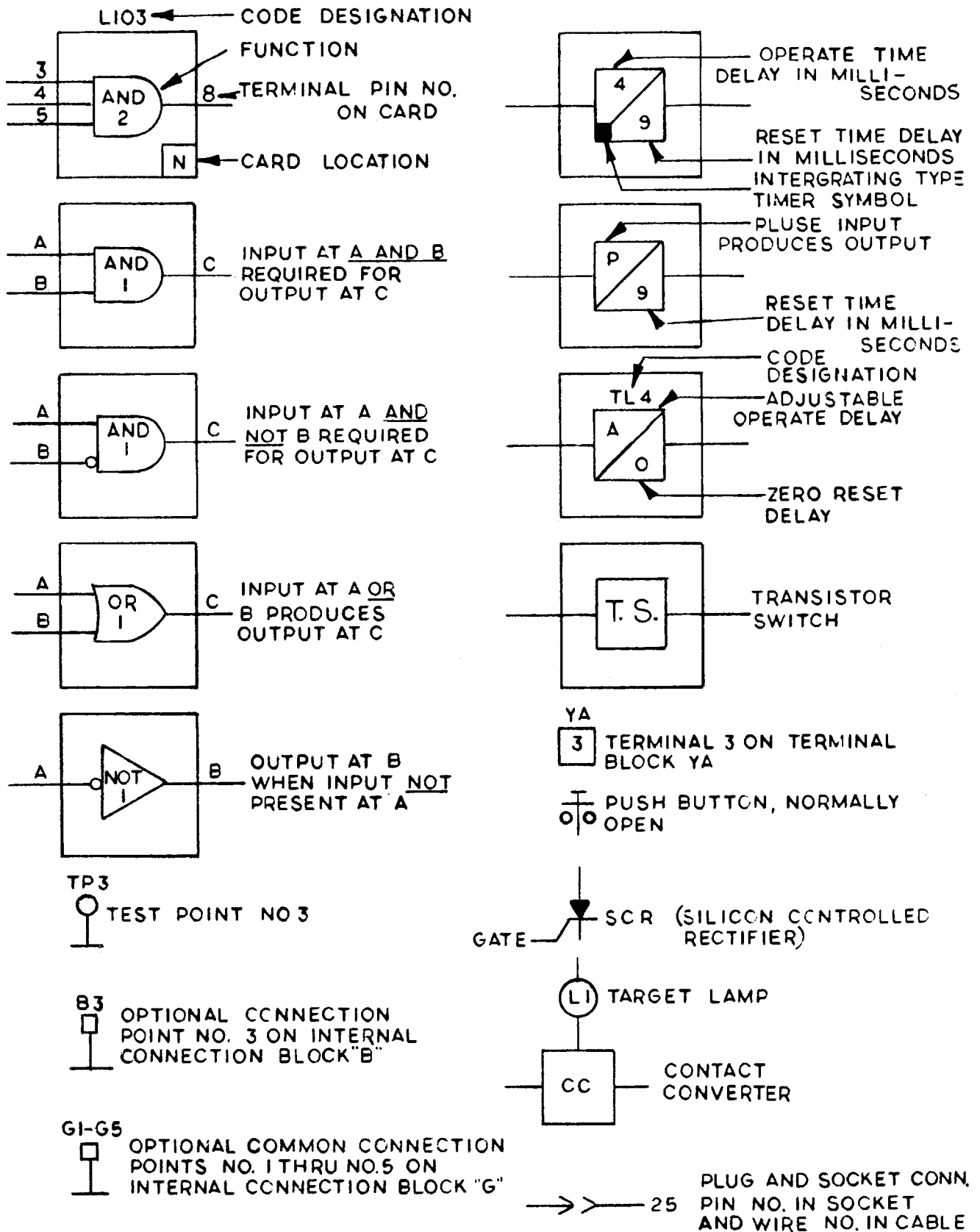
SPARE PARTS

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 semiconductor and other components. The repaired area should be recovered 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 SLA52S relay are included in the card book, GEK-34158.



* Fig. 1 (0145D8641-10) Internal Connections Diagram for the Type SLA52S Relay

* Revised since last issue



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

* Revised since last issue

THE FOLLOWING ARE FACTORY CONNECTIONS MADE AT THE MATRIX BLOCKS INSIDE OF THE SLA RELAY ASSOCIATED WITH THIS EQUIPMENT.
 SYMBOLS LISTED: PL=RELAY INTERCONNECTING CABLE LEAD
 (5)=LOGIC FUNCTION CARD PIN NUMBER
 †=3-WAY CONNECTION □=4-WAY CONNECTION
 * =DLA MONITOR CONNECTION AVAILABLE BUT NOT USED
 NOTE: INSULATE EACH UNUSED DLA OPTION LEAD SEPARATELY & TIE THE BUNDLE TOGETHER

(181)

MATRIX BLOCK JUMPERS		LOGIC FUNCTION		MATRIX BLOCK JUMPERS		LOGIC FUNCTION	
FROM	TO	FROM	TO	FROM	TO	FROM	TO
B19	G19	I ₂ TOC	AND8	BR10	V18	OR14	AND12
Y1	G20	+15V	AND8	V13	Y19	AND12	AND13
†R9	BR15	OR3	AND8	R1	PL413	TL3	DLA
†R9	V20	OR3	AND13	R20	O19	TL3	AND34
R10	O20	OR3	TS39	B7	B9	AND3	OR19
B18	BR12	PL17	NOT1	W13	V17	OR19	AND12
R20	O9	TL3	AND1	W15	BR3	OR19	TS41
R20	O10	TL3	AND2	R15	W1	AND8	TL2
O4	PL420	(I ₀ -K ₁)T	DLA	V15	R13	TL2	OR8
PL420	B2	DLA	OR14	R14	PL417	OR8	DLA
PL415	O16	DLA	OR31	R11	†Y19	OR10	REF
Y13	O13	REF	AND32	W20	V1	RCVR1	OR9
R19	O14	OR31	AND41	†Y18	W18	REF	OR21
R20	BR8	OR31	TS34	V16	V2	RCVR2	OR9
W4	G16	OR12	TS40	†Y16	W19	REF	OR32
Y2	O12	+15V	AND31	Y20	W11	REF	AND19
Y14	BR11	REF	OR3	V12	G15	OR9	TL9
Y11	O2	REF	OR4	W12	R3	AND19	AND16
Y15	B5	REF	OR17	R4	BR4	AND16	TS38
B20	PL419	I ₁ T	DLA	G2	W3	CC2	OR12
PL419	B4	DLA	OR14	BR19	†Y20	OR11	REF
†Y16	B3	REF	OR14	W5	†Y20	OR15	REF
O6	G7	OR6	AND5	BR18	†Y19	OR5	REF
Y3	G8	+15V	AND5				
G4	V8	AND5	TL7				
G5	Y17	OR13	REF				
R6	G6	TL1	OR13				
G10	PL412	AND5	DLA				
BR17	B1	AND5	OR5				
G1	G12	CC1	TL1				
R5	G14	TL1	AND7				
W16	G13	OR18	AND7				
V9	W8	AND7	OR8				
W17	PL418	AND2	DLA				
W6		OR8	REF				
V14	W7	AND13	OR8				

Fig. 3 (0227A2050-2, Sh. 181) Typical Option Chart for the Type SLA52S Relay

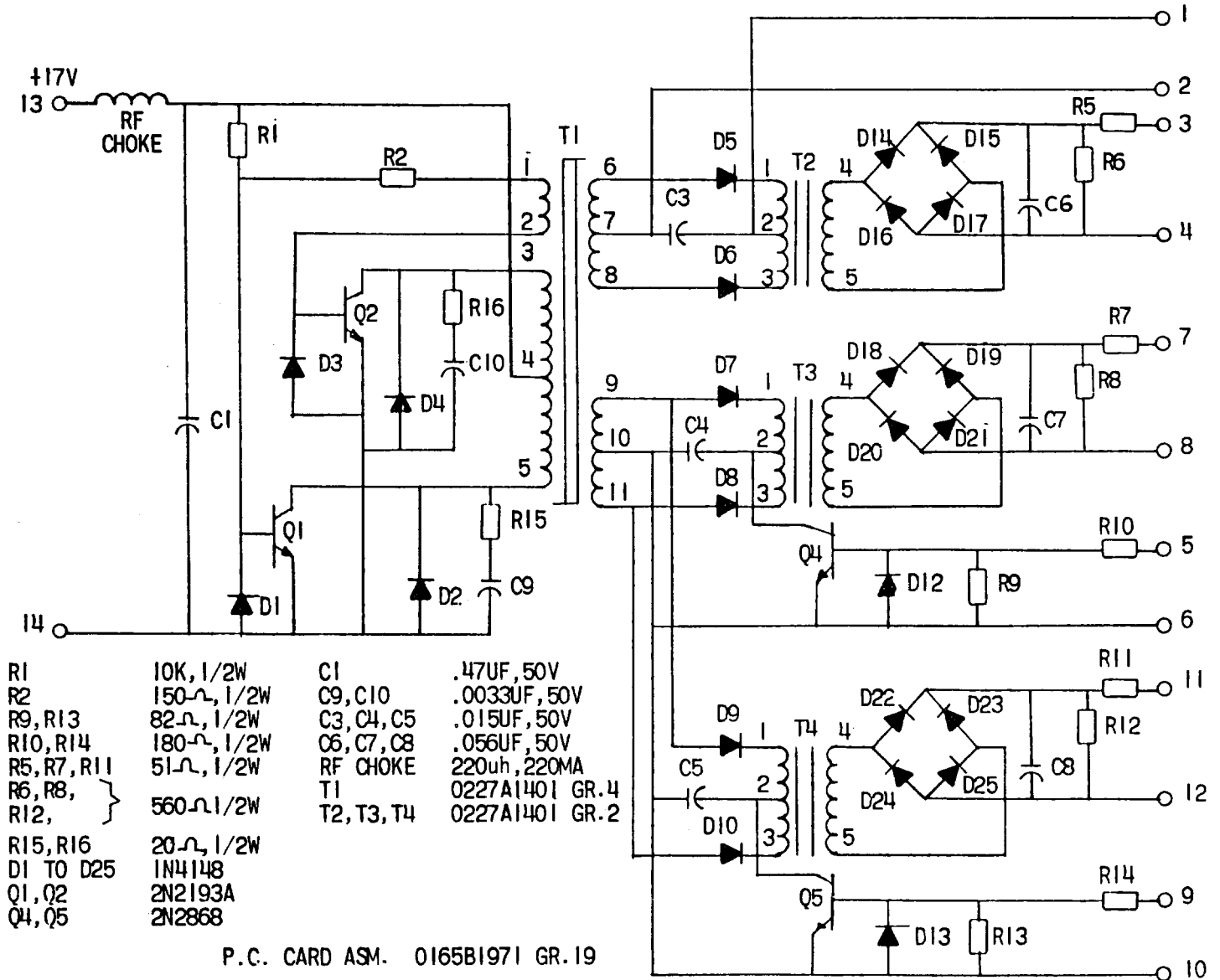
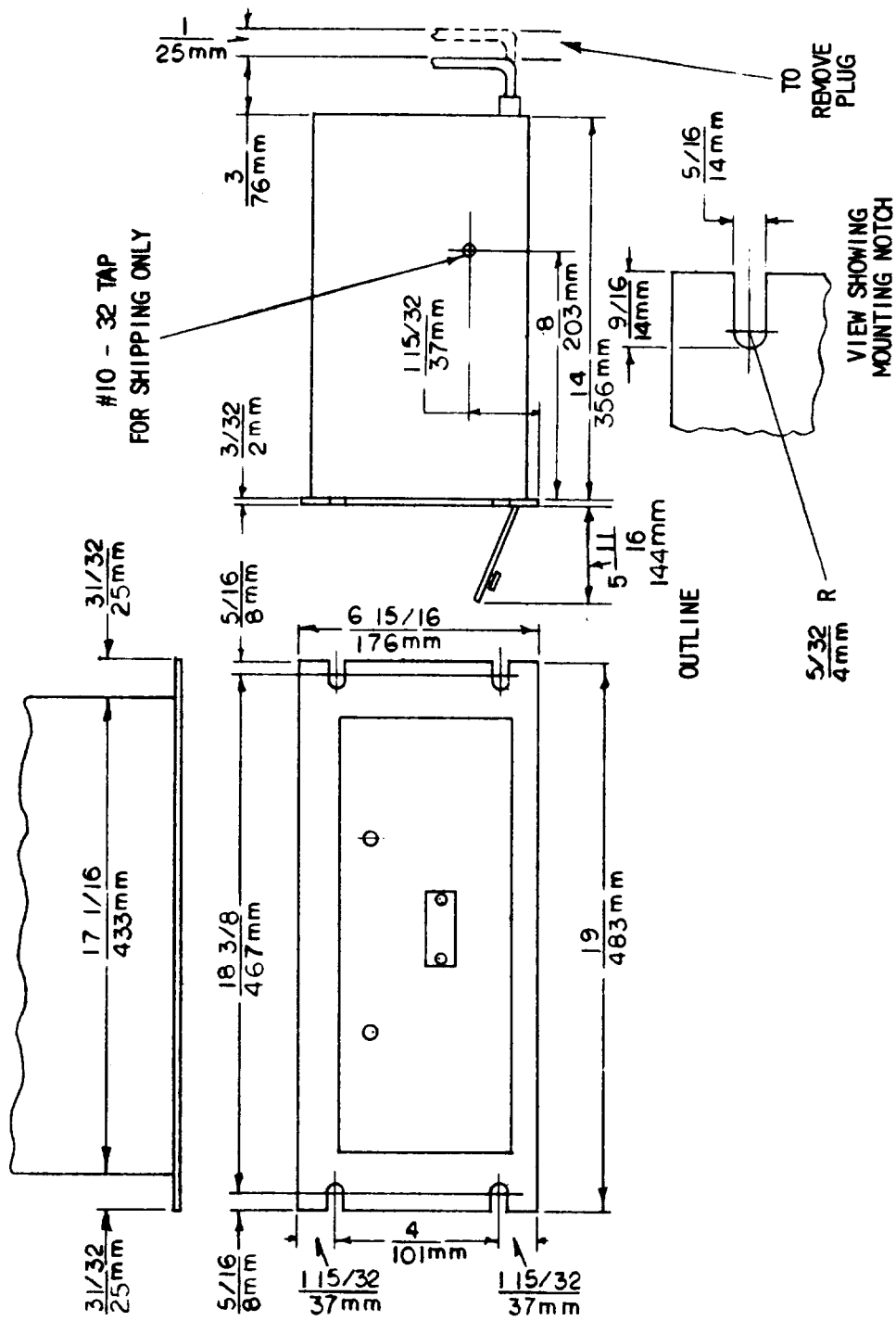
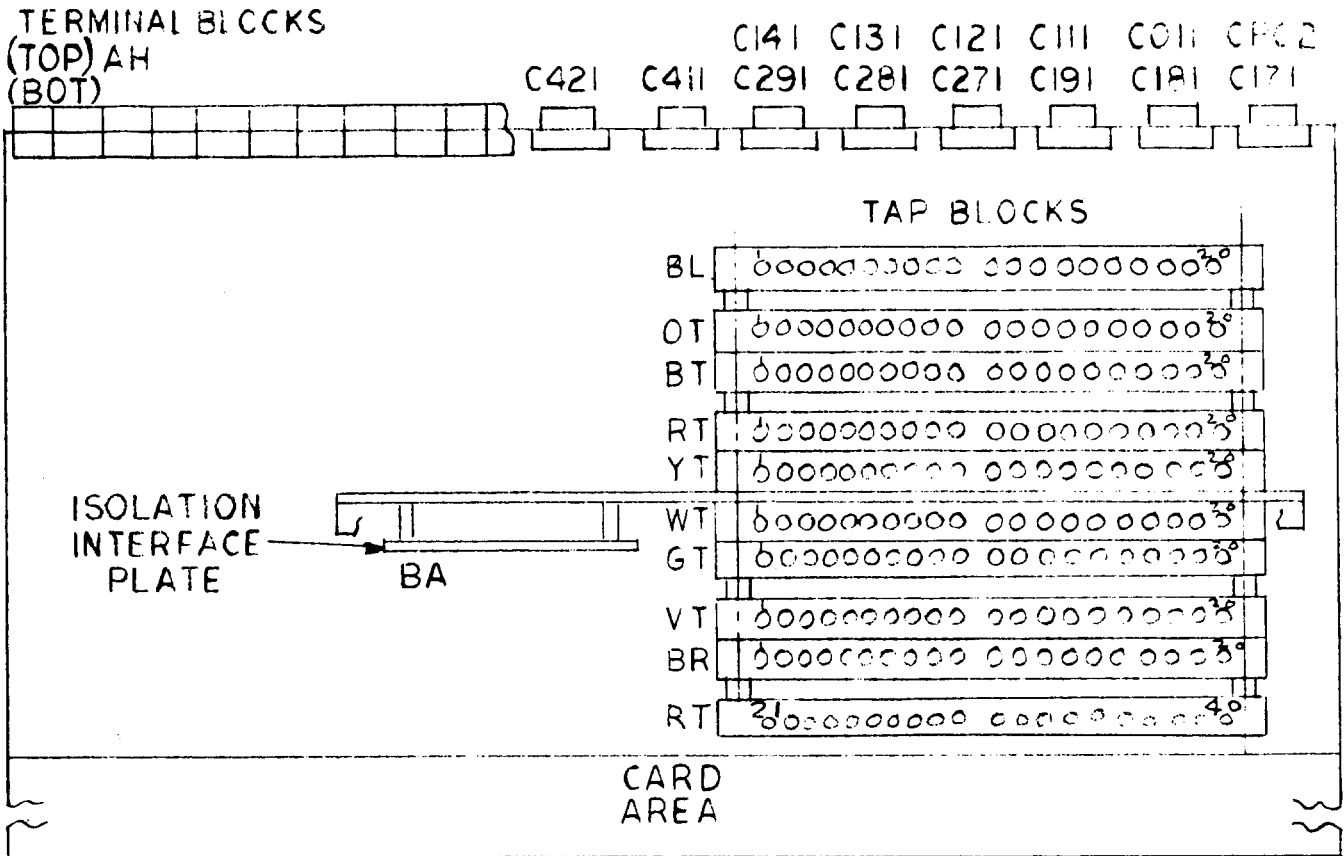


Fig. 4 (0208A5504AR-0) Isolation Interface Circuit Internal



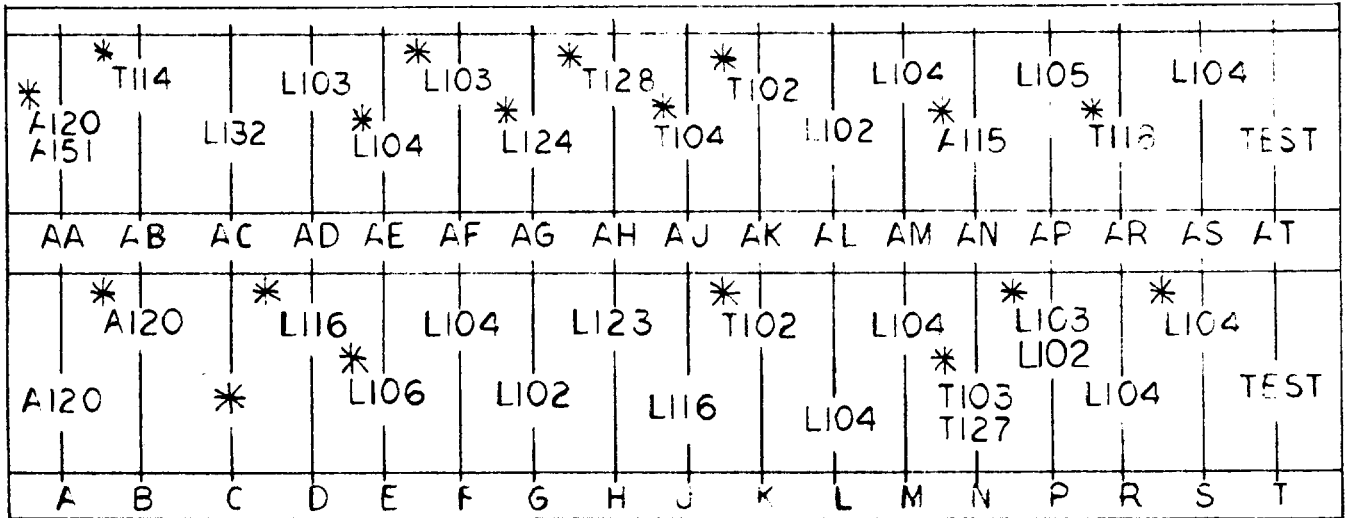
8 Fig. 5 (0227A2037-1) Outline and Mounting Dimensions for the Type SLA52S Relay

* Revised since last issue



PLAN VIEW

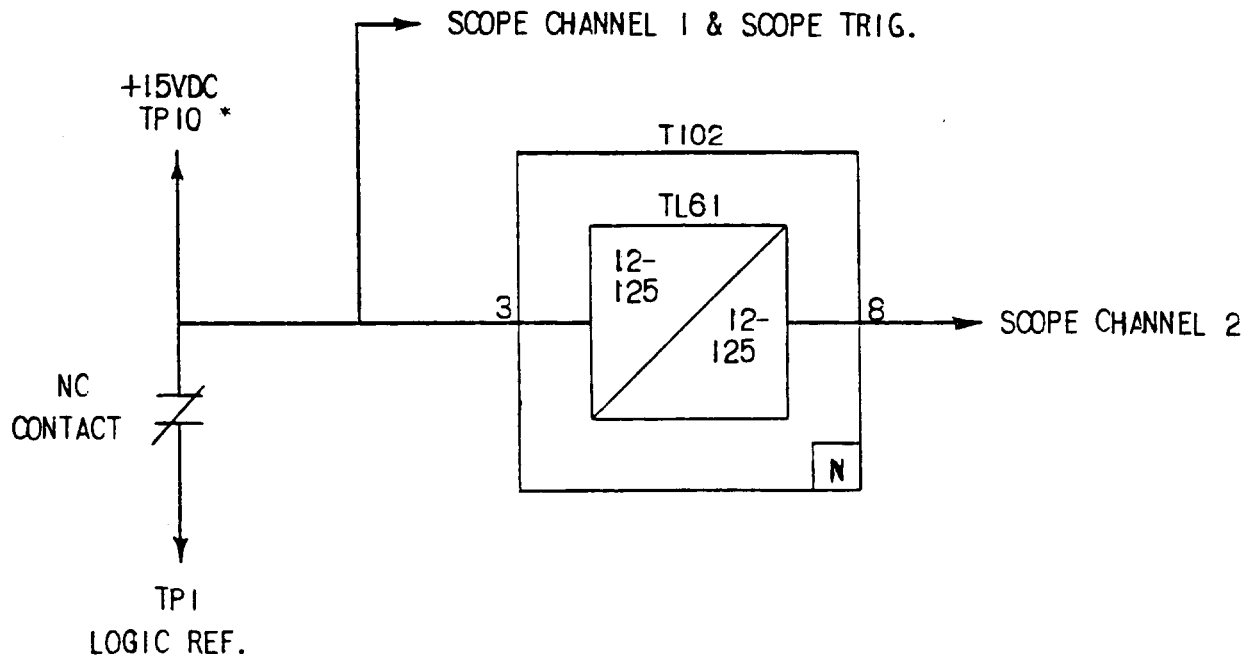
* OPTIONAL P.C.CARDS



FRONT VIEW

* Fig. 6 (0285A6116-2) Component and Printed Circuit Card Location Diagram for the Type SLA52S Relay

* Revised since last issue



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

Fig. 7 (0246A7987-0) Logic Timer Test Circuit

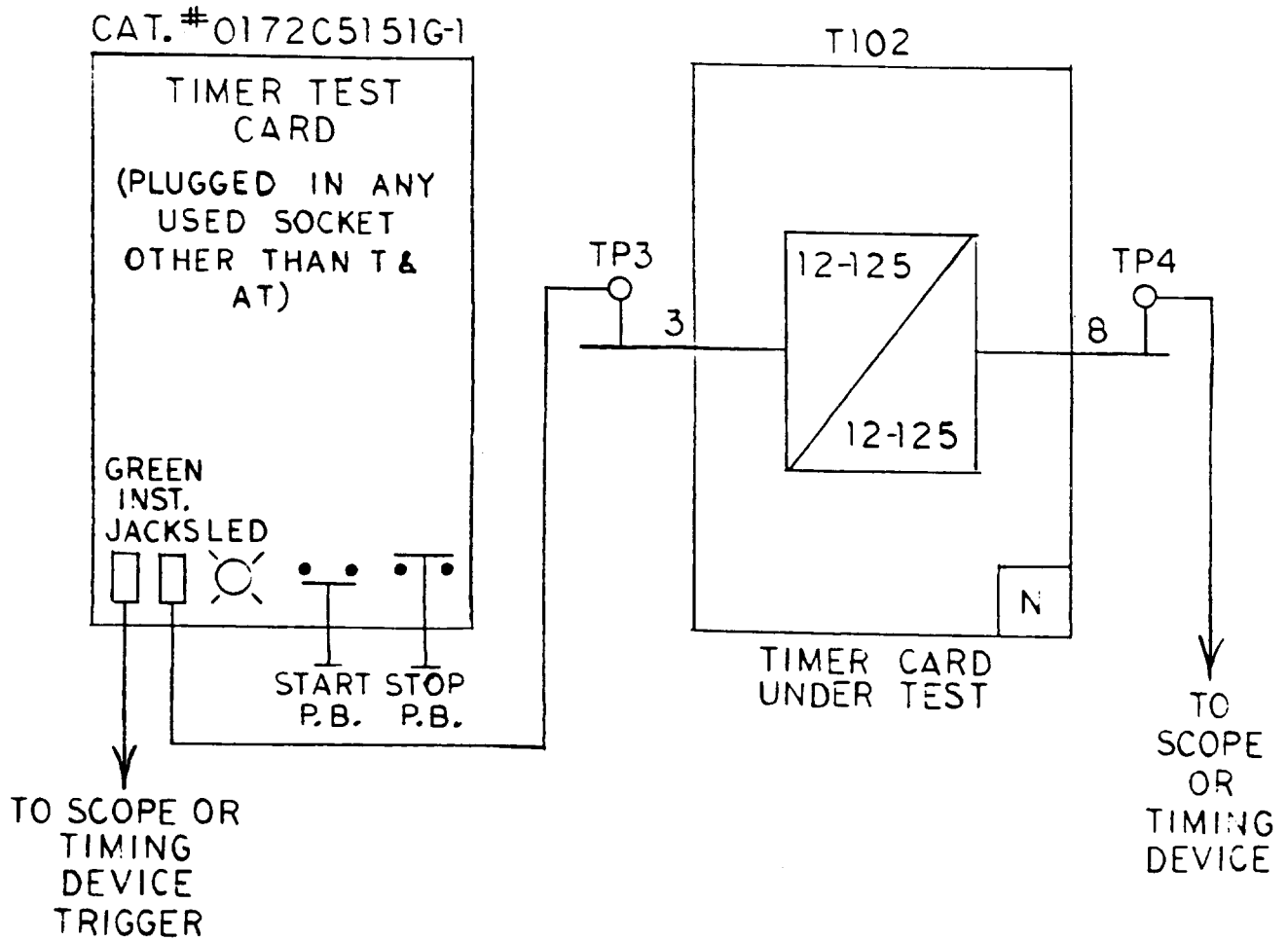


Fig. 8 (0285A6135-0) Timer Test Card Test Circuit