INSTRUCTIONS

GEK-45368 A
Supersedes GEK-45368

AUXILIARY LOGIC RELAY

TYPE SLA55A

GENERAL ELECTRIC

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AUXILIARY LOGIC RELAY

TYPE SLA55A

DESCRIPTION

The SLA55A is a solid state auxiliary logic relay that was designed specifically for use in a combined phase and directional comparison transmission line relaying scheme. The relay is intended to be used with a type SLDY51A relay which contains the necessary measuring functions that are required to implement the scheme. A suitable auxiliary tripping relay of the SLAT type and an SSA power supply are also required to complete the scheme. Frequency shift type channel equipment is required for use with the SLA55A relay. For a complete description of the scheme in which the relay is applied, refer to the logic diagram and associated description supplied with the scheme.

The SLA55A relay is packaged in a 4 rack unit case suitable for mounting in a standard 19 inch rack. Outline and mounting dimensions are illustrated in Figure 1. The internal connections for the complete SLA55A relay are shown in Figure 2 while the component printed circuit card locations are shown in Figure 3.

APPLICATION

The SLA55A is an auxiliary logic relay that is meant to be used with an SLDY51A relay in a combined phase and directional comparison transmission line relaying scheme. The SLA55A contains the necessary scheme logic and channel interface whereas the SLDY51A contains the necessary measuring functions for implementation of the scheme. Positive sequence distance functions are used to initiate directional comparison operation for three phase faults and negative sequence overcurrent functions are used to initiate phase comparison protection for all unbalanced faults. A suitable tripping relay and power supply are also required to complete the scheme.

All of the functions shown in the SLA55A relay may not be included in every scheme. Some of the functions are optional and their use will be dependent on the user's requirements or the specific requirements of the application. Where functions are omitted, they may easily be added at a future date by the insertion of appropriate printed circuit cards and/or jumpers if the need for them arises. It should be noted that other optional functions may also be required in the other relays when optional functions are added to the SLA55A. These too are readily added via appropriate printed circuit cards. Please refer to the associated logic diagram supplied with each scheme to determine the functions that are supplied with that scheme.

RATINGS

The Type SLA55A relay is designed for use in an environment where the air temperature outside the relay case does not exceed $-20^{\circ}C$ or $+65^{\circ}C$.

The Type SLA55A relay requires $\pm$ 15VDC 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 possible voltages are 48 VDC, 125 VDC and 250 VDC.

BURDENS

The SLA55A relay presents a burden of 460 ma to the +15 VDC supply and 60 ma to the -15 VDC supply of the Type SSA power supply.

Each contact contact converter, when energized, will draw approximately 10 max from the station battery, regardless of tap setting.

OPERATING PRINCIPLES

LOGIC CIRCUIT

The functions of the Type SLA55A relay 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 1 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 (Figure 2) are explained by the legend shown in Figure 4.

The matrix block options shown in the internal connections of the SLA55A relay are provided at the factory. The connections are shown on the associated overall logic and are listed on the associated option chart. A sample option chart for the Type SLA55A relay is shown in Figure 8.

CONTACT CONVERTERS

The purpose of this function is to convert a contact operation into a signal that is compatible with the logic circuit of the Type SLA55A relay. Those contact converters are labeled CC1, CC2, CC3 and CC4.

CC1

Contact converter 1 is used to key the transmitter to the TRIP frequency, it is energized by closing an external contact.

CC2

Contact converter 2 is used to block all pilot tripping, it is energized by closing an external contact.

CC3

Contact converter 3 is used to key the transmitter from the TRIP to the GUARD frequency and is provided for use when testing the channel equipment. It is energized by closing an external contact.

CC4

Contact converter 4 is used to provide one of the inputs to AND 2; the second input to AND 2 comes from the positive sequence overcurrent function. CC4 is provided for use as part of the line pickup scheme, it is energized by the closure of a contact associated with external logic.

DATA MONITORING POINTS

Type SLA55A relay has provisions to provide data monitoring outputs. Some of the data monitoring (DLA) points are hard wired into the logic as shown in Figure 2. Other data monitoring points are selected on the matrix blocks and are listed on the option chart. Any matrix block points which are not used for logic connections may be monitored. Key points in the logic have more than one matrix point to allow both logic and monitoring connections.

CHANNEL INTERFACE

The logic of the Type SLA55A relay includes an isolation interface (Figure 5) between the relays in the scheme and the associated channel. The circuitry of the isolation interface provides a signal path but maintains metallic isolation. This features makes it possible to maintain isolation between the DC supply used for the relays and that employed by the channel.

TIMER CARDS

There are a number of timers in the SLA55A relay, some of which are meant to be set in the field, and others which are factory set and should need no further adjustment except in connection with corrective maintenance. All of them may not be included in every scheme. Refer to the logic description supplied with each scheme to determine which timers are included. Following is a brief description of the timers along with a general discussion of the various settings.

TL-1 - This timer forms part of the out-of-step detection and is supplied only when out-of-step detection is required. The pickup setting determines the amount of time that the swing impedance must be in the out-of-step characteristic before an output will be permitted. In general, the lowest setting will permit the fastest swing to be detected. Longer pickup times will in general permit slower swings to be detected but will add to the scheme security. Pickup is adjustable over the range of 2-4 cycles. The dropout time is set at 40 milliseconds and needs no further adjustment.

TL-2 - This timer is used to compensate for any phase delay that may be introduced by the channel equipment and signal propagation time. It permits an accurate comparison to be made at the COMPARER between the locally derived signal and the signal received from the remote terminal. Pickup and dropout time are adjustable over the range of 1-8 milliseconds. The pickup and dropout setting are set equal to each other and must be made in the field after the equipment is installed.

TL-3 - This timer follows the COMPARER and is commonly referred to as the TRIP INTEGRATOR timer. Its pickup, factory set at 4 milliseconds, has been selected to provide security and dependability to the scheme. Its dropout setting will depend on the particular application.

TL-4 - This timer follows the receiver output and is used to adjust for any dissymetries that may be introduced by the channel equipment. Pickup and dropout time is adjustable over the range of 0.3-3.0 seconds. The pickup or dropout must be adjusted so that the output signal is symmetrical for a symmetrically applied keying signal to the transmitter at the remote end of the line. This adjustment must be made in the field after the equipment is installed.

TL-5 - This timer serves the same purpose as TL-4 but is used only in three terminal line applications where a second receiver is required to receive information from the third terminal.

TL-6 - This timer is generally required when the scheme is applied on long lines with shunt reactors. It is used in conjunction with a low set level detector to provide very sensitive protection. Pickup time is adjustable over the range of 5-15 milliseconds. The dropout is factory set at 100 milliseconds. The timer measures the coincidence between the output of AND 9 (the comparer) and TL-3, but this measuring will only take place if the low set level detector is picked up. The timer integrates and sums up the signals applied to it.

The output of TL-3 is the output of AND 9 delayed by 4 milliseconds, therefore TL-6 measures the coincidence between the output of AND 9 and the same signal delayed by 4 milliseconds. The coincidence signal is therefore the output of AND 9 minus 4 milliseconds. Since the maximum signal that AND 9 can produce is 8.33 millisecond, the maximum coincidence that can be measured is 4.33 milliseconds and it occurs only once per cycle. If the pickup time of TL-6 is set at 5 millisecond, at least 2 consecutive cycles must be compared before the timer can produce an output. Therefore with a timer pickup setting of 5 milliseconds, a delay of at least one cycle will be introduced into the trip path. Longer delays in the tripping can be attained by setting the pickup time of the timer accordingly.

TL-7 - This timer is meant to be used with a positive sequence voltage detector located in the SLDY relay. The two functions can be used to either provide a line pickup option or loss of voltage indication. The pickup and dropout time will depend on the particular application.

TL-8 - This timer is provided only when additional coordination time is required between the tripping and blocking functions at each end of the line. The pickup time is adjustable over the range of 1-8 milliseconds. Dropout is set at zero milliseconds.

TL-9 - This timer is used in conjunction with the phase delay timer TL-2. It is required only in those applications where the combination of channel time and propagation are too long to be compensated for by a single phase delay timer. When this timer is used it is effectively in series with TL-2 and the total phase delay will be equal to the sum of the two individual timer settings. The dropout time of each timer must be set equal to its particular pickup time. Each individual timer setting should be approximately half the total setting.

CONSTRUCTION

The SLA55A 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 Figures 1 and 3 respectively.

The SLA55A relay contains printed circuit cards indentified by a code number such as A111, T102, L 104 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 on 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 1.5K resistor. This resistor limits the current when TP10 is used to supply a logic signal to a card.

Other logic options are selected by means of taper tip jumpers and matrix blocks. These matrix blocks are located in the rear of the unit as shown in Figure 2. The green (G) matrix block has ten points in two 5 point common groups. The black (b) matrix block has 20 individual matrix points. The grouped in 10 common points; 1 to 10 are tied to +15 VDC, 11 to 20 are tied to reference. The white matrix block has 20 individual matrix points. A tool for inserting and removing the taper tip jumpers is supplied with each relay.

RECEIVING, HANDLING AND STORAGE

These relays will normally be supplied as a 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 8 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

CAUTION

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 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

If the SLA55A 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.

The SLA55A 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.

In general, when a time range is indicated on the internal connection 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 SLA55A unit can be checked by observing the signals at the twenty test points (PT1 to TP20) in the SLA55A, 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 (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 card instruction book GEK-34158.

EQUIPMENT ADJUSTMENTS AND TESTS

The SLA55A relay is usually supplied from the factory, mounted and wired as part of a complete static relay equipment. There are several adjustments that must be made to this equipment in the field. The field adjustments that directly involve the SLA55A are indicated below.

A. CT Phasing, Polarity and Sequence Check
B. Channel Signal Symmetry Adjustment
C. Phase Delay Adjustment

TESTING INSTRUCTIONS

A. CT Phasing, Polarity and Sequence Check

This test should be performed according to the instructions given in the instruction book for the measuring unit (SLDY Relay). That book states that in makeing this check, one oscilloscope channel should be used to observe the received channel signal in the SLA. This signal can be observed at TP18 or TP19 in the SLA55A. Note that the voltage level at TP18 and TP19 is zero when the received channel signal is in the BLOCKING half cycle. There is a positive signal at TP18 and TP19 when the received channel signal is in the TRIP half cycle.

B. Channel Signal Symmetry Adjustment

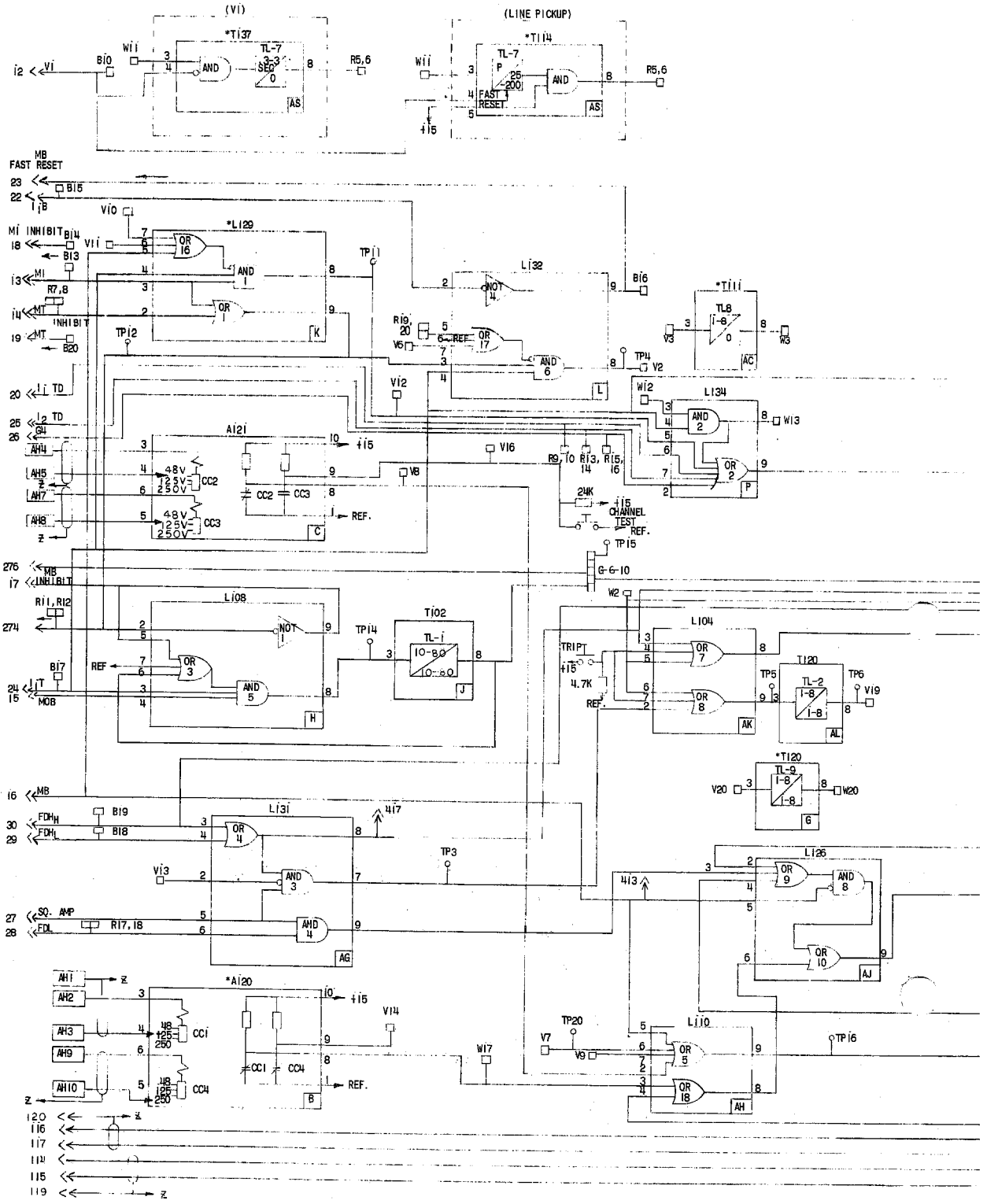
The TL-4 and TL-5 timers located in positions AE and AF respectively are provided for symmetry adjustment; they are used to compensate for any asymmetries that may be introduced by the channel equipment. The final settings for these timers must be made in the field after the transmitters, receivers and coupling equipment have been tuned and adjusted for proper sensitivity per the channel instructions. Operation of the squaring amplifier and fault detectors is required for accomplishment of the final symmetry adjustment; refer to the measuring unit instruction book for the recommended procedure.

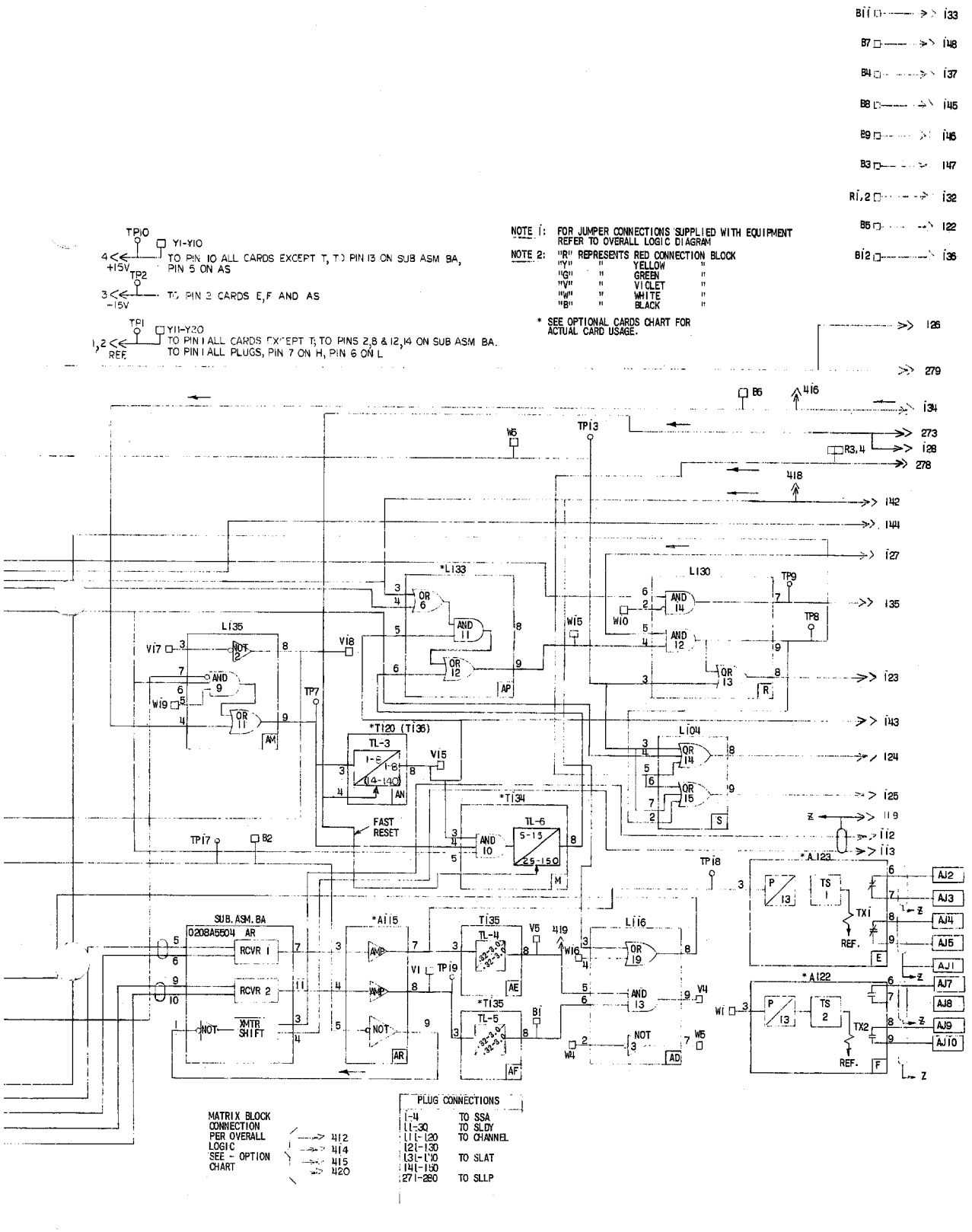
In order to adjust these timer cards it is necessary to monitor the card's output with an oscilloscope. This can be accomplished by putting the card in a card adapter and connecting the oscilloscope input to pin 8. Check the Overall Logic diagram to determine whether or not there is a test point that can be used to monitor the output of the Symmetry Timers. If a test point is used, it is not necessary to put in a card adapter.

C. Phase Delay Adjustment

After the symmetry adjustment has been accomplished, the phase alignment must be made. The purpose of this adjustment is to obtain the proper alignment of the local signal with the received signal; refer to the measuring unit instruction book for the recommended procedure.

Before the Phase Delay adjustment can be made, TP17 in the SLA55A of the local equipment must be connected to TP1; this causes a continous blocking signal to be applied to the Channel Control logic and prevents the local transmission of a trip signal. There must also be a connection made in the SLA55A of the remote equipment between TP1; this prevents the transmission of a continuous trip signal at the remote end.


(VI)
*TI37
TL-7
AND
AS
(LINE PICKUP)
*TII4
FAST RESET
MB FAST RESET
*LI29
OR 16
AND 1
OR 1
INHIBIT
LI32
NOT 4
*TIII
TL-8
OR 17
AND 6
LI34
AND 2
OR 2
*AI2I
48V 125V 250V
CC2
CC3
REF.
CHANNEL TEST
TP15
G-6-10
LI08
NOT 1
OR 3
AND 5
TI02
TL-I
LI04
OR 7
OR 8
TRIP
4.7K
TI20
TL-2
*TI20
TL-9
LI31
OR 4
AND 3
AND 4
SQ. AMP
R17, 18
LI26
OR 9
AND 8
OR 10
*AI20
CCI
CC4
LIIO
OR 5
OR 18
TP16
TP20


TP10
Y1-Y10
+15V
TO PIN 10 ALL CARDS EXCEPT T, TO PIN 13 ON SUB ASM BA, PIN 5 ON AS
TP2
-15V
TO PIN 2 CARDS E,F AND AS
TP1
Y11-Y20
REF.
TO PIN 1 ALL CARDS EXCEPT T; TO PINS 2,8 & 12,14 ON SUB ASM BA. TO PIN 1 ALL PLUGS, PIN 7 ON H, PIN 6 ON L
NOTE 1: FOR JUMPER CONNECTIONS SUPPLIED WITH EQUIPMENT REFER TO OVERALL LOGIC DIAGRAM
NOTE 2: "R" REPRESENTS RED CONNECTION BLOCK
"Y" " YELLOW "
"G" " GREEN "
"V" " VIOLET "
"W" " WHITE "
"B" " BLACK "
* SEE OPTIONAL CARDS CHART FOR ACTUAL CARD USAGE.
B11
B7
B4
B8
B9
B3
R1,2
B5
B12
I33
I148
I37
I145
I146
I147
I32
I22
I36
I26
I279
B6
I16
I34
TP13
W5
I273
R3,4
I28
I278
I18
I142
I144
I27
*LI33
LI30
TP9
I35
W10
W15
TP8
I23
LI35
VI7
VI8
TP7
W19
AP
AM
I43
*TI20 (TI36)
TL-3
LI04
I24
VI5
AN
I25
*TI34
TL-6
FAST RESET
S
I19
I12
I13
TP17
B2
M
TP18
*A123
AJ2
AJ3
AJ4
AJ5
AJ1
AJ7
AJ8
AJ9
AJ10
TX1
TX2
REF.
E
F
SUB. ASM. BA
0208A5504 AR
RCVR 1
RCVR 2
XMTR SHIFT
*AI15
TI35
TL-4
LI16
V6
419
W16
VI
TP19
AE
*TI35
TL-5
B1
AF
AR
V4
W1
W4
W5
AD
*A122
MATRIX BLOCK CONNECTION PER OVERALL LOGIC SEE - OPTION CHART
I12
I14
I15
I20
PLUG CONNECTIONS
1-4 TO SSA
11-30 TO SLDY
111-120 TO CHANNEL
121-130
131-140 TO SLAT
141-150
271-280 TO SLLP

In order to adjust the phase delay, the output of the phase delay timers (TL-2, position AL and TL-9, position G) must be monitored with an oscilloscope and compared to the received signal. A dual trace oscilloscope must be used and one of its inputs must be connected to the output of the Symmetry Timer; use the same monitoring point that was used during the symmetry adjustment. The second oscilloscope input must be connected to the output of the phase delay timer. The output of timer TL-2 can be monitored at TP6. If timer TL-9 is used in this equipment, the card in position "G" must be placed in a card adapter and the output monitored at pin 8; check the Overall Logic diagram to determine whether or not there is a test point that can be used to monitor the output of timer TL-9.

When timers TL-2 and TL-9 are both used, they are effectively series. The dropout time of each timer must be set equal to its particular pickup time. The total phase delay will be equal to the sum of the two individual timer settings. Each individual timer setting should be approximately half of the total setting.

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 (see Table I) 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 Figure 6. Opening the N.C. 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 it counter-clockwise. Closing the contact causes the timer output to drop out after the reset time delay setting card. If the timer card is provided with a variable reset delay, it can be adjusted by the lower potentiometer on the timer card (CW increases reset time).

TABLE I

TIME UNDER TEST	POSITION	REMOVE CARD IN POSITION
TL1	J	H
TL2	AL	*
TL3	AN	AM
TL4	AE	**
TL5	AF	**
TL6	M	AN,AM,AK
TL7	AS	***
TL8	AC	L
TL9	G	*

* See the section on Phase Delay Adjustment for details on the adjustment of this timer.

** See the section on Channel Signal Symmetry Adjustment for details on the adjustment of this timer.

*** Remove wires connected to pins 3 and 4 on the card adapter. Connect the Test Circuit shown in Fig. 6 to pins 3 and 4 of the card, through the terminals on the card adapter.

CONTACT CONVERTER TESTS

Operation of the contact converters can be checked by placing the contact converter card in a card adapter, after checking the voltage tap selected agrees with the station battery voltage. Connect the station DC through a switch to the appropriate pair of terminals of the termianl strip, AH, mounted on the rear of the relay. The terminal numbers and polarity of connections for each of the contact converters are shown in the internal connection diagram, Figure 3. Output of the contact converter card may be monitored between pin 8 and pin 1 (reference) on the card adapter with either a scope or meter. Closure of the switch in the test source will provide a +15 volt DC signal at pin 8 of the card adapter.

ISOLATION INTERFACE TESTS

Operation of the three functions (received carrier #1, received carrier #2 and transmitter control of the isolation interface can be checked without direct connections to the subassembly. External test connections are made to the pins of the C111 socket mounted on the rear of the unit, see Figure 3. Logic circuit test connections are made at TP17.

ISOLATION INTERFACE TESTS

Received carrier operation test connections are shown in Figure 7A and B For this test do not remove channel control card in position "AJ". Closure of the N.O. contact will simulate a received carrier signal and scope display will go from a logic "0" to logic "1".

For the transmitter control checks, remove the channel control card "AJ" from its socket and make the test connections shown in Figure 7C. The test contact in the open position simulates a logic "1" condition, which initiates a transmitter control output producing a 5-6 volt DC signal across the output loading resistor. Closure of the N.O. contact generates a logic "0" condition which holds off the transmitter control output of the isolation interface

OVERALL EQUIPMENT TESTS

After the SLA55A 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 AC 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 measuring units operate.

MAINTENANCE

PERIODIC TESTS

It should be sufficient to check the outputs produced at test points in the SLA55A 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 SLA55A itself should be required.

TROUBLE SHOOTING

In any trouble shooting of equipment, it should first be established which unit is fuctioning 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 trouble shooting, 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 ficility is recommended.

SPARE PARTS

To minimize possible outage time, it is recommemded 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 circuet buses, or overheat the semi-conductor 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 SLA51 relay are included in the card book GEK-34158.

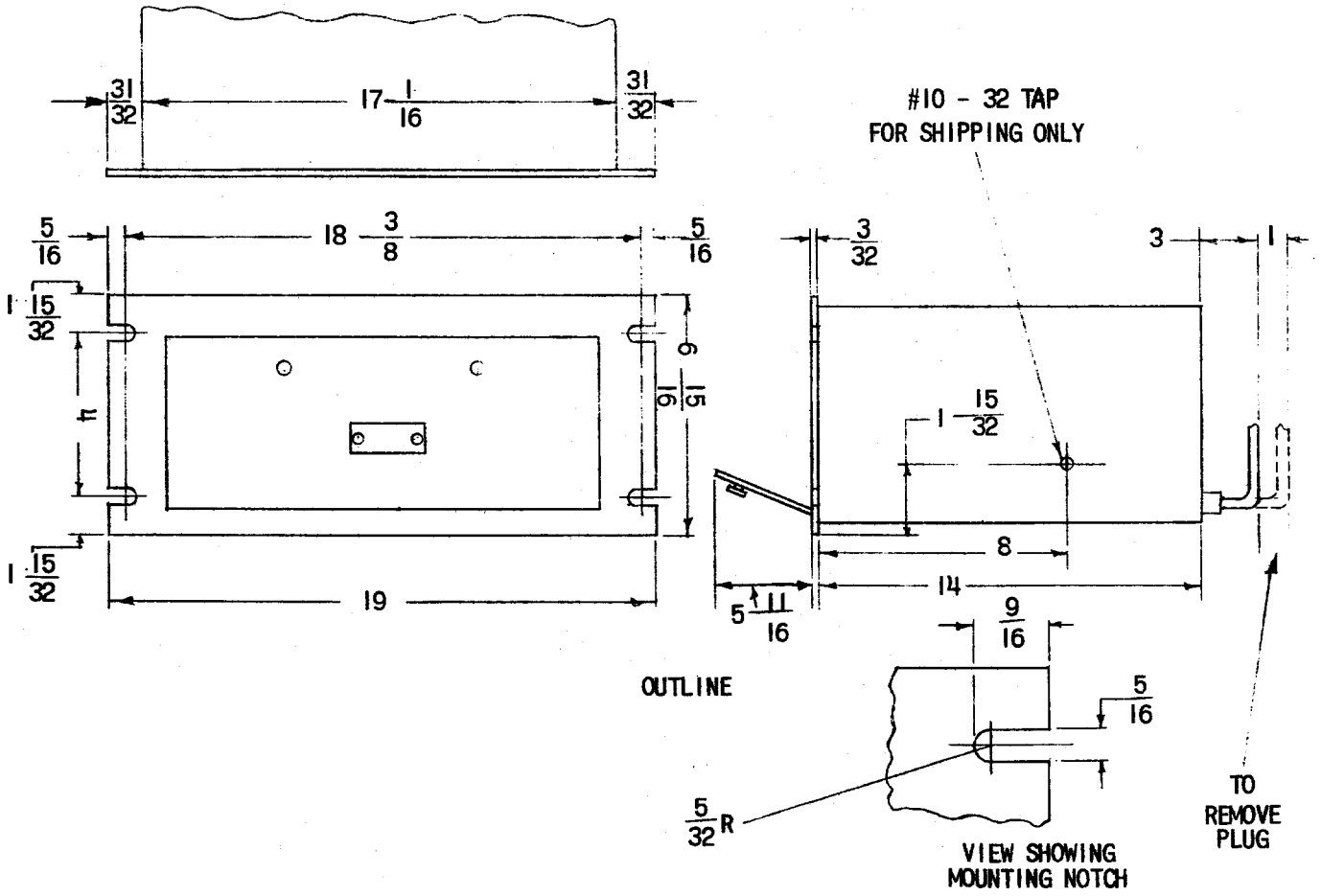


FIG. 1 (0227A2037-0) OUTLINE AND MOUNTING DIMENSIONS FOR THE TYPE SLA55A RELAY

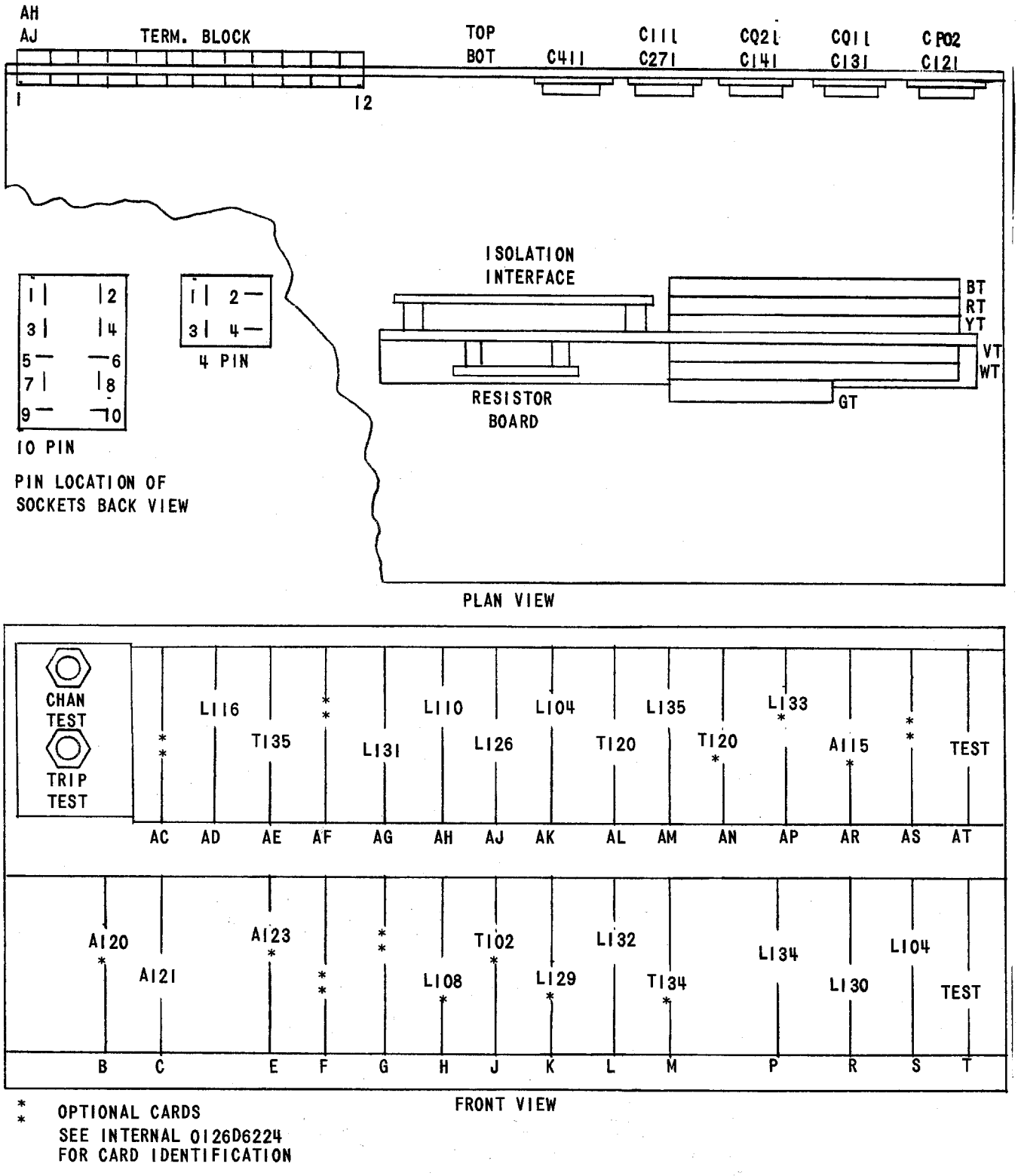


FIG. 3 (0257A6251-0) COMPONENT LOCATION DIAGRAM FOR THE TYPE SLA55A RELAY

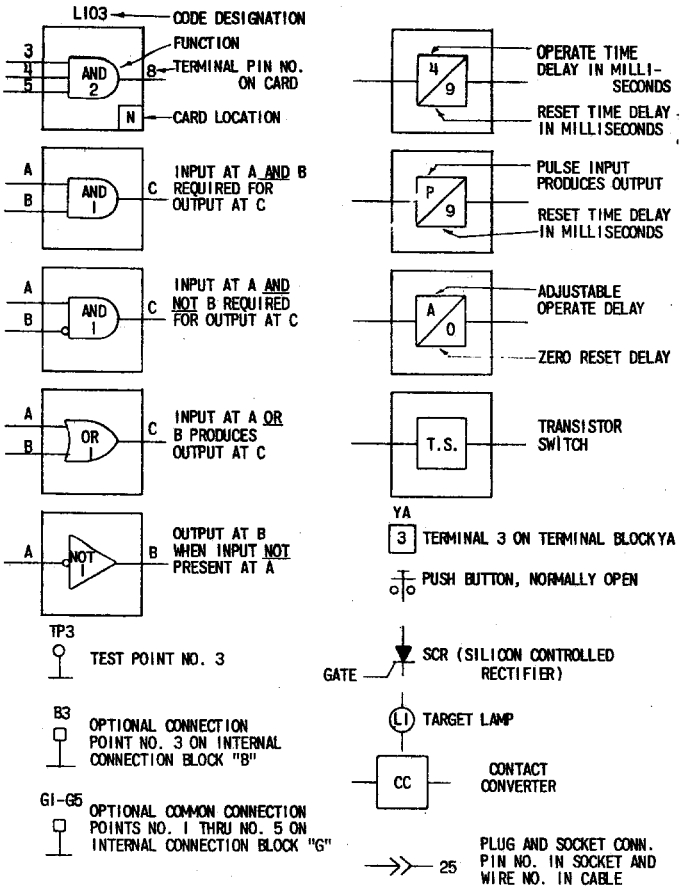
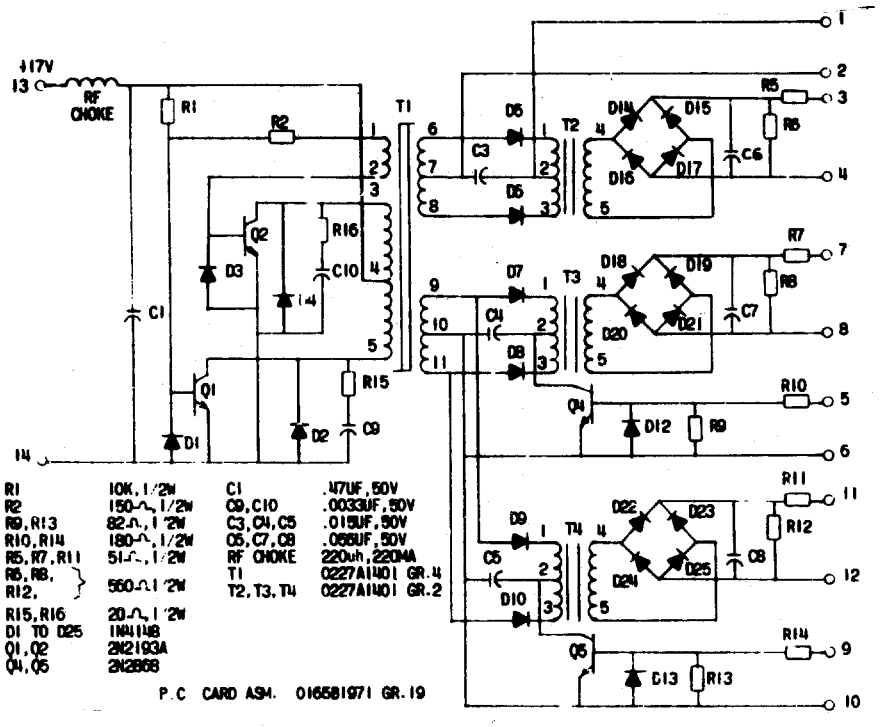
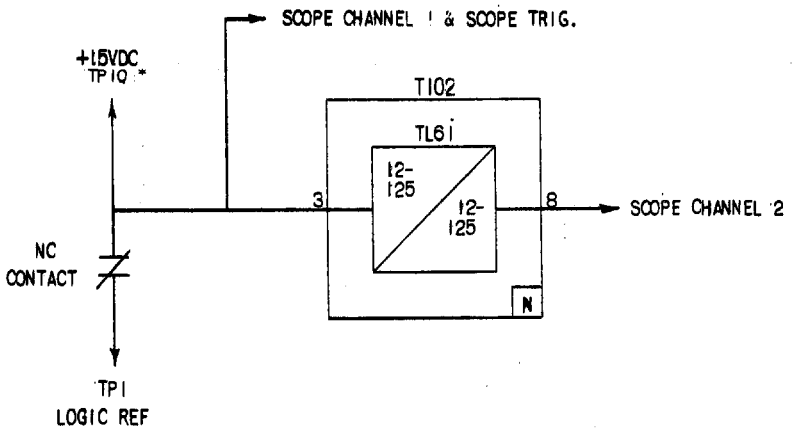


FIG. 4 (0257A2047-0) LOGIC AND INTERNAL CONNECTION DIAGRAM LEGEND



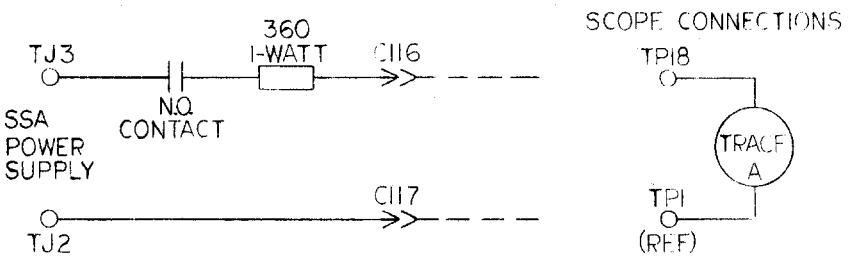
R1	10K, 1/2W	C1	.47UF, 50V
R2	150Ω, 1/2W	C9, C10	.0033UF, 50V
R9, R13	82Ω, 1/2W	C3, C4, C5	.015UF, 50V
R10, R14	180Ω, 1/2W	C6, C7, C8	.056UF, 50V
R5, R7, R11	51Ω, 1/2W	RF CHOKE	220uh, 220MA
R6, R8, R12,	560Ω 1/2W	T1	0227A1401 GR.4
		T2, T3, T4	0227A1401 GR.2
R15, R16	20Ω, 1/2W		
D1 TO D25	IN4148		
Q1, Q2	2N2193A		
Q4, Q5	2N2868		

FIG. 5 (0208A5504AR-0) INTERNAL CONNECTIONS FOR THE ISOLATION INTERFACE

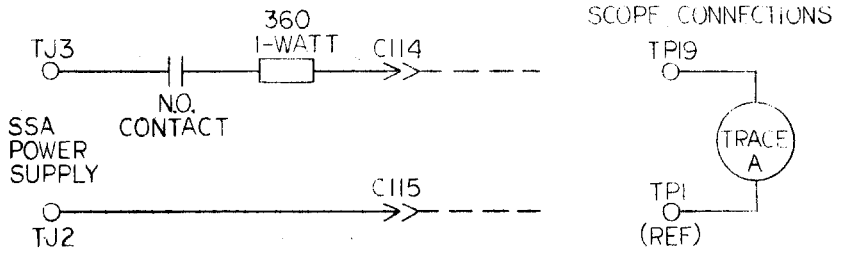


* THE 15VDC SIGNAL AT PIN 10 HAS A CURRENT LIMITING RESISTOR MOUNTED ON THE TEST CARD.

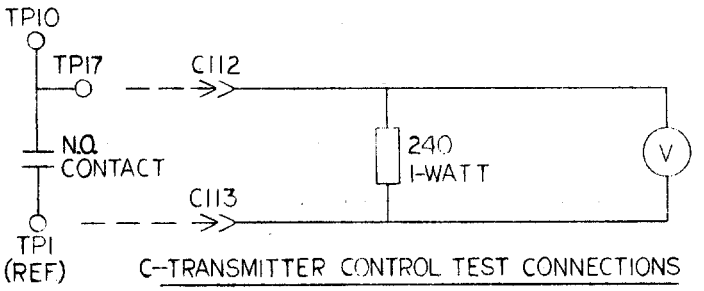
FIG. 6 (0246A7987-0) LOGIC TIMER TEST CIRCUIT



A-RECEIVED CARRIER #1 TEST CONNECTIONS



B-RECEIVED CARRIER #2 TEST CONNECTIONS



C-TRANSMITTER CONTROL TEST CONNECTIONS

FIG. 7 (0257A8386-0) ISOLATION INTERFACE TEST CIRCUIT

THE FOLLOWING CONNECTIONS ARE TO BE MADE TO THE MATRIX BLOCKS INSIDE THE SLA LOGIC UNIT. (52)

FROM	TO	FROM	TO	FROM	TO
B5	G6	W10	Y9		
B8	R15	W16	Y16		
B20	Y10				
		412	R18		
		414	B2		
R7	R12	415	G8		
R9	Y11				
R13	Y13	R4	Y17		
R17	V17				
R19	Y19				
V2	W2				
V5	W4				
V6	G7				
V7	W5				
V9	Y12				
V12	Y14				
V13	Y15				
V14	W12				
V16	V18				
V19	W19				

FIG. 8 (0227A2050-1 sh. 52) SAMPLE OPTION CHART FOR THE TYPE SLA55A RELAY