



INSTRUCTIONS

GEK- 34082

DATA LOGGING AMPLIFIER

TYPE DLA51A

GENERAL  ELECTRIC

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DATA LOGGING AMPLIFIERTYPE DLA51ADESCRIPTION

The Type DLA51A is a transistorized data logging amplifier used for oscillograph monitoring of up to thirty points in a static relaying scheme. These points are shown on the overall logic diagram of the relaying scheme. The DLA51A has contact outputs to operate the oscillograph. This DLA amplifier provides impedance matching between the oscillograph and the logic circuitry thereby preventing undue loading and possible malfunctioning of the relay circuitry that is monitored. The DLA51 has its own built-in, isolated power supply, which is designed for operation from the station battery.

The internal connections for the DLA51A are given in Figure 1. This relay is built into a four rack unit case whose outline and mounting dimensions are given in Figure 2. The component locations for the Type DLA51A are shown in Figure 3.

APPLICATION

The DLA51A is a data logging amplifier designed to be used with General Electric MOD III static relaying equipment. The DLA51A is used to monitor logic points within the static relaying equipment and to couple information regarding the state of these points to appropriate recording equipment. Outputs to the recording equipment are provided via reed relay contacts.

In considering the application of the DLA51A, it should be recognized that the functions within the logic of the static relaying equipment exist in either the "ON" state as indicated by the presence of a signal or the "OFF" state as indicated by the absence of a signal. Therefore, it is not the magnitude of the signal that is of prime concern, but rather the presence or absence of a signal. The magnitude of the signal is important only to the extent that a signal less than 1 volt indicates an "OFF" condition and a signal of approximately 12-15 volts indicates an "ON" condition. An "ON" condition will cause the reed relay associated with a given point to operate and close its contact, whereas an "OFF" condition will be indicated by the contacts being open. It is via this contact that the recording equipment will indicate whether a certain event has or has not occurred.

Points to be monitored by the DLA51A are brought out from a matrix block located within the SLA auxiliary logic relay associated with the static relaying equipment. The number of points available for monitoring within the relaying equipment and thus connected to the matrix block can vary from equipment to equipment. The DLA51A can be used to monitor thirty or less of these points. In ordering the DLA51A, it is necessary to specify the number of points to be monitored. For the points that can be monitored by the DLA51A provided with a specific set of static relaying equipment, see the associated logic diagram and description provided with that equipment.

RATINGS

The DLA51A is designed for use in an environment where the ambient temperature outside the case does not exceed -20°C or $+65^{\circ}\text{C}$.

This DLA is designed for operation from the station battery voltage as indicated on the unit name-plate.

The contact outputs of the DLA51A are rated for a maximum load of 10 VA. The maximum current is 500 MA and the maximum voltage is 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.

BURDEN

The DLA51A maximum current drain from the station battery is given in the table below.

BATTERY VOLTAGE	CURRENT BURDEN
48 VDC	0.9 AMP
125 VDC	0.4 AMP
250 VDC	0.2 AMP

CIRCUIT DESCRIPTION

The type DLA51A amplifier is used when monitoring relay circuitry functions involving basic logic, where the presence or absence of signals, rather than their magnitude, controls the operation. Therefore, signals below 1 volt, with respect to the reference bus, represent an OFF condition while signals of 12 to 15 volts represent an ON condition.

The presence of a positive input signal, with a duration of 14 microseconds or more, at pin three of the A107 card, will cause the relay on the card to pick-up, thus closing the contacts connected between pins eight and nine on the card. If this input signal is removed, the contacts connected between pins eight and nine on the card will reopen after a delay of up to 1.8 milliseconds. The complete 1.8 milliseconds of drop-out delay will be obtained if the duration of the input signal was thirty-five microseconds or more.

The DLA51A unit includes a built-in, isolated power supply. The components of the power supply may be divided into three groups (1) the DC to AC inverter, (2) the rectifier and regulator circuit, and (3) the over-under voltage alarm protection circuit. These are described in detail in the following paragraphs.

DC TO AC INVERTER

Transistors Q₁ and Q₂, in conjunction with the converter card (Fig. 1), form a DC to AC inverter circuit, whose frequency is approximately 1000 Hz. Transformer T₁ provides isolation between the station battery and the desired secondary voltage (33V).

When Q₂ begins to conduct, the voltage induced in the auxiliary winding B3-E3 sustains Q₁ in cutoff and Q₂ in saturation. When the transformer T₁ saturates, the decreasing voltage across the driving winding B1-E1 induces a voltage in the auxiliary winding B3-E3 which turns Q₁ on. The cycle then continues with Q₁ and Q₂ conducting alternately.

REGULATOR CIRCUIT

Transistors Q₃, Q₄, Q₅ and Q₆ (Fig. 1) form a series regulator circuit which provides the 15 VDC logic voltage. The magnitude of the logic voltage can be varied by potentiometer P₁ which is mounted on the regulator card.

Zener Z₁ and transistor Q₅ form a transistor preregulator which serves as a constant current source for the regulator. If the output voltage increases due to an increase in battery voltage, the current through Q₆ increases, which decreases V_{BE} of Q₄ and lowers the current through Q₃. This tends to decrease the output voltage. The net result is a constant output voltage.

Conversely, if the output voltage decreases, the current through Q₆ decreases, V_{BE} of Q₄ increases and the current through Q₃ increases. This tends to increase the output voltage and results in a constant voltage.

ALARM CIRCUIT

The DLA51A power supply is provided with an under-over voltage detector which activates a lamp and two transfer contacts that are made available for connection to a station alarm.

In normal operating conditions, Z5 conducts, Q8 conducts, Q9 does not conduct, Q10 conducts and the alarm relay X1 is energized.

If the output voltage drops below 13 VDC, Z5 ceases to conduct. This turns Q8 off, and causes Q9 to conduct. When Q9 conducts, Q10 is prevented from conducting and the alarm relay X1 is de-energized.

If the output voltage exceeds 16 VDC, Z4 begins to conduct thereby turning on Q7. When Q7 is conducting, Q10 is turned off and the alarm relay X1 is de-energized.

The contacts of the telephone-type alarm relay will make and carry 3 amperes continuously, and will interrupt up to 0.5 ampere (inductive) at 125 VDC, or 0.25 ampere (inductive) at 250 VDC.

CONSTRUCTION

All components of the DLA are mounted in a metal enclosure four rack units in height. Both the cover and the bottom of the metal enclosure are perforated steel to allow for ventilation of heat sinks. The cover is removable.

External connections to the DLA are made at the back of the unit. Sockets for interconnecting the DLA input with the static relay logic units are marked C411 through C521. Arrangement of these sockets is shown on the DLA51A component location drawing, in Figure 3.

External connections to the DLA power supply are made through the DL terminal strip on the rear of the unit. This terminal strip has screw terminals.

TESTING

GENERAL

The DLA51A is usually supplied from the factory mounted in a static relay equipment. All units for a given terminal of static relaying are tested together at the factory and each has the same summary number stamped on its nameplate. When the DLA is furnished as a separate unit, it should be interconnected with the associated relay equipment via the shielded plug-in cables prior to testing.

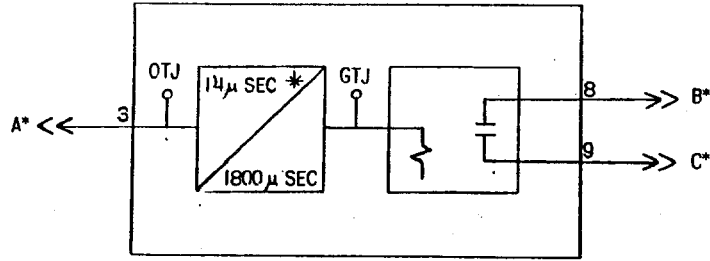
INSTALLATION TESTS

WARNING: 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 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. 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.

Since the DLA51A logic sections are basically transistor switches, adjustments are neither provided nor required. The various functions that are monitored and therefore serve as inputs to the DLA are covered in the overall logic diagram and descriptive writeup furnished with each equipment. The DLA51A power supply section however, is adjustable; therefore, the following tests should be made to insure that it is operating correctly.

1. Connect (+) battery lead to DL2, (-) battery lead to DL3, and station ground to DL1.
2. The power supply output voltage may be conveniently checked at the test points provided on the front of the unit. The voltage indicated adjacent to each test point is the normal voltage. The normal limits are shown in Table 1. The voltage is with respect to reference (TJ1).
3. Power supply regulation can be checked with a variable input voltage. When input supply voltage is reduced to 80% of rated voltage, output voltages should remain within the limits given in Table 1.
4. Power supply regulation with changing load can be checked by first removing all of the type A107 printed circuit cards and then connecting an adjustable resistor and an ammeter between test points TJ1 and TJ2. As the load current is varied, the output voltage should remain within the limits given in Table 1. The upper current limit for the DLA51A power supply is 1.25 amperes.

EVENT RECORDER ISOLATOR
A107



REED RELAY - ELECTROL #RA30021981
CONTACT RATING: 10VA MAX
250V MAX
0.5A MAX

* INPUT PULSE GREATER THAN 40μ SEC
REQUIRED TO GIVE FULL DROP OUT TIME

	COMPONENT VALUES		
	48V	110V	220V
D1	1N2156	1N2156	1N2158
T1	0108B9619G1	0108B9619G4	0108B9619G8
R3	15Ω-5 1/4 W	39Ω-2W	62Ω-2W
R1, 2	6K-10W	12K-10W	25K-10W
Q1, 2	DTS411	IR 425	DTS720

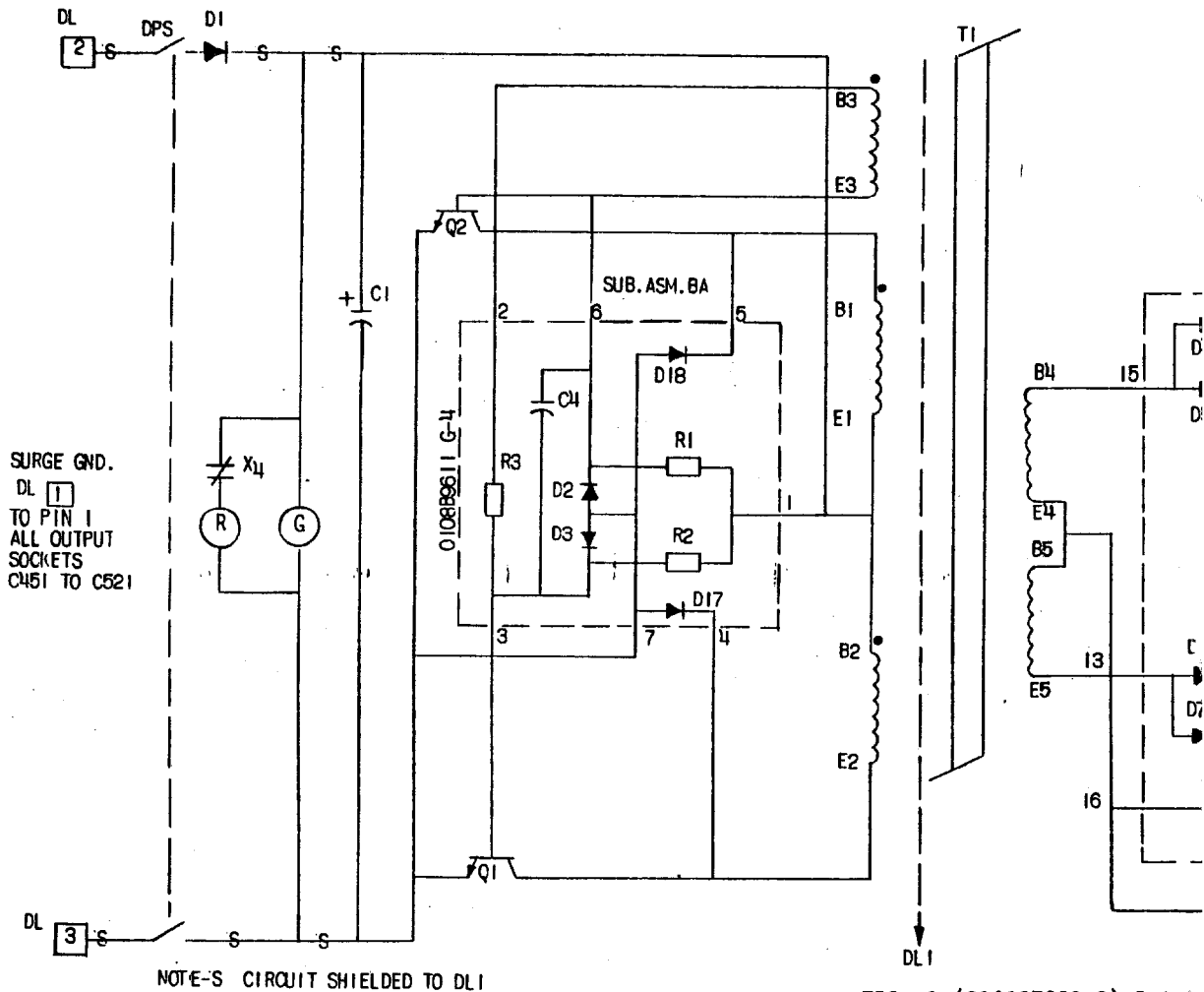


FIG. 1 (0149C7230-3) Inter.

A*
1NP
SIGN
412
413
414
415
416
417
418
419
420
422
423
424
425
426
427

C*	A*	B*	C*
OUTPUT CONTACT	INPUT SIGNAL	A107 LOCATION	OUTPUT CONTACT
452, 453	428	R	488, 489
454, 455	429	P	492, 493
456, 457	430	N	494, 495
458, 459	432	M	496, 497
462, 463	433	L	498, 499
464, 465	434	K	502, 503
466, 467	435	J	504, 505
468, 469	436	H	506, 507
472, 473	437	G	508, 509
474, 475	438	F	512, 513
476, 477	439	E	514, 515
478, 479	440	D	516, 517
482, 483	442	C	522, 523
484, 485	443	B	524, 525
486, 487	444	A	526, 527

COMPONENT VALUES			
D2, 3, 4, 5, 6, 7, 10 17, 18	1N5061	R4	18K, 1/2 W
D8, 9	1N4148	R5	33 Ω , 1/2W
C1	370uf, 450V	R6, 7	10 Ω , 1/2W
C4	.1uf, 50V	R8	560 Ω , 1/2W
C5, 6, 7, 9	5uf, 50V	R9	30 Ω , .5W
C8	1uf, 50V	R10	180 Ω , .5W
P1	100 Ω , 12.5W	R11, 13, 15	47K, 1/2W
X1	1200 Ω RELAY	R12, 14	1K, 1/2W
L1	68uH, 2AMPS	R16	10K, 1/2W
C10	250 uf, 50V	R17	3 Ω 10W
Z1	1N4371A (2.7V)	Q3	2N3713
Z2, 3	1N3826A (5.1V)	Q4	2N3766
Z4	1N3025B (16V)	Q5	2N3740
Z5	1N3023B (13V)	Q6, 7, 8, 9, 10	2N2868
Z6	1N3316B (17V)		
X4	750 Ω RELAY	BR1	2AMP BREAKER

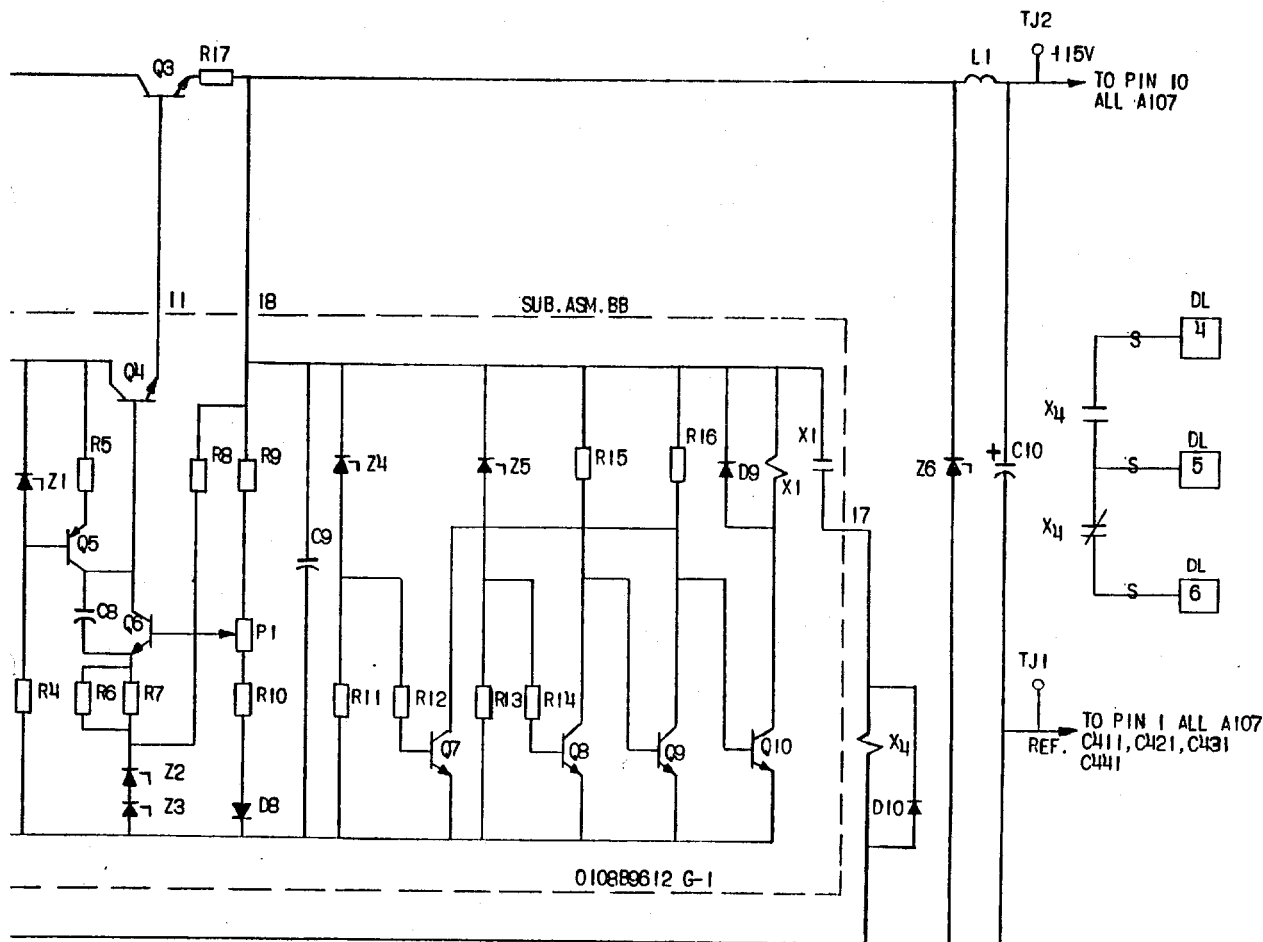


Diagram Of The DLA51A Amplifier

5. The undervoltage alarm relay may be checked by decreasing the input D.C. voltage until the power supply output voltage drops below the rated voltage of Z₅ (approximately 13 volts). This will allow the UV relay to drop out and light the red voltage alarm lamp.

The undervoltage alarm may also be checked by opening the circuit breaker (B1) on the front of the unit.

6. In order to test the overvoltage alarm it is necessary to remove the unit top cover, and increase the output voltage by adjusting P1 on the regulator card. The overvoltage alarm should operate when Z₄ begins to conduct (approximately 16 VDC).

TABLE I

TEST POINT	NOMINAL VOLTAGE	NO LOAD VOLTAGE	LOAD VOLTAGE
TJ1	REF.	-	-
TJ2	15.0	14.9-15.1	14.5-15.1

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 unit 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.

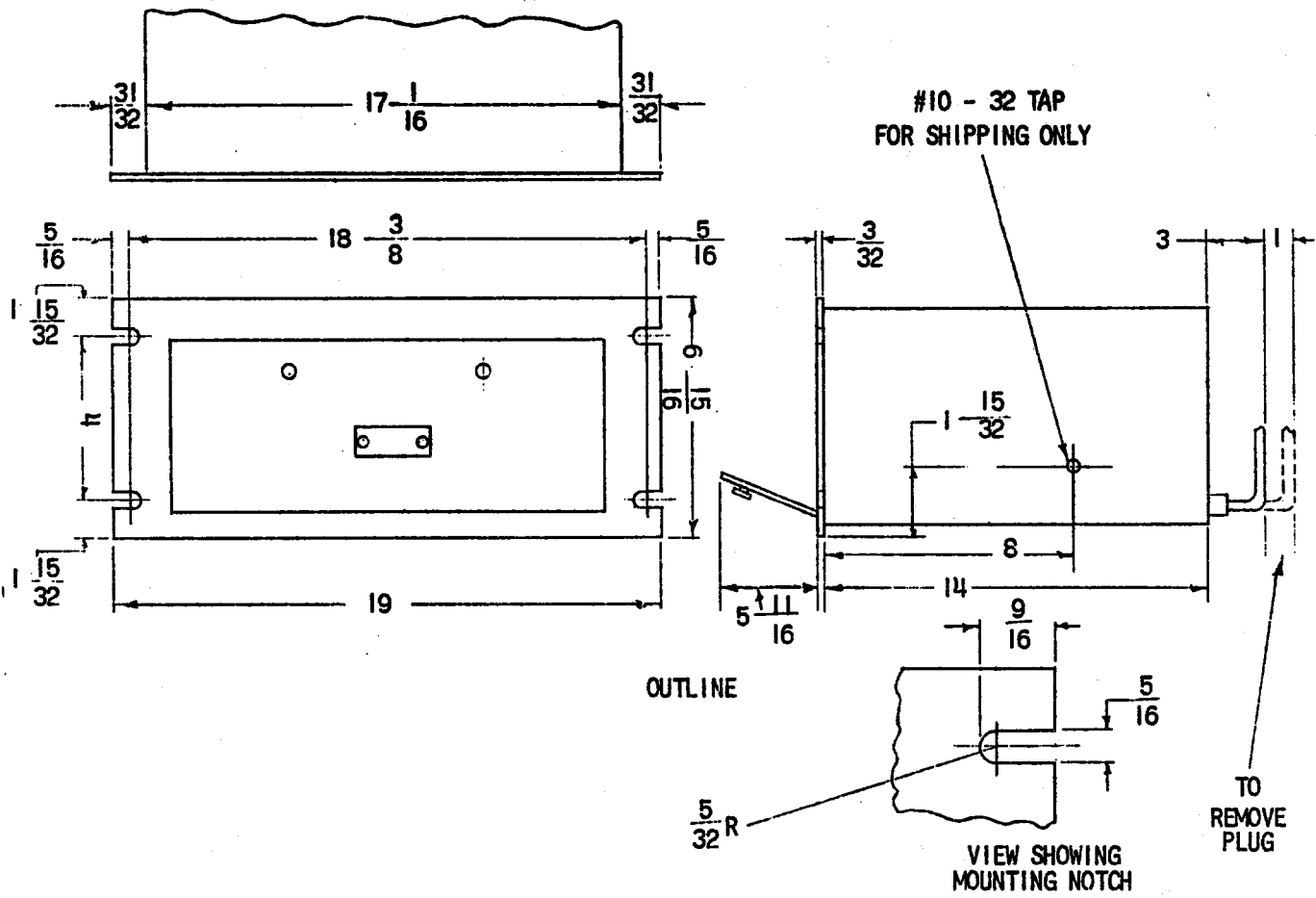
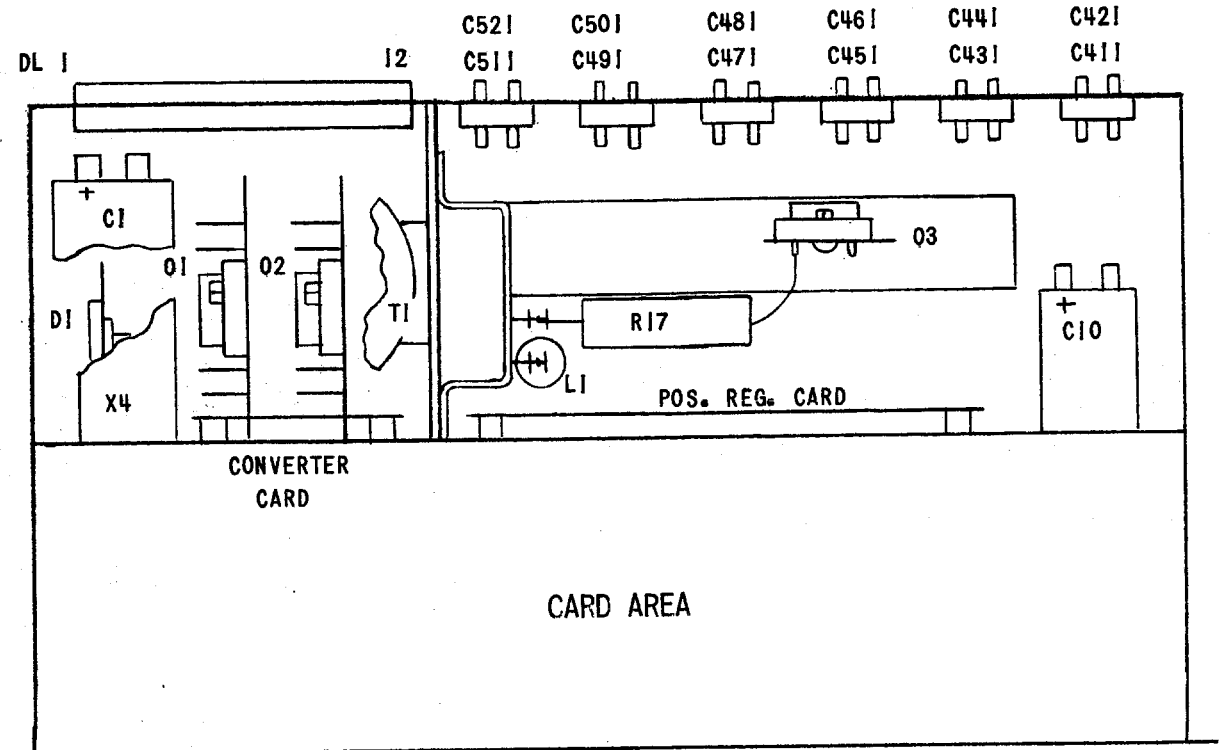
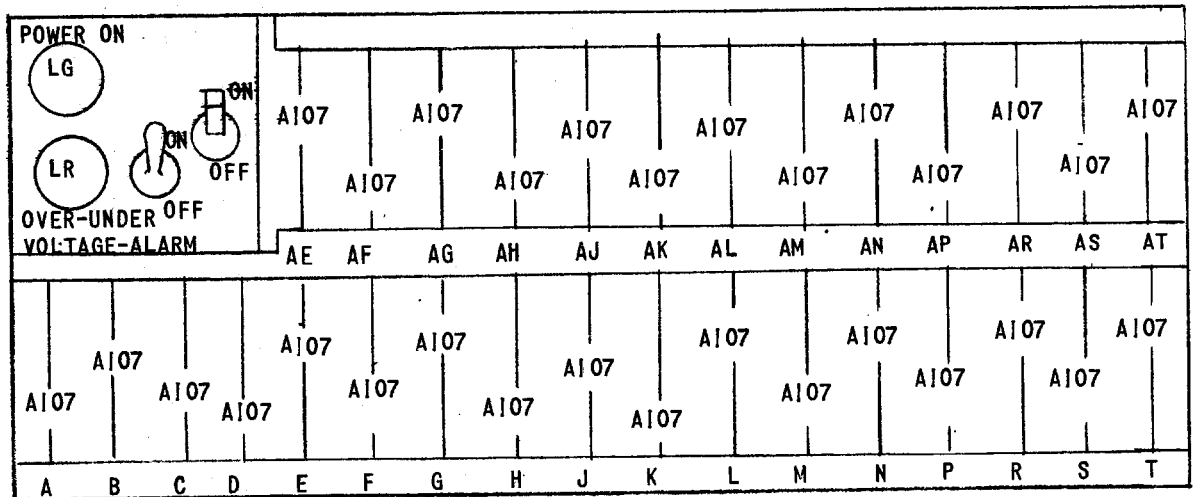


FIG. 2 (0227A2037-0) Outline And Mounting Dimensions For The DLA51A Amplifier Unit



TOP VIEW



FRONT VIEW

FIG. 3 (0246A3509-0) Component Location Diagram For The DLA51A Amplifier Unit

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