



INSTRUCTIONS

GEK-24960B

TIME DELAY RELAY CARD

193X543ADG01 & G02

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 General Electric Company.

GENERAL  ELECTRIC

INSTRUCTIONS

TIME DELAY RELAY CARD 193X543ADG01, G02

WARNING

DISCONNECT ALL POWER TO THE DRIVE BEFORE REMOVING OR INSERTING A PRINTED CIRCUIT CARD. FAILURE TO DO SO MAY CAUSE SERIOUS INJURY TO PERSONNEL INCLUDING DEATH AND DAMAGE TO THE DRIVE AND DRIVEN MACHINERY

GENERAL

This card contains two identical time delay relay channels. The output relays may be energized either from +20V, -20V, or 115V AC input signals. The time delay can be adjusted over three timing ranges from .1 second to 60 seconds. A $\pm 20V$ external power supply is required. A light emitting diode is used to indicate relay energization.

Refer to the system instructions and elementary diagrams for external connections, on-card jumpers and time delay adjustments. The G01 card contains Channel A only.

NOTE

BEFORE REPLACING A DEFECTIVE CARD MAKE CERTAIN THE NEW CARD HAS THE CORRESPONDING CARD JUMPERS AND POTENTIOMETER SETTINGS. TEST FOR CORRECT RELAY OPERATION BEFORE INITIATING DRIVE SYSTEM OPERATION (SEE CARD TEST).

DESCRIPTION

RELAY

The relay is hermetically sealed having a 24V DC coil and qty. (4) from C contacts. The resistive contact rating is 1A, 120V AC or 28V DC. The pilot duty rating is 0.8A inrush, 0.18A holding at 115V AC. The low level rating is 15mA minimum at 20V, DC, 5mA minimum at 115V AC.

INPUT

Standard: The input points are tab 12 for channel "A" and tab 17 for channel "B." The input resistance is 18K ohms with an RC time constant of 1.3 milliseconds for noise suppression. The input signals must be within the ranges of 85V AC to 130V AC or $\pm 6V$ DC to $\pm 130V$ DC.

Low Level: A low level DC input of 3.5V minimum may be applied to tabs 14 and 16. The input resistance at these points is 35K ohms

ON-CARD JUMPERS

Card jumpers are used to select the timing range and delay sense according to the table below:

JUMPER CONNECTORS		FUNCTION
Channel A	Channel B	
FTA—FSA	FTB—FSB	.1 sec. to 1 sec.
LTA—FTA	LTB—FTB	.9 sec. to 10 sec.*
LTA—LCA	LTB—LCB	6 sec. to 60 sec.
PUA—DOA	PUB—DOB	pick-up & drop-out relay*
TDA—PUA	TDB—PUB	pick-up delay
TDA—DOA	TDB—DOB	drop-out delay

*These jumper connections are not required, but are used to hold jumpers for other possible connections.

ADJUSTMENT

The time delay is linear with respect to the setting of the single turn potentiometers, TMA and TMB. CW rotation increases the time delay.

CARD TEST

Test posts REF, RCA, TIA, RCB, TIB and COM along the card front can be used to check the card operation.

TIA and TIB can be used to monitor the input signals.

The voltage at RCA and RCB will change from -20V to about +4V to indicate proper coil excitation.

The electronic circuitry can be bypassed to energize the relay coils directly by connecting REF to RCA to pick up the "A" relay and REF to RCB to pick up the "B" relay

Each channel can be tested with a DC test reference by connecting REF to TIA to energize the "A" channel and REF to TIB to energize the "B" channel.

REMOTE TIMING CONTROL

External timing control can be provided by using an op-amp limit circuit to reduce the integrator reference voltage to tab 13 for channel "A" and tab 20 for channel "B." Refer to the elementary diagrams for additional information if this feature is provided.

EXTENDED TIMING

Extended timing can be provided by connecting external capacitors between tabs 4 and 7 and/or tabs 23 and 26. Card jumpers are used to connect 1A—TA, 2A—FSA and/or 1B—TB, 2B—FSB.

ACCURACY

For a temperature change of 15°C at the card location, the time delay will change less than 1.5% of set timing.

INSTANTANEOUS OPERATION

The instantaneous operating time of the relay will be 20 milliseconds or less after the switching of the input signal.

OPERATION

The following is a brief operating description for channel "A." (The operation of channel "B" is identical.) Voltage levels referenced are approximate.

- a) DOA jumpered to PUA for both pick-up and drop-out delay:

Following the application of an input signal.

- The TDA voltage will switch from about +15V to -15V.
- The RA voltage will switch from about +1V to -1V with the timing potentiometer, TMA, CW, and from +14V to -14V with the potentiometer CCW.
- The TA voltage will start ramping from -.5V towards +10V. When TA reaches +9.5V the RSA voltage will switch from +15V to -15V to turn on transistor T103 which energizes relay coil RLA and turns on the light emitting diode LED A. The RCA voltage will switch from -20V to +4V.

After removal of the input signal the TDA and RA voltages switch back to their positive levels and the TA voltage starts ramping down towards -.5V. When TA reaches about zero volts the RSA voltage switches positive and the relay drops out.

- b) TDA jumpered to PUA for pick-up delay only:

The sequence is the same as in (a) except when the input is removed and the TDA voltage switches positive, the RSA voltage immediately switches positive to drop-out the relay within 20 milliseconds and force the TA voltage to -.5V.

- c) TDA jumpered to DOA for drop-out delay only:

After an input signal is applied the TDA voltage switches negative to immediately (within 20 milliseconds) force the RSA voltage negative to pick up the relay and force the TA voltage to +10V.

The drop-out sequence is the same as described under (a).

POWER SUPPLY

The load on the $\pm 20V$ power supply will be ± 55 milliamps maximum per channel with the relay picked up.

TROUBLESHOOTING TIPS

Remove the card and visually inspect for damaged components or jumper connectors. Inspect the card receptacle for broken connections or shorted pin connectors.

Verify the presence of the $\pm 20V$ supply voltages.

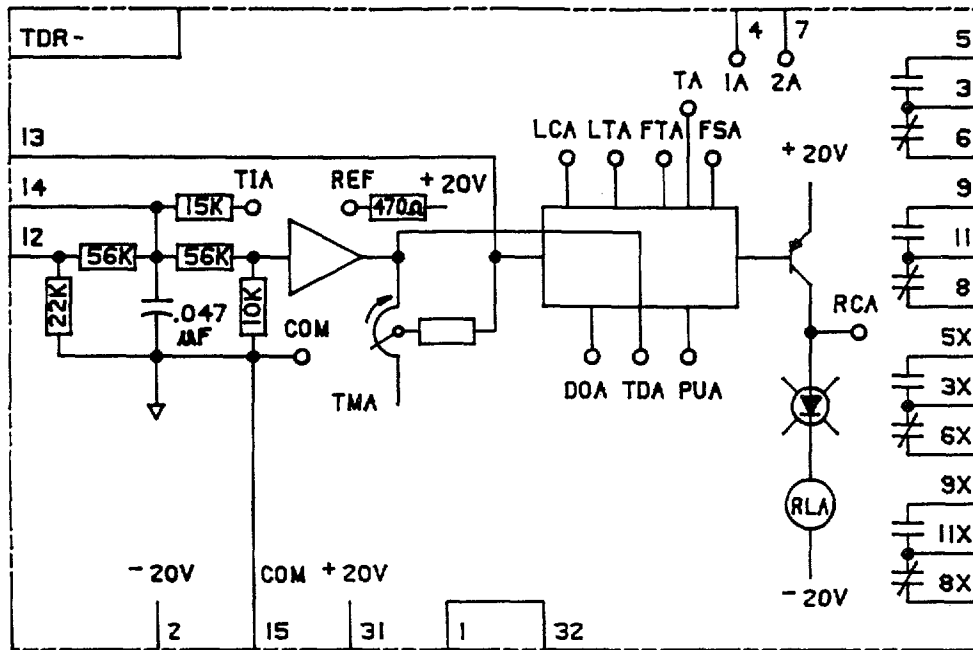
Check the card operation as described under **Operation** using the methods described under Card Test.

With the input applied and removed use an oscilloscope to check for noise at the input point, $\pm 20V$, TIA, TDA, RA, TA, RSA, RCA (or the corresponding channel "B" points).

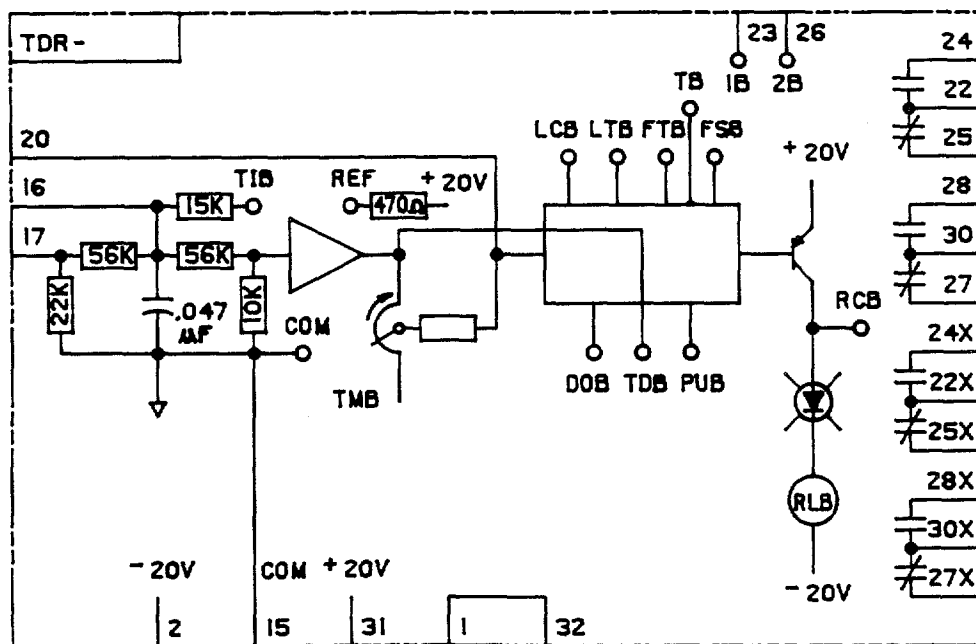
If erratic operation or component failures should occur, check for sources of voltage transients like unsuppressed relay or contact coils.

Verify that the relay contacts do not exhibit high (or infinite) resistance when closed.

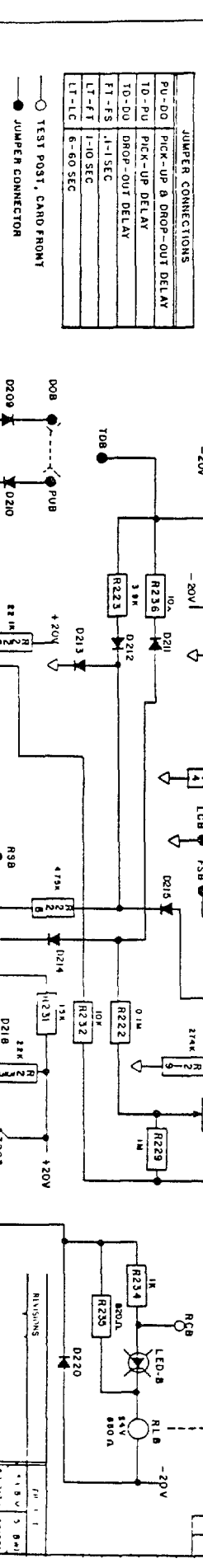
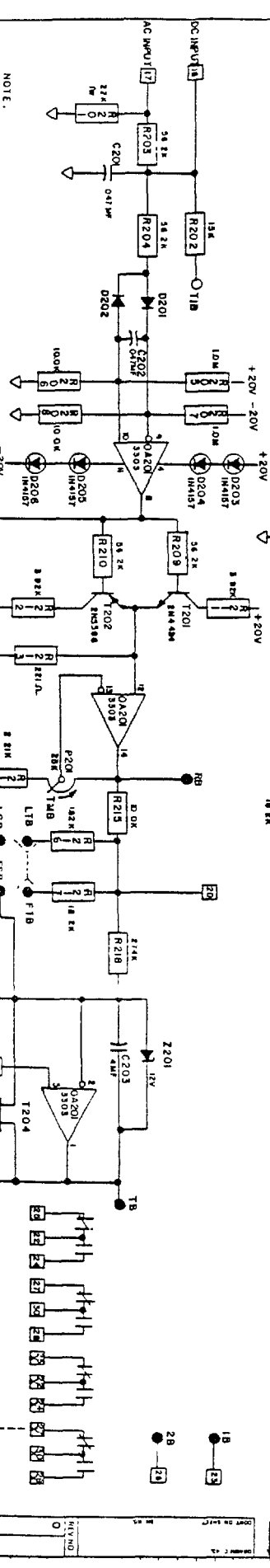
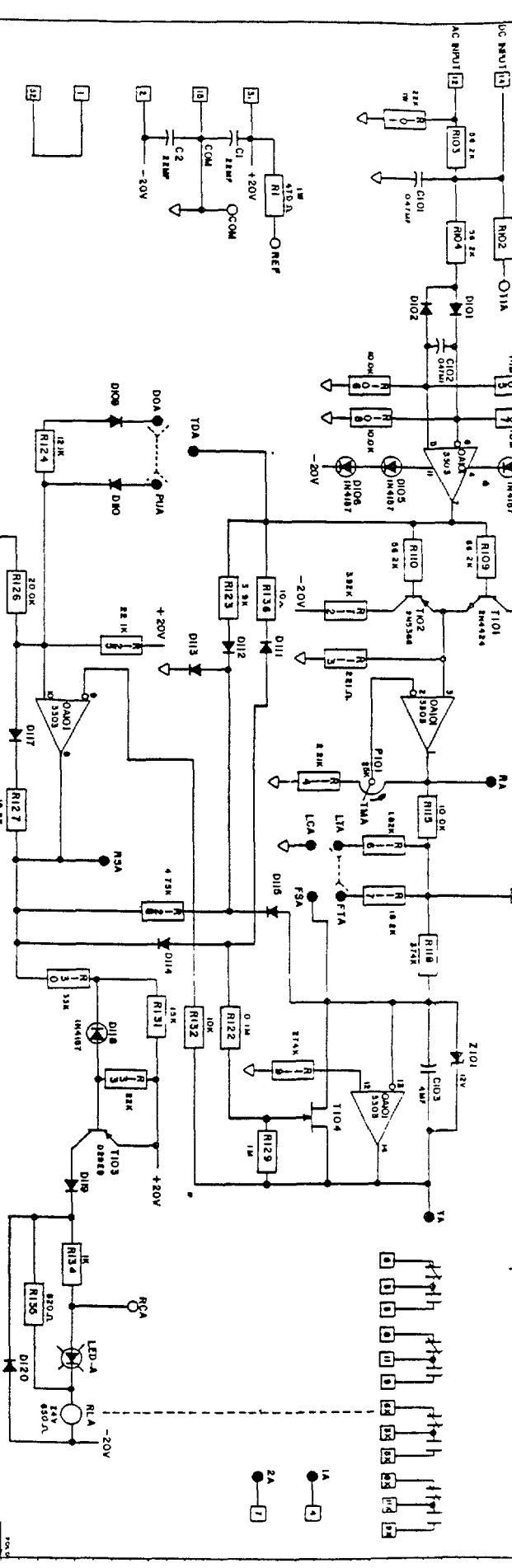
TIME DELAY RELAY - A



TIME DELAY RELAY - B (GO2 ONLY)



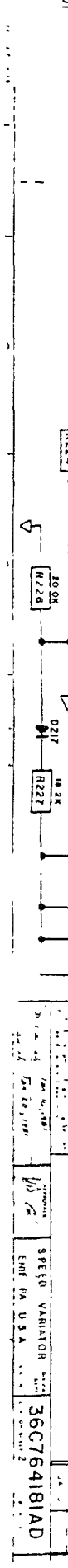
UNIT IS CONSIDERED TO BE THE FOLLOWING...
SUBSTITUTES
TIME DELAY RELAY
FIRST MADE FROM STANDARD LINE
193X543AD 002



NOTE: JUMPER CONNECTIONS

PU-DU	PICK-UP & DROP-OUT DELAY
TD-PU	PICK-UP DELAY
TD-DU	DROP-OUT DELAY
FT-FS	1-1/2 SEC
LT-FT	1-10 SEC
LT-LC	6-60 SEC

TEST POST, CARO FRONT
JUMPER CONNECTOR



UNLESS OTHERWISE NOTED, OBSERVE THE FOLLOWING:
 1. ALL HOLES ARE TO BE REAMED TO A FINISH.
 2. ALL HOLES ARE TO BE DEBURRED.
 3. ALL HOLES ARE TO BE CLEANED AND DRY.

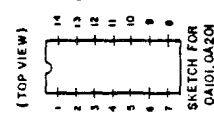
HOLE TABULATION

ALL HOLES .032 DIA. EXCEPT THE HOLES TABULATED BELOW

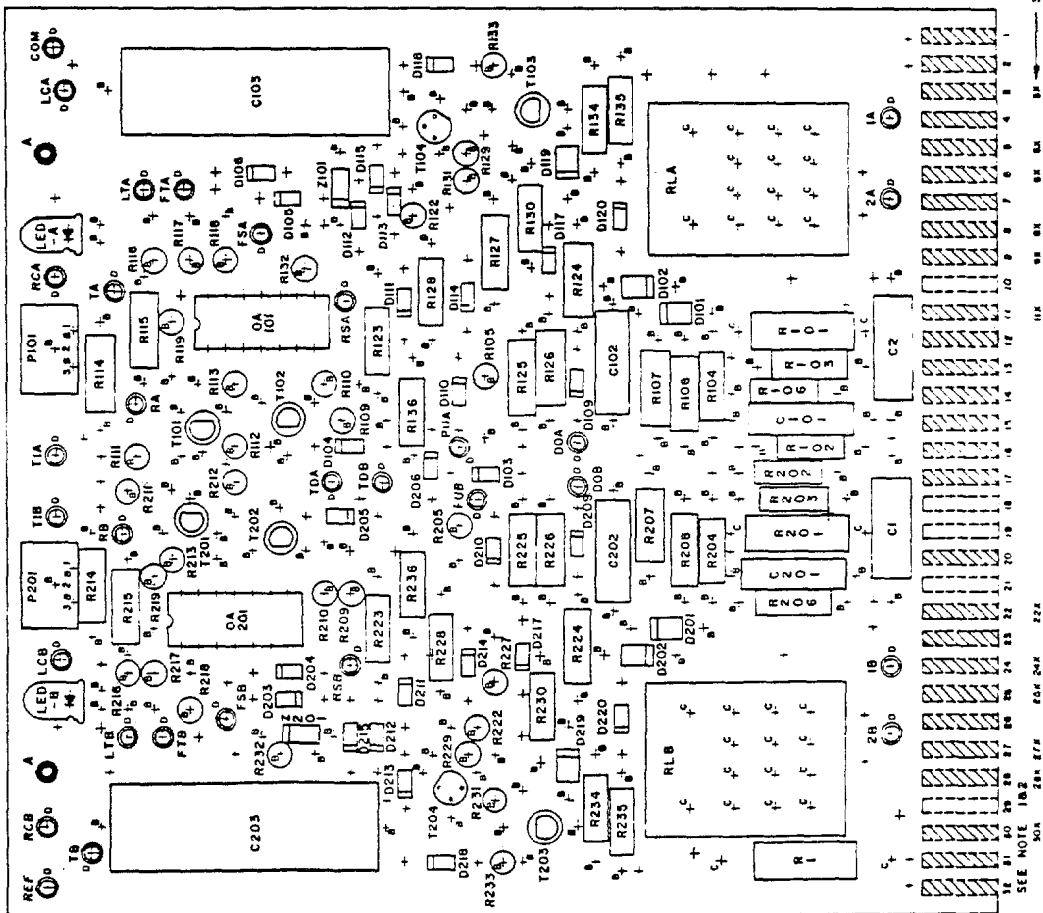
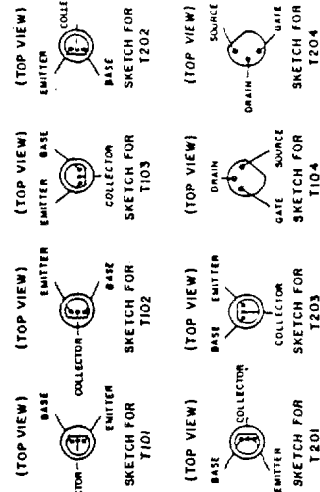
LOC.	DIA.	QUAN.
A	.187	5
B	.040	98
C	.062	34
D	.070	30

- NOTES**
1. INDICATED TAB NUMBERS CORRESPOND TO MATCHING RECEPTACLE NUMBERS.
 2. CROSS HATCHED TABS INDICATES TABS USED.
 3. CARD SIZE, 5 500' 000 X 6 150' 000.
 4. THIS CARD HAS GOLD PLATED TABS ON BOTH SIDES. TABS 1 THRU 32 ARE LOCATED ON THE REVERSE SIDE. TABS 33 THRU 32 ARE LOCATED ON THE COMPONENT SIDE OF THE CARD. TAB IX IS OPPOSITE TAB I AND ETC. THE TAB NUMBERS SHOWN ARE THOSE USED ON THIS CARD.

IC LEAD SKETCH



TRANSISTOR LEAD SKETCHES



SEE NOTE 4

SEE NOTE 1BZ
SEE NOTE 182
SEE NOTE 50A
SEE NOTE 274
SEE NOTE 276
SEE NOTE 278
SEE NOTE 279
SEE NOTE 281
SEE NOTE 282
SEE NOTE 283
SEE NOTE 284
SEE NOTE 285
SEE NOTE 286
SEE NOTE 287
SEE NOTE 288
SEE NOTE 289
SEE NOTE 290
SEE NOTE 291
SEE NOTE 292
SEE NOTE 293
SEE NOTE 294
SEE NOTE 295
SEE NOTE 296
SEE NOTE 297
SEE NOTE 298
SEE NOTE 299
SEE NOTE 300

GROUP	KEY LOCATION		
602	12-13	14-16	17-18-19

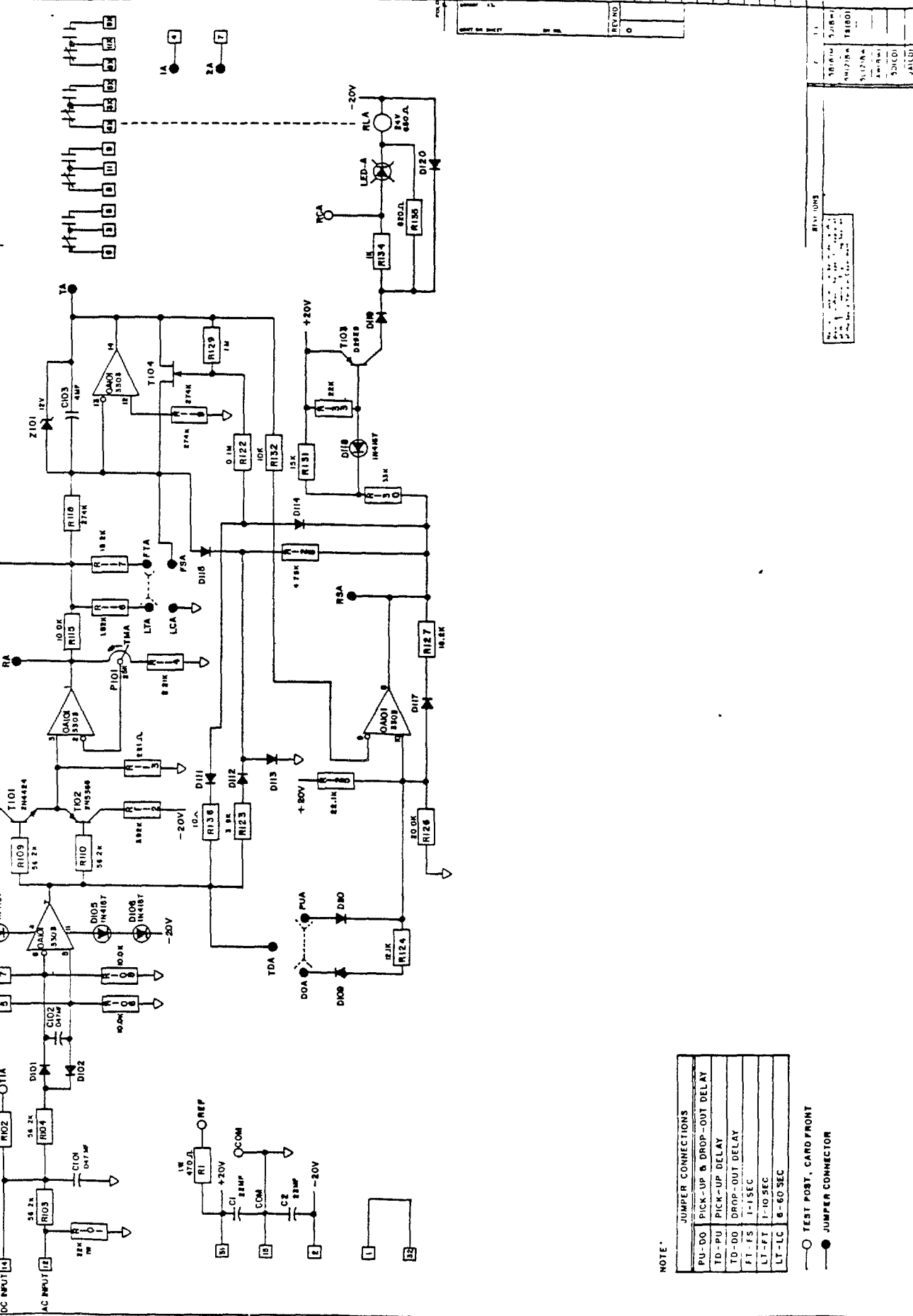
2X SCALE BOARD DIM. BOARD DIM. SPACE UNIT DIM.
 REAR ETCHED POINT ETCHED BOARD DIM.
 BOARD DIM. SPACE UNIT DIM.

GENERAL ELECTRIC
TIME DELAY RELAY
 FIRST MADE FOR STANDARD LINE
 193X543ADG01

5
 SERIALS
 ATTACHED SERIALS
 CHECK THE FOLLOWING
 SERIALS
 SERIALS

3
 SERIALS
 ATTACHED SERIALS
 CHECK THE FOLLOWING
 SERIALS
 SERIALS

2
 SERIALS
 ATTACHED SERIALS
 CHECK THE FOLLOWING
 SERIALS
 SERIALS



NOTE

JUMPER CONNECTIONS	
PU-00	PICK-UP & DROP-OUT DELAY
TD-PU	PICK-UP DELAY
TD-00	DROP-OUT DELAY
FT-FS	1-1SEC
LT-FT	1-10 SEC
LT-LC	8-60 SEC

○ TEST POST, CARD FRONT
 ● JUMPER CONNECTOR

36C764194AC

GENERAL ELECTRIC

PRINTED CIRCUIT DIAGRAM

TIME DELAY RELAY CARD

STANDARD LINE

193XS43ADG01

HOLE TABULATION

ALL HOLES .032 DIA EXCEPT THE HOLES TABULATED BELOW

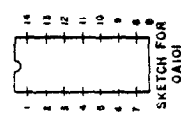
LOC	DIA	QUAN
A	.187	2
B	.040	101
C	.082	18
D	.070	18

NOTES

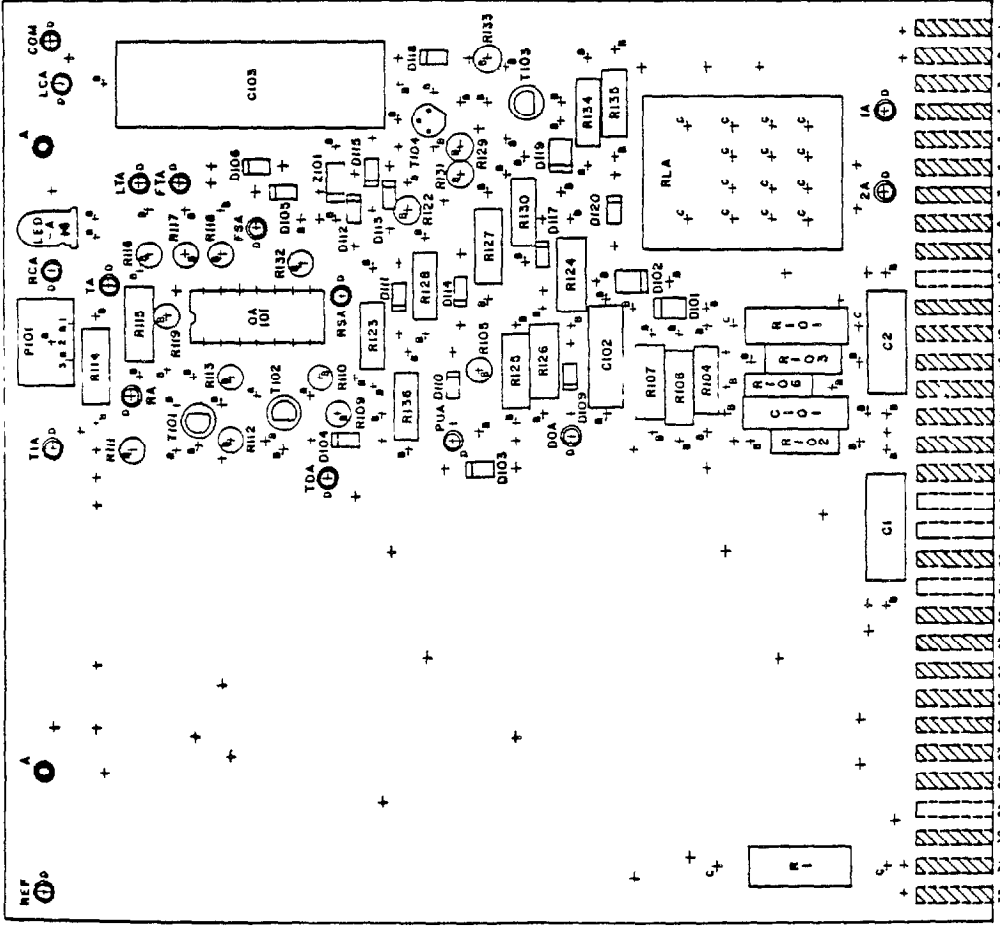
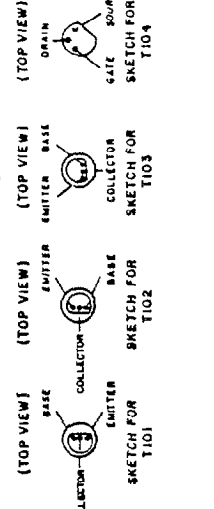
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- CARD SIZE, 5 500'S 000 X 8 130'S 004
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GROUP	KEY LOCATIONS
601	12-13 13-14 16-17

IC LEAD SKETCH (TOP VIEW)



TRANSISTOR LEAD SKETCHES (TOP VIEW)



2X	SCALE	BOARD DIM.	BOARD DIM.	SCALE UNIT	REQUIREMENT
36A358061A000	16A398064A005	16A398064A005	16A398064A005	FRONT	FRONT
36A358061A000	16A398064A005	16A398064A005	16A398064A005	REAR	REAR

REV.	DATE	BY	CHKD.	APP.
1	10/16/51	J. H.
2	10/20/51	J. H.

36C764194AC

GENERAL ELECTRIC

PRINTED CIRCUIT DIAGRAM

TIME DELAY RELAY CARD

STANDARD LINE

193XS43ADG01

Speed variator
ERIE, PA., U.S.A.

SEE NOTE 4

GENERAL ELECTRIC COMPANY
SPEED VARIATOR PRODUCTS OPERATION
ERIE, PENNSYLVANIA 16531

GENERAL  **ELECTRIC**