INSTRUCTIONS

GEI-92027A

SCR REGULATOR LINEAR TIME CARD

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

BE SURE THAT CARD IS INSERTED INTO THE CORRECT REGULATOR RACK SLOT. CARD IDENTIFICATION NUMBER AND SLOT MARKING NUMBER MUST BE IN AGREEMENT. IF THEY ARE NOT, CONTACT SPEED VARIATOR PRODUCTS DEPARTMENT, GENERAL ELECTRIC COMPANY, ERIE, PA. 16501.

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.

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DESCRIPTION AND APPLICATION

The timing circuit utilizes two universal amplifiers to generate a ramp output that varies linearly with time to a voltage value determined by the input voltage. The linear time function is used primarily in single-motor, non-coordinated drives or multi-motor drives requiring relatively long acceleration or deceleration times.

OPERATION

The constant generator amplifier (AMPL 251) saturates for any error between the input and output voltages of the timing circuit. The saturation level is limited by diodes D251 and D252, which provides a strong negative feedback around the amplifier. Resistor R257 is connected to the output of the second amplifier (AMPL 252) to provide the feedback to AMPL 251. The input to AMPL 251 is connected through an external resistor. The constant generator output (Tab 16) can be used for an inertia compensation signal.

AMPL 252 has no steady state feedback around it. Capacitors C251 through C254 are used as feedback elements that provide a feedback for a changing output. Resistors R259, R260, and R261 are input resistors to AMPL 252. One of these resistors is connected to resistor R258, and diodes D253 and D254 to complete the circuit. The resistor selected de-

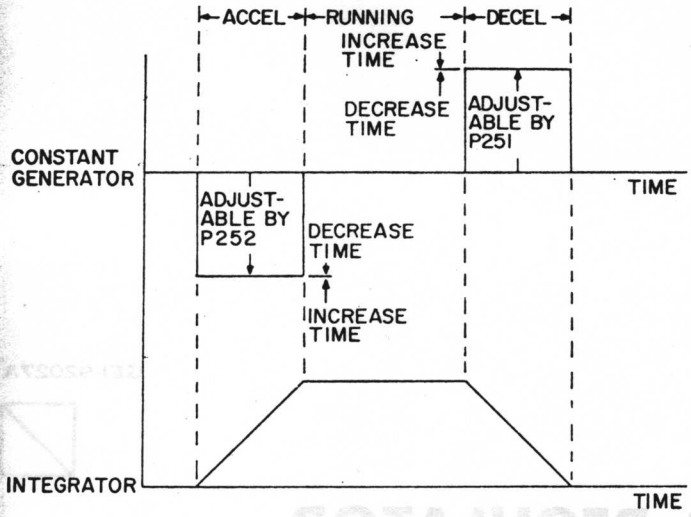


Fig. 1. Linear time subfunctions

pends upon the timing range desired. The universal amplifier is a high-gain device, requiring less than one millivolt input for 10 volts output.

The output from AMPL 252 changes at a rate proportional to the value of capacitance, the value of input resistance, and the magnitude of the input voltage. With a constant input voltage, the output from AMPL 252 changes at a constant rate. The limiting action of AMPL 251 to an error provides a constant input to AMPL 252, where the constant voltage produces a constant rate-of-change output (timed-reference output). The constant output of AMPL 251 is produced by the unbalance of the timing circuit output and the reference input. When the balance between output and input is attained, at the set level of input voltage, the first amplifier resets to zero to keep the second amplifier at the adjusted output.

When the input voltage is reduced to zero, the unbalance between the timing circuit output and feedback is the opposite polarity of that previously described and causes AMPL 251 to produce a constant output of the opposite polarity. This constant signal produces a constant rate-of-change output in the decreasing direction to zero. The subfunction outputs are shown in Fig. 1.

The timed-reference output is adjustable by potentiometers P251 and P252. These potentiometers, in conjunction with D253 and D254, clamp the saturated output of AMPL 251 at a level below saturation. The lower the clamped output, the longer the time required for a change in AMPL 252 output. Increasing the value of the input resistance (resistors R259, R260, and R261) or increasing the value of feedback capacitance (capacitors C251, C252, C253, and C254) increases the timing range.

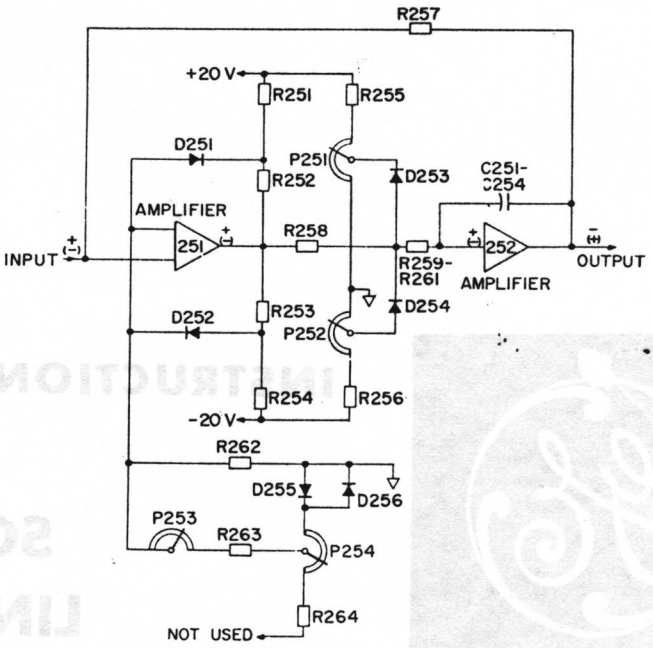


Fig. 2. Simplified diagram

Fig. 1. (PBA-56615)
Fig. 2. (PBA-56609)

ADJUSTMENT

1. With zero input volts, adjust the balance potentiometer on AMPL 251 for zero volt output from AMPL 252.

2. With zero input volts and approximately 1000 Ω connected from input to output of AMPL 252, adjust the balance potentiometer on AMPL 252 for zero volt output of AMPL 252. (The resistor from input to output of AMPL 252 is normally connected when the drive is at standstill. Check elementary drawings.)

3. Adjust the negative output rate and the positive output rate potentiometer for the desired output rate of change. (Clockwise rotation increases the rate and decreases the time.)

TROUBLESHOOTING

CAUTION: *THIS CARD MAY BE WIRED TO PROVIDE AN INTERLOCK FUNCTION DEPENDING ON THE CONFIGURATION OF THE INTERCONNECTION WIRING TO THE CARD; REMOVAL OF THE CARD (WHEN OPERATING) MAY CAUSE THE DRIVE TO SHUT DOWN AND INHIBIT RESTART.*

Follow the troubleshooting procedure outlined in the regulator description in GEI-92001, "General Description."

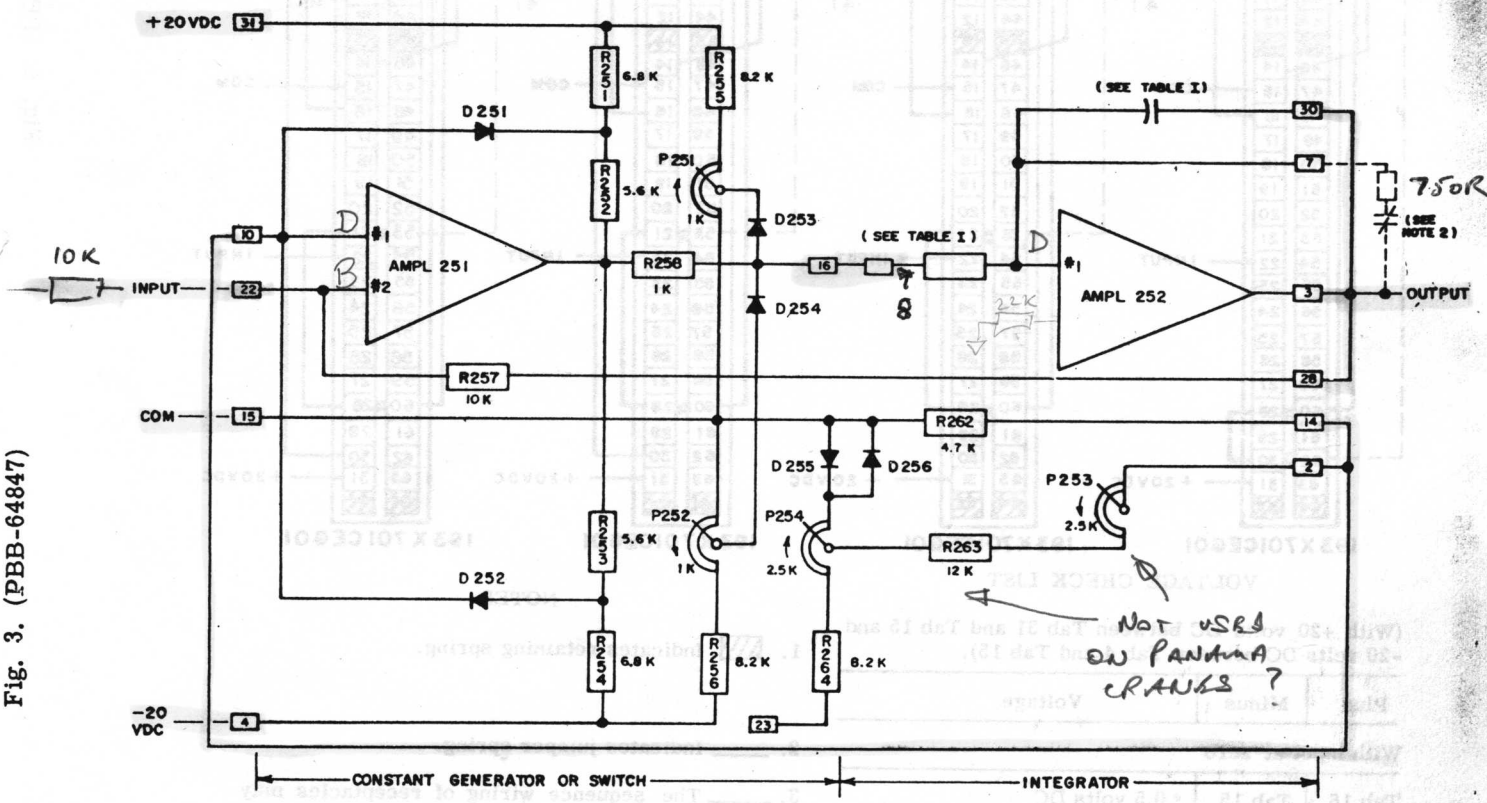


Fig. 3. (PBB-64847)

NOMENCLATURE

C251,C252, C253,C254	Integrating Capacitor
D251,D252	Maximum Limit Diode
D253,D254	Rate Limit Diode
D255,D256	Temperature Compensating Diode
P251	Negative-Going Output Rate Potentiometer
P252	Positive-Going Output Rate Potentiometer
P253	Temperature Compensation Adjust Potentiometer
P254	Zero Adjust Potentiometer
R251,R252, R253,R254	Voltage Divider
R255,R256	Voltage Dropping Resistor
R257	Feedback Resistor
R258	AMPL251 Output Current Limit
R259,R260, R261	Integrating Rate Resistor
R262	AMPL251, Commoning Resistor
R263	Zero Bias
R264	Voltage Dropping Resistor

NOTES

1. Numbers inside small rectangles indicate tab numbers which correspond to matching receptacle numbers.

2. A relay interlock is used to completely discharge the integrating capacitor.

TABLE I

Range	Seconds	Jumper Connections	Resistance	Capacitance
1	.5-5	Tab (16) to Tab (5), Tab (30) to Tab (3)	3.3K	125 mf
2	1-10	Tab (16) to Tab (5), Tab (21) to Tab (3)	3.3K	250 mf
3*	1.25-12	Tab (16) to Tab (8), Tab (30) to Tab (3)	8.2K	125 mf
4	2-20	Tab (16) to Tab (5), Tab (21) to Tab (3), Tab (30) to Tab (7)	3.3K	500 mf
5*	2.5-25	Tab (16) to Tab (8), Tab (21) to Tab (3)	8.2K	250 mf
6	3.25-32.5	Tab (16) to Tab (9), Tab (30) to Tab (3)	22 K	125 mf
7*	5-50	Tab (16) to Tab (8), Tab (21) to Tab (3), Tab (30) to Tab (7)	8.2K	500 mf
8	6.5-65	Tab (16) to Tab (9), Tab (21) to Tab (3)	22 K	250 mf
9*	12-120	Tab (16) to Tab (9), Tab (21) to Tab (3), Tab (30) to Tab (7)	22 K	500 mf

*Standard recommended time ranges

Fig. 3. Function schematic

SPECIFICATION

Output: 0 to ±10 volts DC at 10 ma.

Input: For any voltage desirable above 5 volts DC. An external input resistance selected at 1000 ohms/volt is used so that output does not exceed rating.

Time Range of Output: 1 to 120 seconds, adjustable in nine overlapping ranges. Each range has a time range of 10-to-1.

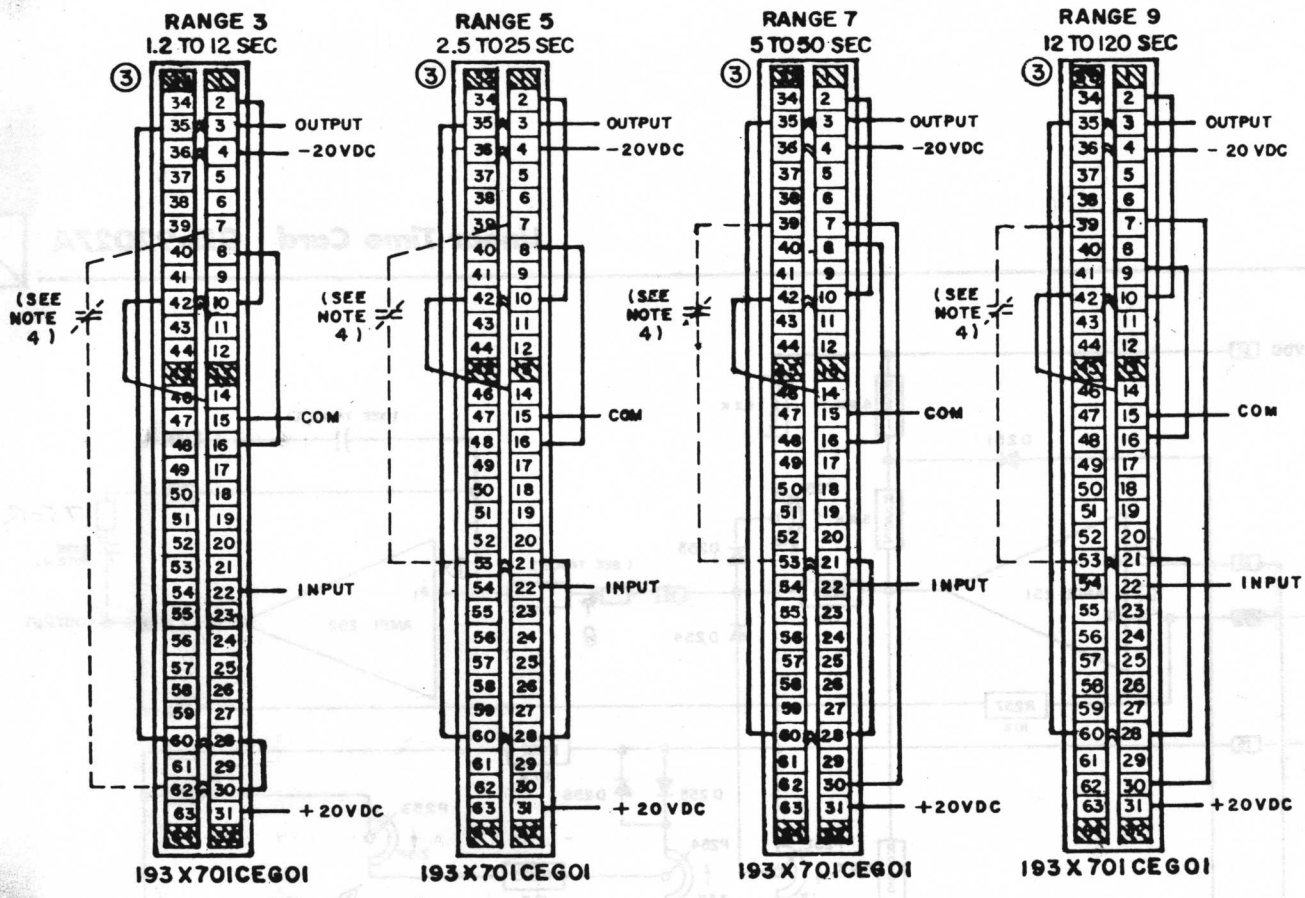


Fig. 4. (PBA-60655)

VOLTAGE CHECK LIST

(With +20 volts DC between Tab 31 and Tab 15 and -20 volts DC between Tab 4 and Tab 15).

Plus	Minus	Voltage
With input at zero		
Tab 16	Tab 15	±0.5 volts DC
Tab 3	Tab 15	Zero
After input changes but before output stops changing		
Tab 16	Tab 15	+1.0 volt to +10 volts (depending on P251) or -1.0 volt to -10 volts (depending on P252)
After output stops changing		
Tab 3	Tab 15	0 to ±10 volts DC (depending on input)

NOTES

1. ▨ Indicates retaining spring.
2. ____ Indicates jumper spring.
3. ____ The sequence wiring of receptacles may require wires for both entering and leaving a terminal. This is accomplished by making the connections to the horizontally adjacent terminals and inserting a jumper spring between the terminals.
4. ____ A relay interlock is used to completely discharge the integrating capacitor.
5. ____ Number in circle at side of receptacle indicates space unit requirements.

Fig. 4. Function connection and specification data

SCHEMATIC DIAGRAM

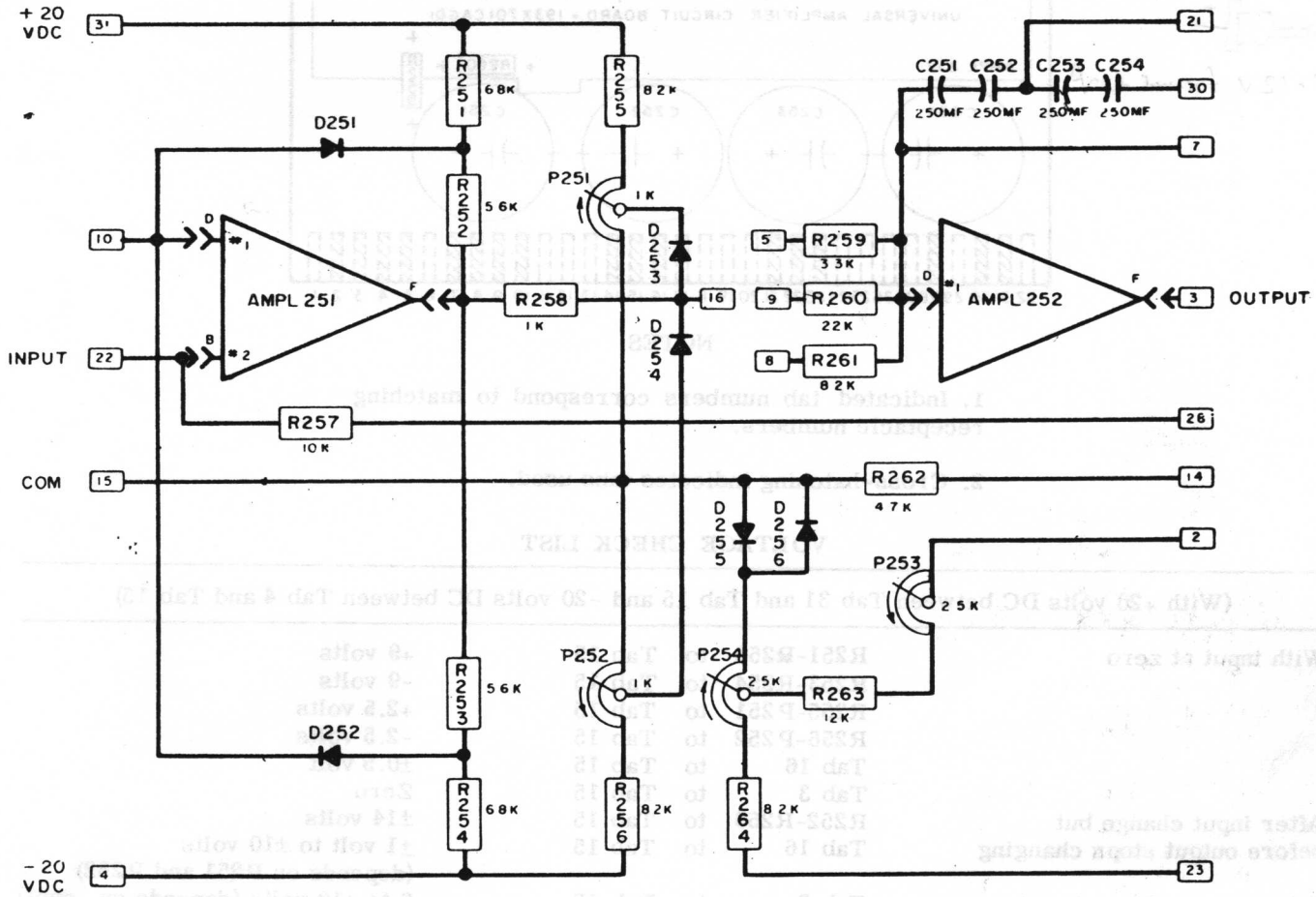


Fig. 5. (PBB-64848)

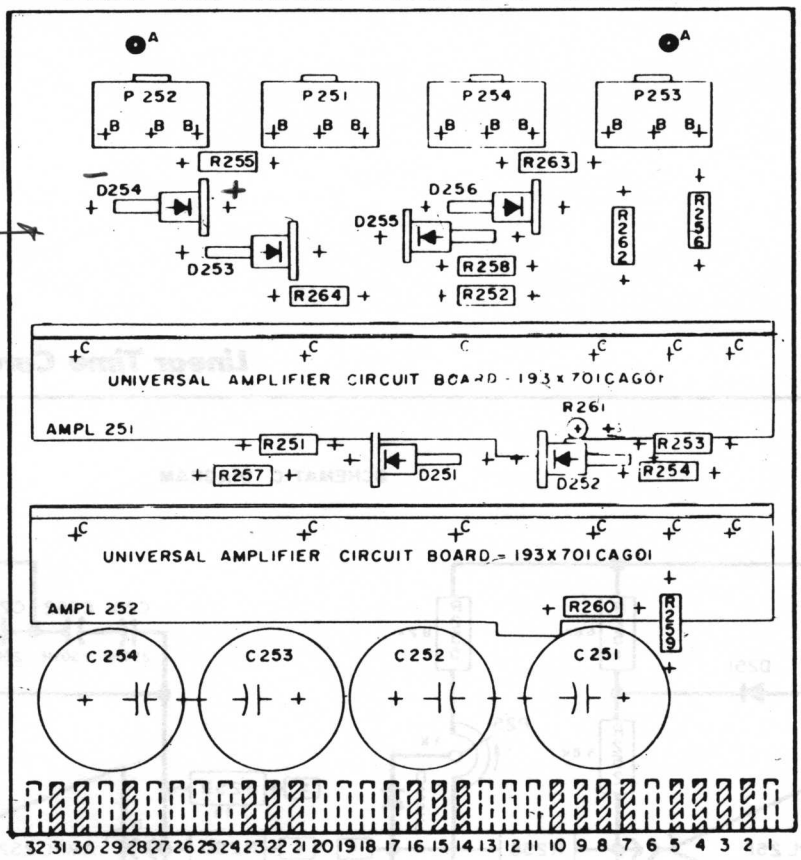
NOTES

1. Numbers inside the small rectangles indicate tab numbers which correspond to matching receptacle numbers.

2. The functional symbol shows only the signal inputs. For power supply connections, refer to the schematic diagram of that function.

Fig. 5. Card schematic 193X701CEG01

FRONT VIEW SHOWING LOCATION OF COMPONENTS



Diodes used 104W125AA079 IN5059.

One card had diodes IN93

0.12v forward drop.

Fig. 6. (PBA-60654)

NOTES

1. Indicated tab numbers correspond to matching receptacle numbers.

2. Cross-hatching indicates tabs used.

VOLTAGE CHECK LIST

(With +20 volts DC between Tab 31 and Tab 15 and -20 volts DC between Tab 4 and Tab 15)

With input at zero	R251-R252	to	Tab 15	+9 volts
	R253-R254	to	Tab 15	-9 volts
	R255-P251	to	Tab 15	+2.5 volts
	R256-P252	to	Tab 15	-2.5 volts
	Tab 16	to	Tab 15	±0.5 volt
	Tab 3	to	Tab 15	Zero
After input change but before output stops changing	R252-R253	to	Tab 15	±14 volts
	Tab 16	to	Tab 15	±1 volt to ±10 volts (depends on P251 and P252)
After output stops changing	Tab 3	to	Tab 15	0 to ±10 volts (depends on input)

Fig. 6. Card layout 193X701CEG01