INSTRUCTIONS

speed variator

SENSITIVE RELAY CARD

CONTENTS

DESCRIPTION AND APPLICATION

The voltage sensitive relay is a universal card used to detect the level of an input voltage, or the difference between input voltages. The relay card can contain one or two sensitive relays. This allows the function to act as a differential relay with the two-relay version, or, with different connections to the card receptacle, to act in a polarized or non-polarized fashion.

The function is applied in either open- or closed-loop circuits. In many applications the card is employed to switch a signal or pick up another relay whenever it is actuated. In other cases it is the forward gain element in a closed-loop system. In this general area of application, whenever the relay operates it actuates some circuit that directly effects at least one of the inputs to the sensitive relay card. An example of this would be a motor-operated rheostat position control.

The voltage sensitive relay card contains, in addition to the relay(s), a universal amplifier and components to allow for wide variations in input voltages. There is a gain adjustment (P629) around the universal amplifier which is used to set the sensitivity of the relay action. A bias adjustment (P626) is also included to set the level at which the relay(s) will pick up or to act as a zero adjust.

The relay card also contains two limit adjustments (P627 and 628). These adjustments are normally left in the fully clockwise or counterclockwise position. In the clockwise position, they serve to limit the universal amplifier output to approximately 10 volts. In the counterclockwise position they clamp the universal amplifier output at near zero volts. By turning one fully clockwise and the other fully counterclockwise, the relay card becomes polarized. The relay operates on one net polarity of input only.

ADJUSTMENT

1. Voltage-sensing Relay – Polarized Operation

   a. Turn *gain* potentiometer fully clockwise.*

   b. If input signal is *positive*, turn P628 fully clockwise and P627 fully counterclockwise.

   If input signal is *negative*, turn P627 fully clockwise and P628 fully counterclockwise.

   c. Set input signal to value required for pick-up of sensitive relay and adjust *bias* potentiometer until relay picks up.

   NOTE: If input signal cannot be varied conveniently, a battery or other d-c source may be used to supply an artificial signal.

2. Voltage-sensing Relay – Non-polarized Operation

   a. Turn *gain* potentiometer fully clockwise.*

   b. With input signal at zero (perferably short-circuited to common), turn *bias* potentiometer to give as near zero output voltage as possible, measured across relay coil.

   c. Turn P627 and P628 clockwise.

   d. Turn *gain* potentiometer fully counterclockwise.

   e. Set input signal to value required for pick-up of sensitive relay and adjust *gain* potentiometer clockwise until relay picks up.

3. Voltage Comparison or Differential Relay – Single Relay with Non-polarized Output or Dual Relay with Polarized Outputs

   a. Turn P627, P628 and gain potentiometer clockwise.

   b. With input signal(s) at zero (perferably short-circuited to common), turn *bias* potentiometer to give as near zero output voltage as possible, measured across relay coil.

   c. Set input(s) to the maximum value required and adjust external rheostat (tracking adjust) to give as near zero output voltage as possible across relay coils.

   d. The above adjustment gives operation a minimum difference between input signal(s)* (maximum sensitivity). If operation at a larger difference between input signals is required, turn the *gain* potentiometer counterclockwise until the desired operation is obtained.

4. Voltage Comparison – Single Relay with Polarized Operation

   a. Turn *gain* potentiometer fully clockwise.*

   b. If relay is to pick up on a *positive* signal, turn P628 fully clockwise and P627 fully counterclockwise.

   c. If relay is to pick up on a *negative* signal, turn P627 fully clockwise and P628 fully counterclockwise.

   d. See adjustment 3, part b.

   e. See adjustment 3, part c.

   f. See adjustment 3, part d.

   NOTE: Input voltages are not necessarily equal for relay operation. The input signals are the currents caused by the applied voltages. This applies to single polarized and non-polarized relays as well as dual relays with polarized outputs.

TROUBLE SHOOTING

1. Follow the general trouble shooting procedure in the General Description in *GEI-87501A-13* or *GEI-92001*.

2. Check potentiometer setting per marked or recorded potentiometer positions.

3. Replace card with spare.

   a. If malfunction persists, the failure is in the external wire connections.

   b. If trouble disappeared, visually inspect defective card for damaged components.

4. See GEI-92016 for instructions on universal amplifier.

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* If relay operation is erratic or unduly sensitive to electrical noise, the gain potentiometer should be turned slightly counterclockwise until satisfactory operation is obtained.

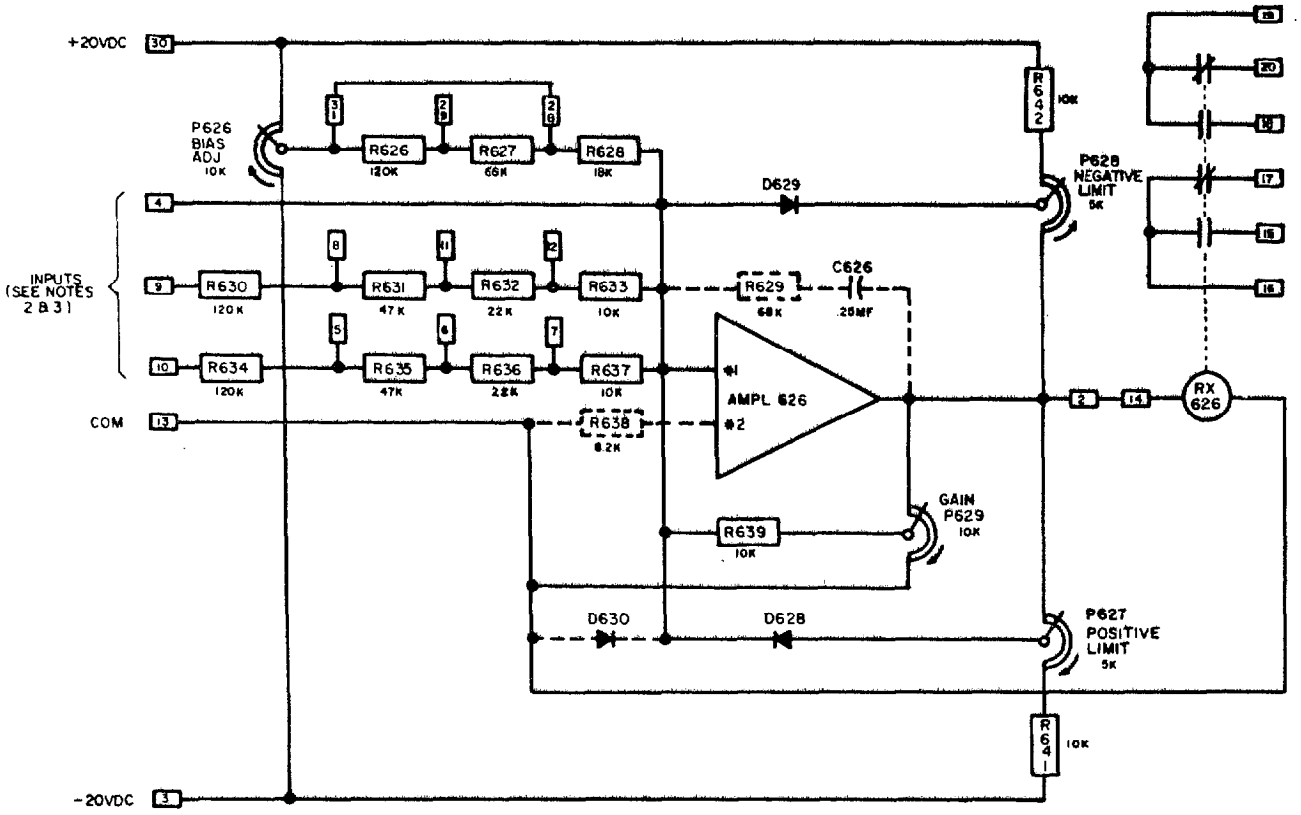


Fig. 1 (PBA-61062)

NOMENCLATURE

AMPL 626	Standard Amplifier
C626	Noise Suppression Capacitor
D628	Positive Limit Diode
D629	Negative Limit Diode
D630	Blocking Diode
P626	Bias Adjust Potentiometer
P627	Positive Limit Adjust Potentiometer
P628	Negative Limit Adjust Potentiometer
P629	Gain Adjust Potentiometer
R626, 627, 628	Bias Resistors
R629	Noise Suppression Resistor
R630, 631 632, 633	Input Resistors
R634, 635 636, 637	Input Resistors
R638	Commoning Resistor
R639	Amplifier Gain Resistor
R641, 642	Limit Resistors
RX626	6.3 V Relay

NOTES

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

2. Select input resistance to approximately 1 K per volt, based on the relay operating input voltage. The maximum input voltage is ten times that of the relay operating input voltage, not exceeding 300 volts.

3. CAUTION: IF 300 VOLTS INPUT IS APPLIED TO TAB 9, TAB 10 MUST NOT BE USED; OR IF 300 VOLTS INPUT IS APPLIED TO TAB 10, TAB 9 MUST NOT BE USED. THIS IS A PRECAUTION TO AVOID 300 VOLTS POTENTIAL BETWEEN TABS.

4. The position of bias adjust potentiometer (P626) determines the input voltage value at which the relay operates.

5. For more accurate zero adjust: there are four resistance combinations furnished with resistors R626, R627, and R628, which provide four ranges that can be selected. As more resistance is added, the range of P626 zero adjust becomes narrower, permitting a more accurate zero adjust setting to be made as input voltages approach or are close to zero volts.

6. The gain can be adjusted so that the relay pickup is obtained between 0.01 and 1.7 MA input current.

7. Refer to GEI-92016 instruction book for information about amplifier (AMPL 626).

8. The components and circuits shown in dashed lines are protective components and do not affect the relay function.

Fig. 1. One non-polarized relay function schematic

SPECIFICATION

Input: 0 to ± 300 VDC
Output: ± 10 volts at 1 MA

FUNCTIONAL CONNECTION

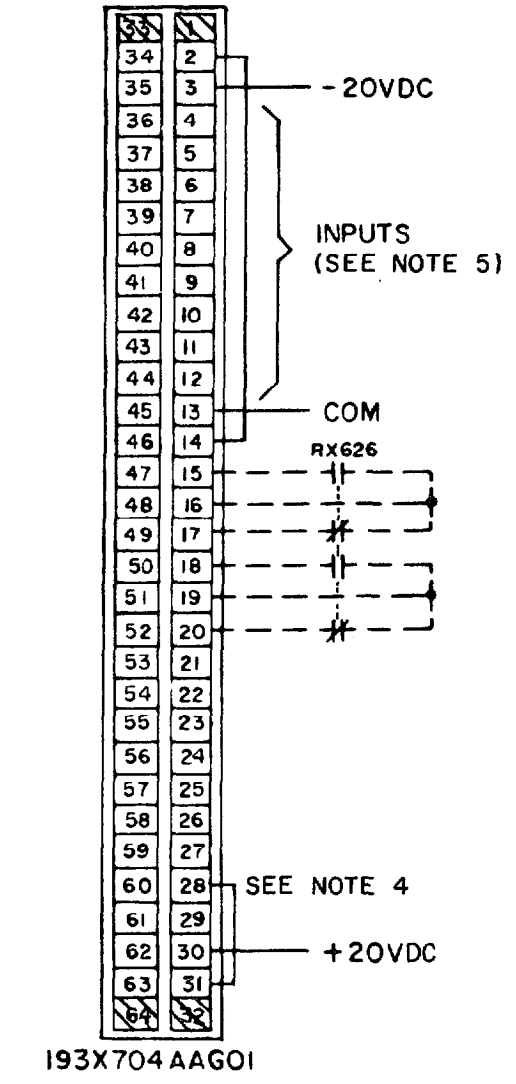


Fig. 2. (PBA-61063)

VOLTAGE CHECK LIST

(With +20 volts DC between Tab 30 and Tab 13, and -20 volts DC between Tab 3 and Tab 13)

Plus	Minus	DC Voltage
Tab 2	Tab 13	0 to -10 volts DC (depending on input)

NOTES

1. ▨ Indicates retaining spring.
2. ____ 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.
3. ____ Number in circle at side of receptacle indicates space unit requirements.
4. ____ See Fig. 1, NOTE 5 under functional schematic diagram.
5. ____ See Fig. 1, NOTES 2 and 3.

Fig. 2. One non-polarized relay function connection

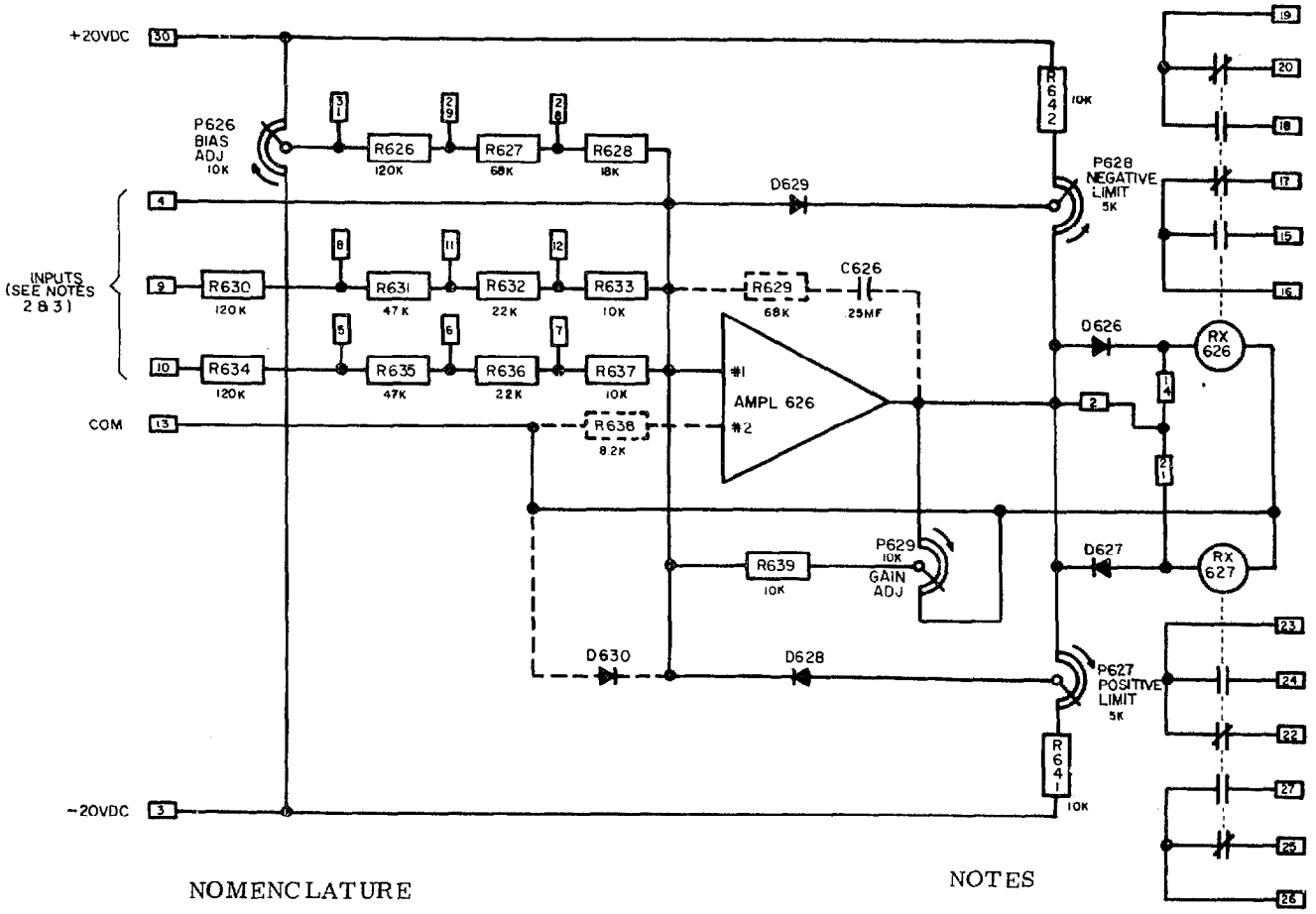


Fig. 3. (PBA-61064)

NOMENCLATURE

AMPL 626	Standard Amplifier
C626	Noise Suppression Capacitor
D626	Relay Function Polarizing Diode *
D627	Relay Function Polarizing Diode *
D628	Positive Limit Diode
D629	Negative Limit Diode
D630	Blocking Diode
P626	Bias Adjust Potentiometer
P627	Positive Limit Adjust Potentiometer
P628	Negative Limit Adjust Potentiometer
P629	Gain Adjust Potentiometer
R626, 627, 628	Bias Resistors
R629	Noise Suppression Resistor
R630, 631, 632 633	Input Resistors
R634, 635, 636 637	Input Resistors
R638	Commoning Resistor
R639	Amplifier Gain Resistor
R641, 642	Limit Resistors
RX626, 627	6.3 V Relay

* Shorted out for the non-polarized relay function.

NOTES

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

2. Select input resistance to approximately 1 K per volt, based on the relay operating input voltage. The maximum input current is 10 MA. The minimum resistance is 1 K, which must be an external resistor. Resistors R630 through R637 furnish two inputs with seven resistance combinations each.

3. CAUTION: IF 300 VOLTS INPUT IS APPLIED TO TAB 9, TAB 10 MUST NOT BE USED; OR IF 300 VOLTS INPUT IS APPLIED TO TAB 10, TAB 9 MUST NOT BE USED. THIS IS A PRECAUTION TO AVOID 300 VOLTS POTENTIAL BETWEEN TABS WHICH MAY DAMAGE THE RELAY CARD OR BLOW A FUSE.

4. The gain can be adjusted so that the relay pick-up is obtained between 0.01 and 1.7 MA input current.

5. Refer to GEI-92016 instruction book for information about amplifier (AMPL 626).

6. The components and circuits shown in dashed lines are protective components and do not affect the relay function.

Fig. 3. Two non-polarized relay function schematic

SPECIFICATION

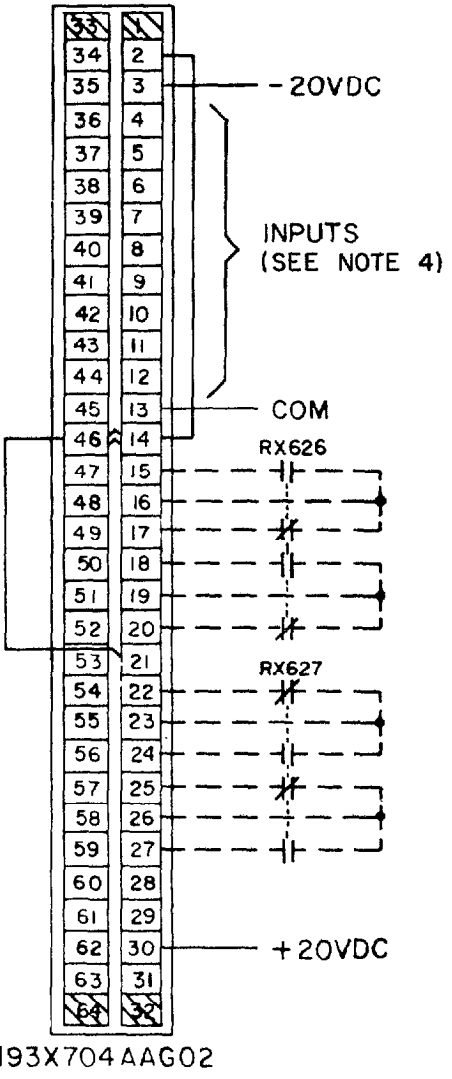
Input: 0 to ± 300 VDC
Output: ± 6.3 volts at 1 MA

VOLTAGE CHECK LIST

(With +20 volts DC between Tab 30 and Tab 13, and -20 volts DC between Tab 3 and Tab 13)

Plus	Minus	Voltage
Tab 2	Tab 13	0 to -6.3 volts DC (depending on input)

FUNCTIONAL CONNECTION



NOTES

1. Indicates retaining spring
2. 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.
3. Number in circle at side of receptacle indicates space unit requirements.
4. See Fig. 3, NOTES 2 and 3.
5. Indicates jumper spring

Fig. 4. Two non-polarized relay function connection

Fig. 4. (PBA-61065)

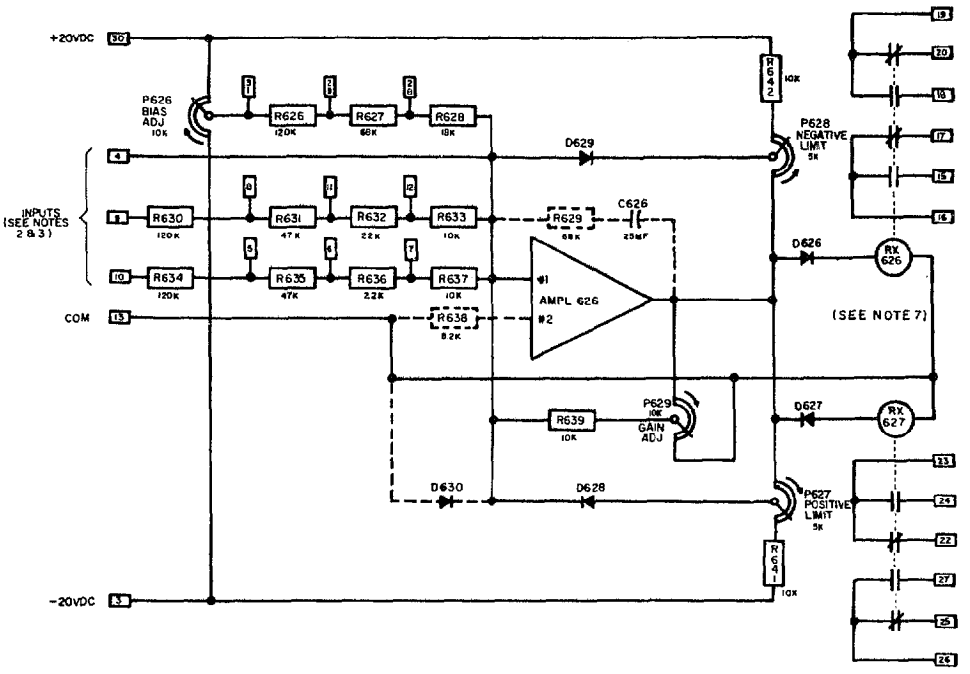


Fig. 5. (PBA-61066)

NOMENCLATURE

AMPL 626	Standard Amplifier
C626	Noise Suppression Capacitor
D626	Relay Function Polarizing Diode
D627	Relay Function Polarizing Diode
D628	Positive Limit Diode
D629	Negative Limit Diode
D630	Blocking Diode
P626	Bias Adjust Potentiometer
P627	Positive Limit Adjust Potentiometer
P628	Negative Limit Adjust Potentiometer
P629	Gain Adjust Potentiometer
R626, 627, 628	Bias Resistors
R629	Noise Suppression Resistor
R630, 631, 632 633	Input Resistors
R634, 635, 636 637	Input Resistors
R638	Commoning Resistor
R639	Amplifier Gain Resistor
R641, 642	Limit Resistors
RX626, 627	6.3 V Relay

NOTES

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

2. Select input resistance to approximately 1 K per volt, based on the relay operating input voltage. The maximum input current is 10 MA. The minimum resistance is 1 K, which must be an external resistor. Resistors R630 through R637 furnish two inputs with seven resistance combinations each.

3. CAUTION: IF 300 VOLTS INPUT IS APPLIED TO TAB 9, TAB 10 MUST NOT BE USED; OR IF 300 VOLTS INPUT IS APPLIED TO TAB 10, TAB 9 MUST NOT BE USED. THIS IS A PRECAUTION TO AVOID 300 VOLTS POTENTIAL BETWEEN TABS WHICH MAY DAMAGE THE RELAY CARD OR BLOW A FUSE.

4. The gain can be adjusted so that the relay pick-up is obtained between 0.01 and 1.7 MA input current.

5. Refer to GEI-92016 instruction book for information about amplifier (AMPL 626).

6. The components and circuits shown in dashed lines are protective components and do not affect the relay function.

7. A G01 polarized relay card is equipped with RX626 whereas a G02 polarized relay card is equipped with RX626 and RX627.

Fig. 5. One- or two-polarized relay function schematic

SPECIFICATION

Input: 0 to ± 300 VDC
Output: ± 10 volts at 1 MA

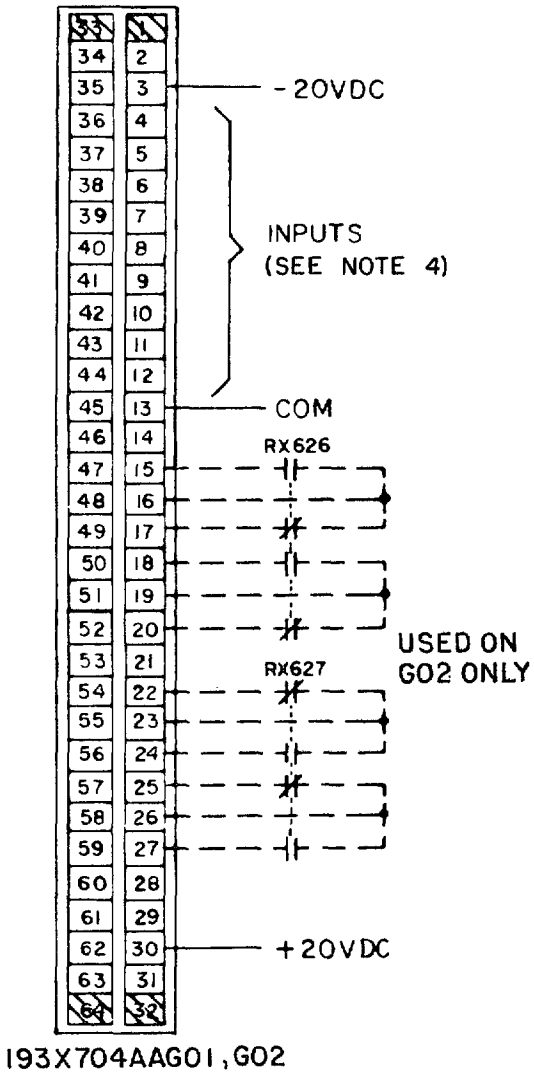


Fig. 6 (PBA-61067)

VOLTAGE CHECK LIST

(With +20 volts DC between Tab 30 and Tab 13, and -20 volts DC between Tab 3 and Tab 13)

Plus	Minus	Voltage
Tab 2	Tab 13	0 to -10 volts DC (depending on input)

NOTES

1. Indicates retaining spring
2. 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.
3. Number in circle at side of receptacle indicates space unit requirements
4. See Fig. 5, NOTES 2 and 3.

Fig. 6. One- or two-polarized relay function connection

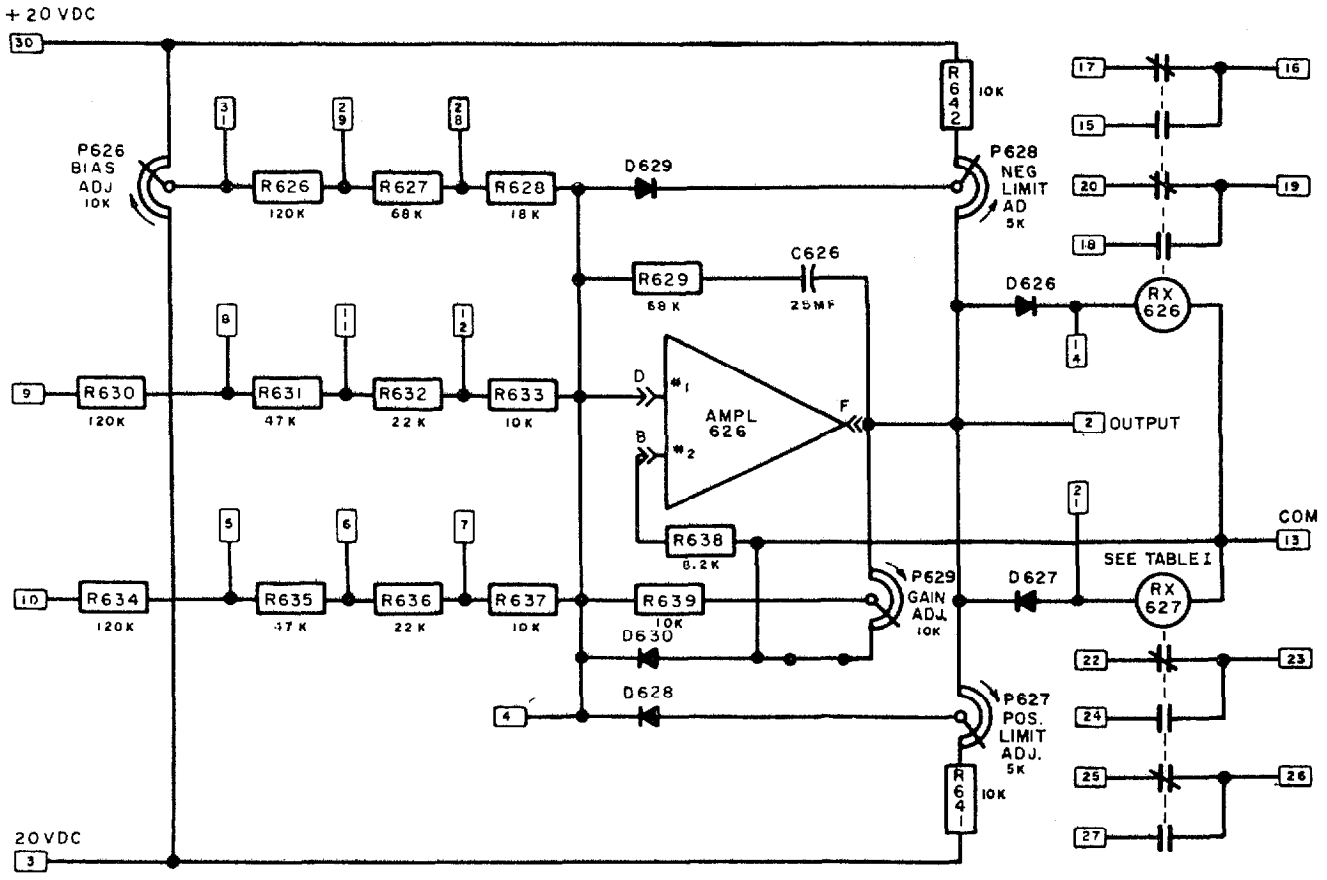


Fig. 7. (PBA-61068)

NOTES

1. Refer to the instruction book for detailed operation.

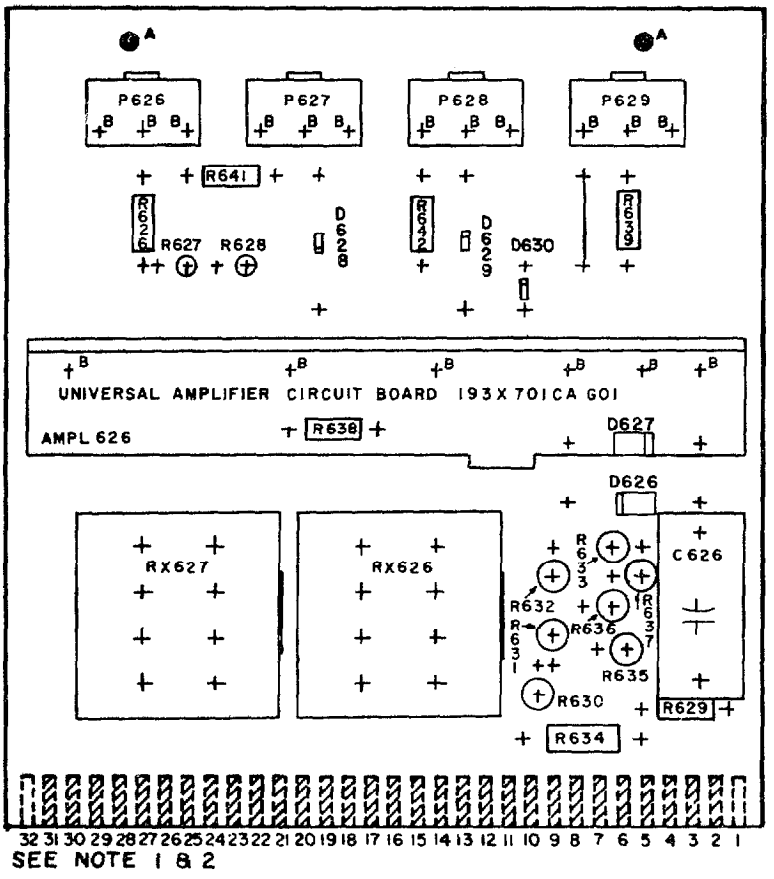
2. Numbers inside the small rectangles indicate tab numbers which correspond to matching receptacle numbers.

TABLE I

Card Catalog No.	Qty of Relays	Relay Nomenclature	Tab Connection
193X704AAG01	1	RX626	See schematic above for tabs associated with relay nomenclature
193X704AAG02	2	RX626, RX627	

Fig. 7. Card schematic 193X704AAGO1, GO2

FRONT VIEW SHOWING LOCATION OF COMPONENTS



HOLE TABULATION

ALL HOLES .052 DIA. EXCEPT THE HOLES TABULATED BELOW

LOC.	DIA.	QUAN.
A	.157	2
B	.078	18

NOTE 1. INDICATED TAB NUMBERS CORRESPOND TO MATCHING RECEPTACLE NUMBERS.

2. CROSS HATCHED TABS INDICATE TABS USED.

3. CARD SIZE, $5.500^{+.000}_{-.015}$ X $5.130^{+.002}_{-.008}$

NOTES

1. Indicated tab numbers correspond to matching receptacle numbers.
2. Cross-hatched tabs indicate tabs used.
3. Card size, $5.500^{+.000}_{-.015}$ x $5.130^{+.002}_{-.008}$

VOLTAGE CHECK LIST

(With +20 volts DC between Tab 30 and Tab 13, and -20 volts DC between Tab and Tab 13)

Plus	Minus	Voltage
Tab 2	Tab 13	0 to ± 6.3 volts (depending on input)

Fig. 8. Card layout 193X704AAG01, G02 (for G01, RX627 is removed)

Fig. 8 (PBA-67676)

SPEED VARIATOR DEPARTMENT

GENERAL ELECTRIC

ERIE, PENNSYLVANIA 16501