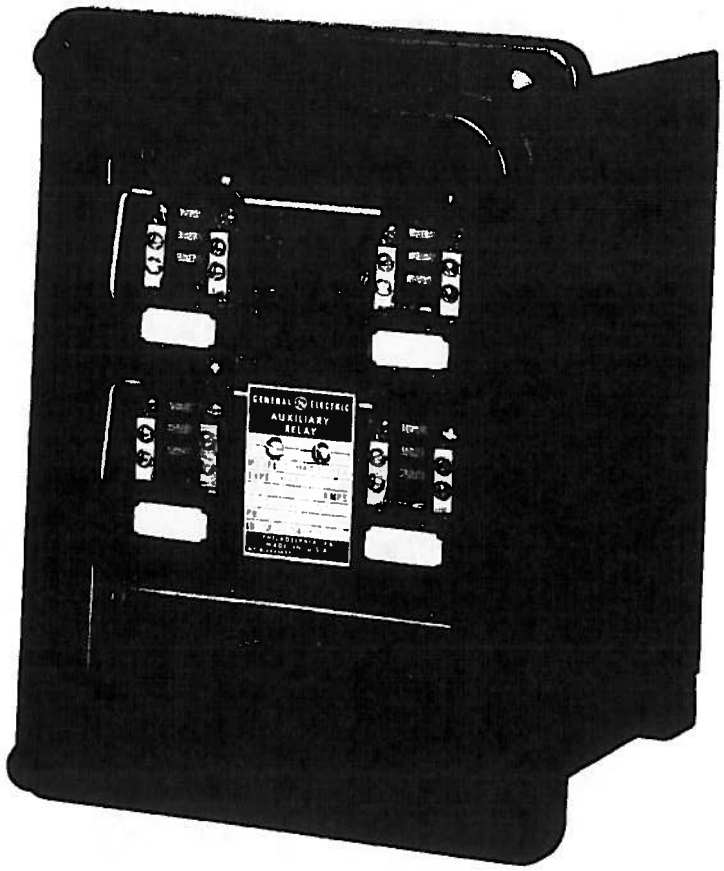
INSTRUCTIONS

AUXILIARY RELAYS

HAA11A	HAA13D
HAA11B	HAA13E
HAA11C	HAA14A
HAA12A	HAA14B
HAA12B	HAA14C
HAA13A	HAA17A
HAA13B	HAA18A



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CONTENTS

AUXILIARY RELAYS

HAA11A, 11B, 11C
HAA12A. 12B
HAA13A, 13B, 13D, 13E
HAA14A, 14B, 14C
HAA17A
HAA18A

DESCRIPTION

The HAA relays covered in this book consist of three to six target units, mounted in either an S1 or an S2 case. Each unit has one or two normally-open contacts that are electrically separate from the associated coil. Different models of the HAA are designed for either current or voltage operation. The characteristics of each of the subject HAA relays are displayed in Tables I and II.

APPLICATION

These HAA relays may be used wherever a number of target units with contacts are required. A typical application would be to obtain a local annunciation of an abnormal condition and to relay the alarm to a central annunciator. In such an arrangement, the abnormal condition would operate one of the HAA unit coil circuits, dropping a target and causing the associated unit contacts to relay the alarm to the remote annunciator.

RATINGS

The contacts will make and carry 30 amperes momentarily, and will carry 6 amperes continuously.

The available current and voltage ratings, resistance values, pickup values (see **ELECTRICAL TESTS** for pickup limits) and the continuous rating of the operating coils are given in TABLE I.

TABLE I

MODEL	Coil Rating	Tap Rating	DC Resistance	Pickup	Carry 30 Amp for	Carry 10 Amp for	Maximum Continuous
HAA11A HAA12A HAA13A HAA14A HAA14C HAA17A	0.2/2.0 Amp DC	0.2 Amp 2.0 Amp	7.0 Ohms 0.13 Ohms	0.2 Amp 2.0 Amp	-- 4 Sec.	0.2 Sec. 30 Sec.	0.30 Amp 3.0 Amp
HAA11A HAA14A	0.6/2.0 Amp DC	0.6 Amp 2.0 Amp	0.6 Ohms 0.13 Ohms	0.6 Amp 2.0 Amp	0.5 Sec. 4 Sec.	4.5 Sec. 30 Sec.	0.90 Amp 3.0 Amp
HAA11A	1.0/4.0 Amp DC	1.0 Amp 4.0 Amp	0.25 Ohms 0.034 Ohms	1.0 Amp 4.0 Amp	1.0 Sec. 5.0 Sec.	10 Sec. 50 Sec.	2.5 Amp 6.0 Amp
HAA13D	1.0 Amp DC	--	0.21 Ohms	1.0 Amp	1.4 Sec.	12 Sec.	1.5 Amp
HAA11C	2.0 Amp DC	--	0.15 Ohms	2.0 Amp	4 Sec.	30 Sec.	3.0 Amp
NAA11B							
HAA12B	250 Volt DC	--	11200 Ohms*	200 Volt	--	--	250 Volt
HAA13B	125 Volt DC	--	5600 Ohms	100 Volt	--	--	125 Volt
HAA13E	48 Volt DC	--	840 Ohms	38.4 Volt	--	--	48 Volt
HAA14B							
HAA18A	125 Volt DC	--	5600 Ohms	85 Volt	--	--	125 Volt
HAA12B	120 volt AC	--	1650 Ohms	96 Volt	---	---	120 Volt
HAA14B	120 Volt AC	--	1650 Ohms	96 Volt	--	--	120 Volt

* Includes Series Resistor of 5600 Ohms

CHARACTERISTICS

The maximum operating values of current or voltage are given in Table I. Operation (pickup) occurs at or below this maximum value. Pickup may occur substantially below the maximum value, except for the HAA18A relay. The pickup and dropout time characteristic is shown in Figure 1.

Dropout is approximately 30% of rated voltage.

Target units should not pick up on either a steady-state or transient basis with an external resistance of 5100 ohms in series with the coil and 112% of rated voltage applied (140 volts for 125 VDC units).

HAA18A RELAY

The HAA18A relay is designed for a maximum operating value of 85 volts, and for a minimum pickup value of 70 volts for a 125 VDC coil rating. This range of operating voltage was selected to prevent false operation due to accidental grounds or capacitance to ground from the positive or negative bus of an ungrounded battery supply.

CONSTRUCTION

The HAA relays covered by this Instruction Book contain target units that are small hinged-armature-type relays, each with a "U" shaped magnet frame, a fixed pole piece, an armature that operates the normally-open contact and the target, and an operating coil.

These relays consist of from three to six target units, mounted in either a single ended S1, or a double ended S2, drawout case, as shown in Table II. Table II also gives type of operation (current or voltage, AC or DC) and references the internal connections diagrams.

With the exception of the HAA18A relay, each unit has one normally-open contact that is electrically separate from the associated coil. The units of the HAA18A relay have two electrically-separate normally-open contacts; the contacts are also electrically separate from the associated coil.

TABLE II

MODEL	No. of Units	Current/Voltage	AC/DC	Case	Internal Connections
HAA11A	5	I	DC	S2	Figure 4
HAA11B	5	V	DC	S2	Figure 5
HAA11C	5	I*	DC	S2	Figure 6
HAA12A	4	I	DC	S1	Figure 7
HAA12B	4	V	AC/DC	S1	Figure 8
HAA13A	6	I	DC	S2	Figure 9
HAA13B	6	V	DC	S2	Figure 10
HAA13D	6	I*	DC	S2	Figure 11
HAA13E	6	V	DC	S2	Figure 12
HAA14A	3	I	DC	S1	Figure 13
HAA14B	3	V	AC/DC	S1	Figure 14
HAA14C	3	I	DC	S1	Figure 15
HAA17A	3	I	DC	S2	Figure 16
HAA18A	5	V**	DC	S2	Figure 17

* Single-rated current coil
** Two electrically-separate normally-open contacts.

The target units are mounted on a cradle assembly that is latched into a drawout case when the relay is in operation, but it can be easily removed if desired, as shown in Figures 2 and 3.

When this is done, first remove the connection plugs that complete the electrical connections between the case block and the cradle block.

If the relay is to be tested in its case, the connection plug is replaced by a test plug. The cover is attached to the front of the relay case, and contains both the target and reset mechanisms and an interlock arm that prevents the cover from being replaced until the connection plugs have been inserted.

Relays with dual-rated coils are connected for the higher ampere rating when shipped, as indicated on Figures 4, 7, 9, 13, 15 and 16. Interchange the green and black leads for the lower-ampere-rating connection.

Every circuit in the drawout case has an auxiliary brush, as shown in Figure 18, to provide adequate overlap when the connecting plug is withdrawn or inserted. Some circuits are equipped with shorting bars, and on these circuits it is expecially important that the auxiliary brush be bent high enough to engage the connecting plug or test plug **before** the main brushes do, with adequate pressure to prevent the opening of C.T. secondary circuits or important interlock circuits.

The relay case is suitable for either semi-flush or surface mounting on all panels up to two inches thick, and appropriate hardware is available. However, panel thickness must be indicated on the relay order to ensure that proper hardware will be included. For outline and drilling dimensions, see Figures 19 and 20. Figure 19 applies to the single-ended S1 case, and Figure 20 applies to the double-ended S2 case.

RECEIVING, HANDLING AND STORAGE

These relays, when not included as part of a control panel, will be shipped in cartons designed to protect them against damage. Immediately upon receipt of a relay, examine it 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.

Also check the nameplate stamping to make sure that the model number and rating of the relay received agree with the requisition.

Reasonable care should be exercised in unpacking the relay in order that none of the parts are injured or the adjustments disturbed.

If the relays are not to be installed immediately, they should be stored in their original cartons in a place that is free from moisture, dust and metallic chips. Foreign matter collected on the outside of the case may find its way inside when the cover is removed, and cause trouble in the operation of the relay.

ACCEPTANCE TESTS

PRELIMINARY CHECK

1. Check wiring, using the applicable internal connections diagram (see Figures 4-17). Check continuity of contact circuits with armature picked up. When checking a contact that is parallel with other contacts, block the paralleled contacts with an insulating barrier such as a strip of clean paper.

2. Manually check the operation of each unit, and that the contact gaps are at least 3/32 inch. Both contacts of each target/seal-in unit of the HAA18A should close at approximately the same time.

3. With the armature against the pole piece, the upper and lower contact buttons should be reasonably parallel and at least 3/4 of each contacting surface should be engaged. This means that an unengaged surface may not extend more than 3/64 inch.

4. In the de-eenergized position, the "T" spring (the moving contacts of HAA18A relays) should rest on the turned-in prongs of the front molded block. The cross member of the "T" spring should overlap the prongs by at least 1/32 inch so that the armature can never drop down.

5. With the armature against the pole piece, the cross member of the "T" spring should lie in a horizontal plane, and there should be at least 1/32 inch wipe on the contacts. To check this wipe, raise the armature by hand until the contacts just make. There should be approximately 1/64 inch air gap between the armature and freeze pin of the pole piece; also, hold armature flush against the pole piece by hand, and raise the orange target with a sharp tool, such as a knife. It should be possible to raise this target at least 1/64 inch.

ELECTRICAL TESTS

Drawout Relays - General

Since all drawout realays in service operate in their cases, it is recommended that they be tested in their cases or in equivalent steel cases. In this way, any magnetic effects of the enclosure will be accurately duplicated during testing. An installed relay may be tested without removing it from the panel by using a 12XLA13A test plug. This plug makes connections only with the relay, and does not disturb any shorting bars in the case. Of course, the 12SLA12A test plug may also be used; although this test plug allows greater flexibility, it also requires current transformer (CT) shorting jumpers and the exercise of greater care, since connections are made to both the relay and the external circuitry.

Power Requirements - General

All alternating-current-operated devices are affected by frequency. Since non-sinusoidal waveforms can be analyzed as a fundamental frequency plus harmonics of the fundamental frequency, it follows that alternating current devices (relays) will be affected by the applied waveform.

Therefore, in order to test alternating-current relays properly it is essential to use a sine wave of current and/or voltage. The purity of the sine wave (i.e., its freedom from harmonics) cannot be expressed as a finite number for any particular relay; however, any relay using tuned circuits, RL or RC networks, or saturating electromagnets (such as time overcurrent relays), would be especially affected by non-sinusoidal waveforms.

Similarly, relays requiring DC control power should be tested using DC and not full-wave rectified power. Unless the rectified supply is well filtered, many relays will not operate properly, due to the dips in the rectified power. Zener diodes, for example, can turn off during these dips. As a general rule, the DC source should not contain more than 5% ripple.

1. Check pickup using a variable power source. Check pickup of both taps of dual-rated units. The higher tap rating is the green lead, and the lower tap is the black lead. The unused taps should be terminated on the auxiliary terminal boards behind the even-numbered terminals. Armatures should pick up with a snap action and seat against the pole piece.

   The pickup limits for DC-current-operated relays are:

Rating	Pickup Amps
0.2	0.12 - 0.20
0.6	0.36 - 0.60
1.0	0.60 - 1.0
2.0	1.20 - 2.0
4.0	2.4 - 4.0

   The pickup limits for AC-operated relays are 80% of rated voltage or less.

   The pickup limits for DC-voltage-operated relays are 60% or less of rated voltage, except see item for for HAA18A relays.

2. Check that dropout of DC-operated seal-in units is 10% of rated voltage or higher.

3. To check latching-in of targets, energize the seal-in units of DC-current-operated relays at approximately 95% of rating; apply approximately 85% of rated value to AC-current-operated relays, and to voltage-operated relays.

   Then de-energize the seal-in unit and tap the top of the unit several times to make sure that the target will not drop on vibration.

4. HAA18A Relays

   4-1 Pickup should be between 56 and 68% of rated DC voltage; this is 70 to 85 volts for a 125 VDC unit.

   4-2 Pickup should not occur with an external resistance of 5100 ohms in series with the coil and 112% of rated voltage applied (140 volts for 125 VDC units).

   4-3 Dropout should be approximately 30% of rated voltage.

INSTALLATION

LOCATION

The location should be clean and dry, free from dust and excessive vibration, and well lighted to facilitate inspection and testing.

MOUNTING

The relay should be mounted on a vertical surface. The outline and panel drilling diagrams are shown in Figures 19 and 20.

INSPECTION

At the time of installation, the relay should be inspected for tarnished contacts, loose screws, or other imperfections.

CONNECTIONS

The internal connection diagrams for the various relays are shown in Figures 4 through 17.

Unless mounted on a steel panel that adequately grounds the relay case, it is recommended that the case be grounded through a mounting stud or screw with a conductor not less than #12 B&S gauge copper wire or its equivalent.

TARGET AND SEAL-IN UNIT

For the 0.2/2.0 amp, 0.6/2.0 amp and 1.0/4.0 amp dual-rated current units, make sure that the tap screw is in the desired tap. The relay is shipped from the factory with the tap screw in the higher ampere position. The tap screw is the screw holding the right-hand stationary contact. To change the tap setting, first remove one screw from the left-hand stationary contact and place it in the desired tap. Next, remove the screw from the undesired tap and place it on the left-hand stationary contact where the first screw was removed. See Figure 2 or 3. This procedure is necessary to prevent the right-hand stationary contact from getting out of adjustment. Screws should **never** be in both taps at the same time.

SERVICING

For cleaning fine silver contacts, a flexible burnishing tool should be used. This consists of a flexible strip of metal with an etched-roughened surface, resembling in effect a superfine file. The polishing action is so delicate that no scratches are left, yet corroded material will be removed rapidly and thoroughly. The flexibility of the tool ensures the cleaning of the actual points of contact.

Fine silver contacts should not be cleaned with knives, files, or abrasive paper or cloth. Knives or files may leave scratches which increase arcing and deterioration of the contacts. Abrasive paper or cloth may leave minute particles of insulating abrasive material in the contacts and thus prevent closing.

The burnishing tool described above can be obtained from the factory.

RENEWAL PARTS

Sufficient quantities of renewal parts should be kept in stock for the prompt replacement of any that are worn, broken or damaged.

When ordering renewal parts, address the nearest Sales Office of the General Electric Company. Specify the name of the part wanted, quantity required, and complete nameplate data, including the serial number, of the relay. If possible, give the GE requisition number on which the relay was furnished.

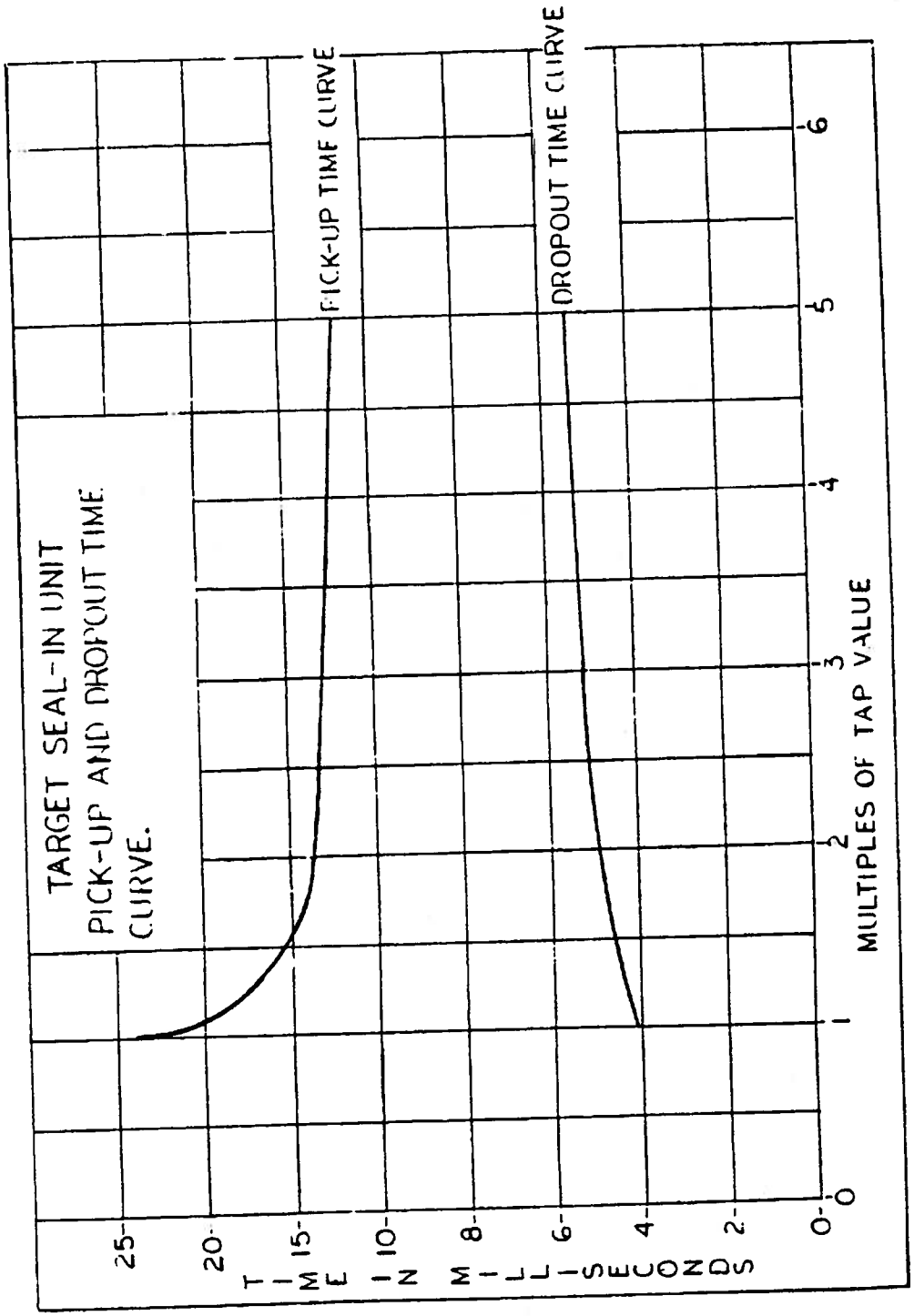


Figure 1 (0273A9131-0) Pickup and Dropout Time Curve for Type HAA Unit

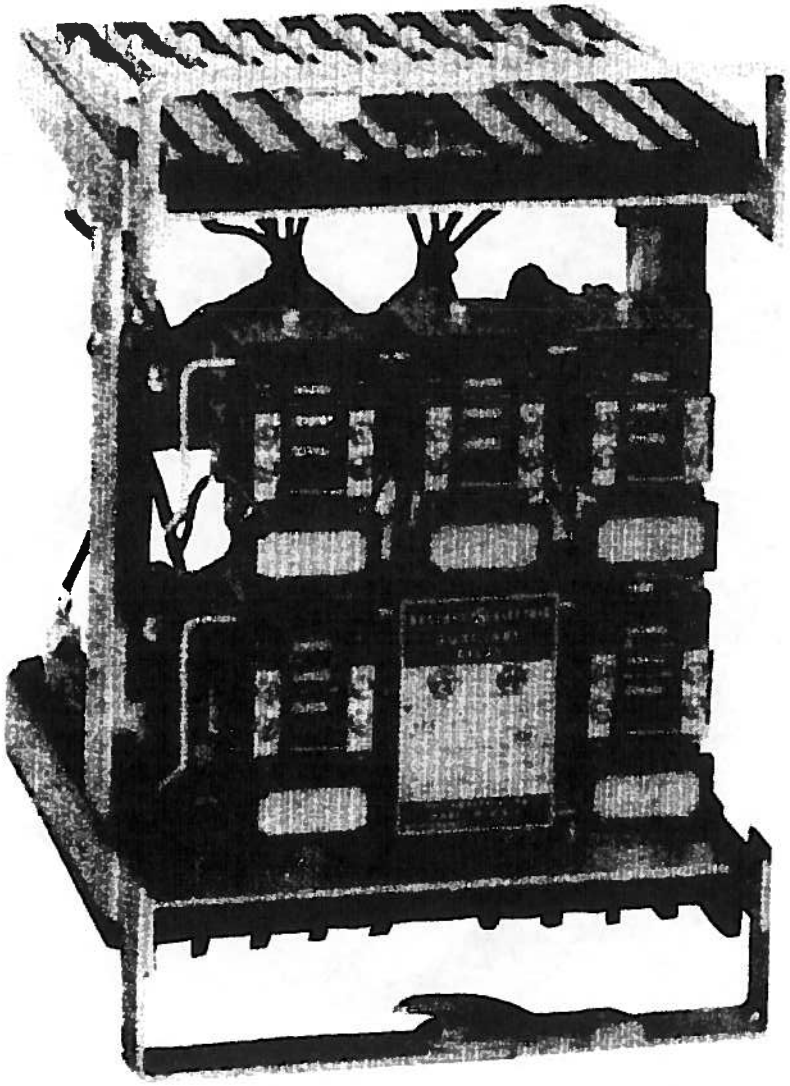


Figure 2 (8028292) HAA11A Relay Removed from Case

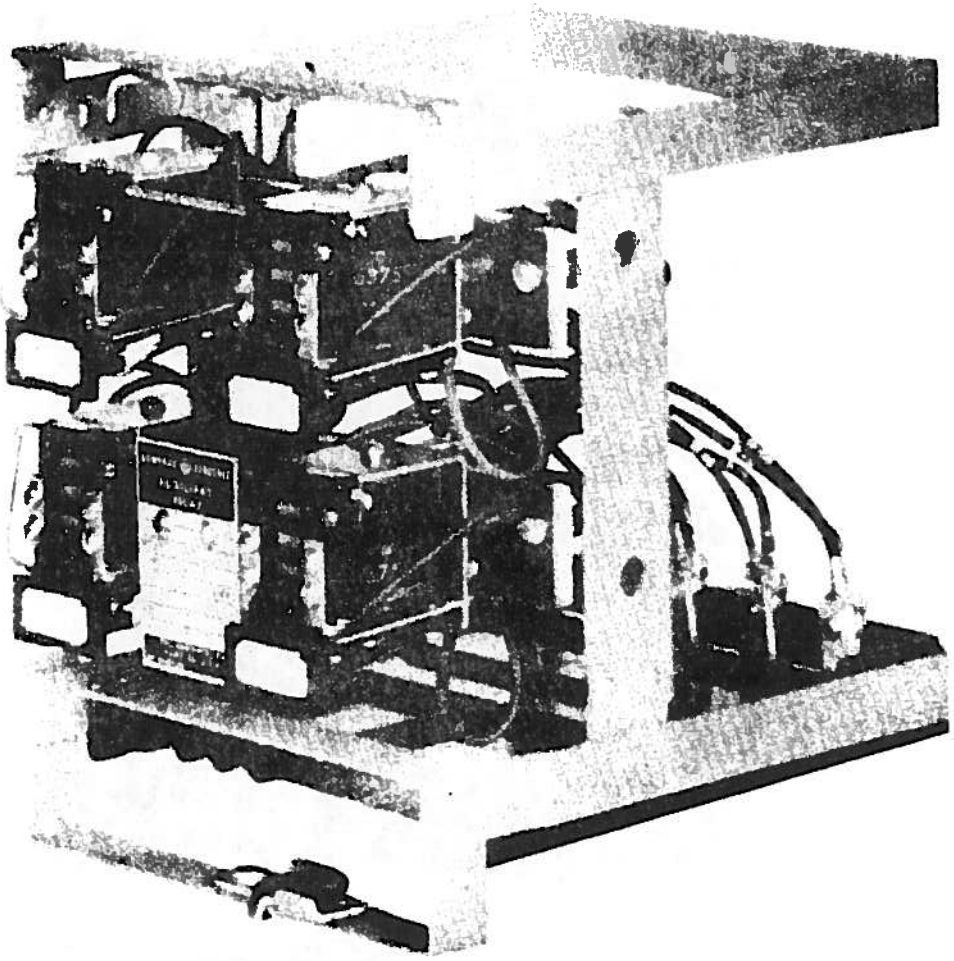


Figure 3 (8035291) HAA12B Relay Removed from Case

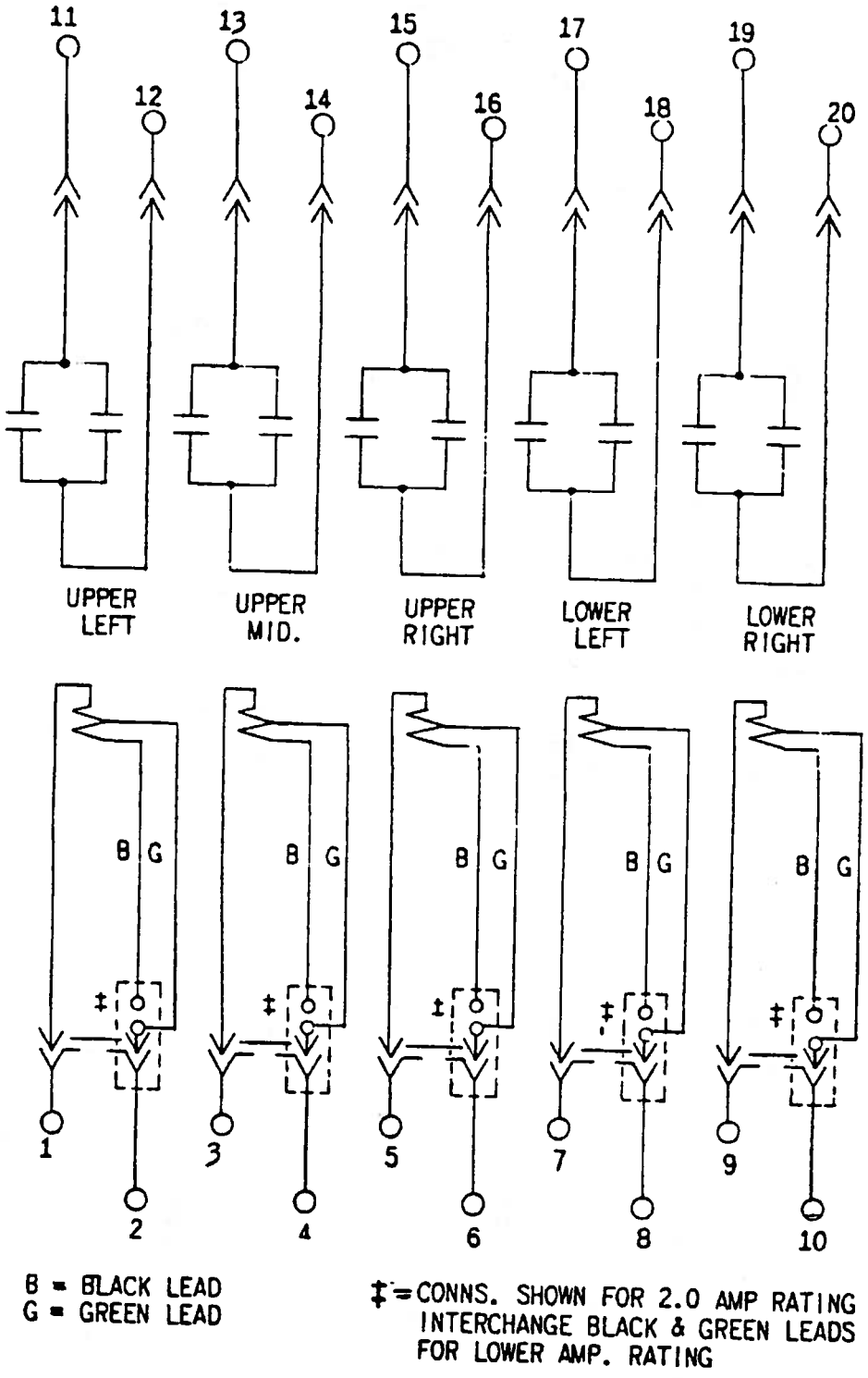


Figure 4 (0127A9439-0) Internal Connections of the HAA11A Relay (Front View)

VOLTS DC	OHMS	
	COIL	R1
250	5600	5600
125	5600	—
48	840	—

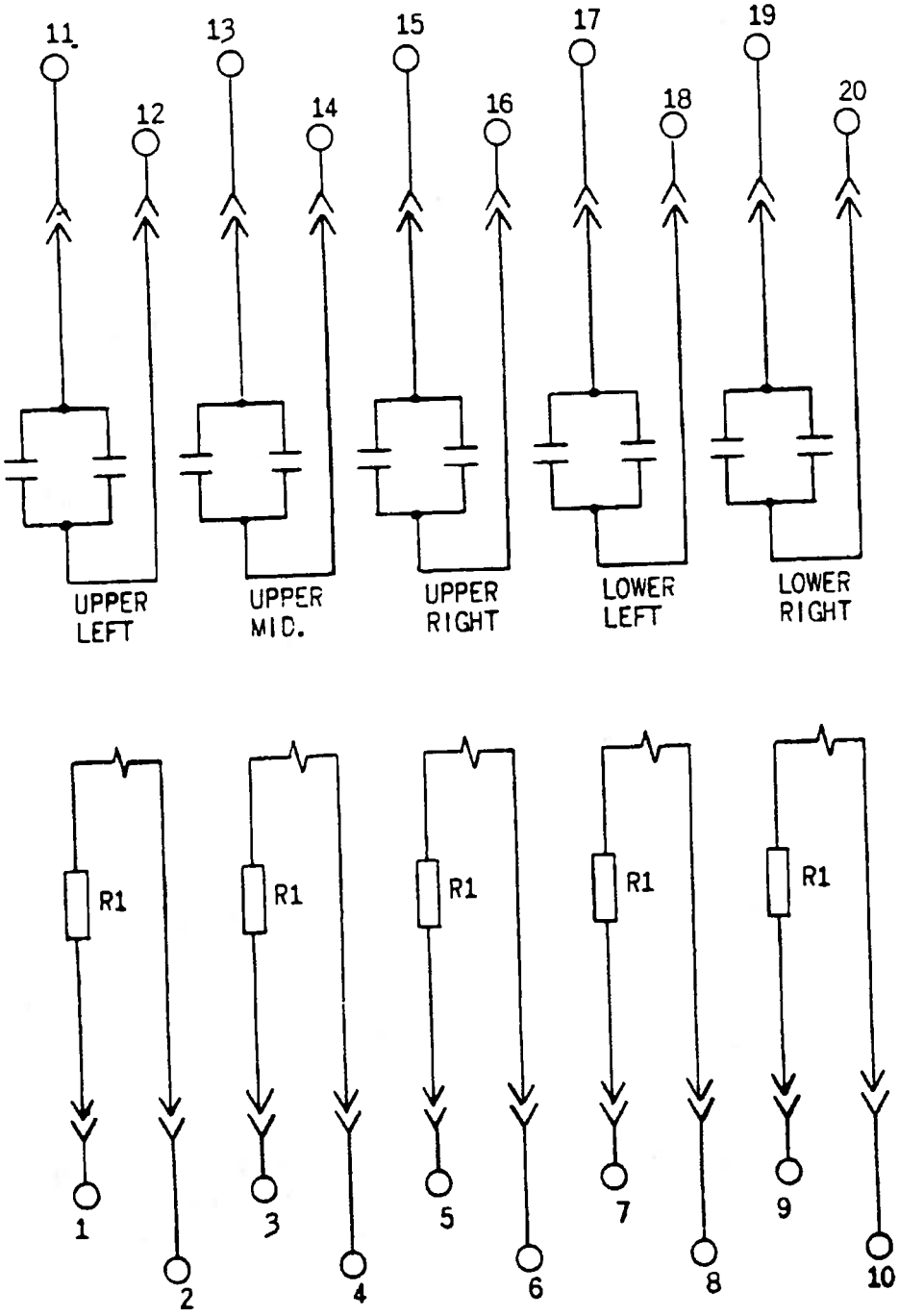


Figure 5 (0165A6086-1) Internal Connections of the HAA11B Relay (Front View)

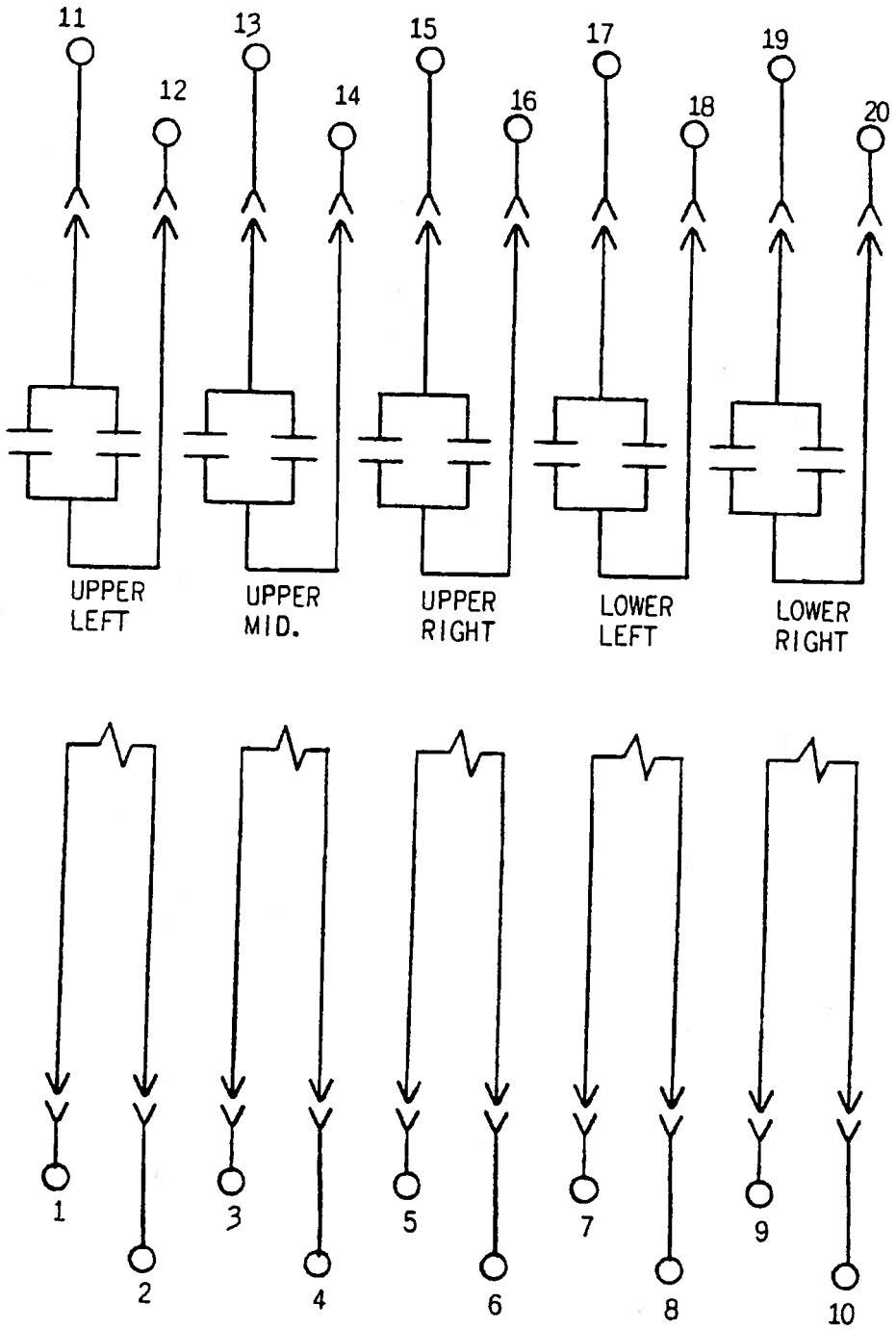


Figure 6 (0208A2334-0) Internal Connections of the HAA11C Relay (Front View)

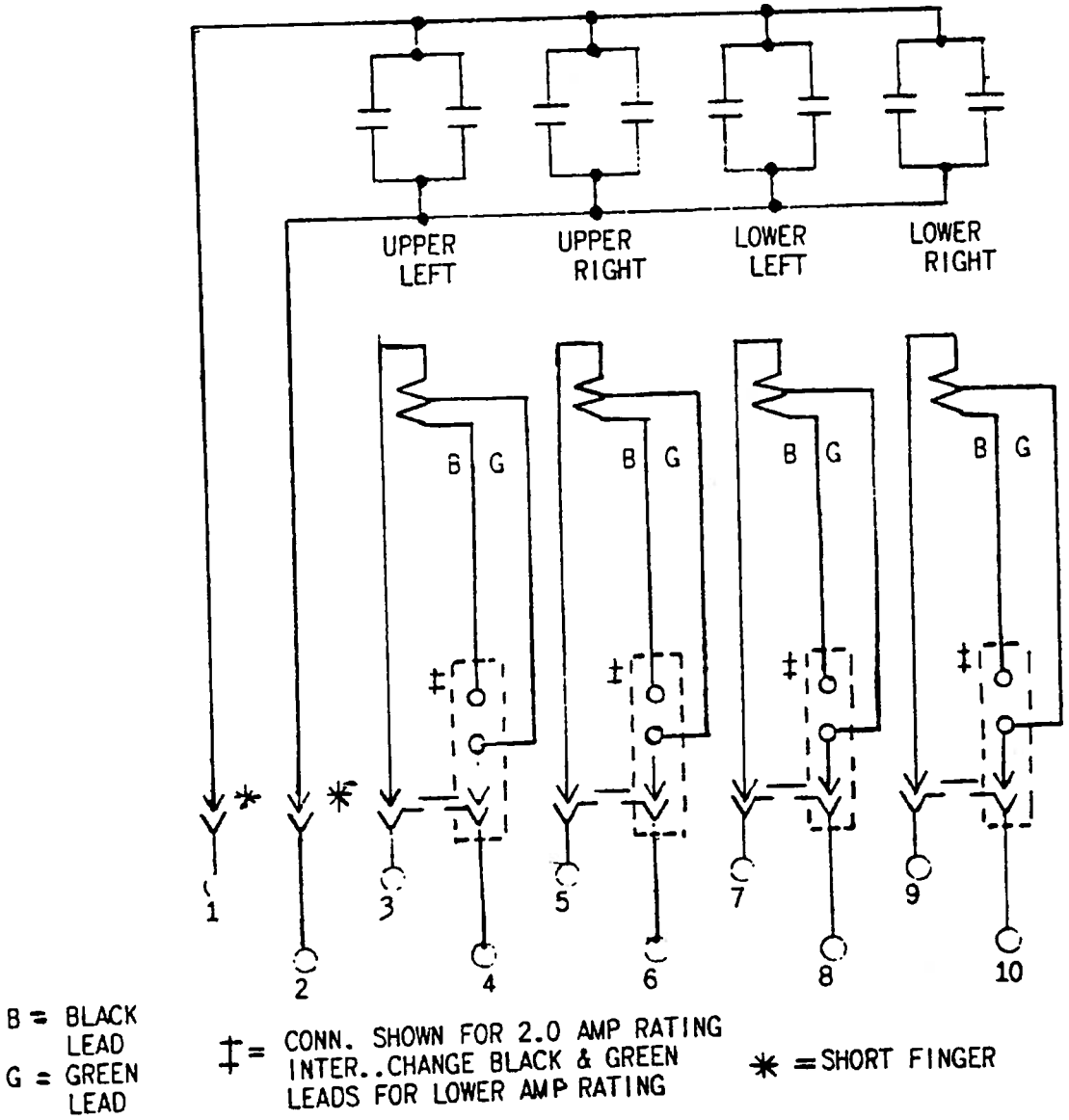


Figure 7 (0165A7669-1) Internal Connections of the HAA12A Relay (Front View)

VOLTS DC	OHMS	
	COIL	R1
250	5600	5600
125	5600	—
48	840	—

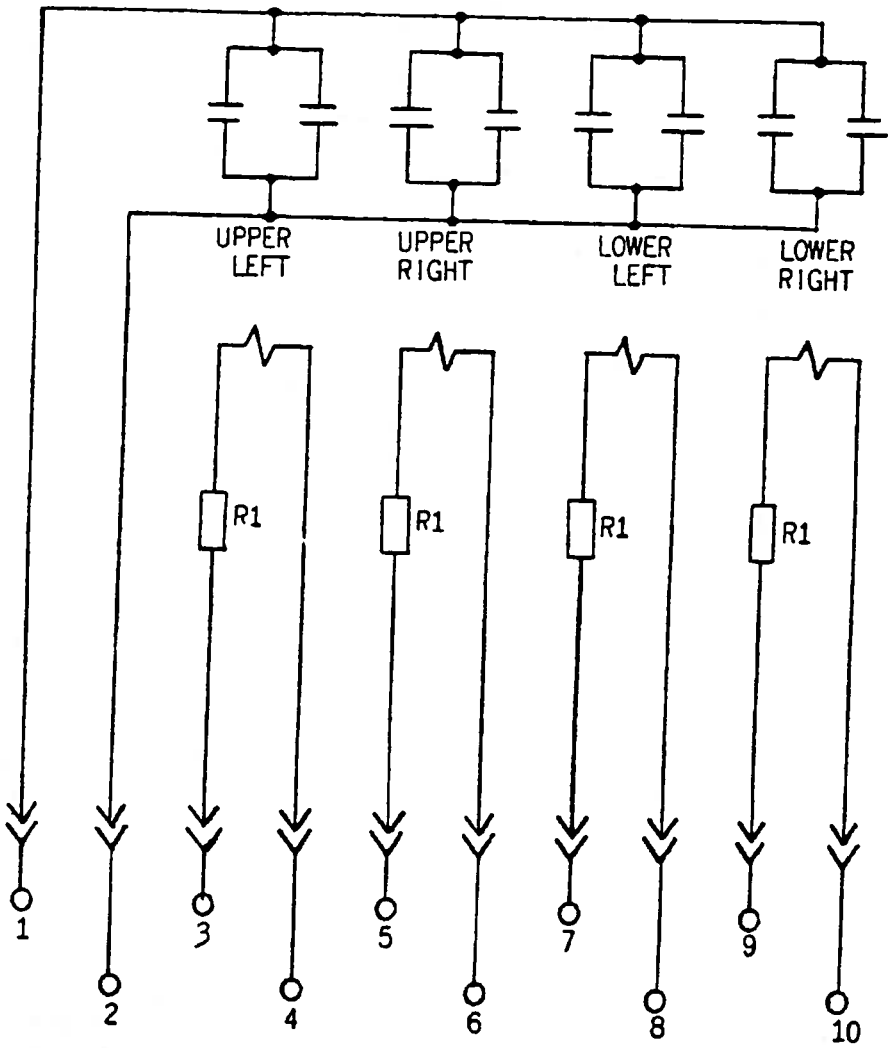


Figure 8 (0127A9517-2) Internal Connections of the HAA12B Relay (Front View)

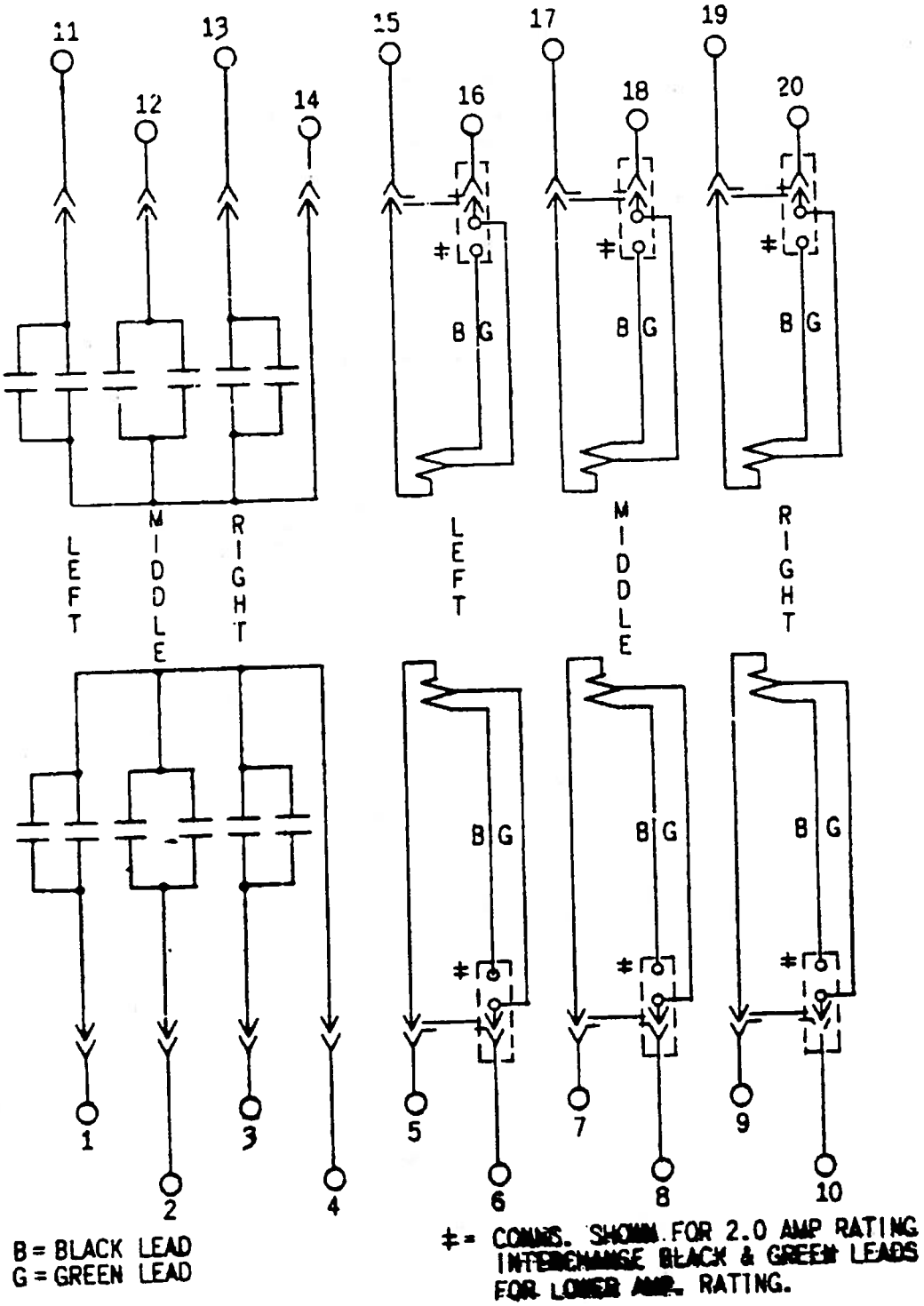


Figure 9 (0148A3952-0) Internal Connections of the HAA13A Relay (Front View)

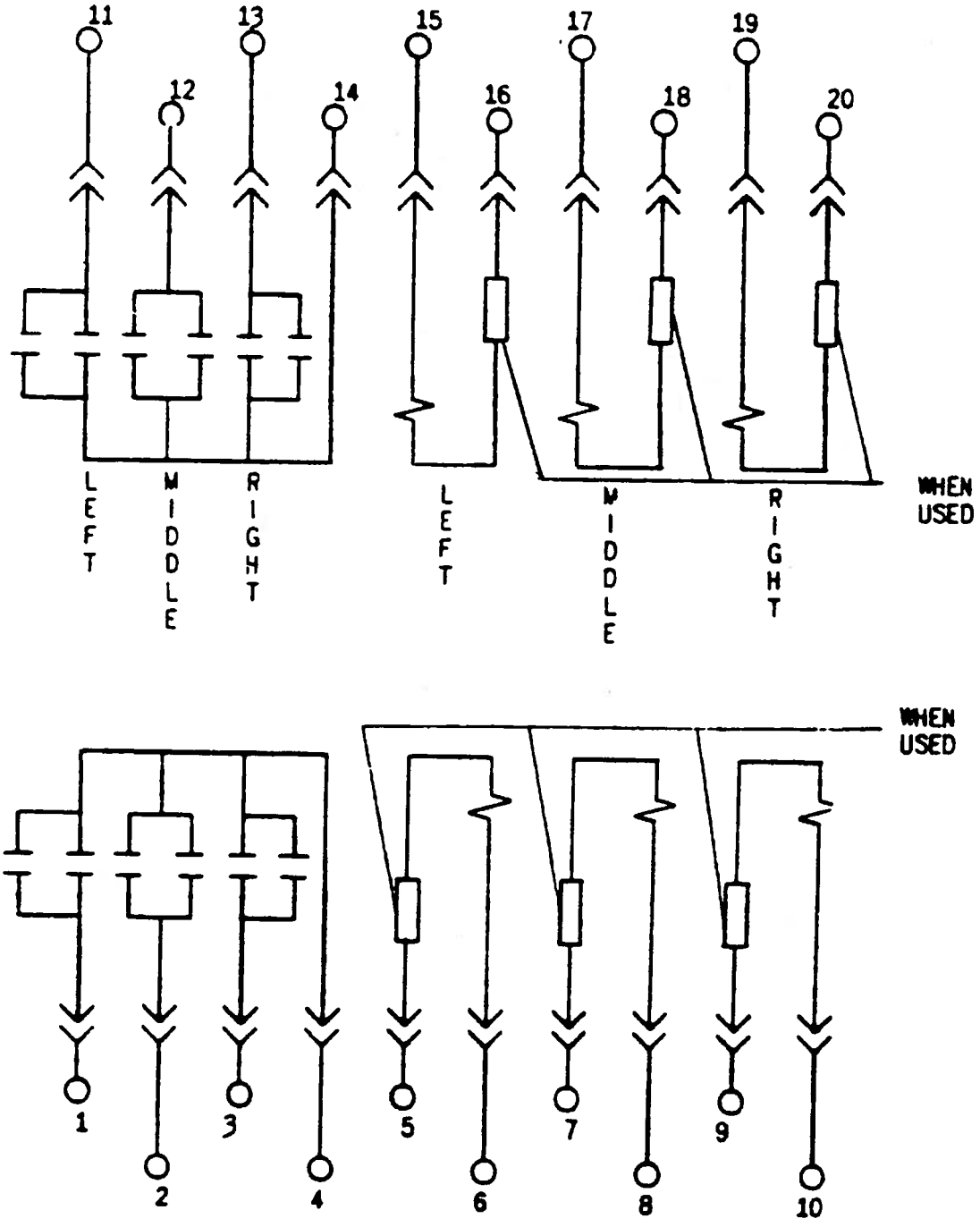


Figure 10 (0178A7004-2) Internal Connections of the HAA13B Relay (Front View)

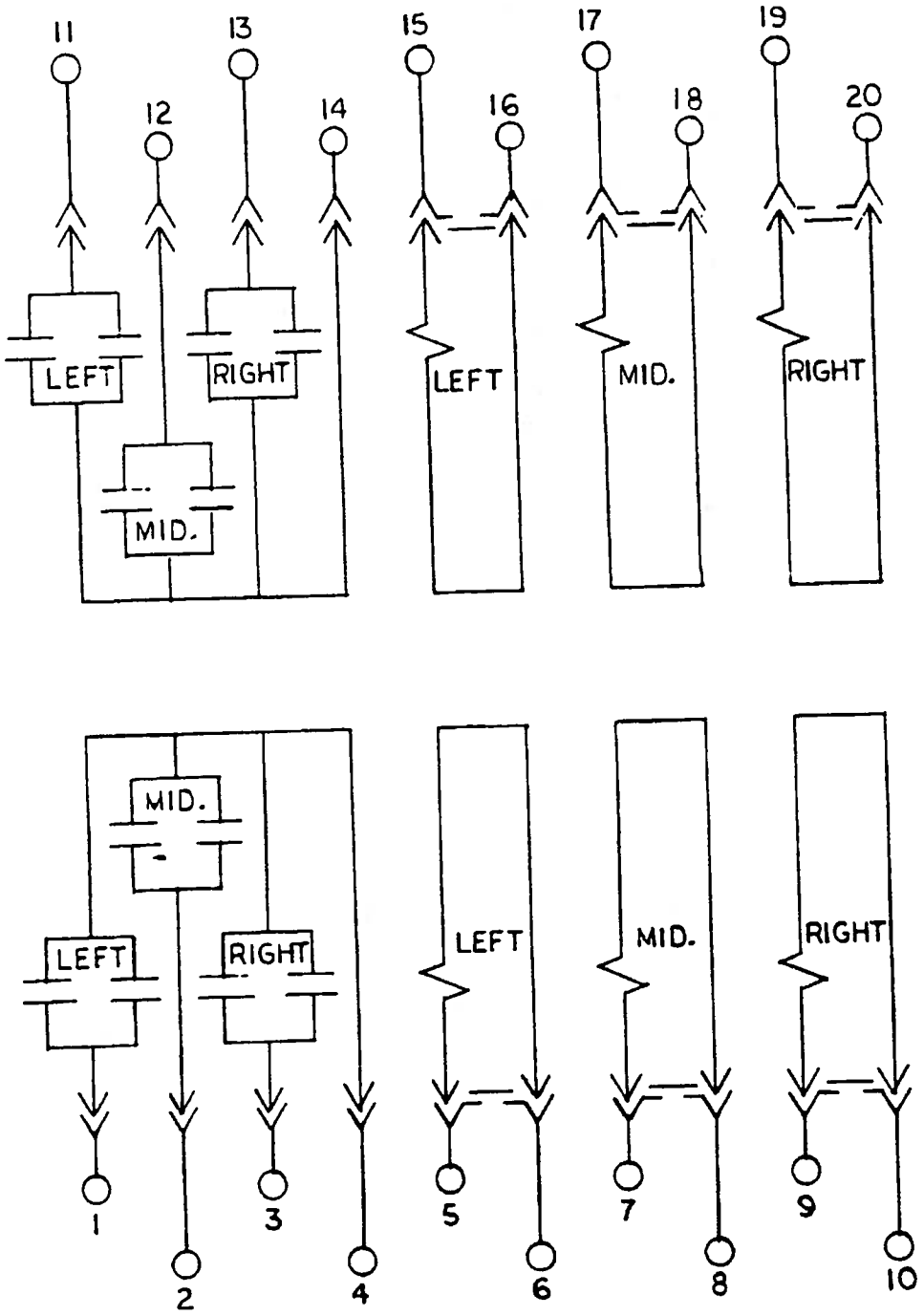


Figure 11 (0178A9180-1) Internal Connections of the HAA13D Relay (Front View)

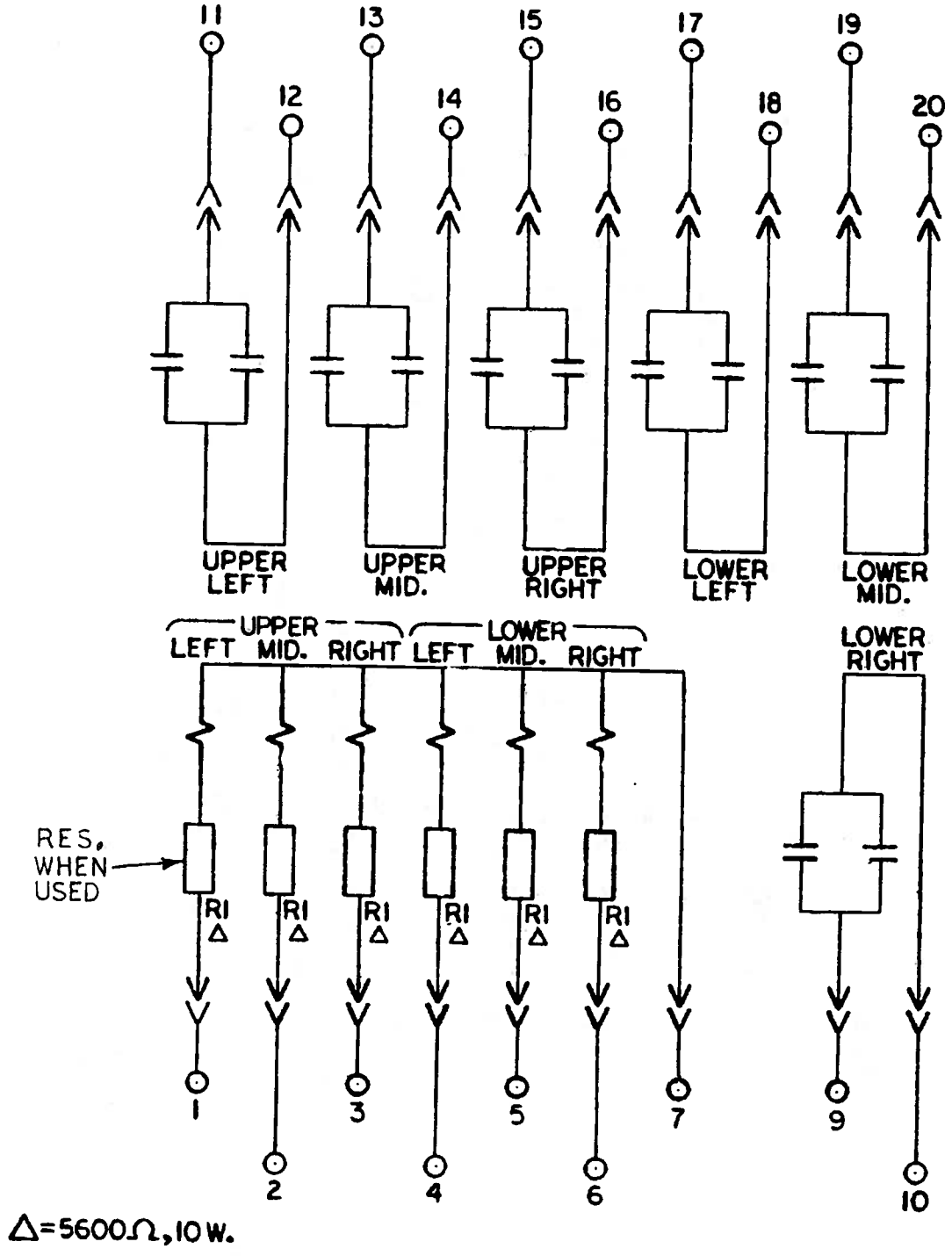


Figure 12 (0257A9606-1) Internal Connections of the HAA13E Relay (Front View)

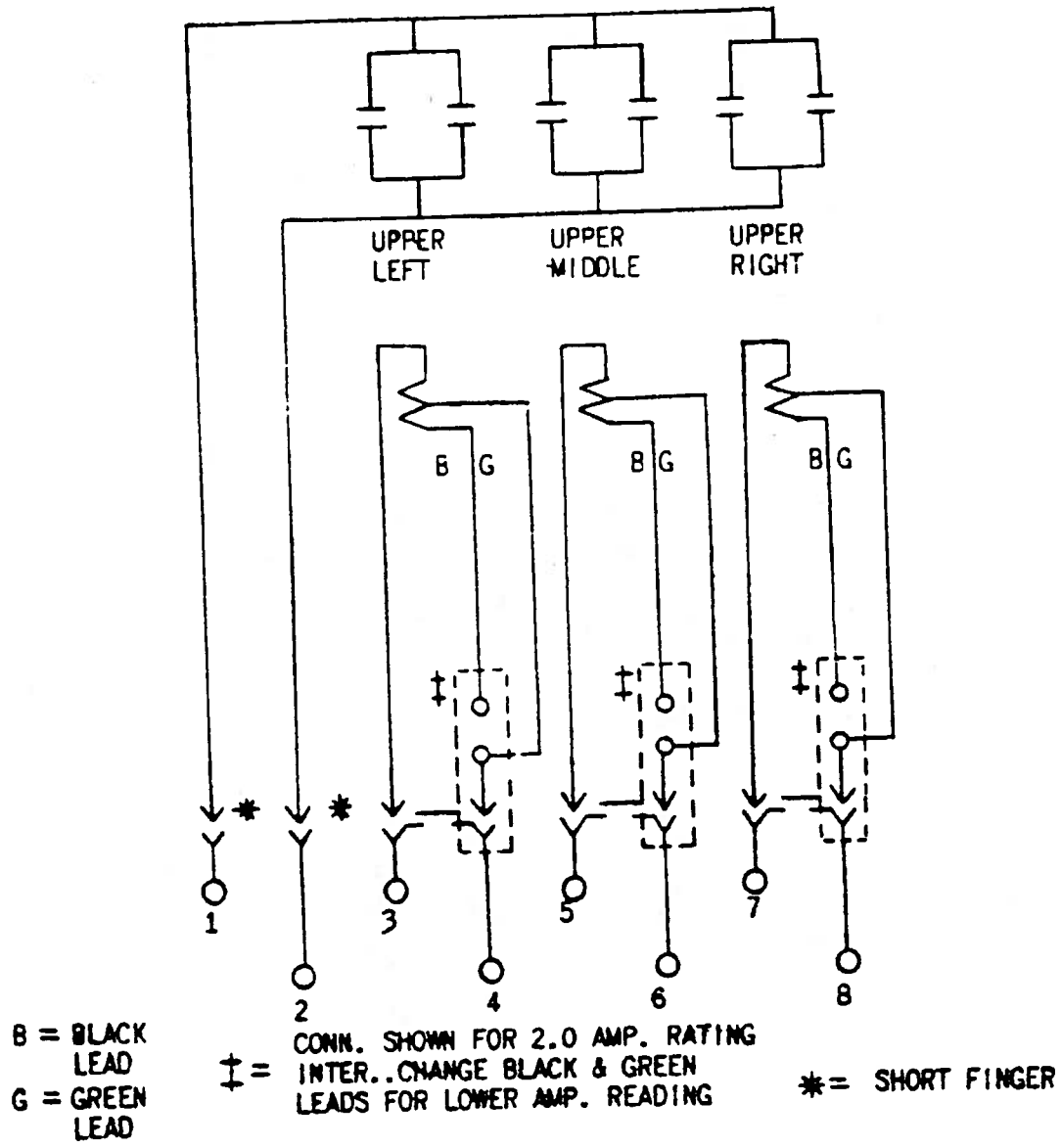


Figure 13 (0178A7199-0) Internal Connections of the HAA14A Relay (Front View)

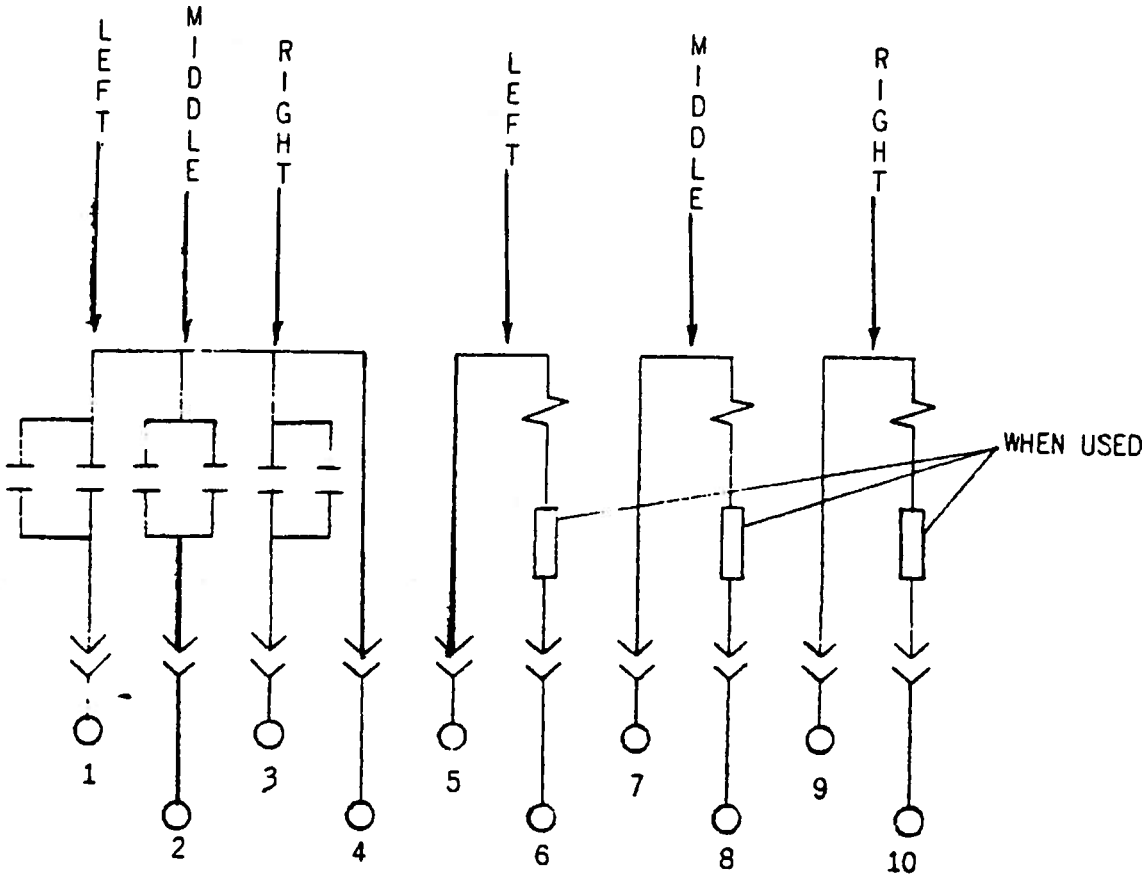
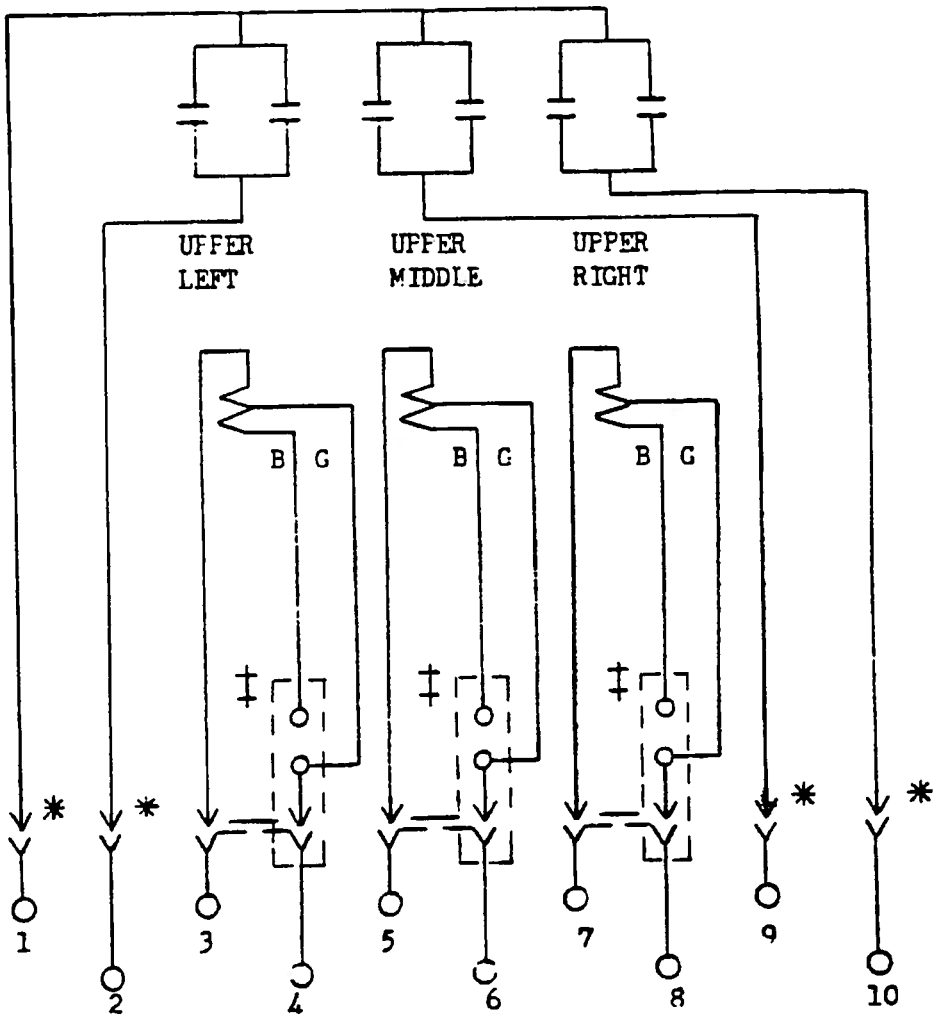


Figure 14 (0178A8197-0) Internal Connections of the HAA14B Relay (Front View)



B=BLACK LEAD
G=GREEN LEAD

‡ = CONN SHOWN FOR 2.0 AMP RATING INTER. CHANGE BLACK & GREEN LEADS FOR LOWER AMP. READING

* = SHORT FINGER

Figure 15 (0195A4902-0) Internal Connections of the HAA14C Relay (Front View)

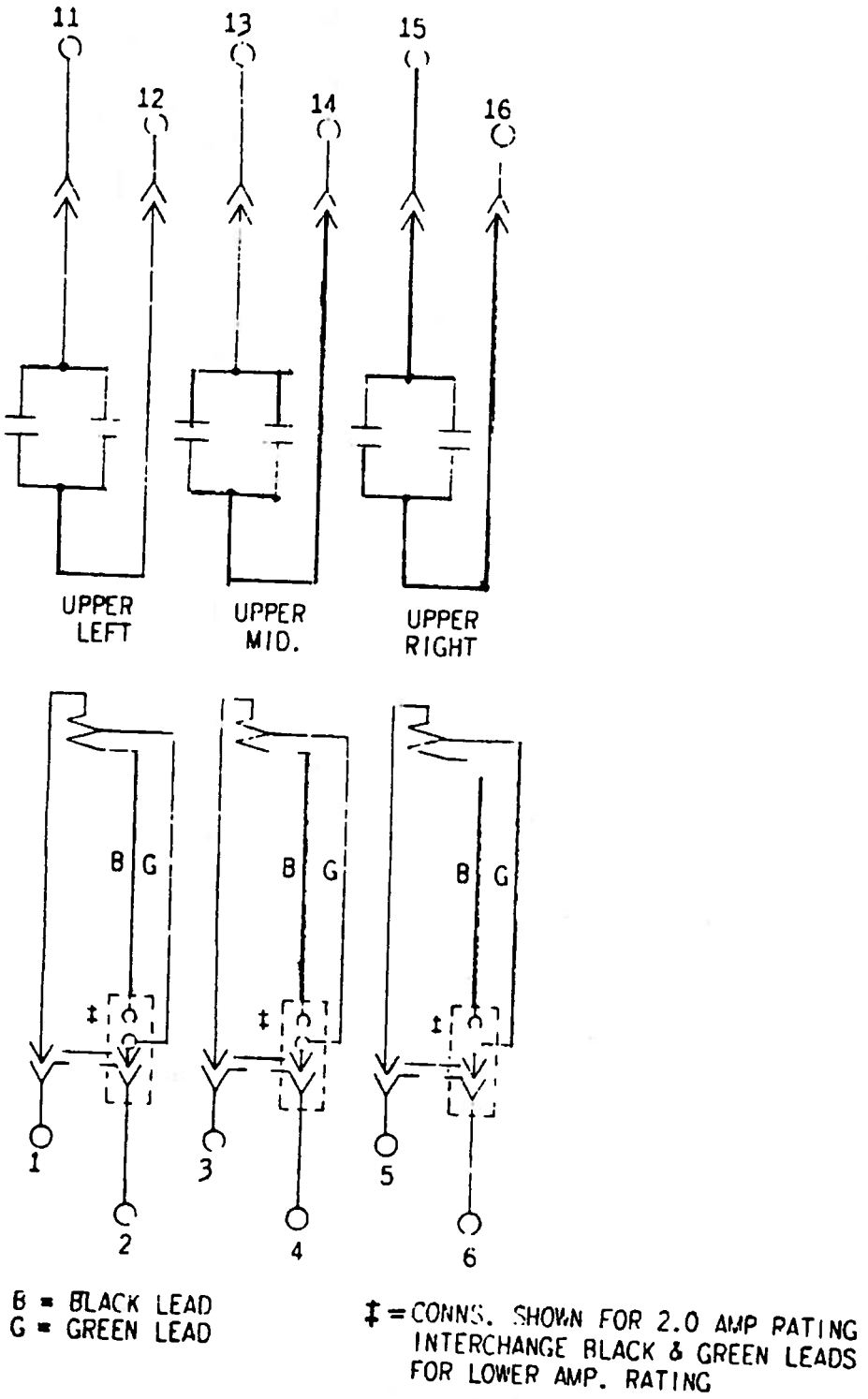
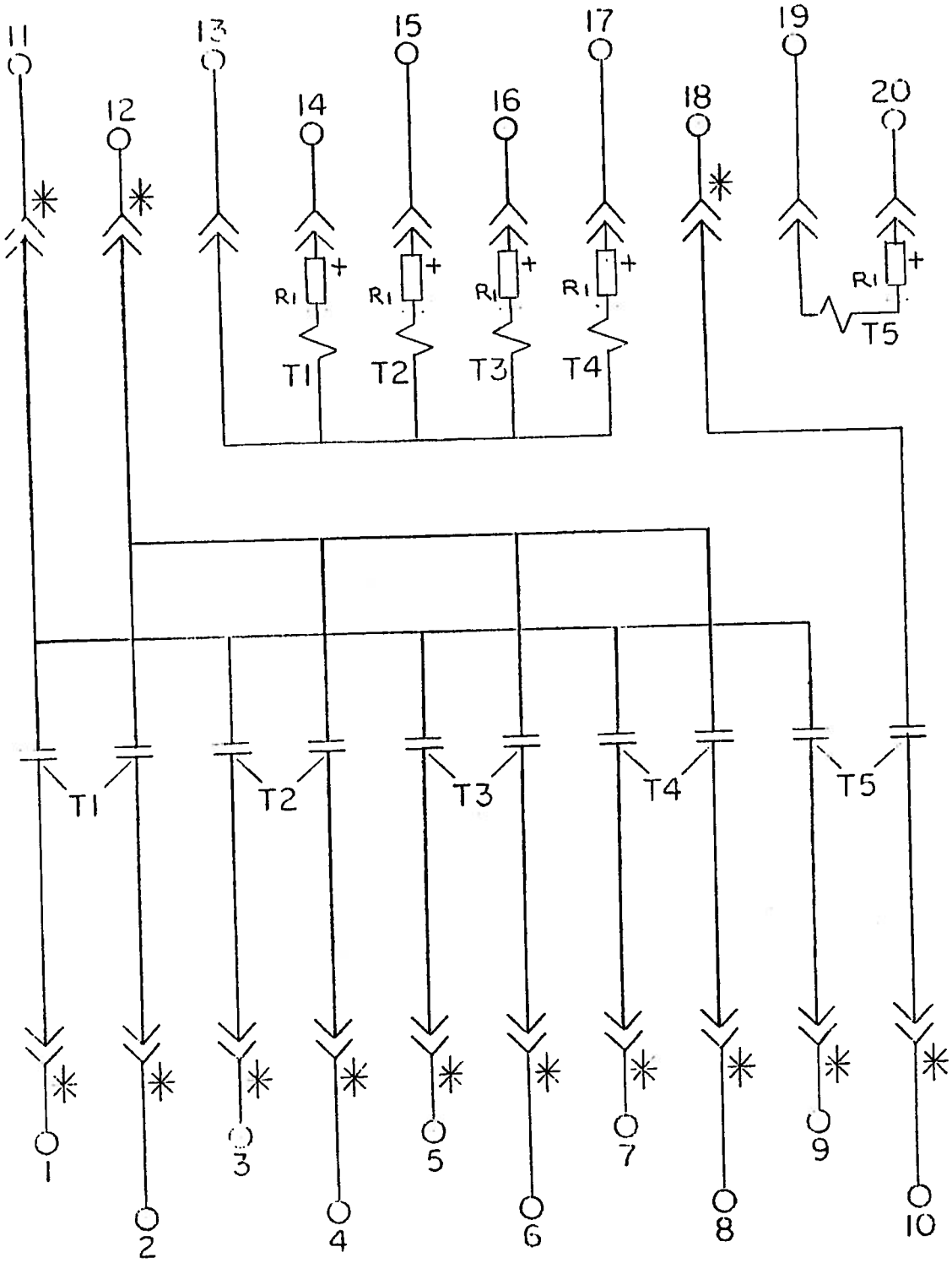
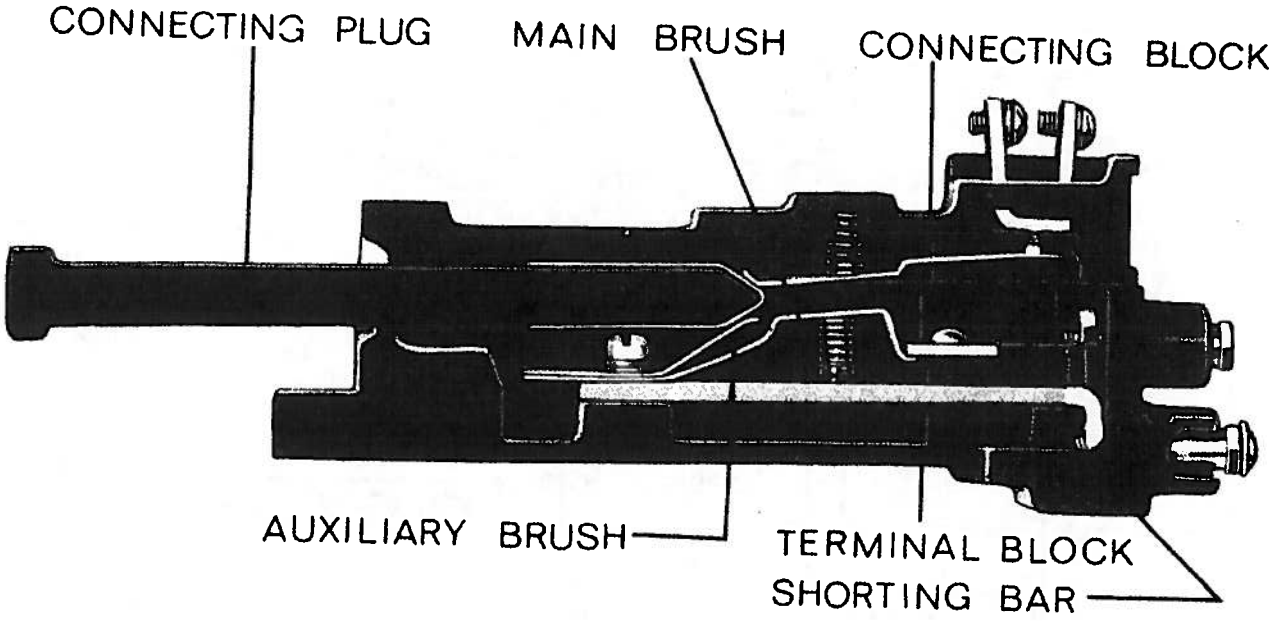


Figure 16 (0226A6927-0) Internal Connections of the HAA17A Relay (Front View)



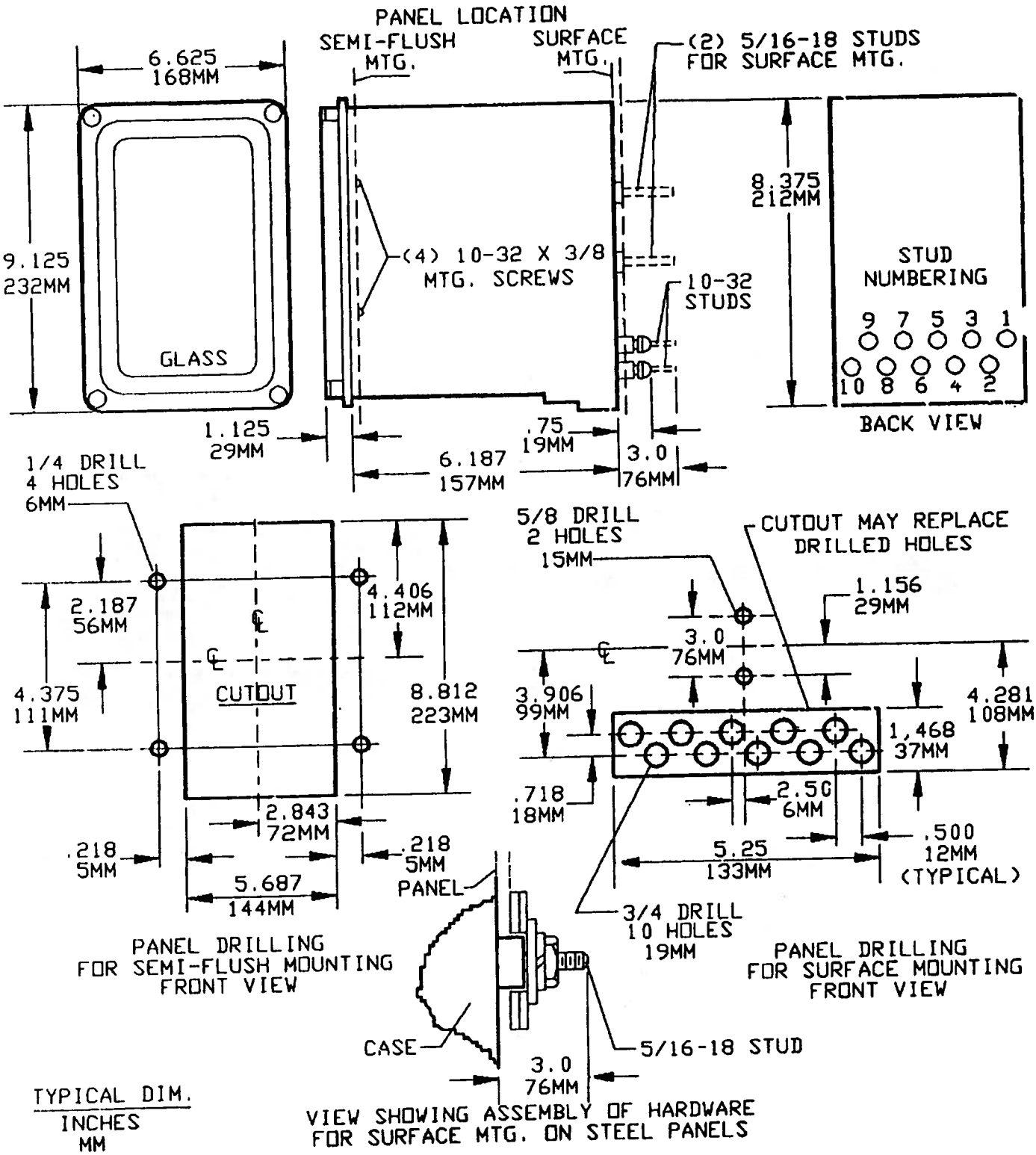
* Figure 17 (0227A7138 [1]) Internal Connections of the HAA18A Relay (Front View)

* Revised since last issue



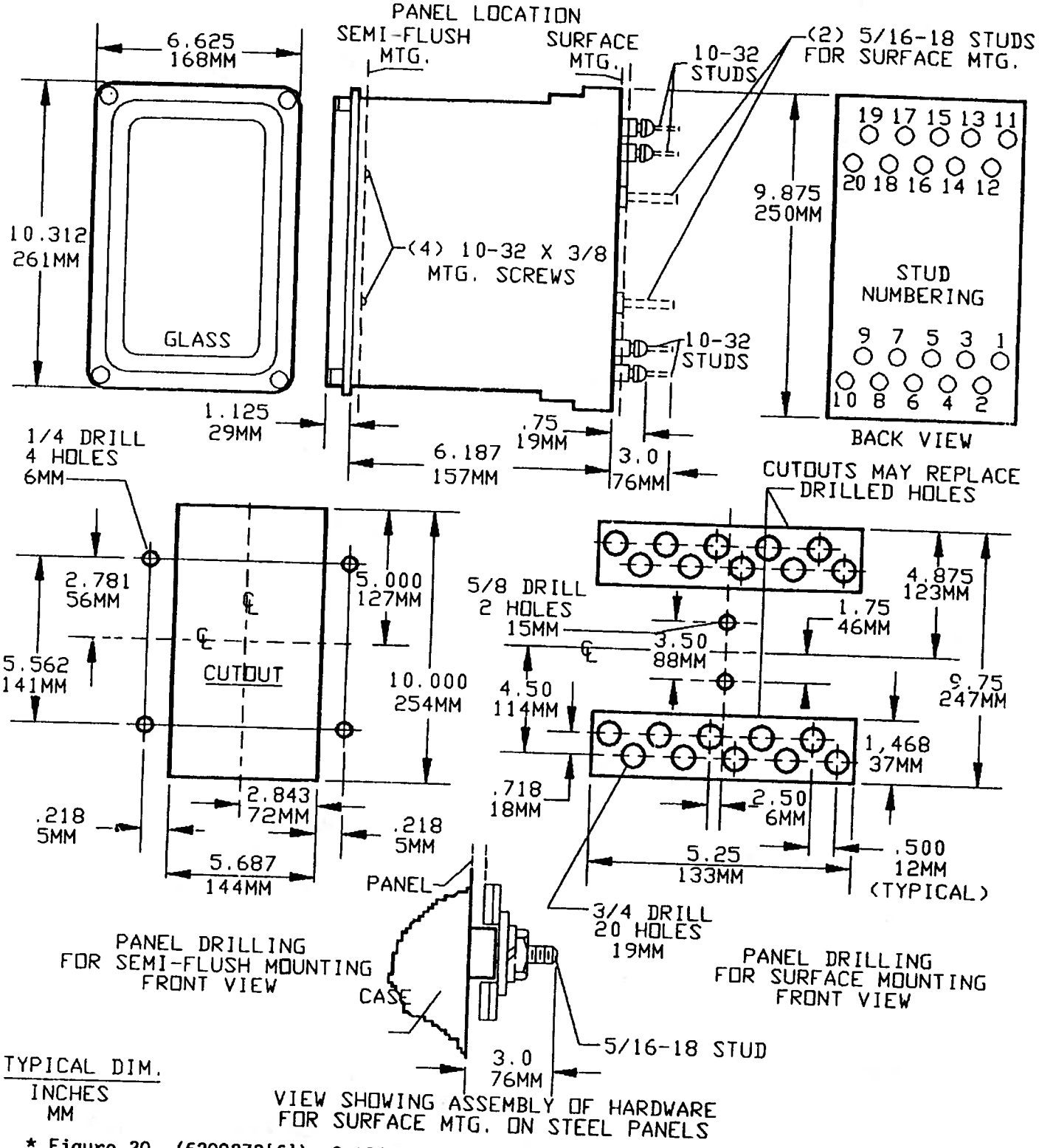
NOTE: AFTER ENGAGING AUXILIARY BRUSH CONNECTING PLUG TRAVELS 1/4 INCH BEFORE ENGAGING THE MAIN BRUSH ON THE TERMINAL BLOCK

Figure 18 (8025039) Cross Section of Drawout Case Showing Position of Auxiliary Brush



* Figure 19 (6209271 [8]) Outline and Panel Drilling for Drawout Relays - Size S1

* Revised since last issue



* Figure 20 (6209272[6]) Outline and Panel Drilling for Drawout Relays - Size S2

* Revised since last issue

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