

RELAYS
AL- AND AM-TYPES
(MAGNETIC LATCHING WIRE SPRING)
PIECE-PART DATA AND REPLACEMENT PROCEDURES

1. GENERAL

1.02 This section covers the information necessary for ordering parts to be used in the maintenance of AL- and AM-type relays. It also covers approved procedures for replacing these parts.

1.02 This section is reissued to:

- Incorporate the information contained in addendum, Issue 2
- Include information on the new plastic relay covers
- Delete P-10F098 cover from Table D
- Revise Fig. 1
- Revise the List of Tools and Gauges
- Revise 3.05
- Revise Fig. 3.

1.03 After replacing parts or performing maintenance procedures covered in this section, the relay must meet the requirements of 040-505-701 (requirements and adjusting procedures). Where timing tests are specified, see Section 040-505-501.

1.04 Part 2 (Piece-Part Data) of this section covers the piece-part numbers and the corresponding names of the parts which it is practical to replace in the field in the maintenance of these relays. No attempt should be made to replace parts not designated. Part 2 also contains explanatory figures showing the different parts.

1.05 Part 3 (Replacement Procedures) of this section gives the approved procedures for the replacement of the parts covered in Part 2.

1.06 Before making any replacement of parts, take the circuits associated with the relay out of service.

1.07 The AL-type relay has one coil and one set of contacts. The AM-type relay has two coils and two sets of contacts, one above the other. The upper coil with its associated set of contacts is designated relay A and the lower coil with its contacts is designated relay B.

1.08 Contact covers for AL- and AM-type relays are now being made of a flame retardant water-white polycarbonate. There is no change in piece-part numbers for these new covers. All new relays being manufactured will come equipped with the new covers.♦

2. PIECE-PART DATA

2.01 Fig. 1 and 2 show the various piece parts in their proper relations to other parts of the relays. Tables A through E give the piece-part numbers for cards, buffer springs, and contact covers. The piece-part numbers of the various parts are given with the names of the parts as listed by the Western Electric Company Merchandise Department. When these names differ from those in general use in the field, the latter names in some cases are shown in parentheses.

2.02 When ordering parts for replacement purposes, give the piece-part number and the name of the part, for example: P-19A132 card. Do not refer to the BSP number or to any information shown in parentheses following the piece-part number.

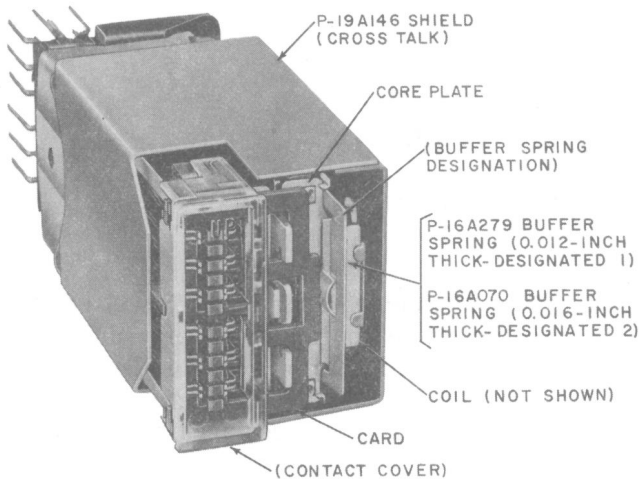


Fig. 1—AL-Type Relay—General View

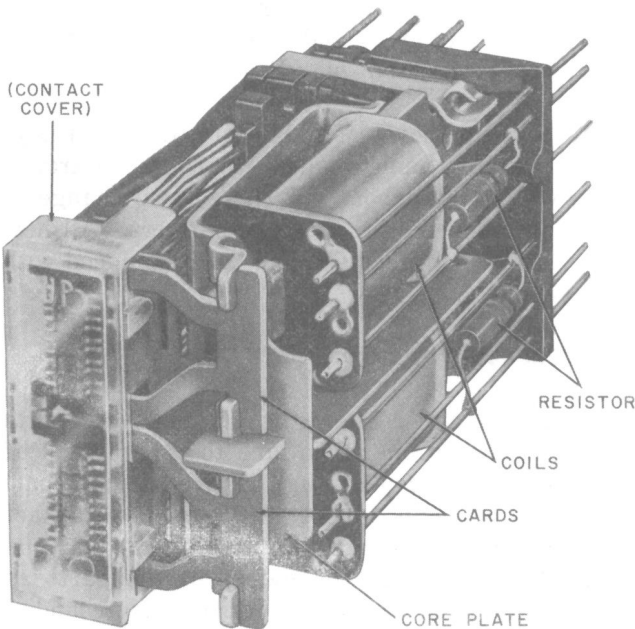


Fig. 2—AM-Type Relay—General View

2.03 It is not practicable to replace the coil and core plate of AL- and AM-type relays in the field; therefore, no attempt should be made to do so.

TABLE A
AL-TYPE RELAYS

| CARD IDENTIFICATION NUMBER (12 POSITION RELAY) | CARD PIECE-PART NUMBER |
|--|------------------------|
| 0 | P-19A130 Card |
| 1 | P-19A131 Card |
| 2 | P-19A132 Card |
| 3 | P-19A133 Card |
| 4 | P-19A134 Card |
| 5 | P-19A135 Card |
| 6 | P-19A136 Card |
| 7 | P-19A137 Card |

The identification number is stamped on each card and, with the card properly mounted on the relay, is located in the lower right-hand corner. Order the replacement card by the piece-part number corresponding to the identification number on the card to be replaced.

TABLE B
AM-TYPE RELAYS

| CARD IDENTIFICATION NUMBER | CARD PIECE-PART DATA |
|----------------------------|----------------------------|
| 1 | P-10B699 Card (lower card) |
| 2 | P-10B700 Card (upper card) |
| 3 | P-10B701 Card (lower card) |
| 4 | P-10B702 Card (upper card) |
| 5 | P-10B703 Card (lower card) |
| 6 | P-10B704 Card (upper card) |
| 7 | P-10B705 Card (lower card) |
| 8 | P-10B706 Card (upper card) |

With the card properly mounted on the relay, the identification number is stamped on the black surface of each card in the upper right-hand corner. Make sure the replacement card has the same identification number, disregarding the letter which may follow.

TABLE C
AL-TYPE RELAYS BUFFER SPRINGS

| IDENTIFICATION NUMBER | PIECE-PART DATA |
|-----------------------|---------------------------|
| 1 | P-16A279 0.012 inch thick |
| 2 | P-16A070 0.016 inch thick |

The AL-type relays may be equipped with buffer springs if necessary to meet electrical release requirements and if circuit requirements table permits. Refer to Section 040-505-701 for data concerning their use.

TABLE D
AL-TYPE RELAYS CONTACT COVER

| IDENTIFICATION NUMBER | PIECE-PART DATA |
|-----------------------|--|
| P-16A144 Cover | Without metal frame — used on relays having a contact cover spring |

TABLE E
AM-TYPE RELAYS CONTACT COVER

| IDENTIFICATION NUMBER | PIECE-PART DATA |
|-----------------------|-----------------|
| P-10B710 Cover | — |

3. REPLACEMENT PROCEDURES

3.01 *List of Tools and Materials*

| CODE OR SPEC NO. | DESCRIPTION |
|------------------|-----------------------------------|
| TOOLS | |
| 628A | Balancing spring lifter |
| 629A | Spring holder (positions 7 to 12) |

| | |
|---------|---|
| 629B | Spring holder (positions 1 to 6) |
| 630A | Spring holder and removable clamp |
| 656A | Insulator (two required) |
| 675A | Spring holder (used when replacing upper cards) |
| 675B | Spring holder (used when replacing lower cards) |
| 684A | Insulator (three required) |
| 688A | Spring holder (used when replacing upper cards) |
| 688B | Spring holder (used when replacing lower cards) |
| KS-6320 | Orange stick |
| KS-8511 | Tweezers |
| 768A | ◆Armature blocking tool◆ |
| R-2315 | Lettering and numbering set |
| AT-7860 | ◆B Long-nose pliers◆ |
| — | 4-Inch E screwdriver |
| — | 5-Inch B diagonal pliers |

MATERIALS

| | |
|---------|-------|
| KS-2423 | Cloth |
|---------|-------|

AL-TYPE RELAYS

3.02 No replacement procedures are specified for screws or other parts if the procedure consists of a simple operation.

3.03 Remove contact cover.

3.04 *Crosstalk Shield:* To replace a crosstalk shield, grasp the upper or lower right side of the shield with the B long-nose pliers and pull the shield straight out from the relay. To mount the new shield, hold it with the shield spring to the right. Tilt the shield slightly to the left, keeping the spring against the spool-head in order to avoid shorting the make contacts. Push the

shield in until the left edge of the shield clears the front edge of the cover guide. Then swing the front of the shield to the right so the shield is approximately in line with the relay and push the shield on the relay until the crimped end of the spring engages the core plate. Remount the contact cover.

3.05 Buffer Spring

(a) **Removing Buffer Spring:** If the relay is equipped with a crosstalk shield, remove it as covered in 3.04. If the buffer spring is positioned by the core plate, disengage the lugs on the upper positioning arm from the core plate using a KS-6320 orange stick and pull the upper part of the spring slightly forward. Similarly disengage the lower lugs and pull the spring straight out.

(b) **Mounting Buffer Spring:** Holding the buffer spring with the operating lug toward the relay card, insert the positioning arms between the spoolhead and the outer legs of the core. Carefully push the buffer spring inward, deflecting it slightly to the right to engage the positioning lugs on the core plate. Check the requirements for buffer spring position and tension covered in Section 040-505-701.

Stamping Relay Code on New Card

3.06 Note the code number and date of manufacture stamped on the card to be replaced. Before mounting the new card, stamp the code number and date on the card in the same location, using the R-2315 lettering and numbering set. Make sure this information is stamped on the same side of the new card as the single digit (0 to 7) located in the lower right-hand corner with the card in its proper position on the relay.

Disengaging Balancing Spring Legs

3.07 Disengage the balancing spring legs from the card as follows: Block the relay operated, using the 768A blocking tool. Holding the 628A balancing spring lifter in the left hand, insert the spring lifter next to the upper leg of the balancing spring with the end of the lifter just behind the comb. Roll the end of the lifter under this leg of the spring so the spring rests in the groove of the lifter. Then draw the lifter forward to the position shown in Fig. 3. With the right hand,

place the end of a KS-6320 orange stick on the top edge of the card in line with fixed contacts. Lift the spring upward with the tool and, at the same time, press the card downward with the orange stick. When the spring clears the top of the card, move it toward the left so it is free of the card. Withdraw the spring lifter. When removing the lower leg of the spring, the procedure is the same except the opposite end of the spring lifter is rolled over the top edge of the leg and pushed downward while the orange stick is pressed upward against the bottom edge of the card. Remove the wedge.

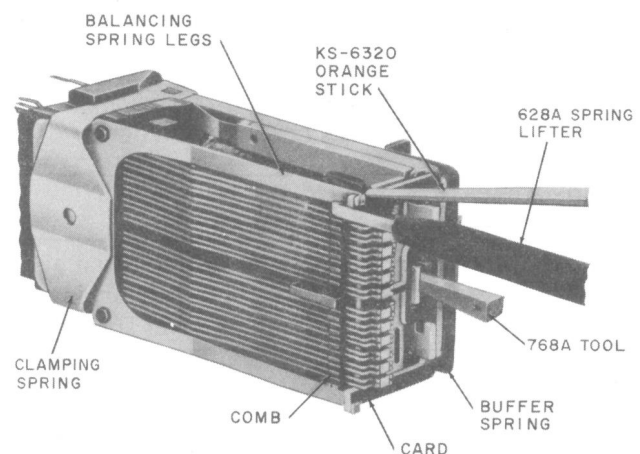


Fig. 3—AL-Type Relay—Disengaging Balancing Spring From Card

Insulating Contact Cover Spring

3.08 **Relays Having Break Contacts and Contact Cover Spring:** On these relays, it is necessary to prevent shorting of the movable break contact springs with the contact cover spring during replacement of the card. For this purpose, one or two 656A insulators are required. When the relay has break contacts in both the 1- to 6- and 7- to 12-position groups, two insulators are required. If only one of these groups has break contacts, only one insulator is required. To insert a 656A insulator, proceed as follows: Hold the tab of the insulator with the offset portion toward the contact cover spring. Insert the insulator between the contact cover spring and the break contact spring combination until the insulator touches the spoolhead. See Fig. 4.

Applying Spring Holders to Break-Contact Springs

3.09 The 629A spring holder is used to hold the break contact springs in positions 7 to 12 and the 629B holder in positions 1 to 6 during replacement of the card. Each of the tools has six notches to engage the six pairs of two springs with which it may be used. It is important that the pairs of springs are engaged by the proper notches in the tools. Special care is required to engage the break springs in the proper notches where all positions on the relay are not equipped with these springs. These spring holders are shown mounted on the relay in Fig. 4.

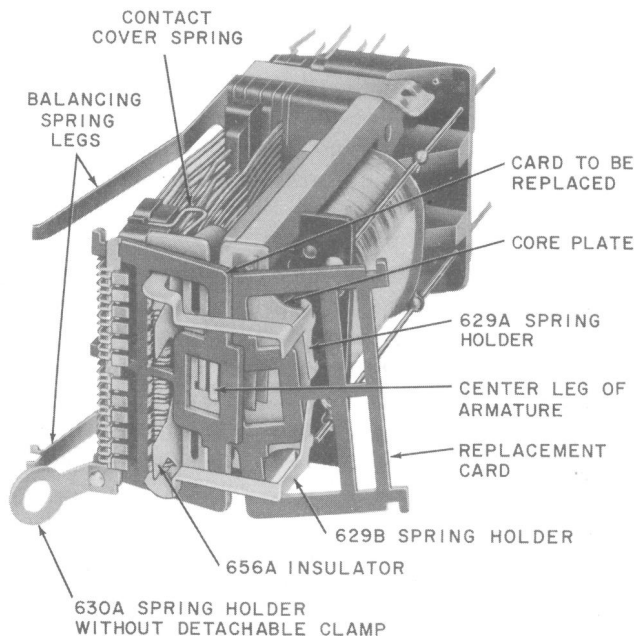


Fig. 4—AL-Type Relay—Card Removal Tools Mounted in Place Except Detachable Clamp of 630A Spring Holder

3.10 If there are any break contacts in positions 7 to 12, insert the 629A spring holder between the fixed and break contact springs in these positions as follows: Holding the the new card with the notched ends at the left and the code and date information visible, insert the notched leg of the holder through the opening in the card adjacent to the upper right-hand corner. The shank of the holder should be adjacent to the top of the card. Hold the spring holder and new card

in one hand and, with the other hand, push the card to be replaced to the right to open the gap between the fixed and break contacts sufficiently to insert the holder. Insert the notched leg of the holder into the gap with the six notches in line with the six positions (7 to 12) on the relay. Swing the outer end of the holder to the right and clip it on the core plate as shown in Fig. 4. Release the card and make sure that each pair of twin springs is engaged by the proper notch in the tool.

3.11 If there are any break contacts in positions 1 to 6, insert the notched leg of the 629B spring holder through the lower right opening in the new card suspended on the 629A spring holder. If the 629A spring holder was not required, place the new card on the 629B spring holder with the shank of the holder adjacent to the bottom of the card. Then push the card to be replaced to the right to open the gap between the fixed and break contacts sufficiently to insert the holder. Insert the notched leg of the holder between the fixed and break contacts with the six notches in the holder in line with the six positions (1 to 6) on the relay. Swing the outer end of the holder to the right and clip it on the core plate as shown in Fig. 4. Release the card and make sure that each pair of twin springs is engaged by the proper notch in the holder. Swing the new card suspended on the holders as far to the right as possible.

Applying Spring Holder and Clamp to Make-Contact Springs

3.12 Referring the Fig. 4, insert the 630A spring holder without the clamp between the fixed and make-contact springs as follows: Pry the card to be replaced from its position on the armature with the KS-6320 orange stick, placing one end of the orange stick over the end of the center leg of the armature and under the adjacent edge of the card. Tilt the card outward so it can be moved over the ends of the armature legs. With the right hand, push the card to the left to open the gap between the fixed and make contacts sufficiently to permit insertion of the spring holder. With the left hand, insert the spring holder through this gap and turn the handle to the left. Release the card. Position the spring holder so that its larger projection is centered between positions 6 and 7 on the relay and the pairs of twin make springs are engaged by the proper notches in the holder.

3.13 Hold the clamp associated with the spring holder by the handle with the notch at the bottom. Place the metal loop at the top of the clamp on the end of the spring holder that extends out above the make-contact springs. Move the clamp downward so that the notch in the bottom of the clamp engages the pin located adjacent to the handle on the spring holder. The clamp will hold the make-contact springs in their proper notches on the spring holder. See Fig. 5.

3.14 Using the 628A balancing spring lifter in the right hand, place the outer end of the top leg of the balancing spring in the notch at the top of the spring holder as shown in Fig. 5. Similarly, place the outer end of the bottom leg of the balancing spring in the notch at the bottom of the spring holder.

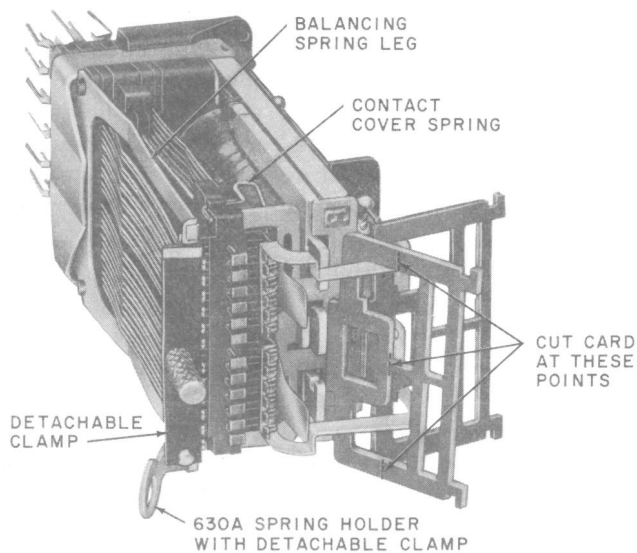


Fig. 5—AL-Type Relay—Card Removable Tools Mounted in Place With Detachable Clamp on 630A Spring Holder

Removing Card

3.15 Relays Having Break Contacts (with or without make contacts): Grasp the horizontal section at the center of the card to be replaced with the KS-8511 tweezers. Carefully remove the card from between the contacts, moving the make-contact springs slightly to the left, if necessary. Swing the card to the right so that it

hangs freely on the 629A and 629B spring holders. Cut this card with the 5-inch diagonal pliers at the three points indicated in Fig. 5. Remove the portion of the card between the holders with the tweezers.

3.16 Relays Having Make Contacts Only: On relays having make contacts only, grasp the horizontal section at the center of the card to be replaced with the KS-8511 tweezers. Carefully remove the card from between the contacts, moving the make-contact springs slightly to the left, if necessary.

Mounting New Card and Removing Tools

3.17 Relays Having Break Contacts (with or without make contacts)

(a) Swing the new card so the vertical sections at the free side of the card are behind the fixed contacts. Do not position the other side of the card on the ends of the armature legs at this time.

(b) If the relay has make contacts, grasp the handle of the 630A spring holder and clamp and move it slightly to the left. With the balancing spring lifter in the other hand, remove the top leg of the balancing spring and then the bottom leg from the notches of the holder. Carefully move the holder to the right, permitting the make-contact springs to fall into their proper grooves in the comb. Remove the clamp from the spring holder. With the right hand, push the card to the left to open the gap between the movable and fixed contacts sufficiently to permit withdrawing the holder. Swing the holder to the right, withdraw it, and release the card.

(c) Move the armature against the armature backstop with the KS-6320 orange stick and hold the armature in this position. With the other hand, position the card on the legs of the armature. Release the armature and hold it against the core with the orange stick. Move the card up and down slightly until the projections on the card engage the notches in the outer legs of the armature.

(d) Remove the 629A and 629B spring holders as follows: Push the card to the right. Unclip one of the holders from the core plate and move it to the left, permitting the break

springs to enter the grooves in the comb. Swing the holder to the left and withdraw it through the gap between the fixed and movable break contacts. Remove the other holder in the same manner. Release the card. Make sure that each movable break-contact spring is in its proper groove in the comb.

- (e) If the 656A insulators were used, remove them.
- (f) Block the relay operated with the ♦768A armature blocking tool.♦ Remount the balancing spring legs in their respective notches in the card, employing a method similar to that covered in 3.07 for disengaging the legs. Remove the wedge and make sure that the card is properly engaged on the armature.
- (g) Where the relay was equipped with a buffer spring, remount the spring as covered in 3.05.
- (h) Where the relay was equipped with a crosstalk shield, remount the shield as covered in 3.04.
- (i) Remount the contact cover on the relay.

3.18 Relays Having Make Contacts Only

- (a) Hold the new card with the notches at the left and the stamped information on the card visible. Insert the extreme left vertical section of the card between the movable make and fixed contacts. Do not position the other side of the card on the ends of the armature legs at this time.
- (b) Grasp the handle at the bottom of the 630A spring holder and clamp with the left hand and move it slightly to the left. With the balancing spring holder in the other hand, disengage the top leg of the balancing spring and then the bottom leg from the notches of the spring holder. Carefully move the holder to the right, permitting the movable make-contact springs to fall into their proper grooves in the comb. Remove the clamp from the spring holder. With the right hand, push the card to the left to open the gap between the fixed and movable make contacts sufficiently to permit withdrawing the spring holder. Swing the holder to the right and withdraw it.

(c) Move the armature against the armature backstop with the KS-6320 orange stick and hold the armature in this position. With the other hand, position the card on the legs of the armature. Release the armature and hold it against the core with the orange stick. Move the card up and down slightly until the projection on the card engages the notches in the outer legs of the armature.

- (d) Block the relay operated with the ♦768A armature blocking tool.♦ Remount the balancing spring legs in their respective notches in the card, employing a method similar to that covered in 3.07 for disengaging the legs. Remove the wedge and make sure that the card is properly engaged on the armature.
- (e) Where the relay was equipped with a buffer spring, remount the spring as covered in 3.05.
- (f) Where the relay was equipped with a crosstalk shield, remount the shield as covered in 3.04.
- (g) Remount the contact cover on the relay.

AM-TYPE RELAYS

3.19 In the procedures covering replacement of cards, the term relay means the half of the relay on which the card is being replaced.

3.20 The same procedures apply for replacing either the upper or lower card, except as stated.

Stamping New Card

3.21 Note the circuit designation on the card to be replaced. Before mounting the new card, stamp the circuit designation in the same location, using the R-2315 lettering and numbering set. Make sure that this information is stamped on the same side of the new card as the single digit (1 to 8) located in the upper right-hand corner with the card in its proper position on the relay.

3.22 Remove the contact cover.

Disengaging Balancing Spring Legs

3.23 Disengage the balancing spring legs from the card to be replaced as covered in 3.24 for the upper card or 3.25 for the lower card.

3.24 *Balancing Spring Legs Engaging Upper Card:*

Block the associated armature in the operated position with the 768 armature blocking tool. To disengage the outer leg of the balancing spring, hold the 628A balancing spring lifter in the left hand and insert the lifter next to the leg so that the end of the lifter is just behind the comb. Roll the end of the lifter under the leg of the spring so that the leg rests in the groove of the lifter. Then draw the lifter forward to the position shown in Fig. 6. With the other hand, place the end of a KS-6320 orange stick on the top edge of the card as shown in the figure. Lift the spring upward with the lifter and at the same time press the card downward with the orange stick. When the leg of the spring clears the top of the card, move it toward the left so that it is free of the card. Withdraw the spring lifter. To disengage the inner balancing spring leg from the card, hold the orange stick in the right hand and insert it between the two cards so that the end of the orange stick is against the front molded section. Rotate the orange stick to separate the cards. With a second orange stick, push down on the end of the balancing spring legs as shown in Fig. 7 and disengage it from the notch in the card. Remove the wedge.

3.25 *Balancing Spring Legs Engaging Lower Card:*

Disengage the balancing spring legs from the lower card by following procedures similar to those covered in 3.24. In this case, however, roll the end of the balancing spring lifter over the top edge of the outer leg of the balancing spring and push this leg downward while pushing the card upward with the orange stick. Disengage the inner leg from the card by separating the cards with one orange stick and pushing the end of the leg upward with the second orange stick.

Insulating Break-Contact Springs

3.26 If the relay has break-contact springs, these springs must be moved out of their comb grooves during replacement of the card. In order to prevent shorting of the break contact springs against the contact cover spring or the core plate,

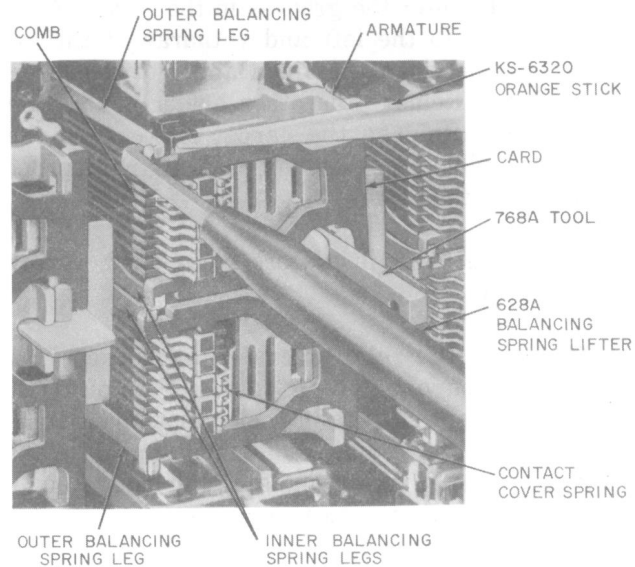


Fig. 6—AM-Type Relay—Disengaging Outer Balancing Spring Leg From Upper Card

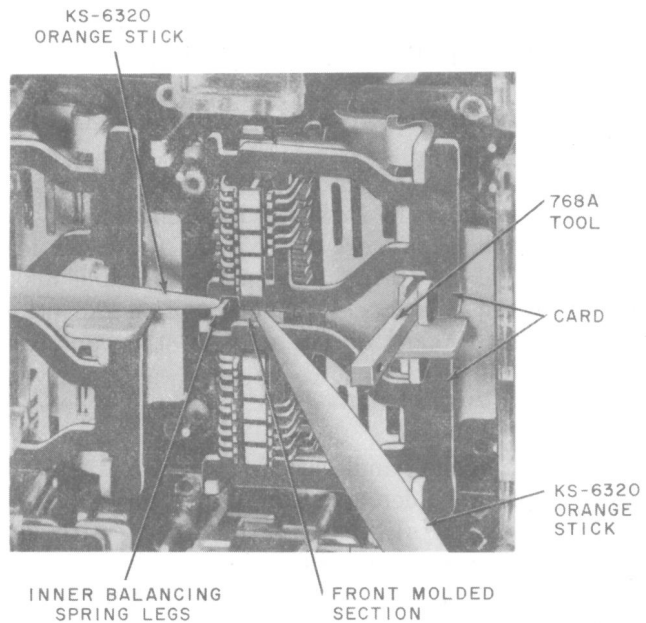


Fig. 7—AM-Type Relay—Disengaging Inner Balancing Spring Leg From Upper Card

insert the 684A insulator in the relay as follows: Hold the insulator with the offset end to the right and insert the other end between the comb and core plate so that the insulator passes to the left

of the contact cover spring. Push the insulator inward until the beginning of the offset touches the core plate as shown in Fig. 8. Moving the insulator laterally while inserting it may facilitate positioning it in the relay. Make sure that the insulator is positioned so that it will insulate all the break-contact springs.

Insulating Make-Contact Springs

3.27 If the relay has make-contact springs and if there is an AF-, AG-, AJ-, AK-, AL-, or AM-type relay mounted at its left as shown in Fig. 8, it is necessary to prevent shorting of the make-contact springs against the core plate of the adjacent relay when these springs are held out of the comb grooves for replacement of the card. To prevent shorting of the make-contact springs, position the 684A insulator adjacent to these springs as follows: Using a KS-6320 orange stick, move the disengaged inner balancing spring leg to the right. Hold the insulator with the offset end to the left and insert the other end between the inner balancing spring leg and the core plate of the other relay. Release the spring leg so that it holds the insulator against the core plate. With the KS-8511 tweezers, position the insulator so that the beginning of the offset is against the core plate as shown in Fig. 8 and so that the insulator will insulate all make-contact springs from the core plate. If the relay is mounted adjacent to other apparatus against which the make-contact springs may be shorted, insert a 684A insulator between the adjacent apparatus and one or both of the disengaged balancing spring legs as necessary.

Applying Spring Holders to Break-Contact Springs

3.28 The 675A and 675B spring holders are used to hold break-contact springs of the upper and lower halves of the relay, respectively, during replacement of the associated card. Each of the spring holders has five notches to engage the five pairs of break-contact springs with which it may be used. It is important that the pairs of springs are engaged by the proper notches in the holders. Special care is required to engage the pairs of springs in the proper notches if all five positions on the relay are not equipped with these springs. The 675A spring holder is shown mounted on the relay in Fig. 8. To mount either the 675A or 675B spring holder, proceed as covered in 3.29.

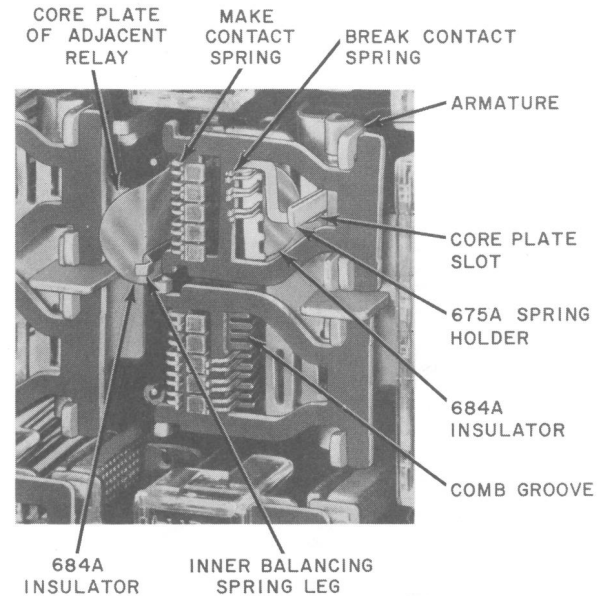


Fig. 8—AM-Type Relay—684A Insulators and 675A Spring Holder Mounted on Upper Half of Relay

3.29 With the right hand, apply the KS-6320 orange stick to the right inner edge of the card and move the card as far to the right as possible. Holding the handle of the spring holder in the left hand, insert the notched section of the holder behind the break contacts. Release the card. Swing the handle of the spring holder to the right and position the holder so that each pair of break-contact springs is engaged by the proper notch and the inner end of the handle is clipped in the core plate slot directly in front of the armature as shown in Fig. 8. Make sure that the notched section of the holder is against the comb, and that the inner end of the handle does not prevent free movement of the armature which is necessary for removal of the card. If necessary, free the armature by carefully moving the handle slightly outward.

Disengaging Card From Armature Legs

3.30 Apply the KS-6320 orange stick to the right side of the outer leg of the armature behind the card and hold the armature in the unoperated position as shown in Fig. 9. With the KS-8511 tweezers, grasp the upper section of the card as

shown in the figure and move the card to the right to disengage it from the armature leg notches. Then pull the card forward so that it is in front of the armature legs. Remove the orange stick from the armature.

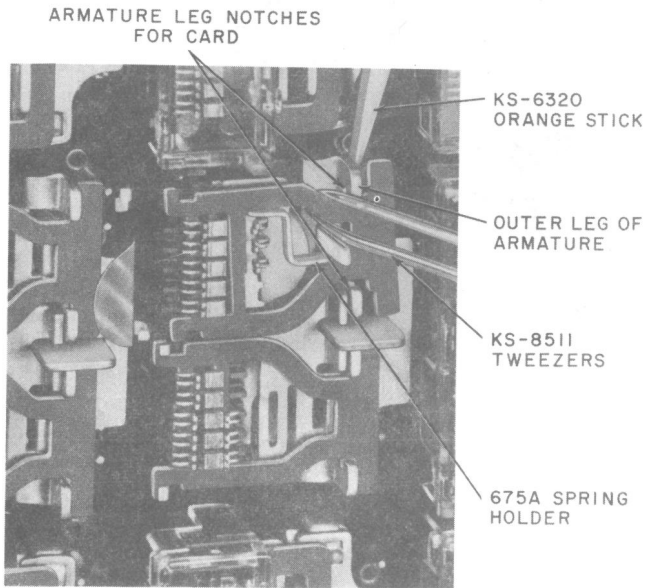


Fig. 9—AM-Type Relay—Disengaging Card From Armature Legs

Applying Spring Holders to Make-Contact Springs

3.31 The 688A and 688B spring holders are used to hold make-contact springs of the upper and lower halves of the relay, respectively, during replacement of the associated card. Each of the spring holders has five notches to engage the five pairs of make-contact springs with which it may be used. It is important that the pairs of springs are engaged by the proper notches in the holders. Special care is required to engage the pairs of springs in the proper notches if all five positions on the relay are not equipped with these springs. Each of the spring holders has a top and a bottom handle. On the 688A spring holder, the bottom handle is adjacent to the unnotched section; on the 688B, it is adjacent to the notched section. The 688A spring holder is shown mounted on the relay in Fig. 10. To mount either the 688A or 688B spring holder, proceed as covered in 3.32.

3.32 With the right hand, apply the KS-6320 orange stick to the right side of the card

and move the card as far to the left as possible. With the other hand, hold the spring holder by the bottom handle and insert the notched section of the holder between the make contacts so that it touches the card. Swing the handle of the holder to the right and position the notched section behind the make contacts. Release the card. Then, using both hands, grasp the top and bottom handles of the spring holder. Position the holder so that its tab adjacent to the card being replaced is in front of this card and the pairs of make contact springs are engaged in the proper notches. Then, with the springs in the notches, move the holder to the left and position it so that each tab rests against the left side of the adjacent armature leg. Make sure the notched section of the holder is against the offset in the make-contact springs and that the inner edge of each tab is against the offset in the armature legs as shown in Fig. 10.

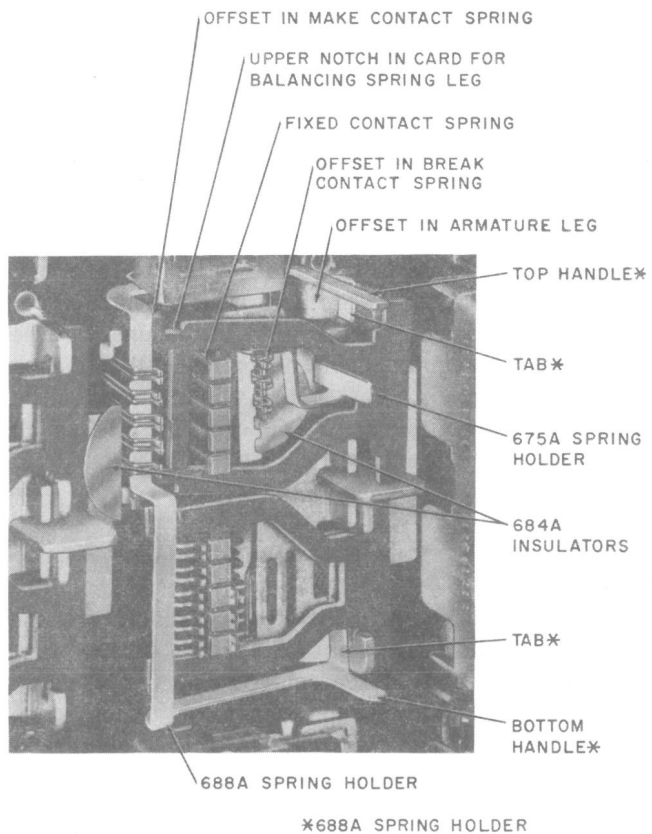


Fig. 10—AM-Type Relay—688A Spring Holder Mounted on Relay (675A Spring Holder and 684A Insulators in Place on Upper Half of Relay)

Removing Card From Relay

3.33 Hold the KS-8511 tweezers horizontally and grasp the card at the upper notch for the balancing spring leg. Withdraw the card from the relay, taking care not to dislodge the spring holders.

Mounting New Card on Relay

3.34 Make sure that the circuit designation has been stamped on the new card as covered in 3.21. Then, with the black surface of the new card uppermost and the two notches for the balancing spring legs at the left, grasp the card at the upper notch with the KS-8511 tweezers. Place the card, black surface outermost, on the relay so that the fixed contact springs are between the two vertical parallel sections of the card. Then engage the card on the armature legs as follows: Apply the KS-6320 orange stick to the right side of the outer leg of the armature behind the notch for the card and hold the armature in the unoperated position (see Fig. 9). Grasp the upper section of the card with the tweezers, and move the card to the right and back so that the card is in line with the notch in each armature leg. Then remove the orange stick from the armature and guide the card into the notches.

Removing Spring Holders and Insulators

3.35 675-Type Spring Holder: If a 675-type spring holder was mounted on the relay to hold break-contact springs, remove it as follows: With the left hand apply a KS-6320 orange stick to the left portion of the card and hold the card against the front molded section of the relay. Grasp the handle of the holder with the other hand and, taking care to keep the break-contact springs in the notches, move the holder outward so that the notched section is against the offset in the springs. Then carefully guide the springs into their proper comb grooves by moving the holder to the left. Still holding the spring holder, apply the orange stick to the left side of the card and move the card to the right as far as possible while keeping the card against the front molded section. Move the spring holder to the left against the fixed-contact springs and withdraw it by moving it vertically upward from the upper half of the relay or downward from the lower half of the relay.

3.36 688-Type Spring Holder: If a 688-type spring holder was mounted on the relay to hold make-contact springs, remove it as follows:

(a) First, make sure that the card is against the front molded section of the relay and that the notched section of the holder is against the offset in the make-contact springs. Using both hands, grasp the handles of the holder and carefully pull them outward to disengage the holder tabs from the armature legs. With the notched section of the holder against the offset in the make-contact springs so that notched section clears the card, carefully move the holder to the right and guide the springs into their proper comb grooves. Then disengage the notched section of the holder from the springs.

(b) Disengage the card from the armature legs as follows: Apply the KS-6320 orange stick to the right side of the outer leg of the armature behind the card and hold the armature in the unoperated position (see Fig. 9). Grasp the upper section of the card with the KS-8511 tweezers and move the card to the right and outward to disengage it from the armature legs. With the orange stick applied to the right side of the card, hold the card as far as possible to the left. Grasp the bottom handle of the holder, swing it outward, and carefully withdraw the notched section through the gap between the make contacts. Release the card.

(c) Remount the card in the armature leg notches as follows: Apply the KS-6320 orange stick to the right side of the outer leg of the armature behind the notch for the card and hold the armature in the unoperated position (see Fig. 9). Grasp the upper section of the card with the KS-8511 tweezers, and move the card to the right and back so that the card is in line with the notches in each armature leg. Then remove the orange stick from the armature and guide the card into the notches.

3.37 684A Insulators: If 684A insulators were used, remove them using the KS-8511 tweezers.

Engaging Balancing Spring Legs

3.38 Block the relay operated using the #768A armature blocking tool. Engage the outer balancing spring leg in its associated notch in the

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card, employing a method similar to that covered in 3.24 and 3.25 for disengaging the spring leg. Engage the inner balancing spring leg in its associated notch in the card by separating the cards with a KS-6320 orange stick as covered in 3.24. Then grasp the end of the leg with the KS-8511 tweezers; align the leg in the notch; remove the

orange stick, and then remove the tweezers. Make sure that both balancing spring legs properly engage the notches in the card. Remove the wedge from the relay and check that the card is properly engaged in the notches of the armature legs.

3.39 Remount the contact cover.