RELAYS

AK-TYPE

PIECE-PART DATA AND REPLACEMENT PROCEDURES

1. GENERAL

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

1.02 This section is reissued to

- Revise 1.06
- Add a new 1.07
- Add a new 1.12
- Include information in 1.09 on the new contact covers
- Revise Fig. 1
- Add Tables B and C
- Revise the List of Tools in Part 3
- Add a new Fig. 2
- Add two notes preceding 3.24
- Rearrange that portion of procedure in the paragraphs between 3.25 and 3.36.
- Revise the List of Tools and Materials in Part 4
- Add a note to 4.36.

1.03 The 1018A tool kit, which is used only for changing cards, is a part of the 1017A tool kit but may be ordered separately.

1.04 The older method of repairing AK-type wire spring relays using the 1014B tool kit is being retained in the section. It may be used where appropriate.

1.05 Part 2 of this section covers the piece-part numbers and the corresponding names of the parts which it is practicable to replace in the field in the maintenance of these relays. No attempt should be made to replace parts not designated.

1.06 ▶Part 3 of this section covers the approved procedures using the 1017A and 1018A tool kits for the replacement of the parts covered in Part 2.

Note: Procedures for the replacement of coil and armature assemblies are not applicable to relays used in ESS installations where the mounting plates are attached to the rear of the equipment frames. See Part 4.

1.07 Part 4 of this section covers the approved procedures using the 1014B tool kit for the replacement of parts listed in Part 2.◀

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

1.09 ▶Contact covers for AK-type relays are now being made of a flame-retardant water-white polycarbonate. There is no change in piece-part numbers for these covers. All new relays being manufactured will come equipped with the new cover.◀

1.10 Complete relays of the same code should be purchased and disassembled in order to obtain the replacement parts for relays to be repaired.

1.11 All replacement coils should have the letter "R" stamped in a 1/4-inch high character on the front of the front spool head at the time of repair.

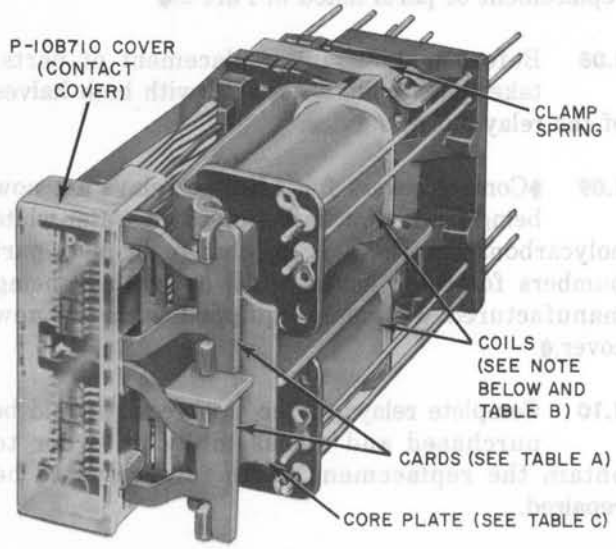
1.12 ▶Bobbin coils, when encountered either in relays or as replacement piece parts, are

directly interchangeable with the earlier filled coils and can be replaced by using existing procedures.

1.13 Some relays of types covered by this section have been purchased from companies other than Western Electric. These may be identified by corporate trade marks molded into the covers and stamped on the relays. Since part designation numbers stamped on individual piece parts in these relays may not always correspond to numbers referenced in this section, when piece-part replacements are necessary, an equivalent Western Electric-made relay, if available, should be examined for the part numbers of the proper parts.

2. PIECE-PART DATA

2.01 Fig. 1 shows the various piece-parts in their proper relation to other parts of the relay. The piece-part numbers of the various parts are given together 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.



NOTE:
ONLY THE COILS LISTED IN TABLE B ARE NOW AVAILABLE AS REPLACEMENTS, AND NO COILS HAVING OTHER RESISTANCE VALUES SHOULD BE ORDERED.

Fig. 1—AK-Type Relay General View

2.02 When ordering parts for replacement purposes give both the piece-part number and the name of the part, for example, "P-10B710 Cover." Do not refer to the BSP number or to any information shown in parentheses following the piece-part number.

TABLE A

*CARD IDENTIFICATION NO.	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)

*The identification number is stamped on the black surface of each card in the upper right-hand corner with the card properly mounted on the relay. Make sure that the replacement card has the same identification number, except for the letter following the number, as the card being replaced. The letter following the identification number is used in connection with manufacture and should be ignored when replacing the card.

→TABLE B←

AK-TYPE RELAY

†COIL RESISTANCE (OHMS)	COIL PIECE-PART DATA	
5.5	P-12F486	(top coil)
16	P-12F487	(top coil)
65	P-12F488	(bottom coil)
100	P-10F211	(top coil)
100	P-10F212	(bottom coil)
145	P-12F489	(top coil)
145	P-12F490	(bottom coil)
185	P-12F491	(top coil)

→TABLE B (Cont)←

210	P-10F213	(top coil)
210	P-10F214	(bottom coil)
280	P-12F492	(bottom coil)
315	P-12F493	(bottom coil)
410	P-12F494	(top coil)
410	P-12F495	(bottom coil)
630	P-12F496	(top coil)
630	P-12F497	(bottom coil)
640	P-10F224	(top coil)
640	P-10F225	(bottom coil)
680	P-12F498	(top coil)
680	P-12F499	(bottom coil)
955	P-12F500	(top coil)
955	P-12F501	(bottom coil)
960	P-12F502	(top coil)
960	P-12F503	(bottom coil)
1100	P-12F504	(bottom coil)
1500	P-12F505	(top coil)
1500	P-12F506	(bottom coil)
2450	P-10F226	(top coil)
2450	P-10F227	(bottom coil)

†Obtain the resistance of the coil for the relay involved from the circuit drawing and order the replacement coil by the piece-part number corresponding to the resistance value (see *Note* on Fig. 1). The piece-part number stamped on the coil to be replaced should be ignored. This number covers the coil and core assembly and is used in connection with manufacture only. When replacing a coil in the field, stamp "R" on the front of the spoolhead near the terminals. This will identify those relays in the equipment which have probably been degraded due to coil replacement.

→TABLE C←

AK-TYPE RELAY

‡CORE PLATE IDENTIFICATION NO.	CORE PLATE PIECE-PART DATA	
1	P-10B712	
2	P-10B713	
1	P-12F465	(chrome plated)
2	P-12F466	(chrome plated)

The chrome plated core plates are used only on the AK-500 series relays.

‡The identification number is stamped in the upper right side of the core plate adjacent to the card. Order the core plate by the corresponding piece-part number in Table C.

3. REPLACEMENT PROCEDURES USING 1017A AND 1018A TOOL KITS

3.01 *List of Tools*

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
1017A	Tool Kit (Includes 1018A tool kit) (consists of the following)

AMT	DESCRIPTION
One	Case, Carrying, KS-20499 L1
One	P-11H619, Det. 1, Retainer, Wedge Support Assembly
Two	P-11H620, Det. 2, Spacer Nut

List of Tools (Cont)

AMT	DESCRIPTION
One	P-11H621, Det. 3, Post, Anchoring
Two	P-11H622, Det. 4, Stud, Spacing
One	P-11H623, Det. 5, Wedge Inserter Assembly
Four	P-12B536, Det. 6, Tubes with Plastic Container, P-12B537
One	P-11H624, Det. 7, Yoke Assembly
Four	P-11H625, Det. 8, Insulator
Two	P-11H627, Det. 10, Retainer Assembly
Two	P-11H628, Det. 11, Retainer, Stud Spacer
One	P-11H629, Det. 12, Support, Top Wedge
One	P-11H634, Det. 17, Support, Bottom Wedge
One	P-11H635, Det. 18, Bracket Assembly
One	P-11H613, Det. 15, Bracket
One	P-11H636, Det. 19, Clip
One	P-11H637, Det. 20, Wedge, Top
One	P-11H644, Det. 21, Wedge, Bottom
One	P-11H638, Det. 22, Wedge, Top
One	P-11H645, Det. 23, Wedge, Bottom
One	P-11H639, Det. 24, Wedge, Top
One	P-11H646, Det. 25, Wedge, Bottom
One	P-11H640, Det. 26, Wedge, Top
One	P-11H647, Det. 27, Wedge, Bottom
One	P-11H641, Det. 28, Wedge, Top
One	P-11H648, Det. 29, Wedge, Bottom
One	P-11H642, Det. 30, Wedge, Top
One	P-11H649, Det. 31, Wedge, Bottom
One	P-11H643, Det. 32, Wedge, Top
One	P-11H650, Det. 33, Wedge, Bottom
One	P-11H632, Det. 34A, Wedge
One	P-11H651, Det. 34B, Wedge
One	P-12B564, Plastic Box for Details 7 and 19, and 630A tool
One	628A tool
1018A	Tool kit, consisting of:
One	P-11H630, Det. 13, Comb
One	P-11H631, Det. 14, Comb
One	P-11H633, Det. 16, Lifter
One	840440168, Det. 35, Lifter
One	840286199, Det. 36, Lifter
One	840286207, Det. 37, Comb
One	840286215, Det. 38, Comb Lifter
KS-6320	Orange stick
KS-8511	Tweezers
768A	Blocking tool
AT-7860	▶B Long-nose pliers◀
—	6-inch C screwdriver

3.02 Fig. 2 shows the tools comprising the 1017A and 1018A tool kits.

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

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

3.05 After making any replacement of parts on the relay, the part or parts replaced shall meet the readjust requirements involved as specified in Section 040-504-701. Other parts whose adjustments may have been directly disturbed by the replacing operations shall be checked to meet the readjust requirements and an overall operation check shall be made of both halves of the relay before restoring the circuits to service.

3.06 After replacing a card or coil, make sure that both halves of the relay meet the requirement in Section 040-504-701 covering movable twin contact spring position.

3.07 ***4B Cover clip,*** Fig. 3, is used to minimize displacement of operating cards, contact covers, and contact springs of wire spring relays during shipping and handling.

(a) ***Removing clip:*** Insert the tip of a KS-6854 screwdriver between the upper end of the 4B clip and the relay cover. A slight twist will disengage the tang. Slide the clip out and down to disengage bottom tang.

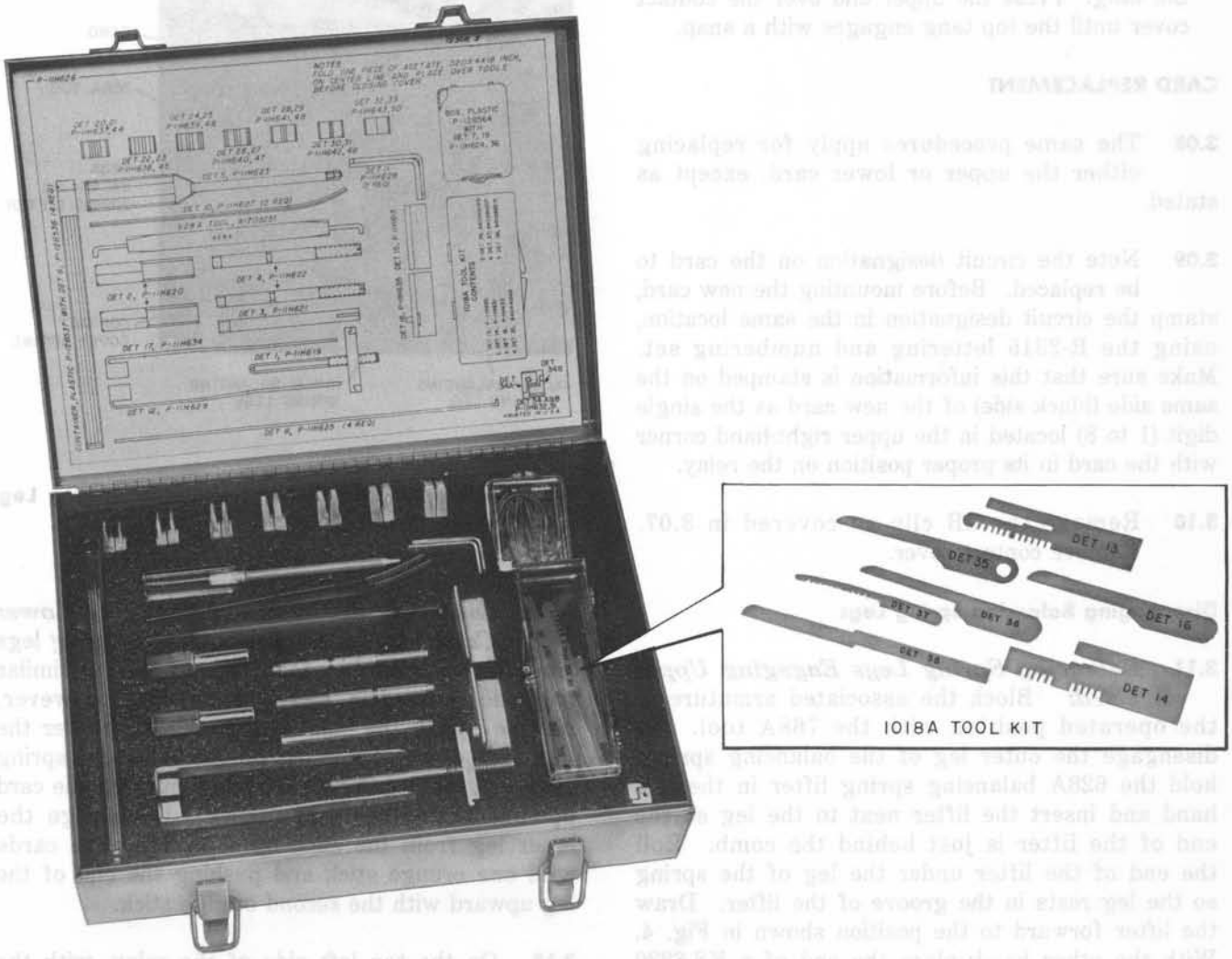


Fig. 2—1017A Tool Kit Including 1018A Tool Kit

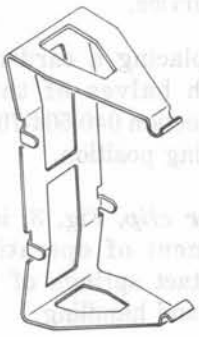


Fig. 3—4B Cover Clip

(b) ***Mounting clip:*** Slide clip over the lower end of the contact cover enough to engage the tang. Press the upper end over the contact cover until the top tang engages with a snap.

CARD REPLACEMENT

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

3.09 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 (black 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.

3.10 Remove the 4B clip as covered in 3.07. Remove contact cover.

Disengaging Balancing Spring Legs

3.11 ***Balancing Spring Legs Engaging Upper Card:*** Block the associated armature in the operated position with the 768A 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 the end of the lifter is just behind the comb. Roll the end of the lifter under the leg of the spring so the leg rests in the groove of the lifter. Draw the lifter forward to the position shown in Fig. 4. 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 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 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 leg as shown in Fig. 5 and disengage it from the notch in the card. Remove the wedge.

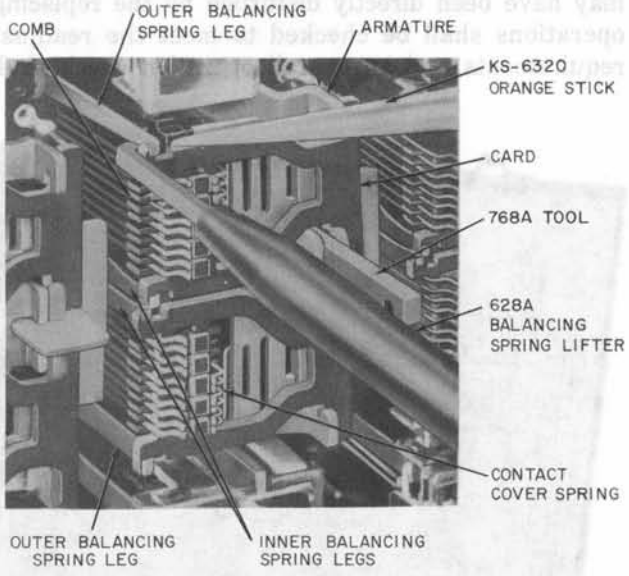


Fig. 4—Disengaging Outer Balancing Spring Leg From Upper Card

3.12 ***Balancing Spring Legs Engaging Lower Card:*** Disengage the balancing spring legs from the lower card by following procedures similar to those covered in 3.11. 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.

3.13 On the top left side of the relay, with the taper of Detail 36 lifter facing to the left, place the lifter behind the cards, inserting it

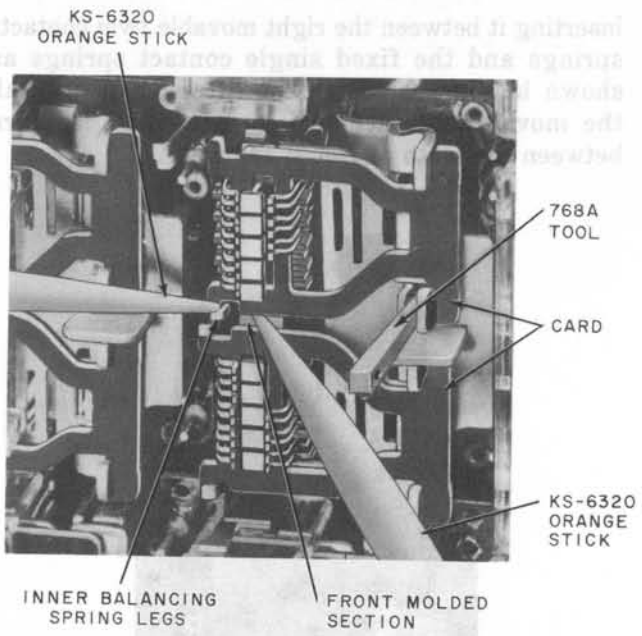


Fig. 5—Disengaging Inner Balancing Spring Leg From Upper Card

between the left movable twin contact springs and the fixed single contact springs as shown in Fig. 6. Push the lifter down until all the movable contacts are lifted away from the fixed contacts.

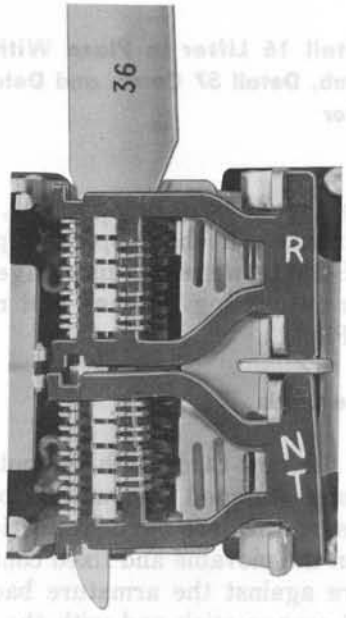


Fig. 6—Detail 36 Lifter in Place

3.14 Insert Detail 37 comb behind the cards and in front of Detail 36 lifter, with the teeth facing the lifted movable contacts as shown in Fig. 7. The comb automatically will come to rest on the stop and the movable contact springs will align in pairs between the teeth of the comb.

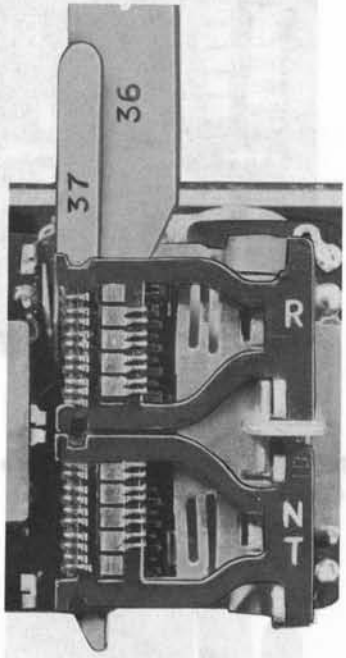


Fig. 7—Detail 37 Comb in Place With Detail 36 Lifter

3.15 Remove the Detail 36 lifter.

3.16 With the taper of Detail 38 comb lifter facing to the right, place the groove (on the left side of Detail 38) over the right side of the protruding Detail 37 comb. Holding the comb with the left hand, slowly push the Detail 38 comb lifter down until all movable contact springs are lifted in pairs as shown in Fig. 8.

3.17 On the top right side of the relay, insert Detail 14 comb behind the cards with the teeth of the comb facing to the left and the slot straddling the armature as shown in Fig. 9. The stop on the comb will come to rest on the top edge of the armature leg so that the movable springs align in pairs between the teeth of the comb.

3.18 With the taper of Detail 16 lifter facing to the right, place the lifter behind the cards,

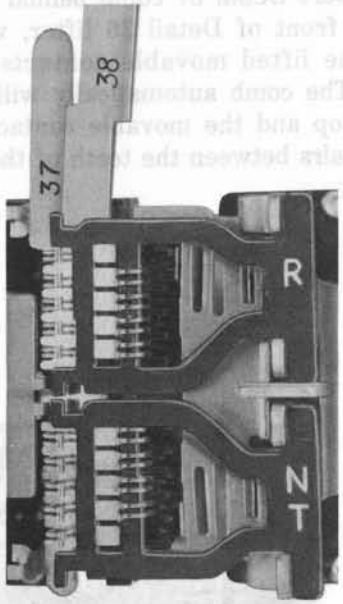


Fig. 8—Detail 38 Comb Lifter in Place With Detail 37 Comb

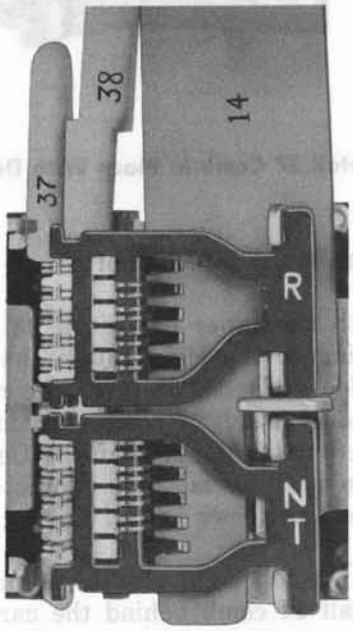


Fig. 9—Detail 14 Comb in Place With Detail 37 Comb and Detail 38 Comb Lifter

inserting it between the right movable twin contacts springs and the fixed single contact springs as shown in Fig. 10. Push the lifter down until all the movable contact springs are lifted in pairs between the teeth of Detail 14 comb.

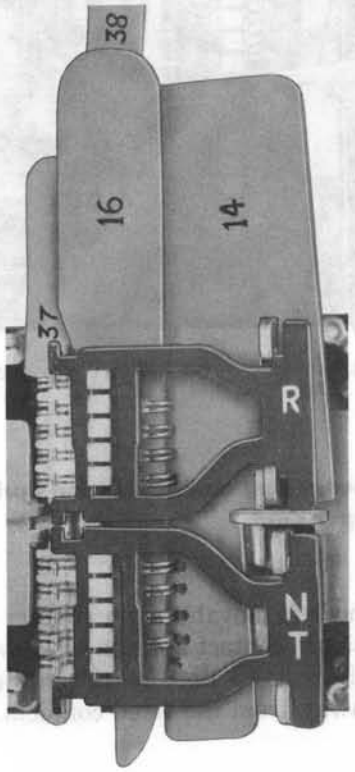


Fig. 10—Detail 16 Lifter in Place With Detail 14 Comb, Detail 37 Comb, and Detail 38 Comb Lifter

3.19 Using the KS-6320 orange stick, hold down the armature in the unoperated position and with the KS-8511 tweezers, disengage the cards from the armature leg notches and remove the cards. See Fig. 11.

Replacing the Cards

3.20 Hold the new cards with the notches at the left and stamped information on the card visible. Insert the left vertical section of each card between the movable and fixed contacts. Hold the armature against the armature backstop with the KS-6320 orange stick and with the other hand position each card on the legs of the armature. Release the armature and move the cards up and

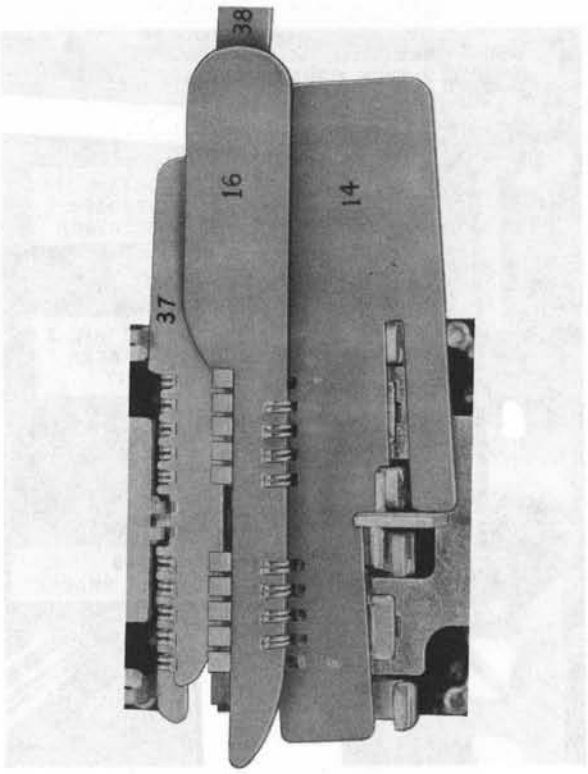


Fig. 11—Cards Removed

down slightly until the projections on the cards engage the notches in the outer legs of the armature.

3.21 On the right side of the relay, remove the Detail 16 lifter carefully so that all the contacts fall back into their respective positions. Remove Detail 14 comb.

3.22 On the left side of the relay, hold Detail 37 comb with the left hand and carefully remove Detail 38 comb lifter. Replace Detail 36 lifter as outlined in 3.13. Remove Detail 37 comb and then remove Detail 36 lifter carefully so that all contacts fall back into their respective positions.

3.23 Reattach balancing springs and replace cover and clip.

REPLACEMENT OF COIL AND CORE AND ARMATURE ASSEMBLY.

▶*Note 1:* This procedure may not be applicable for ESS installations. See 1.06.

Note 2: Before replacing an open coil, attempt to repair it by resoldering the leads at the eyelets or bobbin terminals after removing the enamel with fine sandpaper. Where it exists, the normally unfilled hole may be filled with solder to restore continuity.◀

3.24 To obtain replacement parts for each relay to be repaired, a complete relay of the same code should be purchased and disassembled.

3.25 All replacement coils should have the letter "R" stamped in a 1/4-inch high character on the front of the front spool head at the time of replacement.

3.26 ***Preparation of Wiring and Cabling:*** Remove components and wiring connected to the winding terminals of the relay to be repaired. Remove excess solder from terminals or cut off terminals flush with mounting plate to permit terminals to be drawn through holes in the relay mounting bracket in subsequent operations.

3.27 If the wiring to relays mounted on 2-inch wide plates does not permit moving the mounting plate forward at least 1 inch, cut the cable stitching and reposition the cable. It is not necessary to disturb the wiring or cabling for relays mounted on wider plates.

3.28 If the relay to the left of the relay being repaired has more than one winding, the secondary and tertiary terminals will interfere with the subsequent wedging operations.

Caution: Unsolder and remove these terminals, using care to avoid damage to the coil lead wires and connections.

3.29 ***Positioning of Mounting Plate:***

(a) Remove the upper mounting plate screws and loosen the lower screws several turns. Insert the short thread end of the Detail 4 studs through the upper mounting holes at both ends and screw into frame as shown in Fig. 12.

(b) Place a 0.020-inch by 4-inch by 18-inch acetate strip on top of the row of relays on the mounting plate below the relay being repaired. This will avoid short circuiting or damaging the relays.

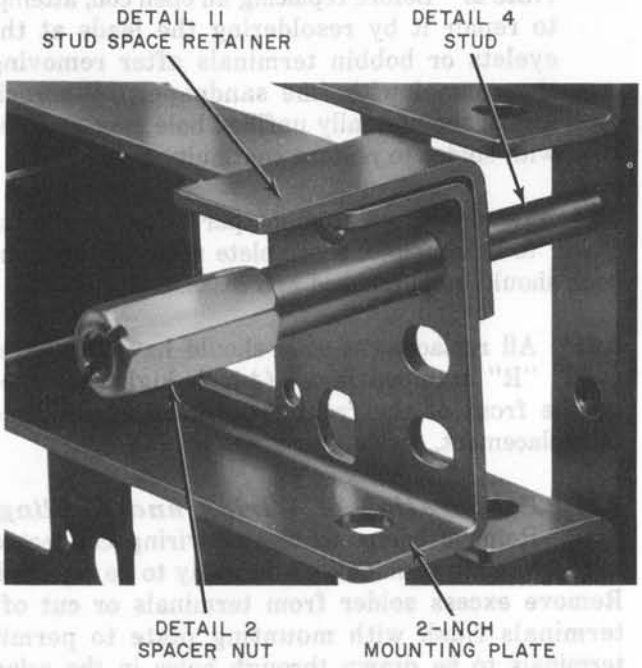


Fig. 12—Detail 4 Studs in Place With Detail 11 Stud Space Retainers

(c) Remove lower mounting plate screws.

(d) Move the mounting plate forward approximately 1 inch until the edge is beyond the grooves in the upper Detail 4 studs.

(e) Insert the Detail 11 stud spacer retainers behind the mounting plate into the grooves of the Detail 4 studs as shown in Fig. 12.

(f) If the relay being repaired is at the left end of the mounting plate, place the Detail 18 wedging bracket over the left Detail Stud as shown in Fig. 13. The wedging bracket is not required for relays in other mounting positions.

(g) Screw the Detail 2 spacer nuts into the Detail 4 studs at both ends of the mounting plate and tighten. See Fig. 14.

(h) Insert the Detail 3 anchoring post into the left Detail 2 spacer nut and hand tighten. See Fig. 15.

(i) To make the relay being repaired more accessible, loosen the mounting screws 1-1/2 turns on the plates above and below the relay; also loosen the mounting screws of the relay to its right.

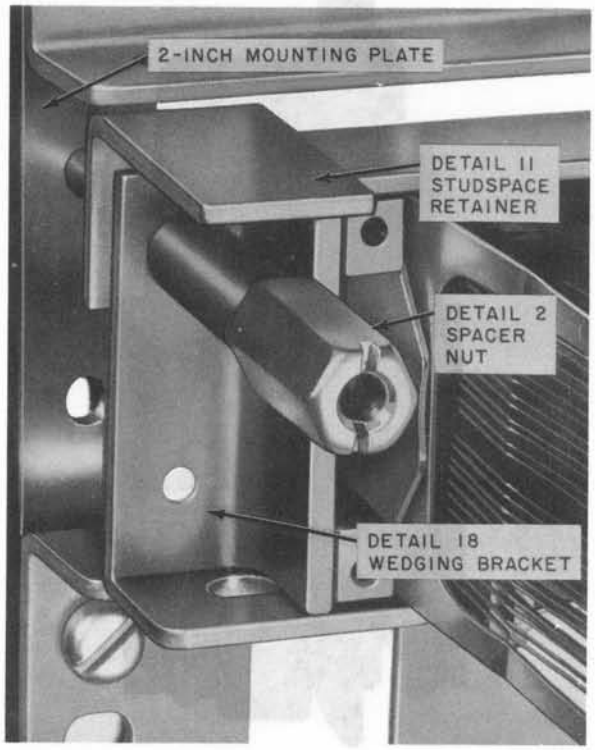


Fig. 13—Detail 18 Wedging Bracket in Place Over Left Detail 4 Stud

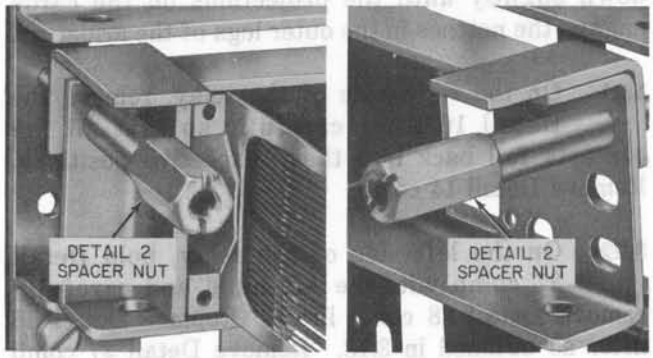


Fig. 14—Detail 2 Spacer Nuts in Place

3.30 Remove 4B clip as covered in 3.07. Remove contact cover.

3.31 Disengage the balancing spring legs from the cards as covered in 3.11 and 3.12.

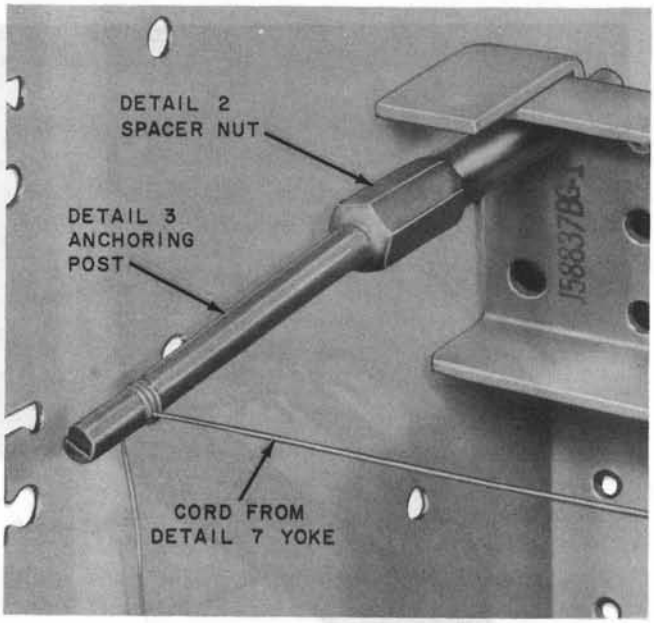


Fig. 15—Detail 3 Anchoring Post Inserted in Left Detail 2 Spacer Nut

3.32 Remove the cards as covered in 3.13 through 3.19.

Wedging

3.33 Procedures for wedging a relay to be repaired depend upon the position in which the relay is mounted on the mounting plates. These different positions are outlined in 3.26 and 3.27.

Removing the Core or Armature Assembly and Coil or Relays Mounted on 2-Inch Wide Plates and on Wider Plates

3.34 ***Relays Mounted on 2-Inch Wide Plates:***

(a) Nominal 7/32-inch horizontal separation between relays

(b) Blank position to left of relay

(c) Other apparatus to left of relay

(d) Relay in extreme left mounting position

(e) Relay to be repaired with empty holes of wire spring relay to the left.

3.35 ***Relays Mounted on Wider Plates:***

(a) Nominal 7/32-inch horizontal separation between relays

(b) Relay in extreme left mounting position

(c) Relay to be repaired with empty holes of a wire spring relay to the left.

3.36 ***Wedging of Relay Mounted on a 2-Inch-Wide Plate With Nominal 7/32-Inch Separation Between Relays is as follows:***

(a) Place Detail 8 insulator over the winding terminals of the relay to the left of the relay being repaired. Place with the 1/8-inch long leg in an up position on the upper terminal and in a down position on the lower terminal. See Fig. 16.

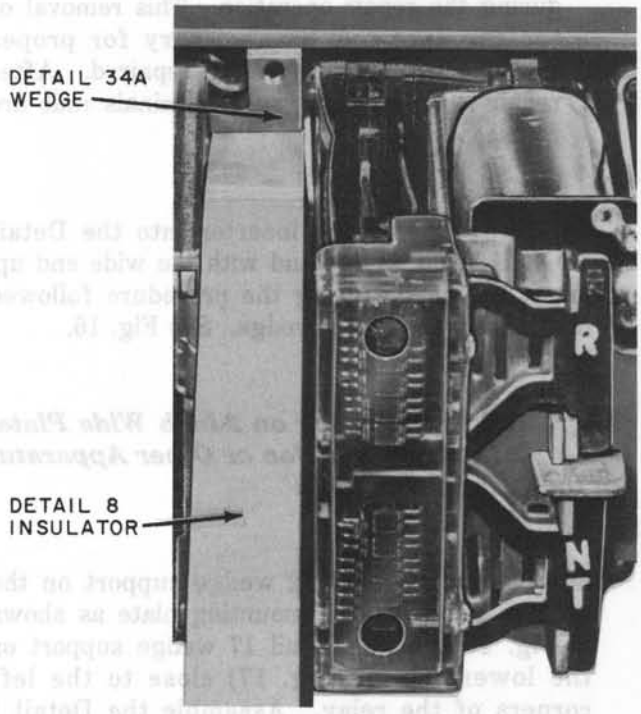


Fig. 16—Details 34A and 34B Wedges in Place With Detail 8 Insulators (34B not shown)

(b) Screw the Detail 5 wedge inserter into the Detail 34A upper wedge. With its wide end down, force the wedge between the clamping spring of the relay being repaired and the core

of the relay to its left. See Fig. 16. After the wedge is firmly in place, unscrew the wedge inserter.

Note: If the relays are too closely spaced to permit normal insertion of the wedges, loosen the mounting screws of both relays and reposition the relays to increase the separation. Follow the same procedure to decrease the separation if the wedges do not sufficiently compress the clamping spring to permit its tabs to be readily disengaged from the core grooves on the right side of the relay.

Note: In the event that the relay to the left of the relay being repaired has four terminal wires, it will be necessary to remove temporarily the upper and lower terminal rods during the repair operation. This removal of the terminal rods is necessary for proper wedging of the relay being repaired. After repair is made, make sure terminals rods are replaced.

(c) Screw the wedge inserter into the Detail 34B lower wedge and with the wide end up, insert the wedge using the procedure followed in inserting the upper wedge. See Fig. 16.

3.37 ***Wedging of Relay on 2-Inch Wide Plates With Blank Position or Other Apparatus to the Left is as follows:***

(a) Place the Detail 12 wedge support on the top flange of the mounting plate as shown in Fig. 17 and the Detail 17 wedge support on the lower flange (Fig. 17) close to the left corners of the relay. Assemble the Detail 1 wedge support assembly to Details 12 and 17 and tighten the screw against the mounting plate as shown.

(b) Use the Detail wedge inserter to force Details 20 to 33 wedges of sufficient thickness to compress the relay clamping spring between the spring and the wedge supports as shown in Fig. 18.

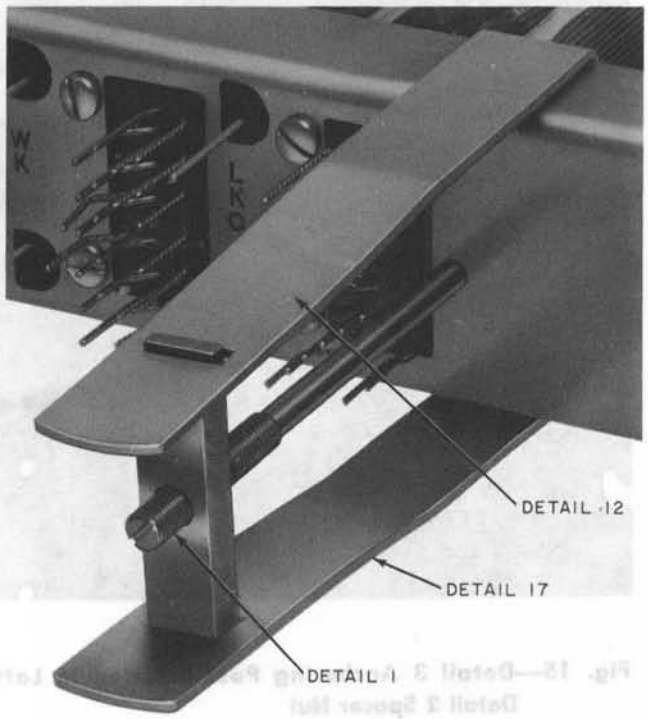


Fig. 17—Detail 12 Wedge Support, Detail 17 Wedge Support, and Detail 1 Wedge Support Assembly

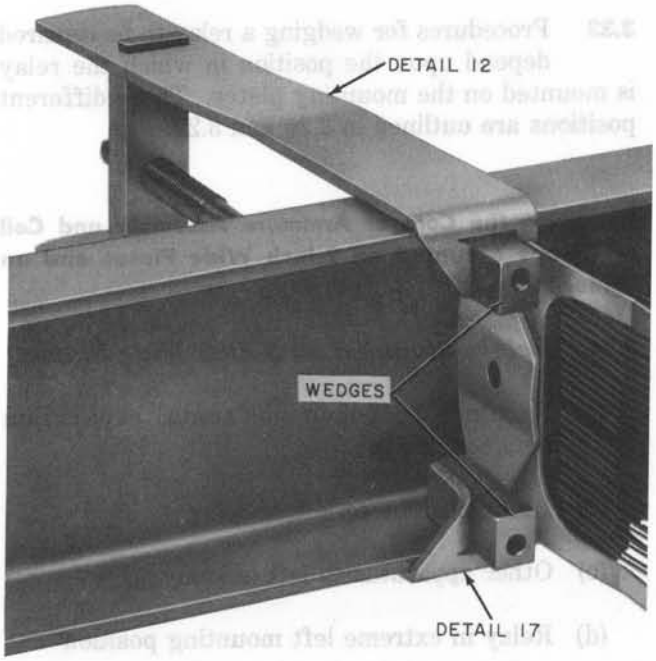


Fig. 18—Wedges in Place

3.38 ***Wedging of Relay on 2-Inch Wide Plates With Relay in Extreme Left Position is as follows:***

(a) Place Detail 18 wedging bracket on Detail 4 stud and then fasten Detail 2 spacer nut as shown in Fig. 19.

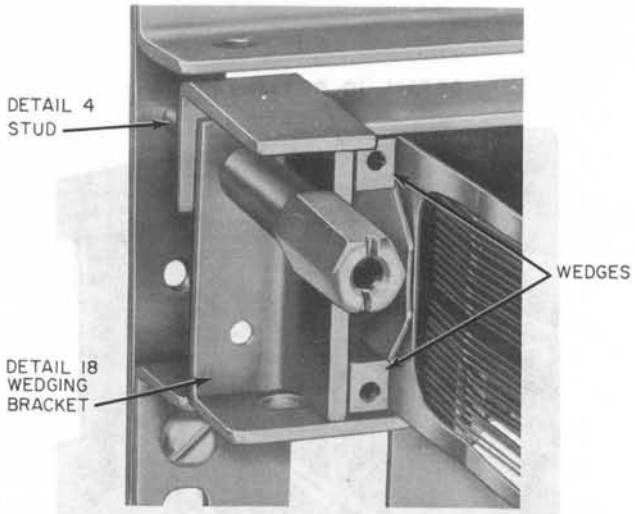


Fig. 19—Detail 18 Wedging Support on Detail 4 Stud

(b) Use the Detail 5 wedge inserter to force Details 20 to 33 wedges of sufficient thickness to compress the relay clamping spring between the spring and the Detail 18 wedging bracket on the top and bottom. See Fig. 19.

3.39 ***Wedging of Relay on 2-Inch-Wide Plate With Empty Mounting Holes of a Wire Spring Relay to the Left is as follows:***

(a) Place Detail 15 wedging bracket to the left of the defective relay (Fig. 20) so that the flat upright of the angle shall provide a backing for the Details 20 to 33 wedges against the clamping spring of the defective relay. The 2-threaded holes of the wedging bracket shall align with the empty mounting holes on the left next to the defective relay. Insert the mounting screws from the rear and tighten.

(b) Use the Detail 5 wedge inserter to force Details 20 to 33 wedges of sufficient thickness to compress the relay clamping spring between the spring and the Detail 18A wedging bracket on the top and bottom.

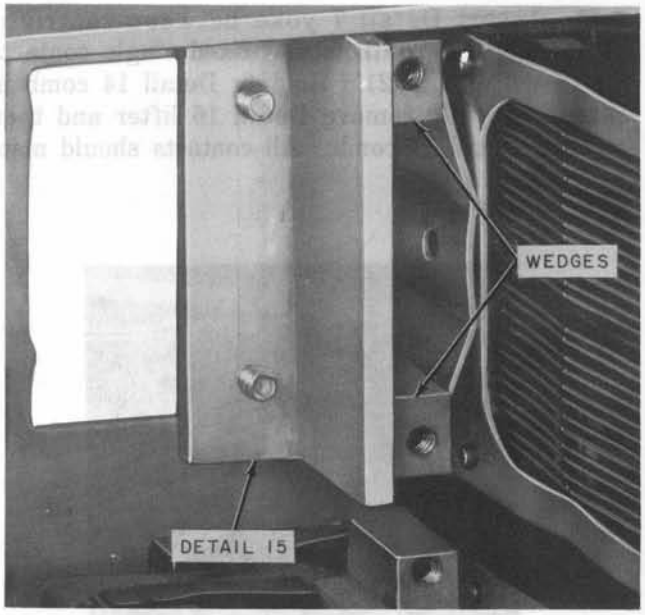


Fig. 20—Detail 15 Wedging Bracket in Place

3.40 ***Wedging a Relay Mounted in the Extreme Left Position on Greater Than 2-Inch Mounting Plates Provided the Mounting Plate Is Mounted in the Front of the Bay.***

(a) Remove the mounting plate screws on the extreme left and place Detail 18 wedging bracket so that the dowel pin will fit into the lower mounting screw hole. Then place the 12-24 by 3/8-inch long mounting screw in the upper hole and tighten the Detail 18 wedging bracket and mounting panel to the frame of the bay.

(b) Use the Detail 5 wedge inserter and force Details 20 to 33 wedges of sufficient thickness to compress the relay clamping spring between the spring and the Detail 18 wedging bracket both on top and bottom.

DISMANTLING

3.41 On the left side of the relay, hold Detail 37 comb with the left hand and carefully remove Detail 38 comb lifter. Replace Detail 36 lifter as outlined in 3.13. Remove Detail 37 comb and then remove Detail 36 lifter carefully so that all contacts fall back into their respective positions.

3.42 Insert Detail 7 yoke between the right movable contacts and fixed single contacts as shown in Fig. 21. Holding Detail 14 comb in place, carefully remove Detail 16 lifter and then remove Detail 14 comb. All contacts should mate properly.

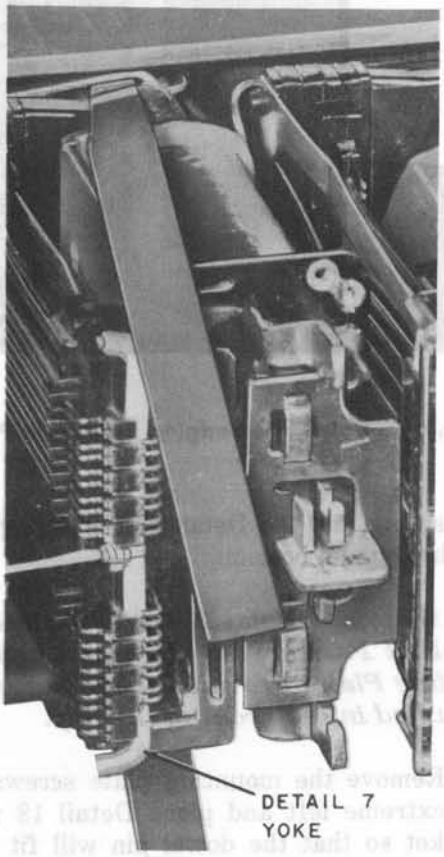


Fig. 21—Detail 7 Yoke in Place Between Contacts

3.43 Tie Detail 7 yoke assembly (Fig. 21) to Detail 3 anchoring post (Fig. 15) using lock stitch. Pull only tight enough to release the pressure of the spring assembly against the core plate of the relay and tie. Clamp spring can now be released.

3.44 Using C screwdriver, release clamp spring from coil and core and armature assembly.

3.45 Lift clamp spring and remove defective assembly with a shaking motion.

3.46 Apply long-nose pliers to the clamping spring as close to the relay mounting bracket as possible and squeeze end of clamping spring to the flange or the mounting plate. Insert Detail 10 retainer between clamp spring end and mounting bracket as shown in Fig. 22. Use one retainer for retaining top of clamp spring and a second retainer for retaining the bottom of the clamp spring. This provides accessibility for the new coil, and core and armature assembly.

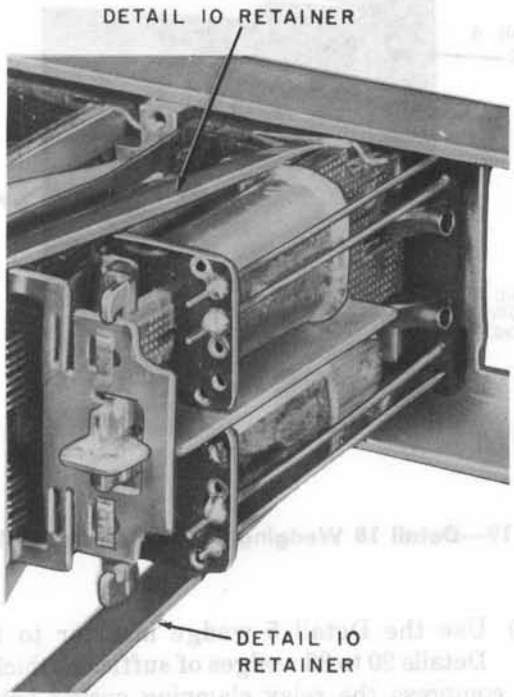


Fig. 22—Detail 10 Retainers in Place

REPLACEMENT AND REASSEMBLY OF RELAY

3.47 Insert terminals of new relay coil into Detail 6 tubes and guide the terminals into their respective holes in the terminal bracket. Upper Detail 6 tube should protrude approximately 1 inch ahead of the lower tube to facilitate insertion into the terminal bracket. The tubes are used to prevent shorting of coil terminals. See Fig. 23.

3.48 Insert the new coil, and core and armature assembly.

3.49 Remove Detail 10 retainers, both top and bottom.

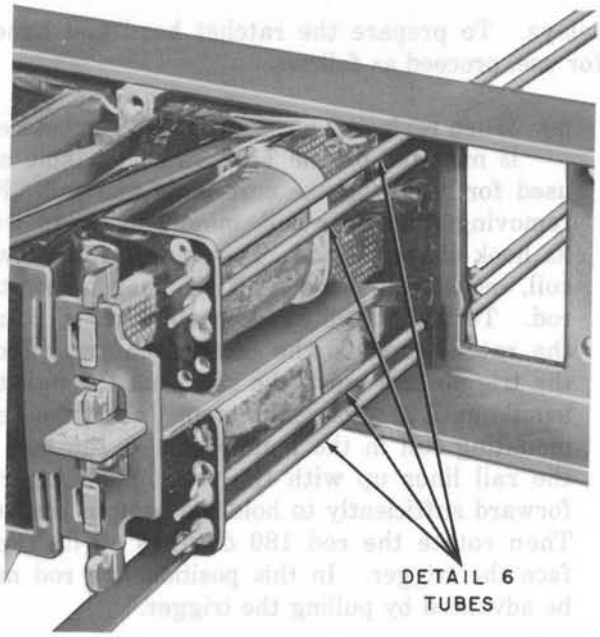


Fig. 23—Detail 6 Tubes on Terminal Rods

3.50 Using C screwdriver, apply a force to both rear ends of the relay core close to terminal bracket so that the tab ends of the clamping spring will snap into the grooves in the core.

3.51 Release lacing cord from Detail 3 anchoring post.

3.52 Remove bottom wedge first, then top wedge. These wedges should be removed by pulling out carefully without twisting.

3.53 Replace combs and lifters as outlined in 3.13 through 3.18 except that the words "behind the cards" should be omitted.

3.54 Remove Detail 7 yoke and then proceed as outlined in 3.20 through 3.23.

3.55 Remove Detail 6 guides.

3.56 Remove Detail 3 anchoring post, loosen Detail 2 spacer nut on both sides, and remove Detail 11 clamps.

3.57 Replace mounting plate to its original position. Replace bottom mounting screws, remove Detail 4 studs, and replace with mounting screws.

3.58 Tighten screws of upper and lower mounting plates and adjacent relay to the right.

3.59 Rewire relay and terminals.

3.60 Check relay for mechanical and electrical adjustments. Put circuit designation on relay.

3.61 Position and relace cabling.

4. REPLACEMENT PROCEDURES USING THE 1014B TOOL KIT

4.01 *List of Tools and Materials*

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
628A	Balancing spring lifter
630A	Spring holder
675A	Spring holder (use when replacing upper cards)
675B	Spring holder (use when replacing lower cards)
684A (3 reqd)	Insulator
688A	Spring holder (used when replacing upper cards)
688B	Spring holder (used when replacing lower cards)
1014B	Tool kit (see 4.02) (includes the following)

AMT	DESCRIPTION
One	20B Carrying case containing:
One	666B Core plate replacer
Two	669A Contact separators
One	674A Spring lifter
One	715A Ratchet handle

List of Tools (Cont)

	AMT	DESCRIPTION
	One	716A Ratchet head
	One	716B Ratchet head
	One	717B Coil setter
	Four	718A Wedges
	Eight	P-12B536 Tubing (terminal guide tube)
	One	P-12B5737 Container (for terminal guide tubes)
	One	P-12B564 Plastic box (for wedges)
	One	P-16A068 Container (for contact separators)
KS-6320		Orange stick
KS-8511		Tweezers
768A		Blocking tool
R-1640		Center punch
R-2315		Lettering and numbering set
AT-7860		♦B Long-nose pliers♦
—		4-Inch E screwdriver
—		4-Ounce riveting hammer
—		5-Inch diagonal pliers
MATERIALS		
KS-2423		Cloth

4.02 ***1014B Tool Kit:*** Fig. 24 shows the tools comprising the 1014B tool kit used for replacing coils on wire-spring type relays. The 716A ratchet head, 666B core plate replacer, 669A separators, and the 674A spring lifter furnished with the tool kit are not required for AK-type relays. The 716A ratchet head is used for AF-, AG-, AJ-, 286-, 287-, and 288-type relays. The 666B core plate replacer, 669A separators, and 674A spring lifter are used on 286-, 287-, and 288-type relays. To prepare the ratchet head and handle for use, proceed as follows:

(a) When replacing a coil, the 716B ratchet head is mounted on the 715A ratchet handle and used for removing the core plate and coil. For removing the upper coil, mount the head with its hook above the rod. For removing the lower coil, mount the head with its hook below the rod. To mount the head on the handle, rotate the ratchet rod so the teeth face away from the trigger and move the rod back through the handle until it engages its stop. Insert the head mounting rail in the handle slot so the hole in the rail lines up with the rod. Push the rod forward sufficiently to hold the head in position. Then rotate the rod 180 degrees so its teeth face the trigger. In this position, the rod may be advanced by pulling the trigger.

(b) To remove the head, rotate the rod so its teeth face away from the trigger. Move the rod back through the handle until it engages its stop and slide the head off the handle.

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

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

4.05 After making any replacement of parts on the relay, the part or parts replaced shall meet the readjust requirements involved as specified in Section 040-504-701. Other parts whose adjustments may have been directly disturbed by the replacing operations shall be checked to meet the readjust requirements and an overall operation check shall be made of both halves of the relay before restoring the circuits to service.

4.06 After replacing a card or coil, make sure that both halves of the relay meet the requirement in Section 040-504-701 covering movable twin contact spring position.

CARD

General

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

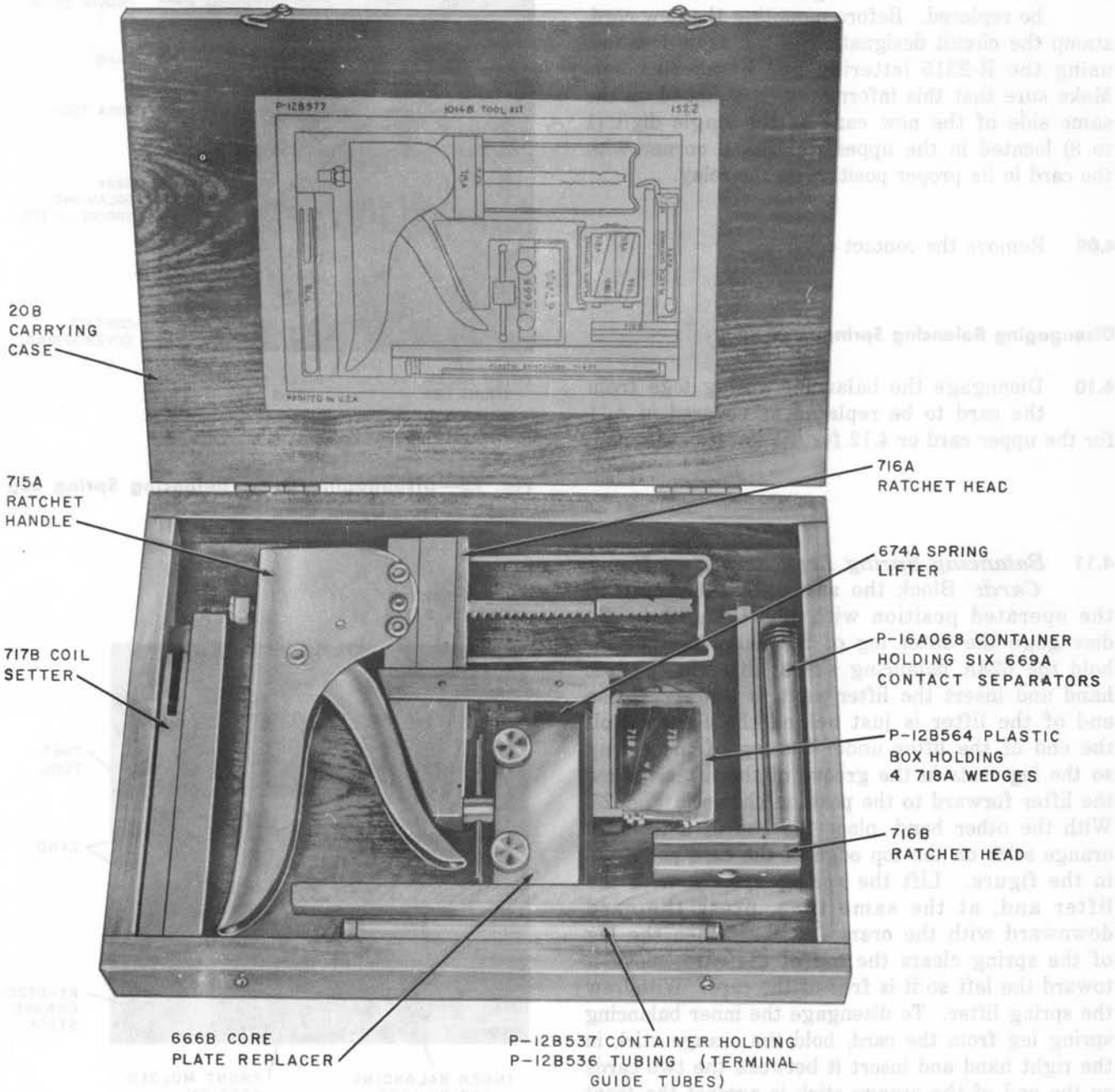


Fig. 24—1014B Tool Kit

Stamping New Card

4.08 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.

4.09 Remove the contact cover.

Disengaging Balancing Spring Legs

4.10 Disengage the balancing spring legs from the card to be replaced as covered in 4.11 for the upper card or 4.12 for the lower card.

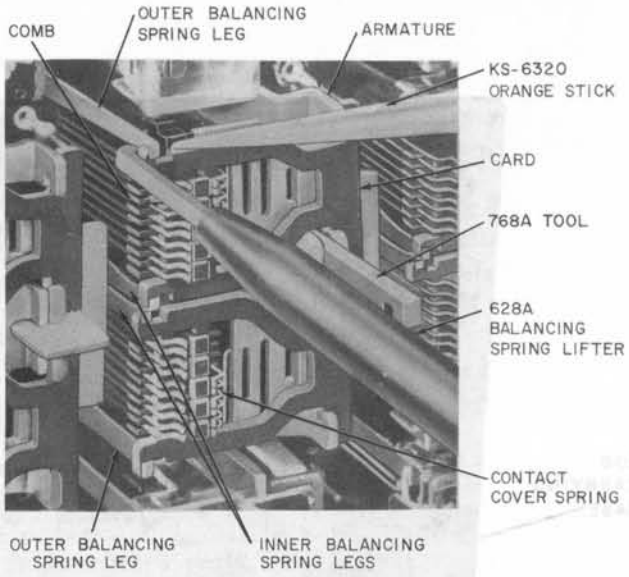


Fig. 25—Disengaging Outer Balancing Spring Leg From Upper Card

4.11 ***Balancing Spring Legs Engaging Upper Card:*** Block the associated armature in the operated position with the 768A 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 the end of the lifter is just behind the comb. Roll the end of the lifter under the leg of the spring so the leg rests in the groove of the lifter. Draw the lifter forward to the position shown in Fig. 25. 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 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 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 leg as shown in Fig. 26 and disengage it from the notch in the card. Remove the wedge.

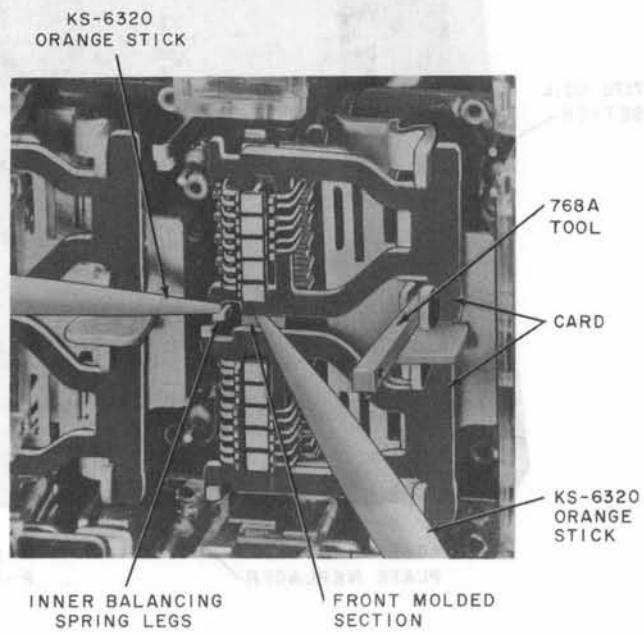


Fig. 26—Disengaging Inner Balancing Spring Leg From Upper Card

4.12 ***Balancing Spring Legs Engaging Lower Card:*** Disengage the balancing spring legs from the lower card by following procedures similar to those covered in 4.11. 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

4.13 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, 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 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. 27. Moving the insulator laterally, while inserting it, may facilitate positioning it in the relay. Make sure that the insulator is positioned so it will insulate all the break contact springs.

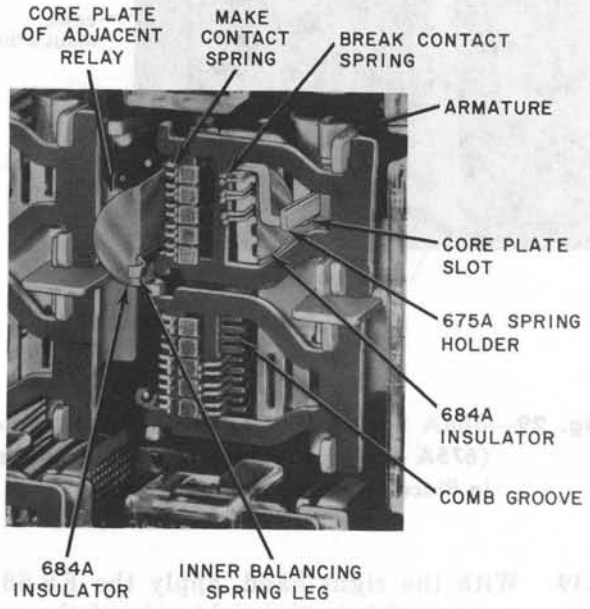


Fig. 27—684A Insulators and 675A Spring Holder Mounted on Upper Half of Relay

Insulating Make Contact Springs

4.14 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. 27, 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 it holds the insulator against the core plate. With the KS-8511 tweezers, position the insulator so the beginning of the offset is against the core plate as shown in Fig. 27 and so 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

4.15 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. 27. To mount either the 675A or 675B spring holder, proceed as covered in 4.16.

4.16 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 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. 27. 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

4.17 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. 28. 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. Pull the card forward so it is in front of the armature legs. Remove the orange stick from the armature.

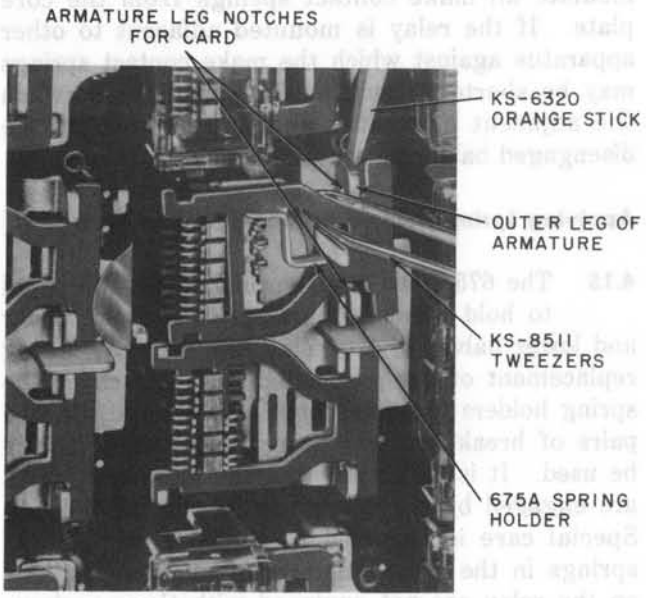


Fig. 28—Disengaging Card From Armature Legs

Applying Spring Holders to Make Contact Springs

4.18 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. 29. To mount either the 688A or 688B spring holder, proceed as covered in 4.19.

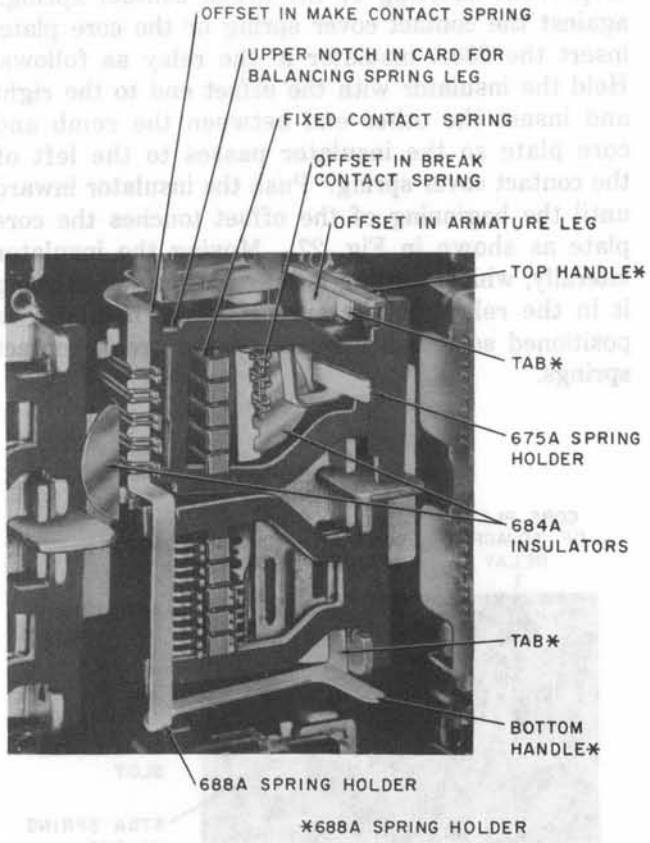


Fig. 29—688A Spring Holder Mounted on Relay (675A Spring Holder and 648A Insulators in Place on Upper Half of Relay)

4.19 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 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. Using both hands, grasp the top and bottom handles of the spring holder. Position the holder so 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. With the springs in the notches, move the holder to the left and position it so each tab rests against the left side of the adjacent armature leg. Make sure that the notches 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 are shown in Fig. 29.

Removing Card from Relay

4.20 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

4.21 Make sure that the circuit designation has been stamped on the new card as covered in 4.08. 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 the fixed contact springs are between the two vertical parallel sections of the card. 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. 28). Grasp the upper section of the card with the tweezers and move the card to the right and back so the card is in line with the notch in each armature leg. Remove the orange stick from the armature and guide the card into the notches.

Removing Spring Holders and Insulators

4.22 ***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 in the notches, move the holder outward so notched section is against the offset in the springs. Carefully guide the springs into their 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.

4.23 ***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 the notched section clears the card, carefully move the holder to the right and guide the springs into their proper comb grooves. 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. 28). 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. 28). Grasp the upper section of the card with the KS-8511 tweezers, and move the card to the right and back so the card is in line with the notches in each armature leg. Remove the orange stick from the armature and guide the card into the notches.

4.24 *684A Insulators:* If 684A insulators were used, remove them using the KS-8511 tweezers.

Engaging Balancing Spring Legs

4.25 Block the relay operated using the 768A tool. Engage the outer balancing spring leg in its associated notch in the card, employing a method similar to that covered in 4.11 and 4.12 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 4.11. 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.

4.26 Remount the contact cover.

COIL

4.27 In some cases, an open coil may be due to a poorly soldered connection where the coil leads are attached to the relay terminals. Therefore, before replacing an open coil, or the relay in case no replacement coil is available, attempt to resolder the appropriate leads to their terminals. If this does not clear the trouble, use a KS-2663 or similar small file to remove some of the enamel from the coil leads near the point where they pass through the eyelets, taking care not to break the leads. Then apply solder to the eyelets so as to cover the exposed part of the coil leads. The same procedures apply for replacing either the upper or lower coil except as otherwise stated.

Stamping New Core Plate

4.28 Replacement of either coil requires replacement of the core plate. Note the circuit designation on the core plate to be replaced. Before mounting the new core plate, 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 core plate as the projecting armature stops.

4.29 Remove the contact cover.

Disengaging Balancing Spring Legs

4.30 Disengage the balancing spring legs from both cards as covered in 4.11 and 4.12.

Relays Having Break Contact Springs

4.31 If the relay has break contact springs, insulate them as covered in 4.13. Mount the 675A spring holder on the upper half of the relay and the 675B spring holder on the lower half of the relay as covered in 4.15 and 4.16.

Disengaging Cards

4.32 Disengage both cards from the armature legs as covered in 4.17.

Relays Having Make Contact Springs

4.33 If the relay has make contact springs, use the 630A spring holder and associated clamp to hold the make contact springs during replacement of the coil as follows.

(a) Push both cards to the left to open the gap between the fixed and moveable contacts sufficiently to permit insertion of the spring holder without the clamp. Insert the spring holder through the gap and turn the handle to the left. Release the cards. Position the spring holder so the larger projection is centered between positions 5 and 6 on the relay and the pairs of twin make springs are engaged by the proper notches in the holder.

(b) 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 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. 30).

(c) 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. 30. Similarly place the outer end of the bottom leg of the balancing spring in the notch at the bottom of the spring holder.

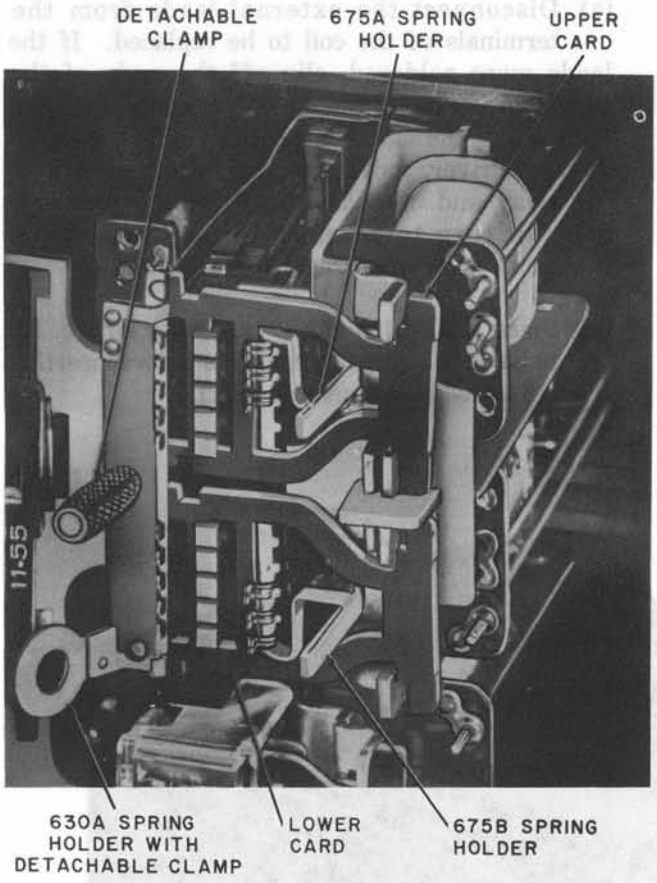


Fig. 30—Card Removal Tools Mounted in Place

Removing Cards

4.34 Remove both cards as covered in 4.20.

Removing Core Plate

4.35 To remove the core plate, proceed as follows.

(a) If a 675-type spring holder was used to hold break contact springs during removal of the card, remove the spring holder as covered in 4.22.

(b) If 684A insulators were used, remove them using the KS-8511 tweezers.

(c) Mount the 716B ratchet head on the 715A ratchet handle with the insulated hook above the ratchet rod as covered in 4.02(a).

(d) Referring to Fig. 31, position the hook of the ratchet head over the top right edge of the core plate with the notched end of the rod engaging the front edge of the shield between the halves of the relay. Make sure that the rod is positioned in the head with the ratchet teeth downward and that the rod is in line with the shield as shown in the figure. Hold the tool with the rod horizontal and advance the rod by pulling the trigger until the core plate is freed from the upper core leg.

(e) Remove the tool by rotating the ratchet rod 180 degrees and moving the rod back into the handle. Remove the head and remount it on the handle with the hook below the rod as covered in 4.02(a). Position the tool with the hook under the lower right edge of the core plate and the rod engaging the end of the shield between the halves of the relay. Advance the rod by pulling the trigger until the core plate is freed from the lower core leg. Withdraw the tool with the core plate. Remove the core plate from the tool.

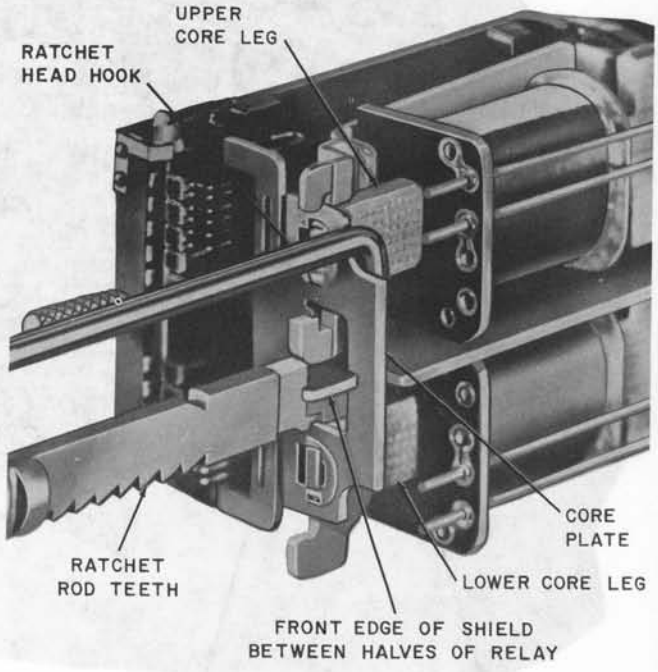


Fig. 31—Removing Core Plate

4.36 ***Note:*** ▶Before replacing an open coil, attempt to repair it by resoldering the leads at the eyelets or bobbin terminals after removing the enamal with fine sandpaper. Where it exists, the normally unfilled eyelet hole may be filled with solder to restore continuity.◀

4.37 ***Removing Coil:*** The procedure for removing the upper and lower coils is the same except for the positioning of the 718A wedge and ratchet tool. These exceptions are noted in the following procedures.

(a) Disconnect the external leads from the terminals of the coil to be replaced. If the leads were soldered, clip off the ends of the terminals as close as possible to the relay mounting plate using the diagonal pliers. Using the 4-inch E screwdriver, loosen the mounting screws of the relay and of adjacent relays, if necessary, one full turn to permit a greater separation between relays when replacing the coil.

(b) Place a KS-2423 cloth, as shown in Fig. 32, to insulate adjacent apparatus before inserting the 718A wedge, as covered in (c).

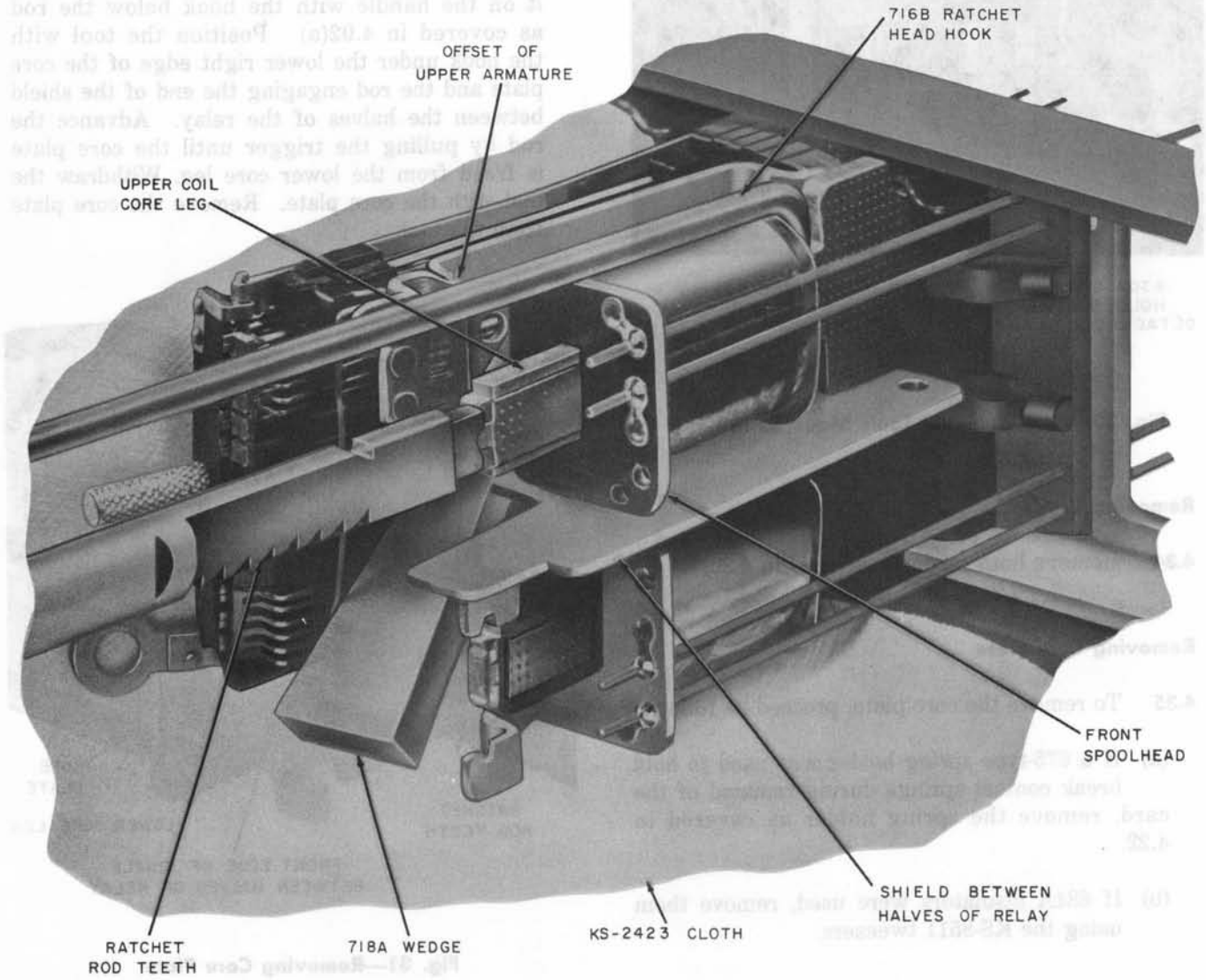


Fig. 32—Removing Upper Coil

(c) Position a 718A wedge between the armature and the shield separating the halves of the relay as shown in Fig. 32 if the upper coil is to be removed and as shown in Fig. 33 if the lower coil is to be removed. To position the wedge for removing the upper coil, manually move the upper armature to the left. Referring to Fig. 32, insert the wedge with the straight side against the shield and the small end toward the rear of the relay. Move the wedge diagonally upward, behind the offset in the armature adjacent to the front spoolhead, to the position shown in the figure. Insert the wedge sufficiently to permit removal of the coil without interference by the front of the armature. The wedge is positioned for removing the lower coil in a similar manner except that the lower armature is moved to the left and the wedge is inserted from above the shield as shown in Fig. 33.

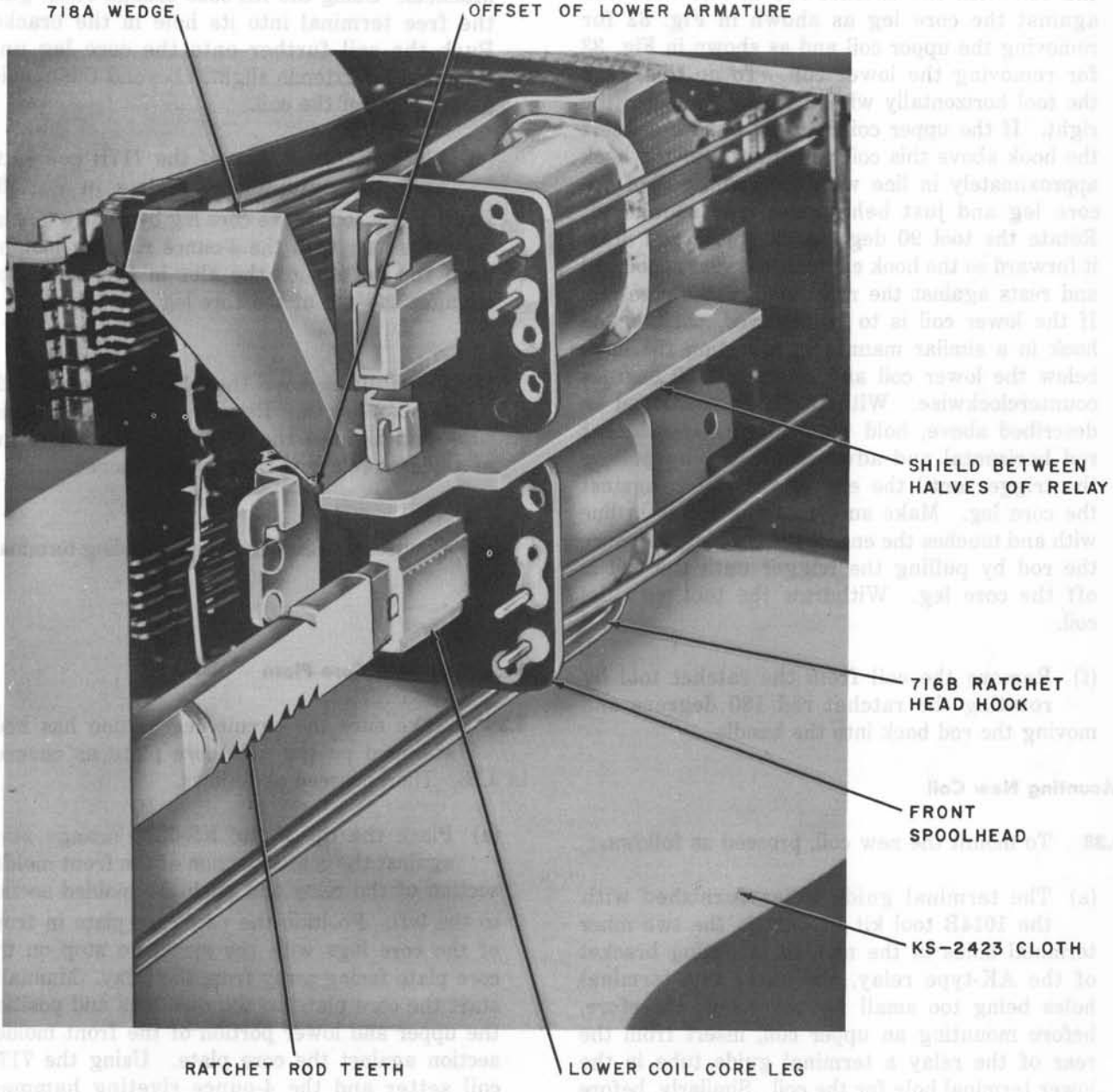


Fig. 33—Removing Lower Card

(d) Position the 716B ratchet head on the 715A ratchet handle as covered in 4.02(a), with the insulated hook of the head above the ratchet rod for removing the upper coil and the hook below the rod for removing the lower coil. Position the rod so the end of the rod is approximately 2-1/2 inches from the end of the hook and the ratchet teeth are downward.

(e) Position the insulated hook of the 716B ratchet head behind the rear spoolhead of the coil with the ratchet rod in line with and against the core leg as shown in Fig. 32 for removing the upper coil and as shown in Fig. 33 for removing the lower coil. To do this, hold the tool horizontally with the hook facing to the right. If the upper coil is to be removed, insert the hook above this coil with the tip of the hook approximately in line with the right side of the core leg and just behind the rear spoolhead. Rotate the tool 90 degrees clockwise and draw it forward so the hook engages the rear spoolhead and rests against the right side of the core leg. If the lower coil is to be removed, position the hook in a similar manner by inserting the hook below the lower coil and rotating it 90 degrees counterclockwise. With the hook positioned as described above, hold the tool with the ratchet rod horizontal and advance the rod by pulling the trigger until the end of the rod is against the core leg. Make sure that the rod is in line with and touches the end of the core leg. Advance the rod by pulling the trigger until the coil is off the core leg. Withdraw the tool with the coil.

(f) Remove the coil from the ratchet tool by rotating the ratchet rod 180 degrees and moving the rod back into the handle.

Mounting New Coil

4.38 To mount the new coil, proceed as follows.

(a) The terminal guide tubes furnished with the 1014B tool kit fit only in the two inner terminal holes in the molded mounting bracket of the AK-type relay, the outer two terminal holes being too small for the tubes; therefore, before mounting an upper coil, insert from the rear of the relay a terminal guide tube in the lower terminal hole for the coil. Similarly, before mounting a lower coil, insert a terminal guide tube in the upper terminal hole for the coil. In each case move the tube forward until it extends beyond the front of the relay.

(b) Hold the new coil with the terminals to the right and facing toward the rear of the relay. Insert the proper terminal of the new coil in the terminal guide tube and push the coil on the core leg, carefully tapping it if necessary, using the slotted end of the 717B coil setter and 4-ounce riveting hammer until the free terminal just touches the molded mounting brackets. Using the KS-6320 orange stick, guide the free terminal into its hole in the bracket. Push the coil further onto the core leg until the core leg extends slightly beyond the opening at the front of the coil.

(c) Place the short slot of the 717B coil setter over the core leg as shown in Fig. 34. Position the coil on the core leg by gently tapping the coil setter with the 4-ounce riveting hammer until the bottom of the slot in the coil setter engages the end of the core leg.

(d) Carefully remove the 718A wedge and the KS-2423 cloth. Remove the terminal guide tube and tighten the screws of the relay and of adjacent relays if they were loosened.

(e) Connect the leads to the coil winding terminals.

Mounting New Core Plate

4.39 Make sure the circuit designation has been stamped on the new core plate as covered in 4.28. Then proceed as follows.

(a) Place the tip of the KS-6320 orange stick against the center portion of the front molded section of the relay and push the molded section to the left. Position the new core plate in front of the core legs with the armature stop on the core plate facing away from the relay. Manually start the core plate on the core legs and position the upper and lower portion of the front molded section against the core plate. Using the 717B coil setter and the 4-ounce riveting hammer, gently tap the core plate into position on the core legs. Fig. 35 shows the coil setter being

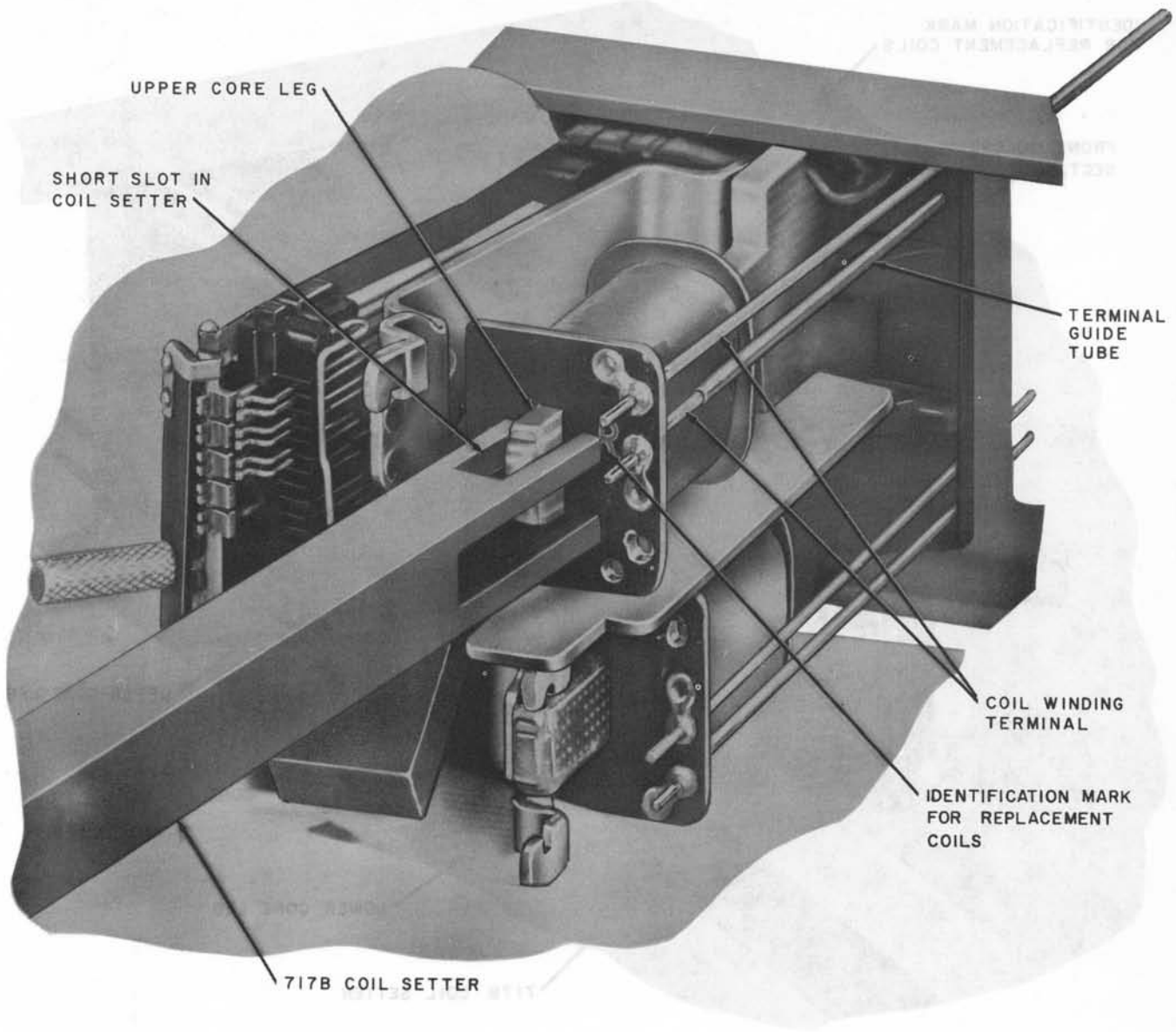


Fig. 34—Positioning Replacement Coil With 717B Coil Setter

used to position the core plate on the lower core leg.

(b) Using the R-1640 center punch and the 4-ounce riveting hammer, stake each corner of the upper and lower core legs to secure the core plate as shown in Fig. 36.

Insulating Break Contact Springs

4.40 If the relay has break contact springs, insulate them as covered in 4.13.

Applying Spring Holders to Break Contact Springs

4.41 Use the 675A and 675B spring holders to hold the break contact springs of the upper and lower halves of the relay respectively, during remounting of the card as covered in (a) and (b).

(a) If there are break contact springs on the upper half of the relay, insert the notched leg of the 675A spring holder behind the movable spring contacts from above. Position the holder so each pair of springs is engaged by the proper notch and clip the inner end of the handle in

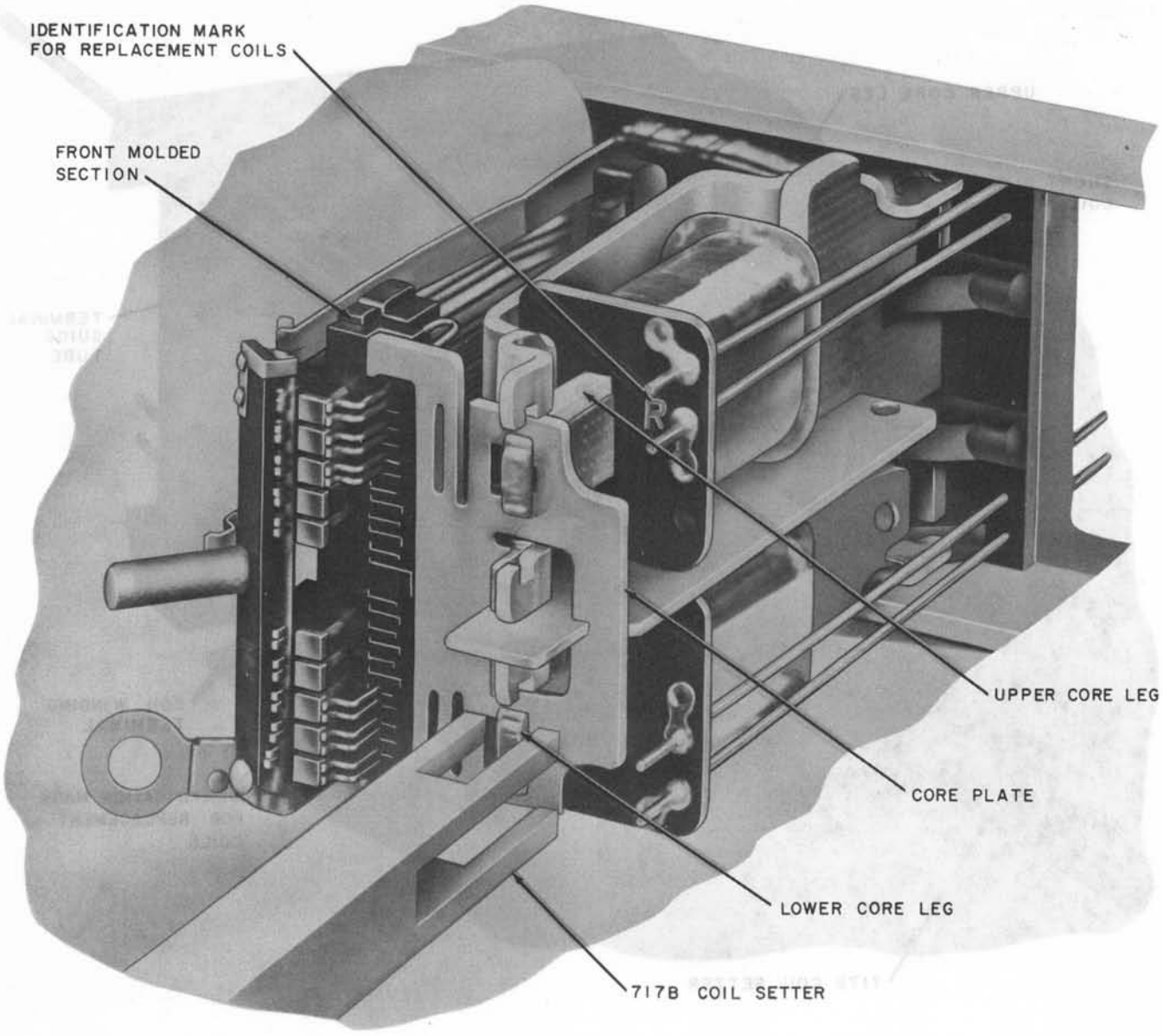


Fig. 35—Positioning Core Plate With 717B Coil Setter

the core plate slot directly in front of the armature. Make sure the notched leg of the holder is against the comb and the inner end of the handle does not prevent free movement of the armature which is necessary for remounting the card.

(b) If there are break contact springs on the lower half of the relay, similarly apply the 675B spring holder, except insert the notched leg of the holder behind the movable spring contacts from below. Fig. 30 shows the spring holders in position.

Remounting Cards and Removing Spring Holders

4.42 To remount the cards and remove the spring holders, proceed as follows.

(a) Remount each card as covered in 4.21.

(b) If 675-type spring holders were used, remove them as covered in 4.22.

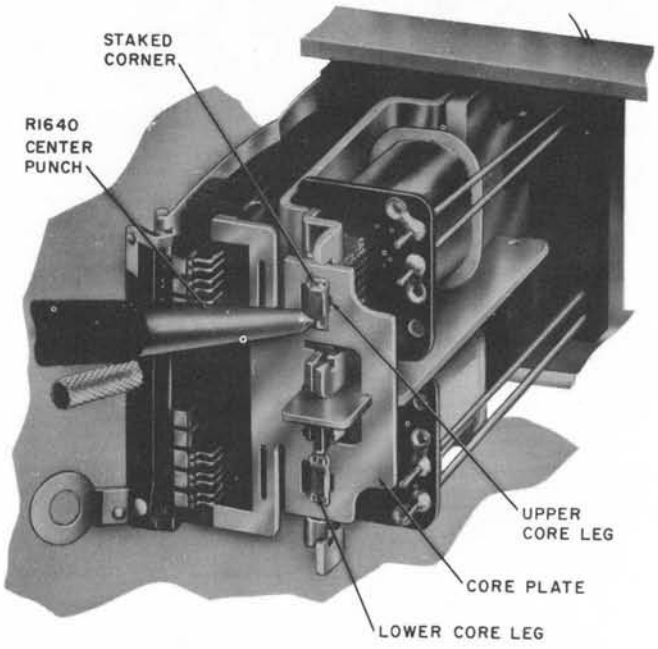


Fig. 36—Staking Core Legs to Secure Core Plate

(c) If the 684A insulators were used, remove them using the KS-8511 tweezers.

(d) Remove the 630A spring holder and associated clamp from the relay as follows. Move the holder and clamp slightly to the left. With the 628A balancing spring lifter, remove the top leg of the upper balancing spring and the bottom leg of the lower balancing spring from the holder. Carefully move the holder to the right, permitting the springs to fall into their proper grooves in the comb. Remove the clamp from the holder. Push both cards to the left to open the gap between the contacts sufficiently to permit withdrawing the holder. Swing the holder to the right, withdraw it, and release the cards.

Final Procedures

4.43 Block the relay operated, using the 768A tool. Engage the outer balancing spring leg in its associated notch in the card, employing a method similar to that covered in 4.11 and 4.12 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 4.11. 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 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.

4.44 Remount the contact cover.

4.45 Coil replacement degrades some relay characteristics which cannot be restored by field adjustment. For good service, replace the whole relay if

(a) The make contact force drops to less than about 5 grams per pair of movable twin contacts. Gauge by feel. This degradation can also be detected by a large increase in armature back tension.

(b) The force of the front molded section (Fig. 35) of the single wire block against the core plate drops to less than about 25 grams at top or bottom. Gauge by feel. This force prevents movement of the fixed contacts, and is normally over 200 grams.

(c) The balancing spring or card rubs against the contact cover.

(d) The readjust requirements cannot be met (after failure to meet the requirements) as specified in Section 040-504-701, Contact Make and Break and Electrical Requirements. Inability to meet these requirements may be caused by a change in armature travel associated with the new core plate.