RELAYS

AF-, AG-, AND AJ-TYPE

PIECE-PART DATA AND REPLACEMENT PROCEDURES

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1. GENERAL

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

1.02 The reasons for reissuing this section are listed below. Revision arrows have been used to denote significant changes. The Equipment Test List is not affected.

(1) To incorporate addendum changes from Issue 8

(2) To delete use of the 1014B Tool Kit (including Fig. 25 through 35)

(3) To change Fig. 1 and 2

(4) To delete Tables D and E

(5) To delete paragraph 1.07

(6) To change paragraph 1.04.

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

1.04 ▶The older method of repairing wire spring relays using the 1014B tool kit should no longer be used.◀

1.05 Part 2 of this section covers the piece-part numbers and the corresponding names of the parts which are practicable 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.

1.06 Part 4 of this section covers the approved procedures using the 1017A and 1018A tool kits for the replacement of parts listed in Part 2.

> ***Note:*** Procedures for the replacement of coil and armature assemblies are not applicable to relays used in Electronic Switching System (ESS) applications where mounting plates are attached to the rear of the equipment frames.

1.07 Before making any replacements on the apparatus covered herein, remove the circuit from service in accordance with approved procedures.

1.08 Contact covers for AF-, AG-, and AJ-type relays are now being made of a flame retardant water-white polycarbonate. There is no change in piece-part numbers for these covers, as shown in Table A. All new relays being manufactured will come equipped with the new cover.

1.09 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 eyelet hole*** may be filled with solder to restore continuity.

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. Disassembly and repair of the relays should be accomplished using the 1017A tool kit.

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 the 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 trademarks 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 Figures 1 and 2 included in this part show 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.

2.02 When ordering parts for replacement purposes, give both 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. See Table B.

2.03 When relays manufactured by other than Western Electric are stamped with the year, quarter code, and relay code preceded by the letters NE, replace the card with the Western Electric card bearing the same number.

2.04 When relays are manufactured by other than Western Electric as shown by a date code of the month and year in numbers and a company trademark indented in the core plate, then Table C shall be used to translate the card identification number stamped in the card to the equivalent Western Electric stamping.

2.05 All replaced cards must be stamped with the proper year and quarter code so they can be identified as carrying the Western Electric code rather than a foreign code number.

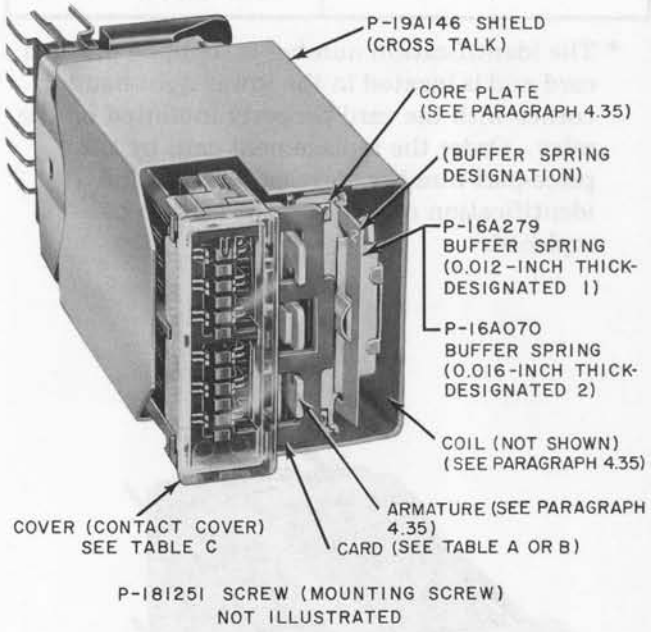

Fig. 1—12-Position Relay—General View

TABLE A

*P-16A144 Cover	Without metal frame — Used on 12-position relays having a contact cover spring.
*P-10F098 Cover	With metal frame — Used on 12-position relays not having a contact cover spring.

* These covers are not interchangeable.

TABLE B

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

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

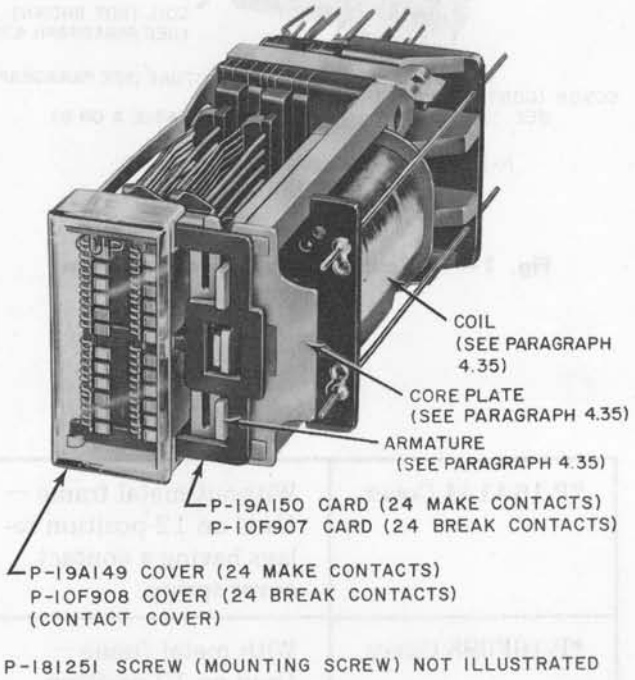

Fig. 2—24-Position Relay—General View

TABLE C

FOREIGN IDENT NO.	WESTERN ELECTRIC PIECE-PART NO.	WESTERN ELECTRIC IDENT NO.
1	P-19A130	0
2	P-19A134	4
3	P-19A131	1
4	P-19A132	2
5	P-19A135	5
6	P-19A133	3
7	P-19A150	10

3. APPARATUS

3.01 *List of Tools:*

CODE OR SPEC NO.	DESCRIPTION
TOOLS	
—	◗New Britain P58 reverse action pliers (to be modified in the field, see Fig. 4)◖
768A	Armature blocking tool
1017A	Tool kit consisting of:
QTY	**DESCRIPTION**
1	Case, carrying, KS-20499, L1
1	P-11H619, detail 1, retainer, wedge support assembly
2	P-11H620, detail 2, spacer nut
1	P-11H621, detail 3, post, anchoring
2	P-11H622, detail 4, stud, spacing
1	P-11H623, detail 5, wedge inserter assembly

QTY	DESCRIPTION
4	P-12B536, detail 6, tubes with plastic container, P-12B537
1	P-11H624, detail 7, yoke assembly
4	P-11H625, detail 8, insulator
2	P-11H627, detail 10, retainer assembly
2	P-11H628, detail 11, retainer, stud spacer
1	P-11H629, detail 12, support, top wedge
1	P-11H634, detail 17, support, bottom wedge
1	P-11H635, detail 18, bracket assembly
1	P-11H613, detail 15, bracket
1	P-11H636, detail 19, clip
1	P-11H637, detail 20, wedge, top
1	P-11H644, detail 21, wedge, bottom
1	P-11H638, detail 22, wedge, top
1	P-11H645, detail 23, wedge, bottom
1	P-11H639, detail 24, wedge, top
1	P-11H646, detail 25, wedge, bottom
1	P-11H640, detail 26, wedge, top
1	P-11H647, detail 27, wedge, bottom
1	P-11H641, detail 28, wedge, top
1	P-11H648, detail 29, wedge, bottom
1	P-11H642, detail 30, wedge, top
1	P-11H649, detail 31, wedge, bottom
1	P-11H643, detail 32, wedge, top
1	P-11H650, detail 33, wedge, bottom
1	P-11H632, detail 34A, wedge
1	P-11H651, detail 34B, wedge
1	P-12B564, plastic box for details 7 and 19
1	628A tool
1	Tool kit, 1018A consisting of:
1	P-11H630, detail 13, comb
1	P-11H631, detail 14, comb
1	P-11H633, detail 16, lifter
1	840440168, detail 35, lifter
1	840286199, detail 36, lifter
1	840286207, detail 37, comb
1	840286215, detail 38, comb lifter
AT-7825	6-inch C screwdriver
AT-7860	B long-nose pliers
KS-6320	Orange stick
KS-6854	Screwdriver
KS-8511	Tweezers
R-2315	Lettering and numbering set

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

4.01 Figure 3 shows the tools comprising the 1017A and 1018A tool kits.

4.02 No replacement procedures are specified for screws or other parts where the replacement consists of a simple operation.

4.03 Modification of the New Britain P58 reverse action pliers, available from most automotive supply stores as a lock ring remover, is to be accomplished in accordance with Fig. 4. The 1/8-inch stop pin is to be installed in a hole drilled with an electric drill and located so as to limit jaw

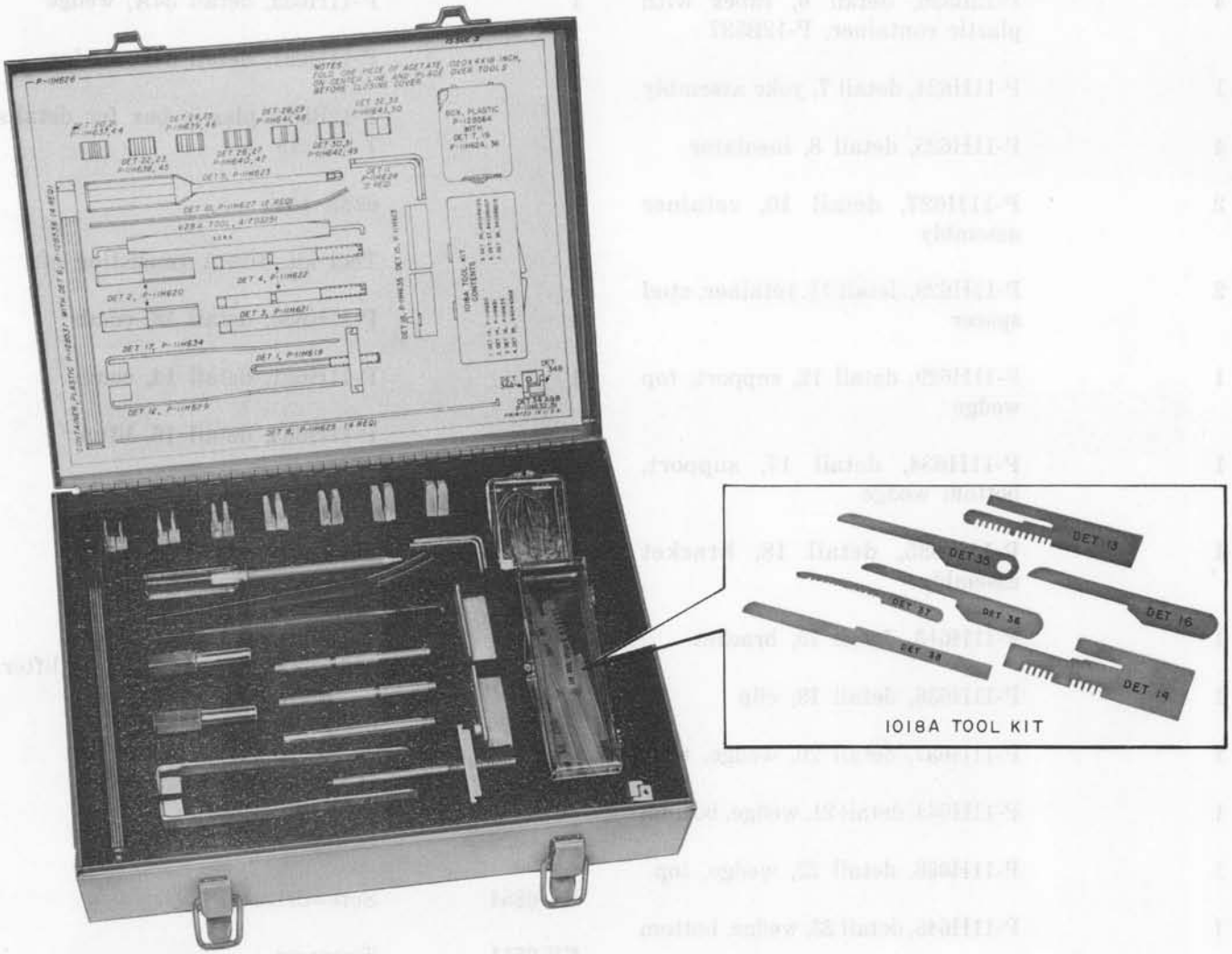

Fig. 3—1017A Tool Kit Including 1018A Tool Kit

travel to approximately 1/2 inch for operation protection.

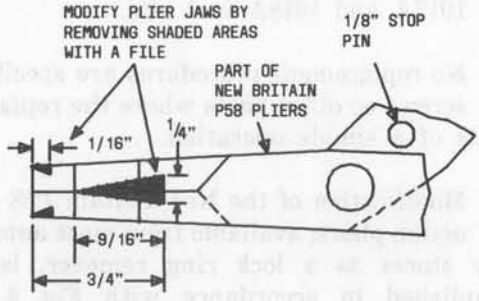

Fig. 4—Modification of New Britain P58 Pliers for Clip Removal

4.04 After making any replacement of parts of an AF-, AG-, or AJ-type relay, the part or parts replaced shall meet the readjust requirements involved as specified in Section 040-502-701. Other parts whose adjustments may have been directly disturbed by the replacing operations shall be checked to the readjust requirements, and an overall operation check shall be made of the relay before restoring the circuit to service.

4.05 ***Crosstalk Shield:*** To replace a crosstalk shield, remove the contact cover. 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 spoolhead 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 that 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.

4.06 ***Buffer Spring:***

(a) ***Removing Buffer Spring:*** If the relay is equipped with a crosstalk shield, remove it as covered in paragraph 4.05. 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. If the buffer spring is positioned by the spoolhead, disengage the upper leg of the buffer spring from the spoolhead by pressing the leg gently toward the core with the KS-6320 orange stick and pull the upper part of the spring slightly forward. Similarly disengage the lower leg, 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 040-502-701.

4.07 ***4B Cover Clip:*** (Fig. 5)—This clip is used to minimize displacement of operating cards, contact covers, and contact springs of wire spring relays during shipping and handling.

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

(b) ***Mounting 4B Cover 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.

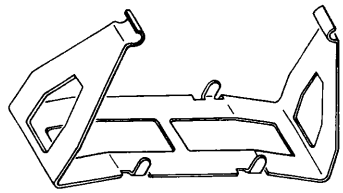

Fig. 5—4B Cover Clip

CARD REPLACEMENT—12-POSITION RELAYS

Removing Contact Cover, Crosstalk Shield, Buffer Spring, and 4B Cover Clip

4.08 Remove the clip as covered in paragraph 4.07. Remove the contact cover. If the relay is equipped with a crosstalk shield, remove it as covered in paragraph 4.05. Remove the buffer spring, if provided, as covered in paragraph 4.06.

Stamping Relay Code on New Card

4.09 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 that this information is stamped on the same side (black side) of the new card as the single digit (0 to 6) located in the lower right-hand corner with the card in its proper position on the relay.

Disengaging Balancing Spring Legs

4.10 Disengage the balancing spring legs from the card as follows:

(a) Block the relay operated using the 768A tool.

(b) 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.

(c) Roll the end of the lifter under this leg of the spring so that the spring rests in the groove of the lifter.

(d) Then draw the lifter forward to the position shown in Fig. 6.

(e) 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.

(f) Lift the spring upward with the tool and, at the same time, press the card downward with the orange stick.

(g) When the spring clears the top of the card, move it toward the left so that it is free of the card.

(h) Withdraw the spring lifter.

When removing the lower leg of the spring, the procedure is the same except that 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.

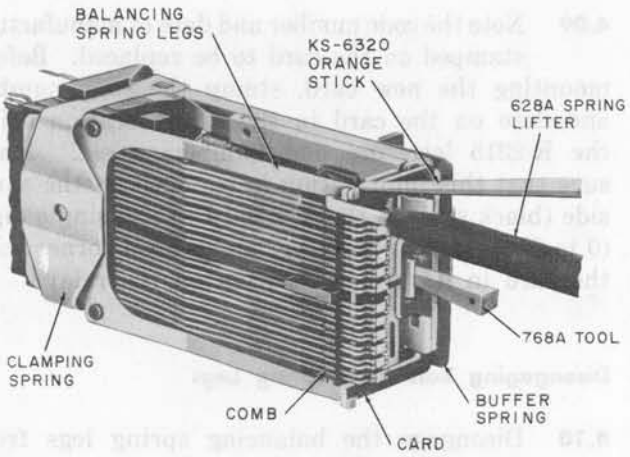

Fig. 6—Disengaging Balancing Spring From Card

4.11 On the top left side of the relay, with the taper of detail 36 lifter facing to the left, place the lifter behind the card inserting it between the left movable twin contact springs and the fixed single contact springs as shown in Fig. 7. Push the lifter down until all the movable contacts are lifted away from the fixed contacts.

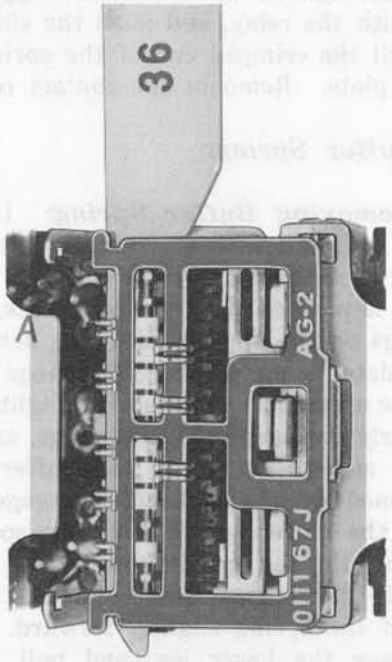

Fig. 7—Detail 36 Lifter in Place

4.12 Insert detail 37 comb behind the card and in front of detail 36 lifter with the teeth facing the lifted movable contacts as shown in Fig. 8. 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.

4.13 Remove detail 36 lifter.

4.14 With the taper of detail 38 comb lifter facing to the right, place the groove (on left side of detail 38) over the right side of the protruding detail 37 comb. Holding the comb with the left hand, slowly push detail 38 comb lifter down until all movable contact springs are lifted in pairs as shown in Fig. 9.

4.15 On the top right side of the relay, insert detail 13 comb behind the card with the teeth of the comb facing to the left and the slot straddling the armature as shown in Fig. 10. The stop on the comb shall come to rest on the top edge of the armature leg so that the movable springs align in pairs between teeth of the comb.

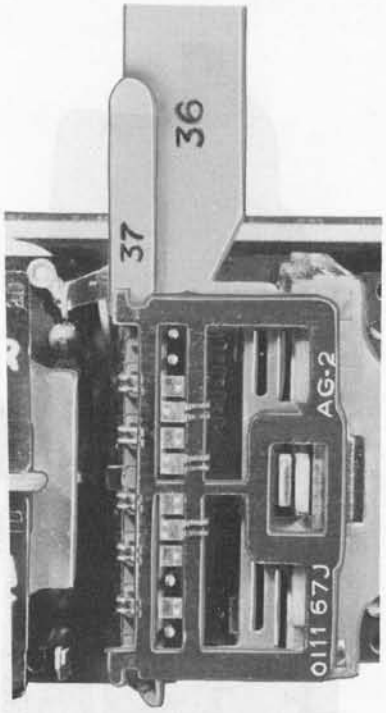

Fig. 8—Detail 37 Comb in Place with Detail 36 Lifter

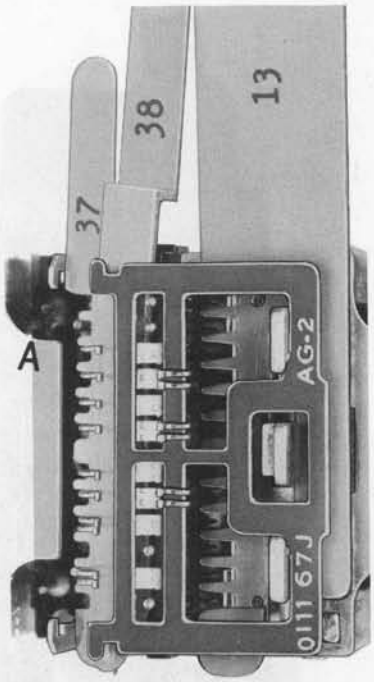

Fig. 10—Detail 13 Comb in Place With Detail 37 Comb and Detail 38 Comb Lifter

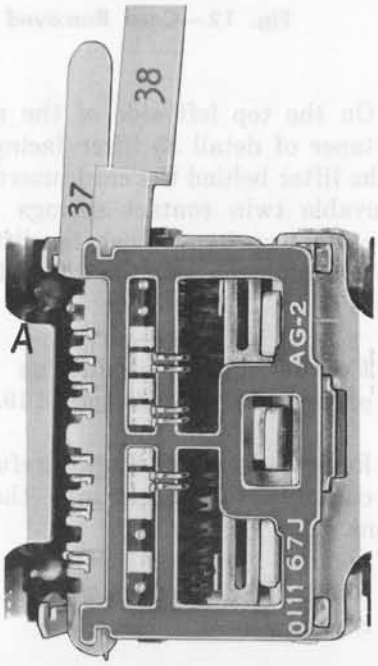

Fig. 9—Detail 38 Comb Lifter in Place With Detail 37 Comb

4.16 With the taper of detail 16 lifter facing to the right, place the lifter behind the card inserting it between the right movable twin contact springs and the fixed single contact springs as shown in Fig. 11. Push the lifter down until all the movable contact springs are lifted in pairs between the teeth of the detail 13 comb.

4.17 Using the KS-6320 orange stick, hold down the armature in the unoperated position and with the KS-8511 tweezers disengage the card from the armature leg notches and remove the card (Fig. 12).

Replacing the Card

4.18 Hold the new card with the notches to the left and the stamped information on the card visible. Insert the left vertical section of the 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 the card on the legs of the armature. Release the armature, and move the card up and down until the projections on the card engage the notches in the outer legs of the armature.

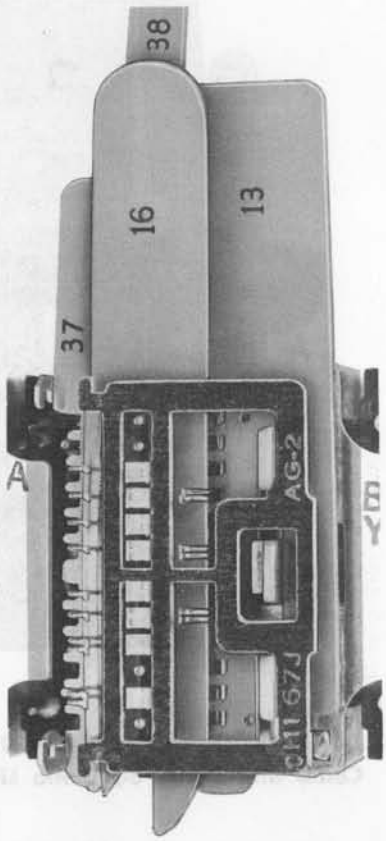

Fig. 11—Detail 16 Lifter in Place With Detail 13 Comb, Detail 37 Comb, and Detail 38 Comb Lifter

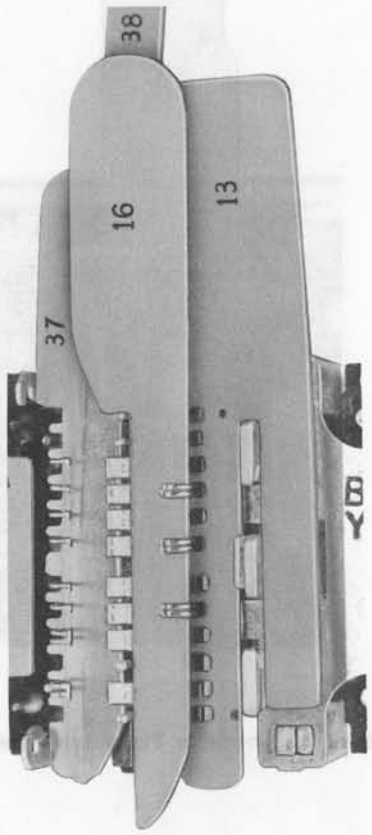

Fig. 12—Card Removed

4.19 Remove detail 16 lifter carefully so that all contacts fall back into their respective positions. Remove detail 13 comb.

4.20 Hold detail 37 comb with the left hand, and carefully remove detail 38 comb lifter. Replace detail 36 lifter as outlined in paragraph 4.11. Remove detail 37 comb and then remove detail 36 lifter carefully so that all contacts fall back into the respective positions.

4.21 Reattach balancing springs to card, and replace cover.

CARD REPLACEMENT—24-POSITION BREAK CONTACT RELAYS

4.22 Release balancing springs as covered in paragraph 4.10.

4.23 On the top left side of the relay with the taper of detail 35 lifter facing to the right, place the lifter behind the card inserting it between the movable twin contact springs and the fixed single contact springs. Push the lifter down until all the movable contacts are lifted from the fixed contacts.

4.24 Follow the procedures outlined in paragraphs 4.15 through 4.19.

4.25 Remove detail 35 lifter carefully so that all contacts fall back into their respective positions.

4.26 Reattach balancing springs to card, and replace cover.

CARD REPLACEMENT—24-POSITION MAKE CONTACT RELAYS

4.27 Release balancing springs as covered in paragraph 4.10.

4.28 Follow the procedures outlined in paragraph 4.11 through 4.14.

4.29 With the taper of detail 35 lifter facing to the left, place the lifter behind the card inserting it in the right-hand row of contacts between the movable twin contact springs and the fixed single contact springs. Push the lifter down until it comes to rest, and all movable contacts are lifted.

4.30 With the KS-6320 orange stick, hold down the armature in the unoperated position, and with the KS-8511 tweezers, disengage the card from the armature leg notches and remove the card.

4.31 To insert a new card, follow the procedures outlined in paragraph 4.18.

4.32 Remove detail 35 lifter carefully so that all contacts fall back into their respective positions.

4.33 Follow procedure outlined in paragraph 4.20.

4.34 Replace balancing springs and replace cover.

REPLACEMENT OF COIL AND ARMATURE ASSEMBLY—12- AND 24-POSITION RELAYS

Note 1: See paragraph 1.09.

Note 2: This procedure may not be applicable for ESS installations. See paragraph 1.06.

4.35 To obtain replacement parts for each relay to be repaired, a complete relay of the same code should be purchased and disassembled. The coil, core armature and core plate from the new relay must be used as a unit. Do not reuse the old armature.

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

4.37 ***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.

4.38 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.

4.39 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 operation.

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

4.40 ***Positioning of Mounting Plate:***

Note: When loosening of mounting plate is required to perform maintenance routines, mounting plate clips should be removed. Replacement of clips is not required following maintenance.

(a) Remove mounting plate clips, if applicable, using the following method:

(1) Using the modified New Britain pliers, spread the clip to clear the mounting plate cutouts and remove the clip.

Note: In order to remove the type of clip that employs a spacer prong between the mounting plates, the plates will have to be spread to release the spacer prior to the application of the pliers.

(2) After the clip is removed from the mounting plate, a screwdriver is to be inserted into the clip to allow removal from the pliers.

(b) 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. 13.

(c) Place an 0.020- by 4- by 28-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.

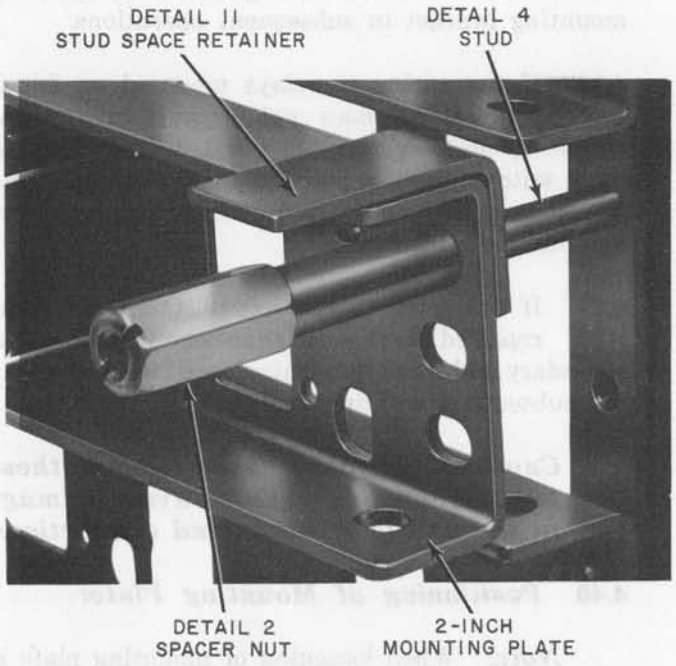

Fig. 13—Detail 4 Stud in Place With Detail 11 Stud Space Retainers

(d) Remove lower mounting plate screws.

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

(f) Insert the detail 11 stud spacer retainers behind the mounting plate into the grooves of the detail 4 studs as shown in Fig. 13.

(g) 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. 14. The wedging bracket is not required for relays in other mounting positions.

(h) Screw the detail 2 spacer nuts into the detail 4 studs at both ends of the mounting plate and tighten. (See Fig. 15).

(i) Insert the detail 3 anchoring post into the left detail 2 spacer nut and hand tighten. (See Fig. 16).

(j) 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.

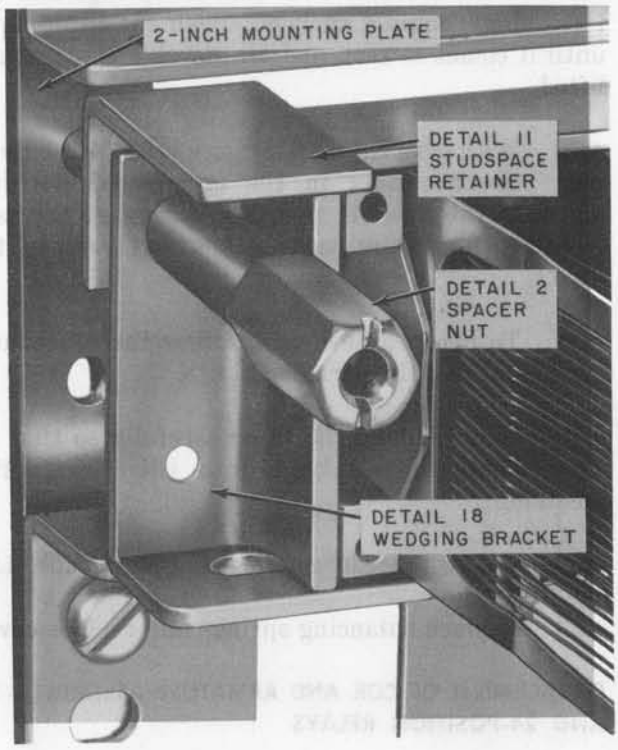

Fig. 14—Detail 18 Wedging Bracket in Place Over Left Detail 4 Stud

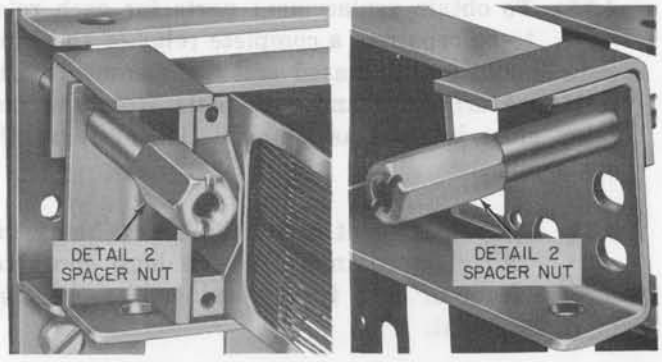

Fig. 15—Detail 2 Spacer Nuts in Place

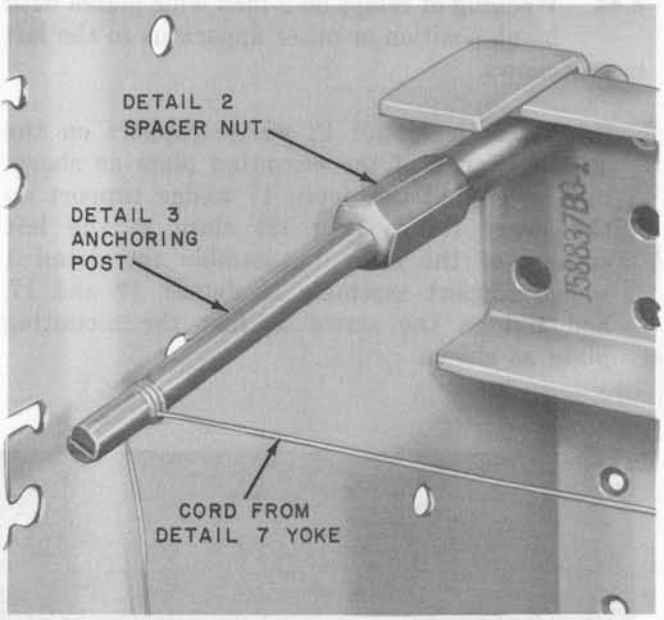

Fig. 16—Detail 3 Anchoring Post Inserted in Left Detail 2 Spacer Nut

4.41 Remove 4B cover clip as covered in paragraph 4.07. Remove contact cover and, if provided, crosstalk shield and buffer springs as covered in paragraphs 4.05 and 4.06.

4.42 Disengage the balancing spring legs from the card as covered in paragraph 4.10.

4.43 Remove the card as covered in paragraphs 4.11 through 4.30.

4.44 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 paragraphs 4.45 and 4.46.

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

4.45 ***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.

4.46 ***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.

Wedging

4.47 Wedging of a 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 to be 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. 17).

(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. 17). After the wedge is firmly in place, unscrew the wedge inserter.

Note 1: 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 2: 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 terminal 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. 17).

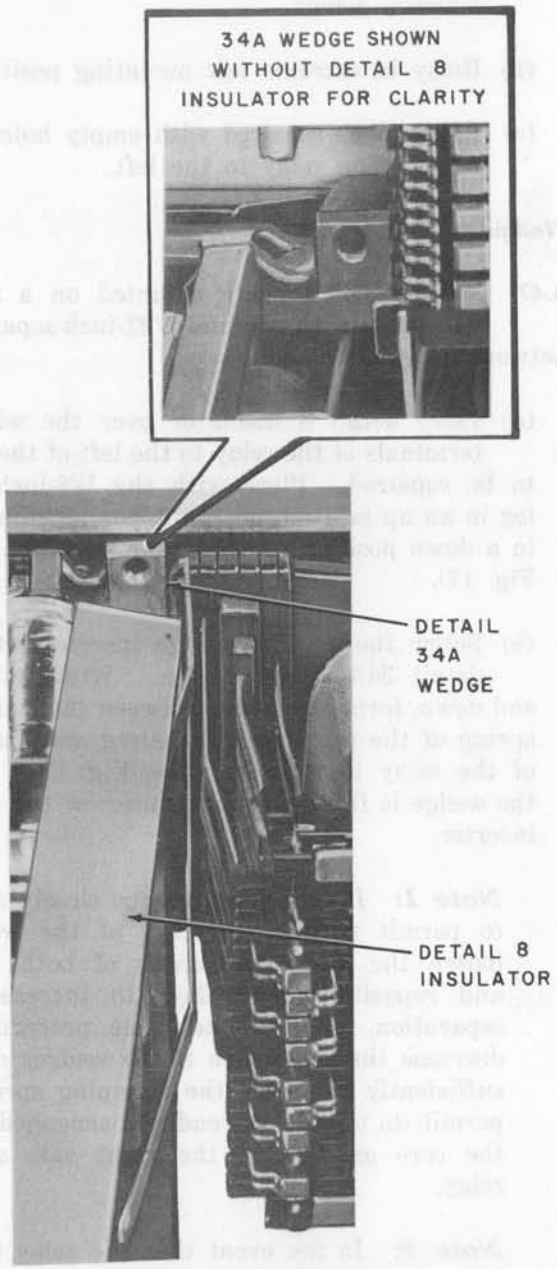

Fig. 17—Details 34A and 34B Wedges in Place With Detail 8 Insulators (34B Not Shown)

4.48 Wedging of relays 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. 18 and the detail 17 wedge support on the lower flange (Fig. 18) 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.

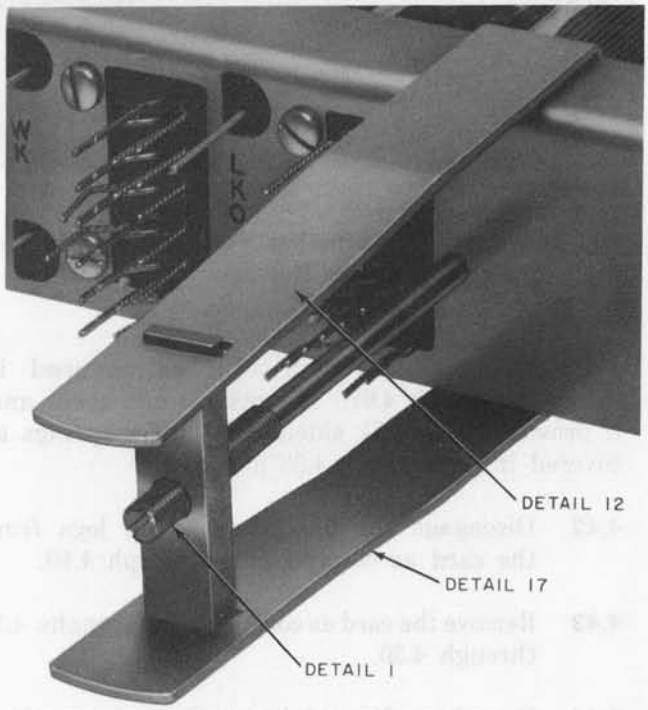

Fig. 18—Detail 12 Wedge Support, Detail 17 Wedge Support, and Detail 1 Wedge Support Assembly

(b) Use the detail wedge inserter to force details 20 through 33 wedges of sufficient thickness to compress the relay clamping spring between the spring and the wedge supports as shown in Fig. 19.

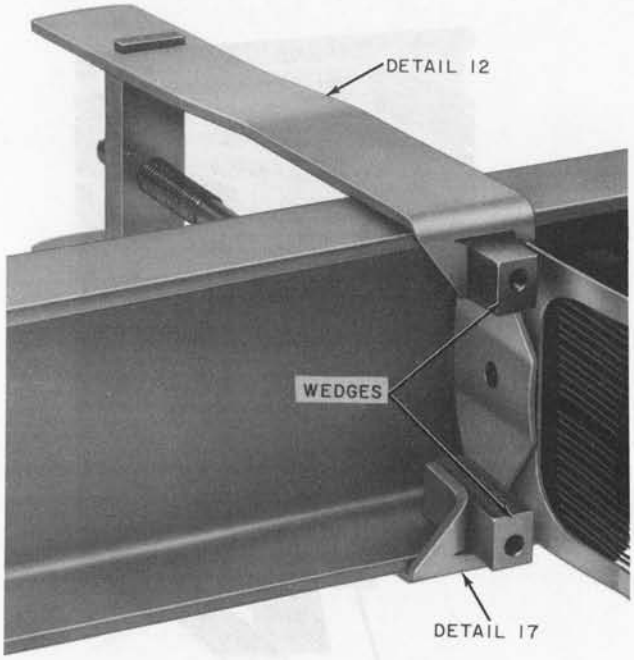

Fig. 19—Wedges in Place With Details 12 and 17

4.49 Wedging of a relay mounted on a 2-inch wide plate with the 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. 20.

(b) Use the detail 5 wedge inserter to force details 20 through 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. 20).

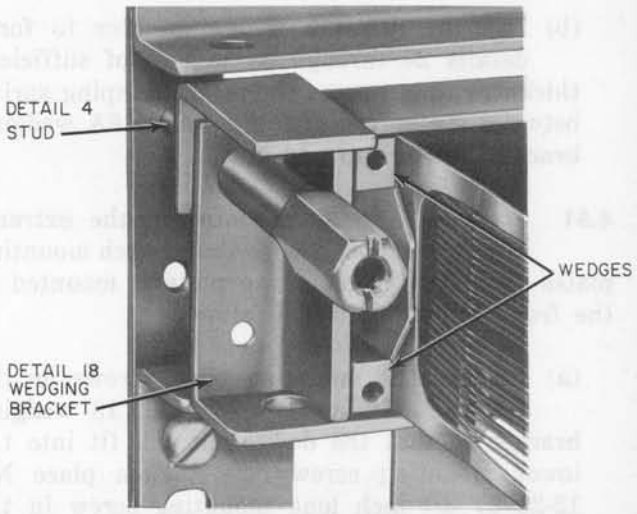

Fig. 20—Detail 18 Wedging Support on Detail 4 Stud

4.50 Wedging of a 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. 21) so that the flat upright of the angle shall provide a backing for the details 20 through 30 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.

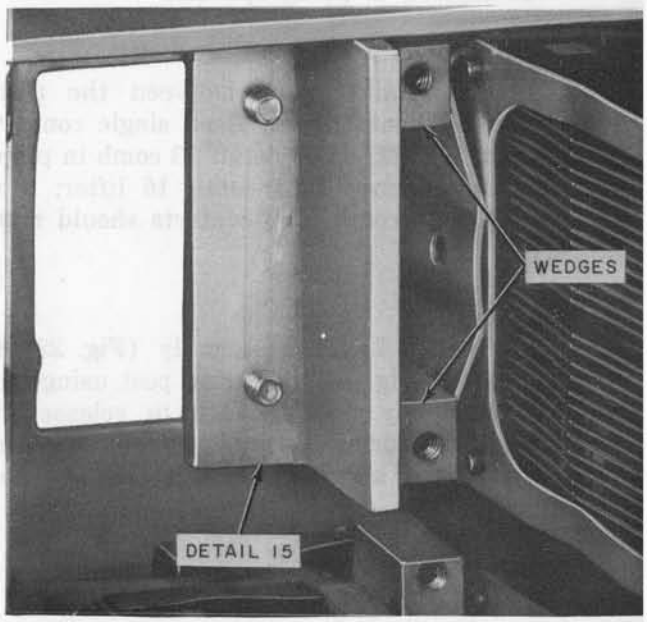

Fig. 21—Detail 15 Wedging Bracket in Place

(b) Use the detail 5 wedge inserter to force details 20 through 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.

4.51 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 is as follows:

(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 No. 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 through 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.

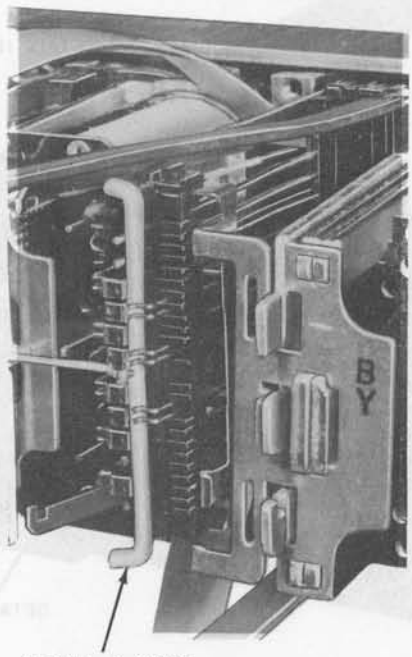

Fig. 22—Detail 7 Yoke in Place Between Contacts

DISMANTLING RELAY—12-POSITION

4.52 Remove card as covered in paragraphs 4.11 through 4.17.

4.53 Remove comb and lifter on left side of relay as covered in paragraph 4.20.

4.54 Insert detail 7 yoke between the right movable contacts and fixed single contacts as shown in Fig. 22. Hold detail 13 comb in place, and carefully remove first detail 16 lifter; then remove detail 13 comb. All contacts should mate properly.

4.55 Tie detail 7 yoke assembly (Fig. 22) to detail 3 (Fig. 16) anchoring post 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.

4.56 Using 6-inch C screwdriver, release clamp springs from coil, core, and armature assembly.

4.57 Lift clamp springs; remove defective coil, core, and armature assembly with a shaking motion.

4.58 Apply the B long-nose pliers to the clamping springs as close to the relay mounting bracket as possible and squeeze ends of clamping spring to the flange of the mounting plate. Then insert detail 10 retainer between clamp spring end and mounting bracket as shown in Fig. 23. Use one retainer for retaining the top clamping spring and a second detail 10 retainer for retaining the bottom clamping spring. This provides accessibility for new replacement coil, core, and armature assembly.

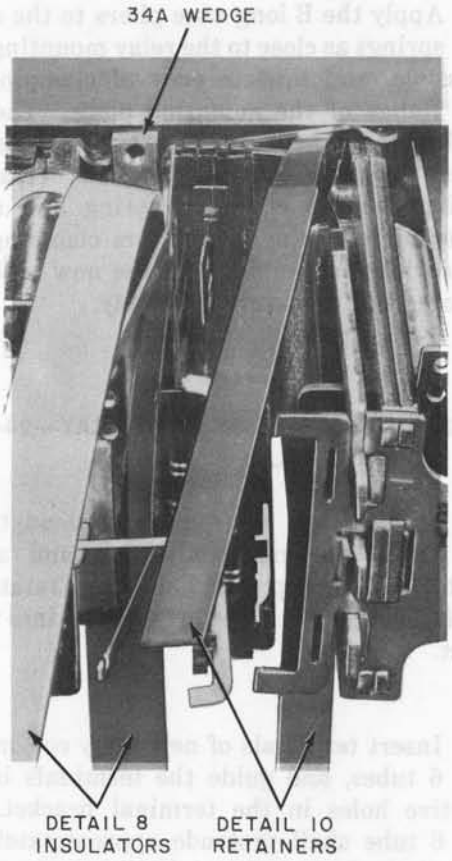

Fig. 23—Detail 10 Retainers in Place

REPLACEMENT AND REASSEMBLY OF RELAY—12-POSITION

4.59 Apply detail 19 (Fig. 24) clip on the front tip of the new coil, core, and armature assembly. This clip will hold both the armature core and coil together until all parts fit into terminal bracket.

4.60 Insert terminals of the new relay coil into detail 6 tubes, and guide the terminals into their respective holes in the terminal bracket. Upper detail 6 tubes should protrude approximately 1 inch ahead of the lower tubes to facilitate insertion into the terminal bracket. The tubes are used to prevent shorting of the coil terminals. (See Fig. 24).

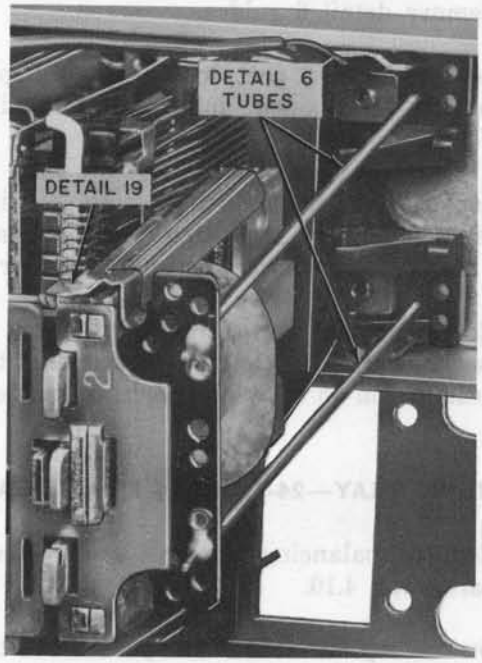

Fig. 24—Detail 6 Tubes on Terminal Rods

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

4.62 Remove detail 10 retainers, both top and bottom.

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

4.64 Remove detail 19 clip from armature.

4.65 Release lacing cord from detail 3 anchoring post.

4.66 Remove bottom wedge first; then the top wedge. These wedges should be removed by pulling out cautiously without twisting.

4.67 Replace combs and lifters as covered in paragraphs 4.11 through 4.16, omitting the words "behind the card."

4.68 Remove detail 7 yoke, and proceed as covered in paragraph 4.18 through 4.21.

4.69 Remove detail 6 guides.

4.70 Remove detail 3 post, loosen detail 2 spacer nut on both sides, and remove detail 11 clamps.

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

4.72 Rewire relay coil terminals; check for mechanical and electrical adjustments. Stamp circuit designation on relay and position and relace cabling.

DISMANTLING RELAY—24-POSITION BREAK RELAY

4.73 Remove balancing springs as covered in paragraph 4.10.

4.74 On the top left side of relay with the taper of detail 35 lifter facing to the right, place the lifter behind the card, inserting it between the movable contact springs and the fixed single contact springs. Push the lifter down until all movable contacts are lifted from the fixed contacts.

4.75 Remove the card as covered in paragraphs 4.15 through 4.17.

4.76 Remove comb and lifter as covered in paragraph 4.20.

4.77 Insert detail 7 yoke on right side of fixed contacts. (See Fig. 22). Holding detail 13 comb in place, carefully remove detail 16 lifter and then remove detail 13 comb. All contacts should mate properly.

4.78 Tie detail 7 yoke assembly to detail 3 anchoring post 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.

4.79 Using the C screwdriver, release clamp springs from coil, core, and armature assembly.

4.80 Lift clamp springs; remove defective coil, core, and armature assembly.

4.81 Apply the B long-nose pliers to the clamping springs as close to the relay mounting bracket as possible, and squeeze ends of clamping spring to the flange of the mounting plate. Then insert detail 10 retainer between clamp spring and mounting bracket. (See Fig. 23). Use one retainer for retaining the top clamping spring and a second retainer for retaining the bottom clamping spring. This provides accessibility for the new replacement coil, core, and armature assembly.

REPLACEMENT AND REASSEMBLY OF RELAY—24-POSITION BREAK CONTACT RELAY

4.82 Apply detail 19 (Fig. 24) clip on the front tip of the new coil, core, and armature assembly. This clip will hold the armature core and coil together until all parts will fit into terminal bracket.

4.83 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 shall protrude approximately 1 inch ahead of the lower tube to facilitate insertion into the terminal bracket. The tubes are used to prevent shorting of the coil terminals.

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

4.85 Remove detail 10 retainers, both top and bottom.

4.86 Using the 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 springs will snap into the grooves in the core.

4.87 Remove detail 19 clip from armature.

4.88 Release lacing cord from detail 3 anchoring post.

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

4.90 On the top left side of the relay with the taper of detail 35 lifter facing to the right, insert the lifter between the movable twin contact springs and the fixed single contact springs. Push the lifter down until all movable contacts are lifted from fixed contacts.

4.91 Replace combs and lifters as covered by procedure in paragraphs 4.15 and 4.16 except that the words "behind the card" shall be omitted.

4.92 Remove detail 7 yoke, and insert new card as covered in procedure in paragraph 4.18.

4.93 On the right side of the relay, remove detail 16 lifter carefully so that all contacts fall back into their respective positions. Remove detail 13 comb.

4.94 On the left side of the relay, remove detail 35 lifter carefully so that all contacts fall back into their respective positions.

4.95 Follow procedure outlined in paragraphs 4.69 through 4.72.

DISMANTLING RELAY—24-POSITION MAKE RELAY

4.96 Remove balancing springs as covered in paragraph 4.10.

4.97 Remove card as covered in paragraphs 4.11 through 4.14, 4.29, and 4.30.

4.98 Remove comb and lifter on left side of relay as covered in paragraph 4.20.

4.99 Insert detail 7 yoke (see Fig. 22) on the right side of the fixed contacts, and carefully remove detail 35 lifter. All contacts shall mate properly.

4.100 Tie detail 7 yoke assembly to detail 3 anchoring post 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.

4.101 Using the C screwdriver, release the clamp springs from the coil, core, and armature assembly.

4.102 Lift clamp springs, and remove defective coil, core, and armature assembly with a shaking motion.

4.103 Apply the B long-nose pliers to the clamping springs as close to the relay mounting bracket as possible, and squeeze ends of clamping springs to the flange of the mounting plate. Then insert detail 10 retainer between clamp spring and mounting bracket. (See Fig. 23). Use one retainer for retaining the top clamping spring and a second retainer for retaining the bottom clamping spring. This provides accessibility for the new replacement coil, core, and armature assembly.

REPLACEMENT AND REASSEMBLY OF RELAY—24-POSITION MAKE CONTACT RELAY

4.104 Apply detail 19 (Fig. 24) clip on the front of the new coil, core, and armature assembly. This clip will hold both the armature and coil together until all parts will fit into the terminal bracket.

4.105 Insert terminals of the new relay into detail 6 tubes, and guide the terminals into their respective holes in the terminal bracket. Upper detail 6 tube shall protrude approximately 1 inch ahead of the lower tube to facilitate insertion into the terminal bracket. The tubes are used to prevent short-circuiting of coil terminals.

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

4.107 Remove detail 10 retainers, both top and bottom.

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

4.109 Remove detail 19 clip from armature.

4.110 Release lacing cord from detail 3 anchoring post.

4.111 Remove bottom wedge first, then top wedge. These wedges shall be removed by pulling out cautiously without twisting.

4.112 Replace combs and lifter as covered by procedure in paragraphs 4.11 through 4.14 and 4.29 except that the words "behind the card" shall be omitted.

4.113 Remove detail 7 yoke, and then replace card as covered in paragraph 4.18.

4.114 On left side of relay, hold detail 37 comb with the left hand and carefully remove detail 38 comb lifter. Replace detail 36 lifter as outlined in paragraph 4.11. Remove detail 37 comb; then remove detail 36 lifter carefully so that all contacts shall fall back into their respective positions.

4.115 On the right side of the relay, remove detail 35 lifter carefully so that all contacts fall back into their respective positions.

4.116 Reattach the balancing springs.

4.117 Follow procedures outlined in paragraphs 4.69 through 4.72.