

## 209-TYPE RELAY AND ASSOCIATED 18-TYPE CONNECTING BLOCKS PIECE-PART DATA AND REPLACEMENT PROCEDURES

### 1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of 209-type relays and the associated 18-type connecting blocks. It also covers approved procedures for replacing these parts.

1.02 This section is reissued to delete piece-part data of certain relays, to add recoding information for the 209 FB and 209 FC relays, to add stamping information on certain relays when they are equipped with a spacer, to revise piece-part data for the terminal lockwasher, and to add a tool. Detailed reasons for reissue will be found at the end of the section.

1.03 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 209-type relays and the associated 18-type connecting blocks. No attempt should be made to replace parts not designated. Part 2 also contains explanatory figures showing the different parts. This information is called Piece-part Data.

1.04 Part 3 of this section covers the approved procedures for the replacement of the parts covered in Part 2. This information is called Replacement Procedures.

### 2. PIECE-PART DATA

2.01 The figures included in this part show the various piece parts in their proper relation to the other parts of the relay or connecting block. The piece-part numbers of the various parts are given together with their corresponding names as listed by the Western Electric Company Merchandise Department. Where 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 piece parts for replacement purposes, give both the number and the name of the piece part; for example, "P-204214 armature." Do not refer to the BSP number or any information shown in parentheses following the piece-part numbers.

2.03 The piece-part information for the No. 18B connecting block is covered in Section 040-232-801 covering 215-type relays.

2.04 Piece parts for relays per D specifications shall be ordered in accordance with the following table. Parts for which piece-part numbers are not given should be ordered by giving the name of the part and the D specification number; for example, "Magnet for Relay per D-18532."

<u>D Specification</u>	<u>Ordering Information</u>
D-18608	Order parts as specified for No. 209FA relay except: (a) Shell (b) Magnet (c) Coil
D-18532	Order parts as specified for No. 209FA relay except: (a) Shell (b) Magnet (c) Coil
D-43024	Order parts as specified for No. 209FA relay except: (a) Mounting Posts. Specify position of mounting post when ordering.
D-47976	Order parts as specified for No. 209FA relay except: (a) Coil
D-86514	Order parts as specified for No. 209FA relay except: (a) Coil

P-385473 SHELL  
(COVER)

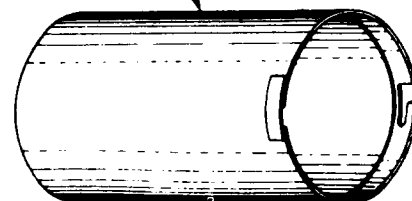


Fig. 1 - Shell

## SECTION 040-231-801

2.05 All 209FB and 209FC relays shall be equipped with P-356521 tungsten contact screws and shall be restamped with the code marking 209FH and 209FJ, respectively.

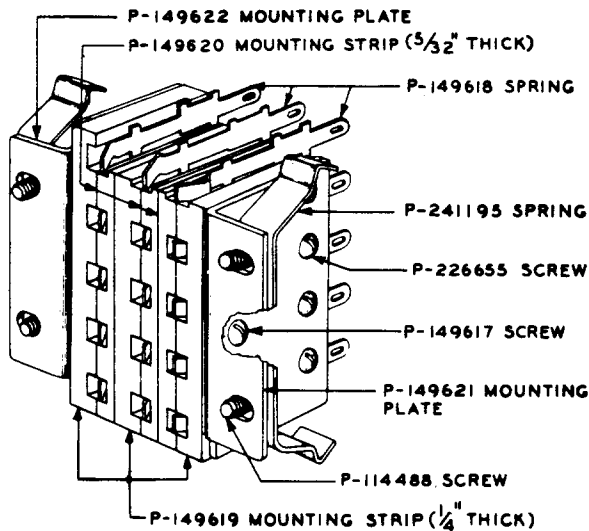
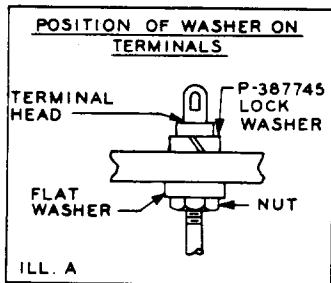


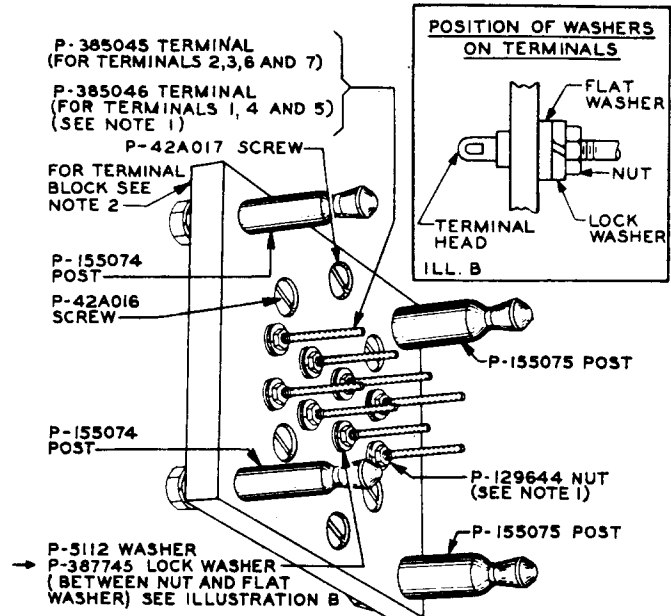
Fig. 2 - No. 18A Connecting Block



NOTE 1 - WHEN NECESSARY TO REPLACE EITHER A TERMINAL OR ITS ASSOCIATED NUT, REPLACE BOTH TERMINAL AND NUT.

Fig. 3 - Mounting and Terminal Block Parts for No. 209FA, 209FD, 209FE, 209FF, 209FG, 209FK, and 209FM Relays

All 209FB and 209FC relays already equipped with P-35621 tungsten contact screws and not restamped shall be restamped with the code marking 209FH and 209FJ, respectively.



NOTE 1 - WHEN NECESSARY TO REPLACE EITHER A TERMINAL OR ITS ASSOCIATED NUT, REPLACE BOTH TERMINAL AND NUT.

NOTE 2 - WHEN NECESSARY TO REPLACE THE TERMINAL BLOCK, REPLACE THE ENTIRE RELAY WITH A NO. 255A RELAY.

Fig. 4 - Mounting and Terminal Block Parts for No. 209FH and 209FJ Relays

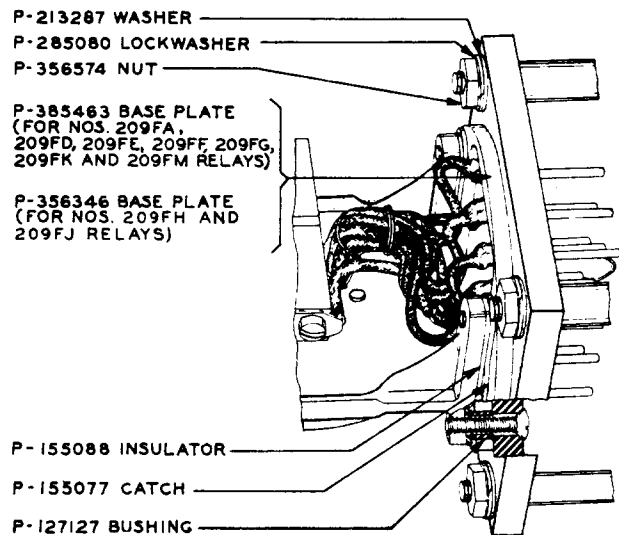
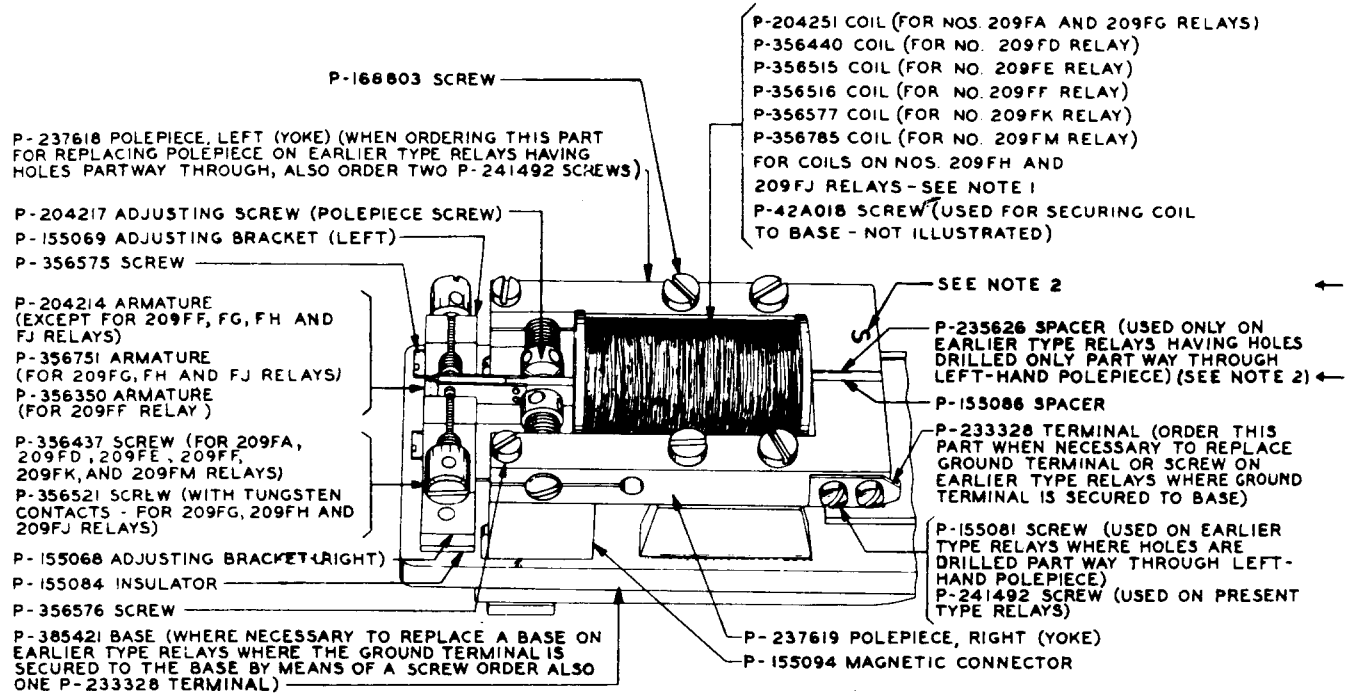


Fig. 5 - Parts Associated With Terminal Block



NOTE 1 WHEN NECESSARY TO REPLACE COILS ON THE NO. 209FH, AND NO. 209FJ RELAYS, REPLACE THE ENTIRE RELAY WITH A NO. 255A RELAY

2 "S" STAMPED IN RED ON THE LEFT HAND POLE PIECE INDICATES RELAY IS EQUIPPED WITH SPACER P-235626. RELAYS OF THIS TYPE WHICH ARE EQUIPPED WITH THIS SPACER BUT LACK THE "S" STAMPING SHALL BE STAMPED IN ACCORDANCE WITH SECTION 040-231-701.

Fig. 6 - General View of 209-type Relay

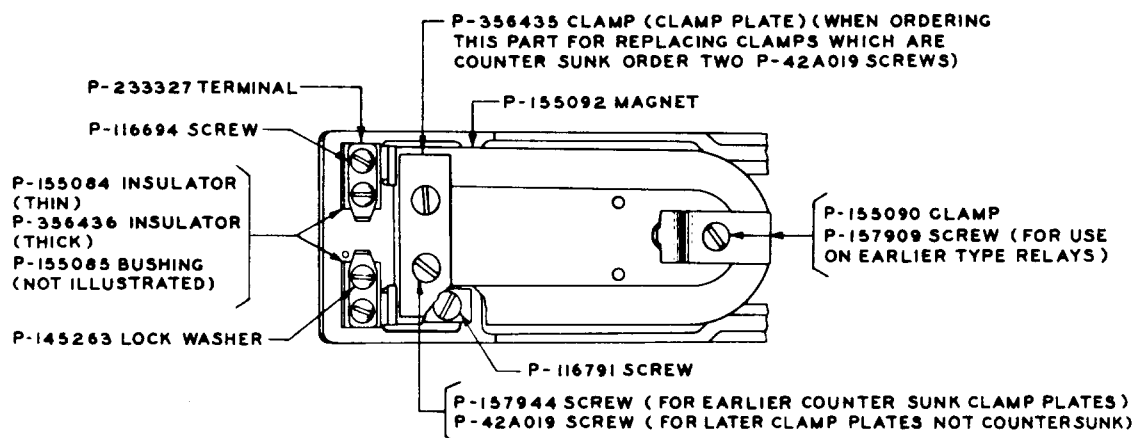


Fig. 7 - Bottom View - 209-type Relay

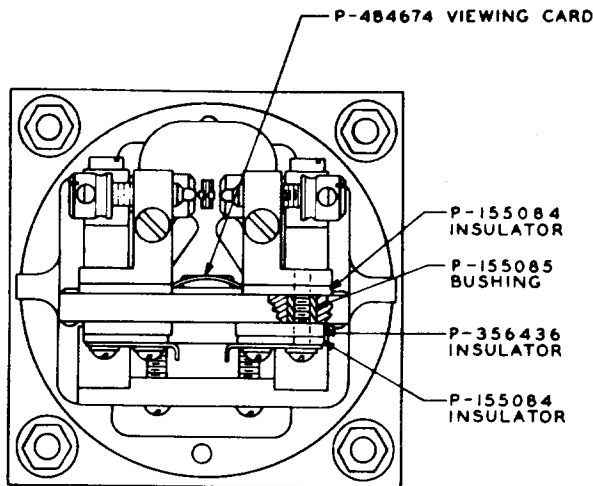


Fig. 8 - End View - 209-type Relay

### 3. REPLACEMENT PROCEDURES

#### 3.01 List of Tools

Code or Spec. No.	Description
45B	5/16-inch Hex. Single-end Socket Wrench
→ 46	3/8-inch Hex. Single-end Socket Wrench
72	Combination 5/32 inch and 3/16-inch Hex. Double-end Socket Wrench and Screwdriver
485A	Smooth Jaw Pliers
-	3-inch Cabinet Screwdriver
-	4-inch Regular Screwdriver

3.02 At the time of making a replacement of parts, clean the relay in accordance with Section 069-306-801. After making any replacement of parts of a relay, the part or parts replaced shall meet the re-adjust requirements involved, as specified in Section 040-231-701. Other parts, whose adjustments may have been disturbed by the replacement procedure, shall be checked to the test requirements and an over-all check shall be made of the relay before restoring it to service.

3.03 No replacement procedures are specified for screws and other parts where the replacement procedure consists of a single simple operation.

3.04 Remagnetization of the permanent magnets of relays is required after removal under certain conditions, as covered in Section 040-231-701 covering the requirements for the particular relay, and Section 040-231-811 covering remagnetization of permanent magnets.

#### Connecting Block Parts

3.05 Mounting Spring: Remove the screws which attach the mounting spring to the mounting plate with the 3-inch cabinet screwdriver and remove the spring. Substitute the new part and fasten it in place by tightening the mounting screws securely.

3.06 Terminal Block Springs: To replace an individual terminal block spring loosen the screws which attach the mounting spring to the mounting plate with the 3-inch cabinet screwdriver. Loosen the connecting block assembly screws with the 3-inch cabinet screwdriver sufficiently to permit the defective spring to be withdrawn from the rear of the connecting block. Insert the new spring in position, taking care that it is in proper alignment with the other springs, and position it so that the sides of the spring do not touch the mounting

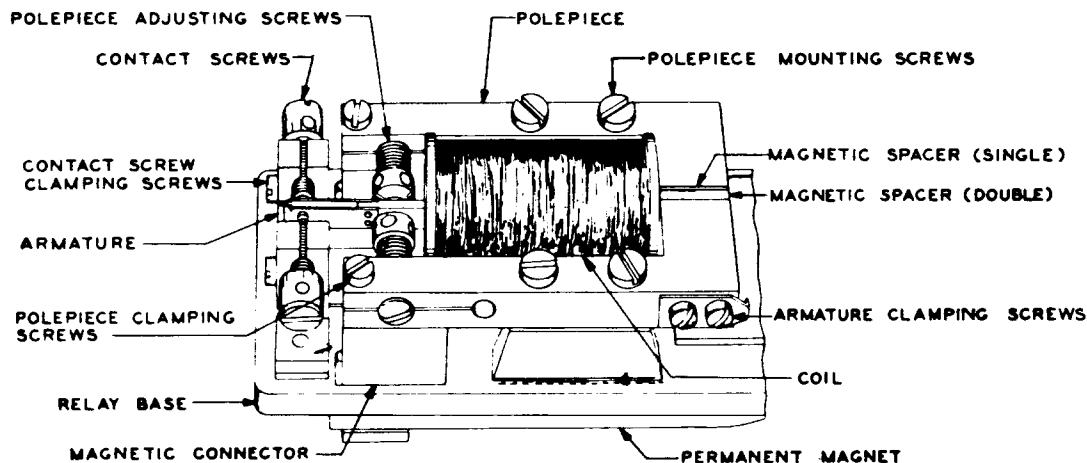


Fig. 9 - General View - 209-type Relay

strip. Tighten the connecting block assembly screws and connect the lead to the terminal of the connecting block which was replaced.

**3.07 Terminal Mounting Strips and Mounting Plates:** Disconnect the leads and remove the connecting block from its mounting by removing the connecting block mounting screws with the 3-inch cabinet screwdriver. Remove the connecting block assembly screws with the 3-inch cabinet screwdriver. Substitute the new part and reassemble the block, taking care before tightening the connecting block assembly screws to see that the sides of the spring do not touch the mounting strip, and that the mounting plates are in approximate alignment with each other. Fasten the connecting block securely to its mounting. When assembling the connecting block to the mounting plate, use a 209-type relay as a gauge to insure that the connecting block is properly positioned. Reconnect the leads to the connecting block terminals.

#### Relay Parts

**3.08 Mounting Posts:** To replace a mounting post, remove the mounting post nut with the No. 45B or No. 46 wrench and remove the mounting post from the terminal block. Substitute the new part and tighten the mounting post nut securely.

**3.09 Terminals and Locknuts:** To replace a terminal which can be replaced without removing the terminal block, hold the wiring end (head) of the terminal with the No. 485A pliers, remove the terminal locknut with the No. 72 wrench, and remove the terminal from the terminal block. Unsolder the lead from the terminal being replaced and solder the lead to the new terminal head. Assemble the new terminal in the terminal block as covered in 3.10 or 3.11, whichever applies. If necessary to remove the terminal block in order to replace a terminal, remove the terminal block mounting screws with the 4-inch regular screwdriver. Take care in this operation not to lose the cover catches, insulators, or bushings associated with the terminal block mounting screws. After the terminals are replaced, remount the terminal block to the base of the relay, taking care that the cover catches, insulators, and bushings are properly located before tightening the terminal block mounting screws.

**3.10 Assembly of Terminals in Relays Equipped With Eight Terminals:** Place the terminal into the terminal block and add a flat washer, a lockwasher, and a locknut, as shown in Fig. 4. Tighten the nut securely with the wrench, while holding the wired end (head) of the terminal with the pliers.

**3.11 Assembly of Terminals in Relays Equipped With 15 Terminals:** Before placing the terminal into the terminal

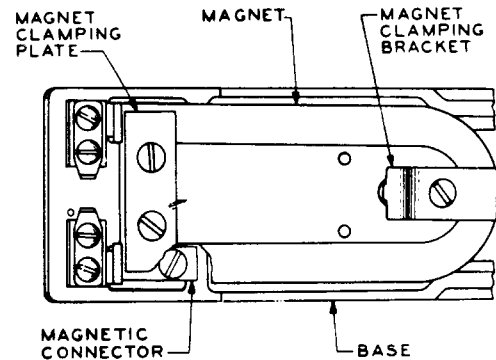


Fig. 10 - Bottom View - 209-type Relay

block, add a lockwasher. Insert the terminal into the terminal block and add a flat washer and locknut. Refer to Fig. 3 for correct washer positioning. Tighten the nut securely with the wrench, while holding the wired end (head) of the terminal with the pliers.

**3.12 Cover Locking Plate, Insulators, and Bushings:** To replace the cover locking plate and the associated insulators and bushings, remove the terminal block from the relay, as covered in 3.09. In case the cover locking plate or insulator on one side only is to be replaced, remove the terminal block mounting screws from that side only and sufficiently loosen the terminal block mounting screws on the other side to permit the removal of the cover locking plate and insulator. Inspect the bushings associated with the terminal block mounting screws at this time and, if necessary, replace them. Substitute the new part, adjusting the catch of the cover locking plate so that there is a clearance between the ends of the catch and the inside of the plates on the shell. Tighten the terminal mounting block screws securely.

**3.13 Terminal Block and Base Plate:** To replace a terminal block or base plate, remove the terminal block from the relay base as described in 3.09. Remove the base plate from the terminal block by removing the base plate mounting screws with the 3-inch cabinet screwdriver. With the No. 72 wrench, remove the terminal lock nuts from all terminals, taking care to mark or otherwise record the position of the terminals so that they can be replaced in the new block in their proper positions. If another relay with the same code is available it may be used to check the terminal position when replacing the terminals. Tap the terminals lightly until the threaded section is free from the block, leaving the unthreaded portion in position. Separate the terminal block and base plate approximately 1/4 inch to 1/2 inch and insert a

## SECTION 040-231-801

pencil or separator of similar size between each vertical row of terminals. One or two separators will be required depending on the terminal arrangement. The terminal block may now be removed with no appreciable disturbance to wiring and terminals. Remove the terminal block. If necessary to replace the base plate, remove it by passing it over one end of the pencils or separators and then drawing the pencils through the plate until the other ends of the pencils are free from the plate. Position the new base plate by reversing the process. Hold the new terminal block at a slight angle to the base plate. Replace the terminals as covered in 3.14 or 3.15, whichever applies. Remount the base plate on the terminal block, tightening the base plate mounting screws securely. Remount the terminal block on the relay base, taking care that the cover locking plates, bushings, and insulators are properly located before tightening the terminal block mounting screws.

**3.14 Relays Equipped With Eight Terminals:**  
Position the terminals in the terminal block a row at a time. Grip each terminal with the 485A pliers and pull into the terminal block until it is fully seated. Place a flat washer, a lockwasher, and a locknut on each terminal, as shown in Fig. 4. Tighten the nut securely with the wrench, while holding the wired end (head) of the terminal with the pliers.

**3.15 Relays Equipped With 15 Terminals:**  
Place lockwashers on the terminals and position the terminals in the terminal block a row at a time. Grip each terminal with the pliers and pull into the terminal block until it is fully seated. Place a flat washer and a locknut on each terminal. Refer to Fig. 3 for correct washer positioning. Tighten the nut securely with the wrench, while holding the wired end (head) of the terminal with the pliers.

**3.16 Magnet Clamping Plate and Bracket:**  
To replace the magnet clamping plate or magnet clamping bracket, remove the plate or bracket mounting screws with the 4-inch regular screwdriver and remove the magnet clamping plate or bracket. Substitute the new part and fasten it in place by tightening the mounting screws securely.

### Magnets

**3.17** Observe the following cautions with respect to magnets:

- (1) Never remove the magnet unless absolutely necessary.
- (2) Keep the magnets free from the influence of stray magnetic fields.
- (3) Do not subject the magnets to mechanical shock.

(4) Do not permit the magnets to come into contact with magnetic bodies other than the relay structure.

(5) Remagnetize the magnet as covered in 3.04.

When it becomes necessary to replace a magnet proceed as outlined in 3.18.

**3.18** To replace the magnet, remove the magnet clamping plate and clamping bracket if equipped, as covered in 3.16, and remove the magnet from the frame. Substitute the new magnet, taking care that the punch mark on the side of the magnet is in the same position as the corresponding mark was on the magnet which was removed. Note that the ends of the magnet rest on the magnet connectors for the full length of the connector. Fasten the magnet in position with the magnet clamping plate and the magnet clamping bracket.

**3.19 Armature:** To replace the armature back off the pole-piece screws and loosen the pole-piece mounting screws on one side of the armature with the 4-inch regular screwdriver. Then loosen the armature clamping screws with the 3-inch cabinet screwdriver and withdraw the armature from the front of the relay. Insert the new armature through the coil of the relay into the double spacer. If the spacer has sprung so that the armature will not enter, remove the spacer and spread it sufficiently to permit the insertion of the armature. Tighten the pole-piece mounting screws securely. Tighten the armature clamping screws securely. Check that the armature lies approximately in the center of the coil. If necessary, loosen the clamping screws and adjust the position of the armature in the coil.

**3.20 Magnetic Spacers:** To replace a double spacer or a single spacer, remove the armature clamping screws with the 3-inch screwdriver, and slightly loosen the pole-piece mounting screws on one side of the armature with the 4-inch regular screwdriver. Remove the spacers from the relay with the fingers or, if necessary, push them up with the end of the screwdriver. Substitute the new spacers, taking care that the spacer is inserted so that one part of the double spacer is on either side of the armature.

**3.21 Contact Screws:** To replace the contact screws, loosen the contact clamping screws with the 3-inch cabinet screwdriver and remove the contact screw from the clamping block with the fingers or with the 3-inch cabinet screwdriver. Substitute the new part and tighten the contact clamping screw securely. Make sure that relays requiring tungsten contacts are so equipped. The end of contact screws with tungsten

metal are designated "T" or "W," while screws with other than tungsten metal are not marked.

**3.22 Contact Screw Brackets, Clamping Plates, and Insulators:** To replace the contact screw brackets, clamping plates, and insulators, loosen the contact clamping screw with the 3-inch cabinet screwdriver and remove the contact screw, as covered in 3.21. Remove the contact screw clamping bracket mounting screws with the 3-inch cabinet screwdriver, taking care not to strain or otherwise damage the leads which are connected to the terminals. Remove the clamping screw from the contact screw bracket and place it, together with the contact screw, in the new bracket. Note that the hard rubber bushings and insulators are in good condition and if they are not, replace them. Place the contact screw bracket in position and fasten in place by tightening the mounting screw securely, taking care that the contact screw is at right angles with the armature as near as can be gauged by eye, and that the contact lines up properly with the contact on the armature.

**3.23 Pole Pieces, Pole-piece Adjusting Screws, and Magnetic Connectors:** To replace the pole piece or magnetic connector, remove the armature as described in 3.19, and remove the armature clamping screws from the relay. With the 4-inch regular screwdriver remove the pole-piece mounting screws from the side of the relay on which the replacement is made. Remove the magnet as covered in 3.17 and 3.18, and remove the pole-piece mounting screw from the underside of the relay. Remove the pole-piece clamping screw with the 3-inch cabinet screwdriver. Remove the pole piece and the magnetic connector from the relay, and remove the pole-piece adjusting screw from the pole piece. Substitute the new part as required, and remount the parts in their proper position, taking care to tighten all mounting and clamping screws securely. Remount the magnet as covered in 3.18. Reinsert the armature clamping screws and remount the

armature, taking care that the spacers are properly located before inserting the armature clamping screws.

**3.24 Coil:** To replace the coil, remove the terminal block and base plate and mark the leads for future identification as covered in 3.13 and unsolder the leads which connect the coil to the terminals. Remove the pole pieces as described in 3.19. Remove the coil mounting screws with the 3-inch cabinet screwdriver and remove the coil. Substitute the new part, remount the pole pieces, and connect the leads from the coil to the proper terminals.

**3.25 Base:** To replace the base, remove the magnet as described in 3.17 and 3.18. Remove the contact screw brackets and the coil, as described in 3.22 and 3.24 respectively, except that it will not be necessary to disconnect the leads from the coil to the terminals. Remove the screw from the terminal which is connected to the relay frame. Remove the terminal block mounting screws and remove the terminal block as described in 3.09. Substitute the new relay base and reassemble the parts as described in the procedures for the replacement of these individual parts.

#### REASONS FOR REISSUE

1. To delete piece-part data of the D-94954, 209A, 209FB, and 209FC relays (2.04, Fig. 3, 4, 5, and 6).
2. To add information that the 209FB and 209FC relays shall be equipped with tungsten contact screws and restamped 209FH and 209PJ, respectively (2.05).
3. To add identification stamping on certain relays equipped with spacer P-235626 (Note 2, Fig. 6).
4. To revise piece-part data for the terminal lockwasher (Fig. 3 and Fig. 4).
5. To amplify contact screw information (3.21).
6. To add the No. 46 tool (3.01, 3.08).