RELAYS
MODIFIED NO. 228A PER D-160118
AND ASSOCIATED NO. 18F CONNECTING BLOCK
PIECE-PART DATA AND ADJUSTING PROCEDURES

1. GENERAL

1.01 This section covers the information necessary for ordering parts to be used in the maintenance of the modified No. 228A relay per D-160118 and associated No. 18F connecting block. It also covers approved procedures for replacing these parts.

1.02 This section is reissued to revise the piece-part data for the contact screws, to provide for remagnetization of the magnet, and to add piece-part data and replacement procedures for additional parts of the relay. 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 for maintenance of modified No. 228A relays per D-160118 and associated No. 18F connecting block. 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 other parts of the relay or connecting block. 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 piece parts for replacement purposes, give both the number and the name of the piece part, for example, P-457720 Armature. Do not refer to the BSP number, or to any information shown in parentheses following the piece-part numbers.

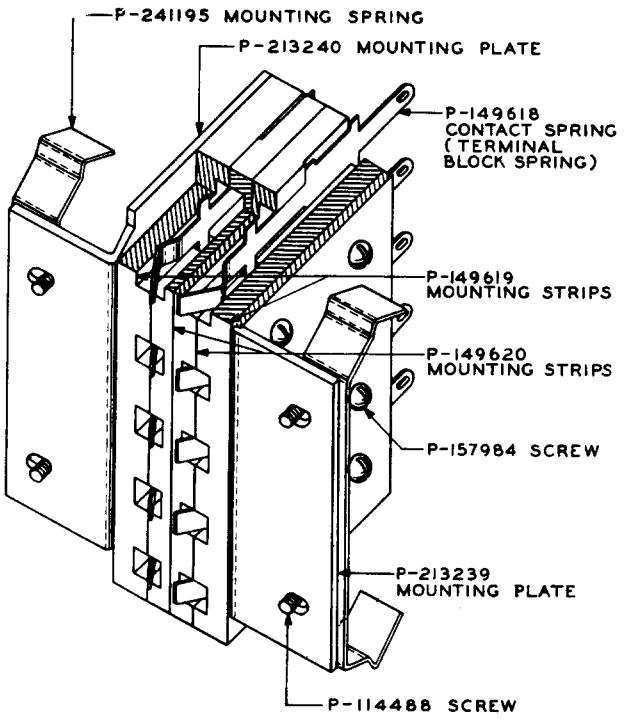
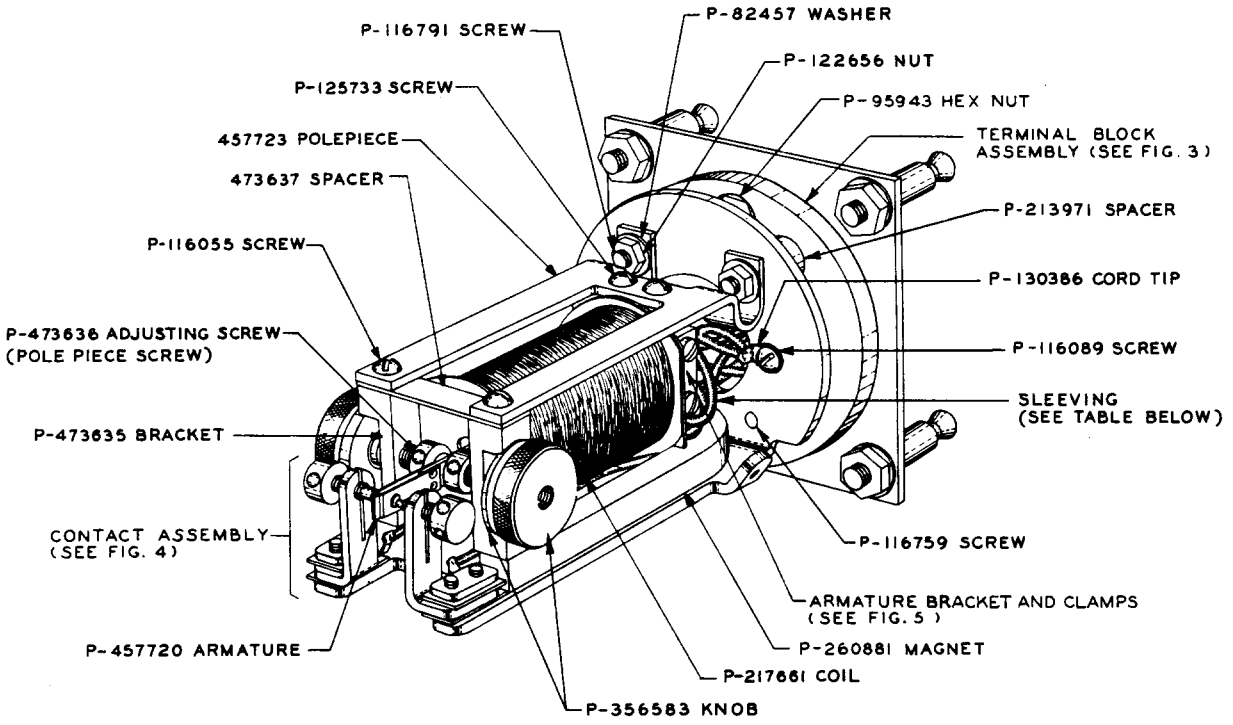


Fig. 1 - No. 18F Connecting Block



SLEEVING (ORDER BY THE FOOT - CUT TO SIZE)		
TERMINAL NO.	COLOR	P.P. NUMBER
1	BLUE WHITE	P-311320
4	BLACK	P-311319
5	RED	P-311318
2	GREEN BLACK	P-311327
3	BLUE	P-311317
6	WHITE	P-311314
7	RED BLACK	P-311328
8	-	-
9	GREEN	P-311316
10	ORANGE	P-311315

Fig. 2 - Modified No. 228A Relay per D-160118

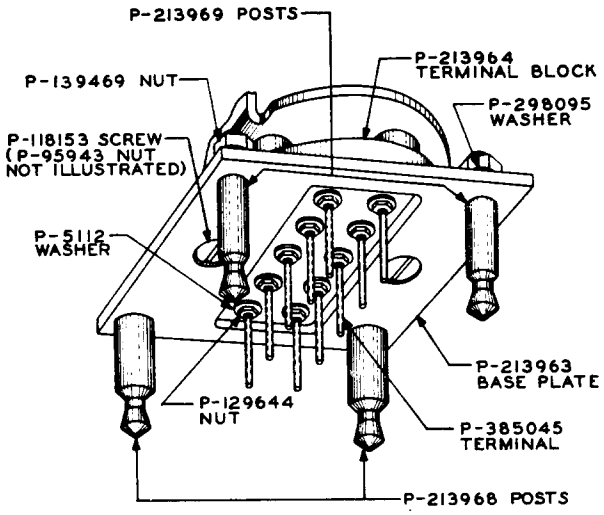


Fig. 3 - Terminal Block Assembly

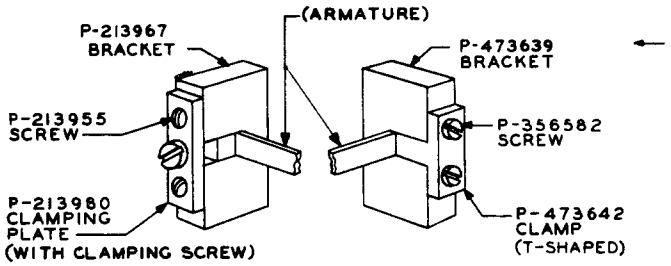


Fig. 5 - Armature Bracket and Clamps

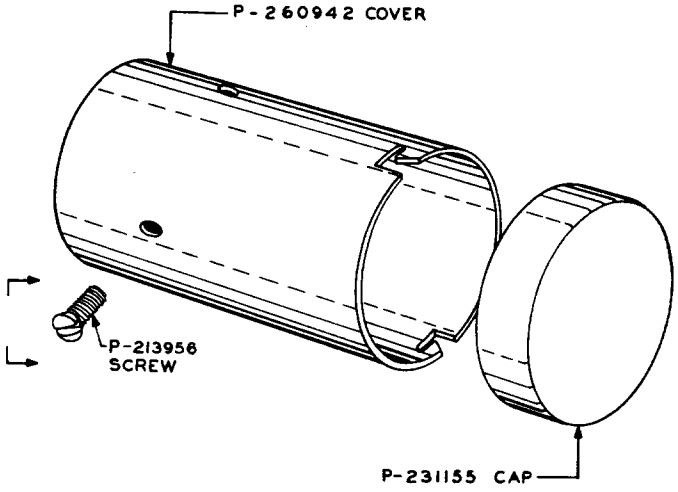


Fig. 6 - Cover and Cover Cap

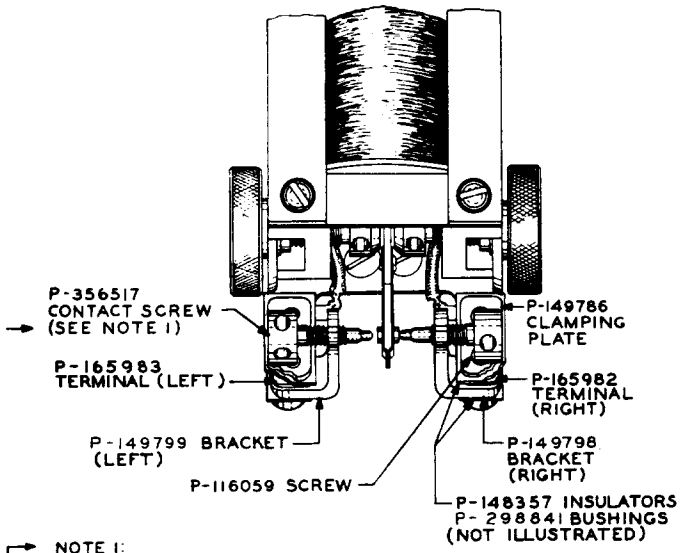


Fig. 4 - Contact Assembly

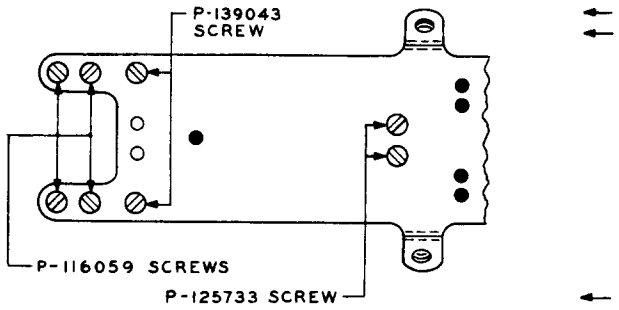


Fig. 7 - Bottom of Relay

3. REPLACEMENT PROCEDURES

3.01 List of Tools

Code No.	Description
46	3/8-inch Hex Single-end Socket Wrench
340	Adjusting Key
403A	5/32-inch and 3/16-inch Hex Double-end Socket Wrench
417A	1/4-inch and 3/8-inch Hex Open Double-end Flat Wrench
-	6-1/2-inch P-long-nose Pliers
-	3-inch Cabinet Screwdriver
-	4-inch Regular Screwdriver

3.02 Before making any replacement of the parts of a relay, remove the associated circuit from service in accordance with the approved procedures.

3.03 At the time of making a replacement of parts, clean the relay as covered in Section 069-306-801. After making any replacement of parts of the relay, the part or parts replaced shall meet the readjust requirements involved, as covered in Section 040-240-701. Other parts whose adjustment may have been disturbed by the replacing operations shall be checked to the test requirements, and an over-all operation check shall be made of the relay before restoring the circuit to service.

3.04 No replacement procedures are specified for screws and other parts when the replacement procedure consists of a simple operation.

3.05 Remagnetization of the permanent magnets of relays is required after removal as covered in Sections 040-240-701 and 040-231-811 covering remagnetization of permanent magnets.

3.06 To replace the majority of parts of the relay, it will be necessary to remove it from the connecting block and remove the relay cover. To remove the cover, remove the cover mounting screws with the 3-inch cabinet screwdriver.

Connecting Block Parts

3.07 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.

3.08 Connecting Block Springs: To replace an individual connecting block spring, unsolder the wire from the spring and loosen the connecting block mounting screws with the 3-inch cabinet screwdriver. Loosen the connecting block assembly screws sufficiently with the 3-inch cabinet screwdriver 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 clear the mounting strip. Tighten the connecting block assembly screws, connect the lead to the terminal of the connecting block spring which was replaced, and tighten the connecting block mounting screws.

3.09 Connecting Block 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 in the reverse order, taking care, before tightening the connecting block assembly screws, to see that the sides of the spring clear 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 modified No. 228A relay per D-160118 as a gauge to insure that the connecting block is properly positioned. Reconnect the leads to the connecting block terminals.

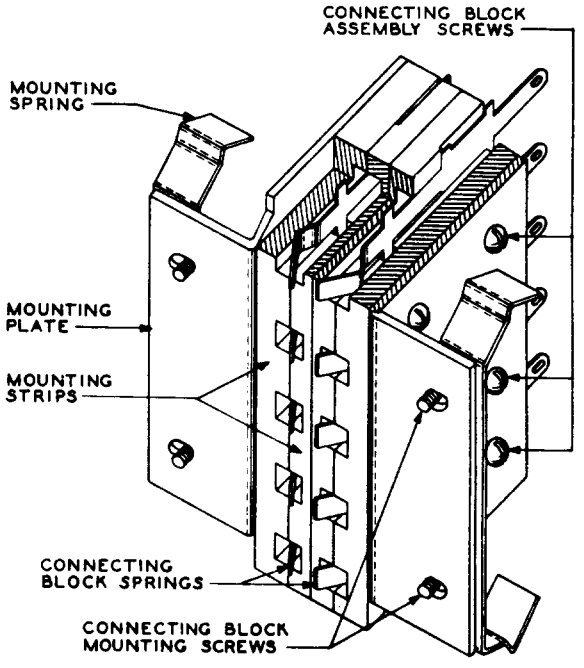


Fig. 8 - No. 18F Connecting Block

Relay Parts

3.10 Mounting Posts: Remove the mounting post nut with the No. 46 wrench and remove the mounting post from the base plate. Substitute the new part and tighten the mounting post nut securely.

3.11 Terminals: Remove the base plate mounting screws with the 4-inch regular screwdriver. Remove the two lower terminal block mounting screws with the 4-inch regular screwdriver. Remove the nuts on the two upper terminal block mounting screws with the No. 417A wrench, and remove the two associated terminal block mounting screws with the 4-inch regular screwdriver. Hold the large end of the terminal with the long-nose pliers, remove the terminal locknut and washer with the No. 403A wrench, and remove the terminal from the terminal block. Unsolder the lead from the terminal, place the new terminal in position, place a washer under the locknut, and tighten the locknut securely. If the sleeving on the lead is damaged, replace it at this time. Resolder the lead to the terminal, remount the terminal block assembly and terminal block spacing bushings to the base of the relay, and securely tighten the terminal block mounting screws and the associated nuts on the two upper screws. Remount the base plate so that the terminal numbers are in the same relative position as the terminal numbers on the terminal block.

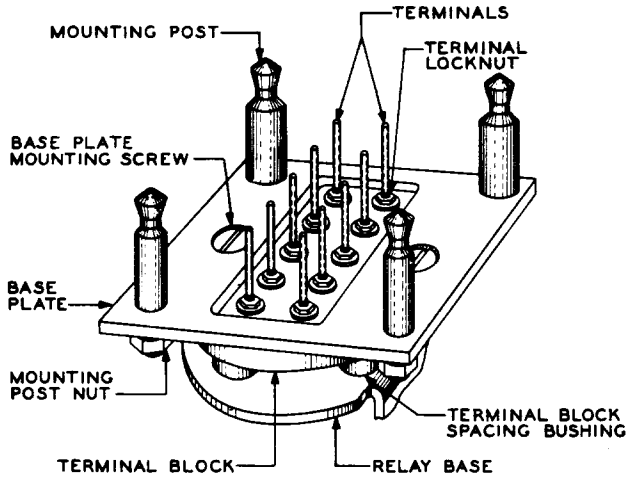


Fig. 9 - Terminal Block Assembly

3.12 Terminal Block: Remove the base plate and terminal block mounting screws as covered in 3.11. Remove the terminal locknuts and washers from all terminals with the No. 403A wrench, taking care to mark or otherwise record the positions of the terminals so that they can be reassembled in the new block in their proper positions. Remove the old terminal block from the terminals and substitute the new one. Remove the two hexagonal nuts from the old terminal block, set them in the new terminal block, and reassemble the parts as covered in 3.11.

3.13 Armature: If the relay is equipped with a clamping screw, loosen the clamping screw with the 4-inch regular screwdriver. If the relay is equipped with

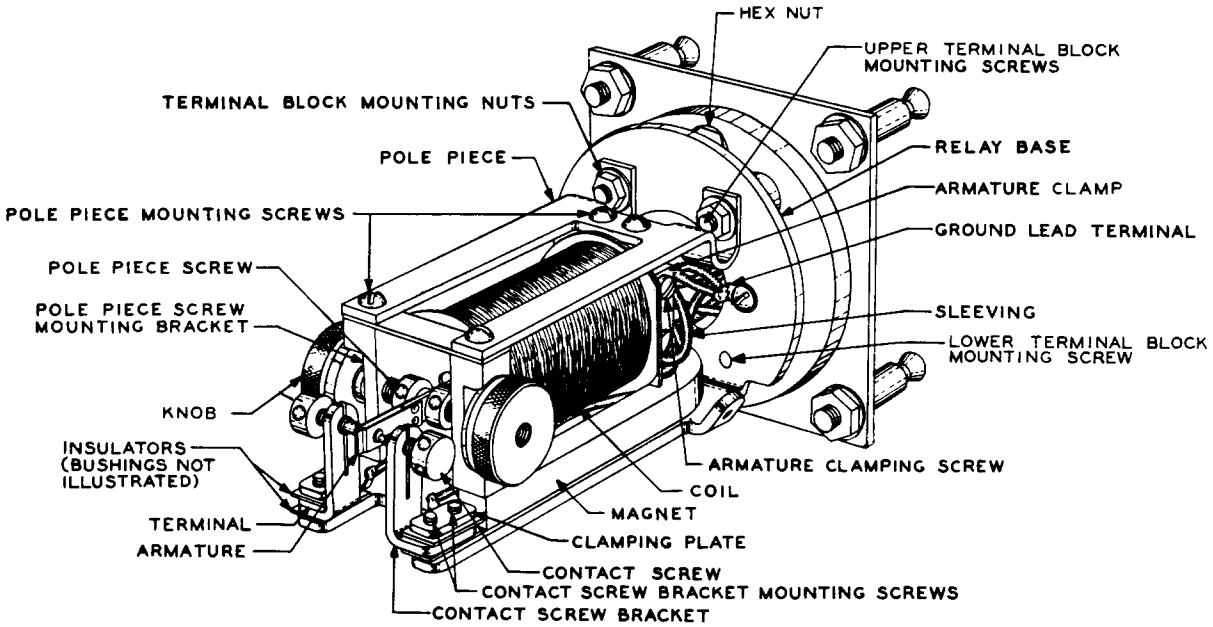


Fig. 10 - Designation of Relay Parts

a T-shaped clamp, use the 3-inch cabinet screwdriver to loosen the screws. Withdraw the armature from the front of the relay. Insert the new armature through the coil of the relay. Locate the armature so that the contacts line up properly and securely tighten the clamping screw or screws.

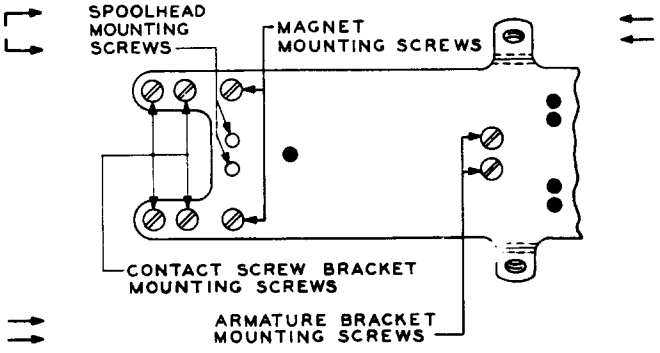


Fig. 11 - Bottom of Relay

3.14 Armature Clamp: Remove the armature as covered in 3.13. Remove the screws that hold the clamp or clamping plate to the armature bracket. Install the new clamp or clamping plate and replace the screws. Replace the armature as covered in 3.13.

3.15 Contact Screw Brackets: Remove the contact screw from the bracket to be replaced, using the No. 340 adjusting key. Remove the contact screw bracket mounting screws with the 3-inch cabinet screwdriver. Take care, when doing this, not to lose the clamping plate, insulators, or bushings, or damage the lead connected to the terminal. At this time, check the condition of the insulators and bushings and replace them if necessary. Substitute the new bracket and reassemble in the reverse order, tightening the contact screw bracket mounting screws slightly. Install the contact screw in the bracket and position the bracket so that the contacts line up properly. Holding the bracket in position, tighten the contact screw bracket mounting screws securely.

3.16 Pole-piece Screws and Pole-piece Screw Mounting Bracket: To replace a pole-piece screw or pole-piece screw mounting bracket, remove the magnet mounting screw and the pole-piece mounting screw associated with the bracket with the 3-inch cabinet screwdriver, and remove the bracket. Remove the knob and the pole-piece screw. Substitute the new part and reassemble the pole-piece screw, bracket, and knob. Remount the bracket so that the pole-piece screw lines up properly, and tighten both mounting screws securely.

3.17 Pole Piece: Remove the pole-piece mounting screws with the 3-inch cabinet screwdriver. Remove the nuts and washers on the terminal block mounting screws with the No. 417A wrench and the two associated terminal block mounting screws with the 4-inch regular screwdriver. Replace the pole piece. Reposition the screws and tighten all screws and nuts securely.

3.18 Armature Bracket: Remove the armature as covered in 3.13. Remove the pole piece as covered in 3.17. Remove the armature bracket mounting screws with the 3-inch cabinet screwdriver and remove the bracket. Substitute the new bracket and tighten the bracket mounting screws securely. Reassemble the armature and pole piece as covered in 3.13 and 3.17, respectively.

3.19 Magnets: 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 3.05.

When it becomes necessary to replace a magnet, proceed as follows. Remove the base plate mounting screws with the 4-inch regular screwdriver. Remove the nuts and washers on the upper terminal block mounting screws with the No. 417A wrench and unscrew the two associated terminal block mounting screws until the ends of the screws are slightly underflush with the relay base. Loosen the armature clamping screws as outlined in 3.13 and withdraw the armature. Remove the magnet mounting screws and the armature bracket mounting screws using the 3-inch cabinet screwdriver, lift off the pole piece, pole-piece screw brackets, and the armature bracket as an assembly from the relay base. Remove the front spoolhead mounting screws using the 3-inch cabinet screwdriver and lift the coil assembly sufficiently so that the manget may be removed. Position the new magnet. Make sure that the beveled edge at the rear of the magnet is adjacent to the base and the punch mark on the side of the magnet (when the magnet has a punch mark) is on the left-hand side of the magnet looking at the contact end of the relay. Reassemble the parts in the reverse order; make sure the base plate is mounted so that the terminal numbers are in the same relative position as the terminal numbers on the terminal block. Tighten all screws securely.

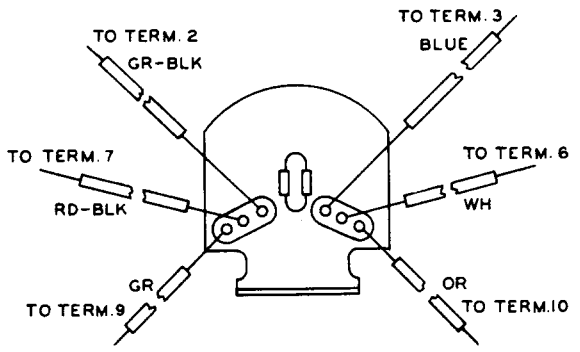


Fig. 12 - Sleeving of Coil Leads

3.20 Coil: When replacing the coil, observe the cautions for the magnet as outlined in 3.19. To replace the coil dismount it as outlined in 3.19. Remove the terminal block mounting screws and spacing bushings using the 4-inch regular screwdriver. Tilt the terminal block away from the relay base. Unsolder the coil leads from the terminals. Remove the coil and replace it with a new coil. Apply the sleeving to the coil leads and solder the leads to the terminals as covered in Fig. 12. If the sleeving on the lead is damaged, replace it at this time. Reassemble the other parts in the reverse order and tighten all screws and nuts securely.

REASONS FOR REISSUE

1. To add piece-part data for additional relay parts, the replacement of which is possible due to facilities for remagnetization of the magnet (Fig. 2, 5, 7, and 12).
2. To revise the terminal numbers (Table, Fig. 2).
3. To delete piece-part data for contact screw P-213929 having No. 4 contact metal and to refer to tungsten contact screws only (Fig. 4).
4. To add reference to procedures for remagnetization of the magnets (3.05).
5. To designate additional relay parts (Fig. 6, 10, and 11).
6. To add replacement procedures for the parts added to Fig. 2, 5, and 7 (3.16 through 3.20).