MAIN DISTRIBUTING FRAMES
MAINTAINING PROTECTORS

1. GENERAL

1.01 This section describes methods of maintaining protector blocks, protector units, and heat coils.

1.02 This section includes information originally contained in Section 201-206-301 which was canceled.

1.03 The kinds of protection to use in particular cases are described in Section 201-202-101.

1.04 If evidence is found, or there is suspicion, of abnormally high voltage conditions or contact between foreign potentials and central office main frame terminations, the following precautions shall be observed.

(a) Notify supervisor and test center.

(b) Notify other employees who may have occasion to work on the frame.

(c) Avoid all contact with associated frame terminations until so authorized by the test center.

(d) If the test center requests that heat coils or protector blocks be inspected, wear lineman's rubber gloves for the following.

(1) On C-, E-, 1177, or similar type protector mountings, use KS-2827 heat coil pliers to remove and replace heat coils and B long-noise pliers to remove and replace protector blocks.

(2) On 300-type connectors, use the KS-16567 tool to remove or replace the protector units.

Note: Insulating gloves shall be mechanically inspected immediately before they are used, in accordance with Section 075-141-501.

2. TOOLS AND MATERIALS

2.01 ***List of tools and materials.***

CODE OR SPEC NO.	DESCRIPTION
KS-2827	Heat Coil Pliers
KS-14540 List 1	Protector Spring Support (for 1177-, C-, and E-type protectors)
KS-14540 List 2	Protector Spring Support (for 1268- and 1269-type protectors)
KS-16567	Protector Unit Wrench (for 300-type connectors)
R-1102	Fibre Spudger
—	Insulating Gloves per Specification AT-7743
—	B Long-nose Pliers
—	Typewriter Brush (toothbrush type)
KS-2423	Cloth
KS-6854	Screwdriver (used with 760B tool to disassemble 302-type protectors) (or equivalent)
760B	Tool Assembly (for disassembling 302- and 303-type protectors)

3. REMOVING, INSPECTING, CLEANING, AND PLACING PROTECTOR BLOCKS AND HEAT COILS

3.01 Both the porcelain and carbon blocks shall be handled and stored carefully. They should be kept either in the original shipping cartons or in approved holders or cabinets.

3.02 When protector blocks are removed for any reason, they shall be inspected and cleaned.

3.03 On all circuits where heat coils are used, the same type of heat coil shall be used in both sides of the same circuit. In the case of phantom toll line groups, the same type of heat coil shall be used in each line associated with the same group.

3.04 Before reusing coils, they shall be inspected for dirty contact surfaces and defects. Heat coils which have operated or have any of the following defects shall be discarded:

(a) Loose connections on head of coil

(b) Loose contact pin or washer

(c) Injured or loose winding

(d) Contact pin showing evidence of having been cut or operated.

3.05 The method of cleaning the contacts of heat coils and protector springs is covered in Section 069-315-801.

A. C-, E-, 1177, or Similar Type Protector Mountings

Removing Protector Blocks

3.06 When removing protector blocks from circuits which are ***not*** suspected of having abnormally high voltages present and do ***not*** require special safeguarding measures (telegraph loops, carrier circuits, PBX battery, and ringing supply circuits), the following procedure is recommended.

(1) Press the flat end of a spudger against the inside of the protector spring and move outward sufficiently to relieve the tension on the protector block.

(2) Pull the blocks forward carefully by hand until entirely clear of the protector mounting and withdraw the spudger.

3.07 When removing protector blocks from circuits which are suspected of having abnormally high voltages present, insulating gloves (note in 1.04) shall be worn and the following procedure should be followed.

(1) Press the flat end of the spudger against the inside of the protector spring and move outward sufficiently to relieve the tension on the protector block.

(2) Pull the blocks forward carefully by using the B long-nose pliers until entirely clear of the protector mounting and withdraw the spudger.

3.08 When removing protector blocks from circuits requiring special precautions (telegraph loops, carrier circuits, PBX battery, and ringing supply circuits, etc), the KS-14540 tool should be used when directed by the test center. This tool prevents the line from becoming grounded and is used in the following manner.

(1) Insert the metal prong of the KS-14540 tool under the front end of the protector spring and raise the spring about 1/8 inch. Slide the tool along the spring approximately 1/2 inch, taking care not to dislodge adjacent protector blocks.

(2) Allow the spring tension to draw the tool toward the protector, noting that the fibre legs of the tool rest on the porcelain frames of the adjacent blocks (Fig. 1).

(3) With the tool in place, as shown in Fig. 1, remove the block by hand.

(4) Reverse the procedure to place the blocks in the protector mounting.

Inspecting Porcelain and Carbon Blocks

3.09 Inspect porcelain and carbon blocks for indications of chips and cracks. One side of the carbon block may show sufficient pitting to cause rejection of the use of that side, but if the reverse side appears satisfactory, the latter side of the block should be utilized. Discard porcelain and carbon blocks if subject to any of the defects listed below. Judge all dimensions by eye.

(a) Porcelain blocks which have chips in the porcelain of greater dimensions than those shown in Fig. 2 and 3. As shown in Fig. 2, all four spring groove wall corners may be chipped provided the two larger chips are on opposite ends of the block.

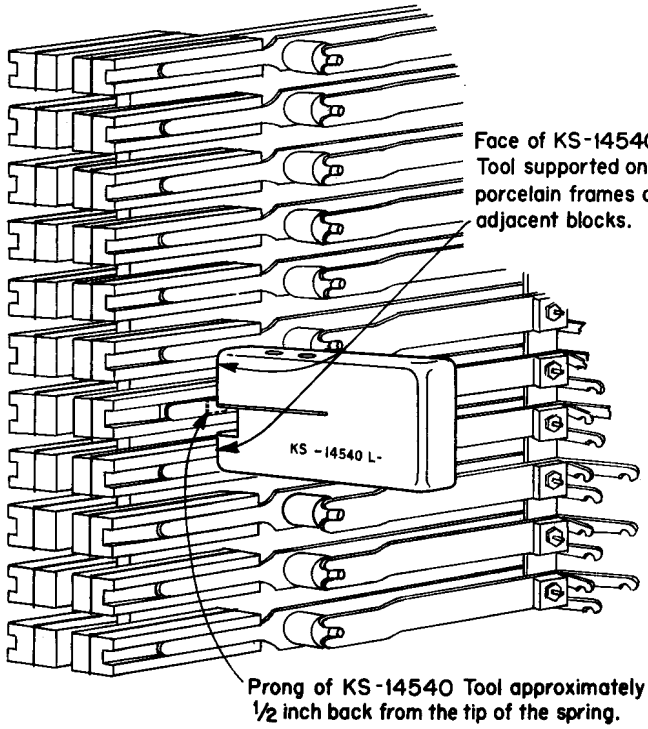

Fig. 1—Method of Using KS-14540 Tool

(b) Porcelain blocks which have any chip or crack in the porcelain that extends to the carbon insert.

(c) Porcelain blocks which show evidence that the carbon insert has moved.

Note: This condition may be indicated by cracked or otherwise damaged cement between the carbon insert and the porcelain.

(d) Porcelain and carbon blocks in which the operating surfaces contain any pit greater than 1/16 inch in diameter.

(e) Porcelain blocks in which the carbon insert contains a chip which extends closer to the center than 1/16 inch. On the spring contact surface this chip shall not extend along the edge for a distance greater than the width of the block. On the sparking surface this chip shall not extend along the edge for a distance greater than the width of the insert.

(f) Carbon blocks in which the chips exceed the following requirements.

- On 26-type protector blocks, chips shall not extend closer to the center than 1/16 inch from the long sides and 3/8 inch from the ends.

- On 28-type protector blocks, chips shall not extend closer to the center than 1/32 inch from the long sides and 1/4 inch from the ends.

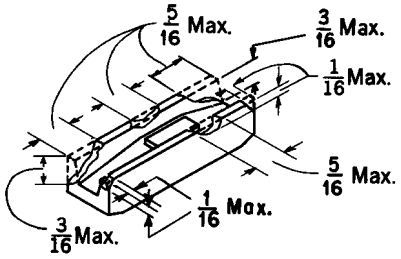

Fig. 2—Maximum Permissible Chips in Spring Groove Walls

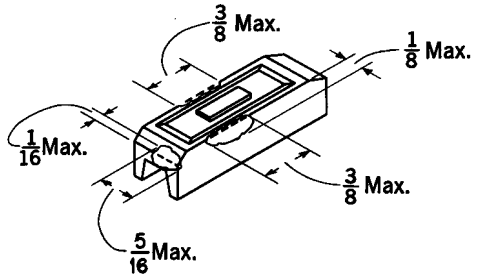

Fig. 3—Maximum Permissible Chips in Moat Walls

Cleaning Protector Blocks and Micas

3.10 Clean porcelain and carbon blocks, which pass inspection as outlined in 3.09, by brushing their operating surfaces with a typewriter brush to remove loose dirt and other foreign matter. In brushing the porcelain block, brush not only the surfaces of the carbon insert but the whole face of the porcelain around the insert.

3.11 Discard protector blocks if subject to any of the defects listed below:

(a) Dirt or other foreign matter cannot be removed

(b) Carbon sparking areas which are glazed, scratched or cracked, or show signs of soft or unduly roughened spots on those areas.

Note: Do not discard blocks because of discoloration of the carbon or porcelain surfaces.

(c) There is a black deposit on the porcelain extending from the carbon insert to the raised edge of the block on the moat side.

3.12 Reuse porcelain and carbon blocks which do not have any evidence of the defects outlined in 3.09 and 3.11.

3.13 A great deal of care must be exercised when cleaning or placing carbon blocks and micas. Imperfect cleaning or accumulation of dust is likely to result in such service troubles as noisy lines, permanent signals, premature tripping of ringing relays, poor transmission, etc.

3.14 Clean carbon blocks and micas before placing them in protectors in the following manner.

(1) Wipe the carbon blocks and micas on a KS-2423 cloth with moderate pressure until all dust appears to be removed.

(2) Check by wiping on a clean portion of the cloth. No appreciable mark should be left.

(3) Do not rub carbon surfaces together or use any abrasive method of cleaning.

(4) Reject carbons which are badly pitted or in which the metal globule is damaged so that it extends above the surface of the carbon.

Placing Protector Blocks and Micas

3.15 Place porcelain and carbon blocks, except as covered in 1.04 and 3.08, by holding the assembly firmly by hand and pressing it in place on the protector mounting so that the outside protector spring rests squarely against the carbon insert of the porcelain block. Avoid sliding motion between the blocks as resultant loosened particles are a potential service hazard.

3.16 Place carbon blocks and micas in protectors as follows, except as covered in 1.04 and 3.08.

(1) Insert mica between two carbon blocks so that the notched edge is flush with the bottom of the carbons and the straight edge projects above the top of the carbons.

Note: Only one mica is to be used in a single assembly, and the face of the carbon containing the metallic globule shall be turned toward the mica.

(2) Hold the assembly firmly by hand and place squarely between the protector springs. Avoid sliding motion between mica and carbons, as resultant loosened particles are a potential service hazard.

(3) Check to see that the blocks rest between the protector springs properly so that there is no possibility of causing a cross between adjacent protectors.

Placing and Removing Heat Coils

3.17 When it is necessary to remove heat coils from circuits which are ***not*** suspected of having abnormally high voltages present, the heat coils may be removed with the KS-2827 heat coil pliers. When it is suspected that abnormally high voltages ***are*** present, protective rubber gloves (note in 1.04) are worn.

3.18 Place heat coils in the protector mounting so that the slot in the fibre portion of the heat coils faces outward. In this position the solder on the washer of the heat coil will be in the protector spring slot and the protector spring will be in contact with the metal washer. If the coil is placed in any other position, the protector spring may rest on a portion of the solder. This condition is likely to cause a poor connection with resultant service trouble.

Note: The foregoing procedure need not be observed in placing the 73A-, 75-, and 76A-type heat coils.

B. 300-Type Connectors (1A1-Type Protector)

Removing Protector Units

3.19 To remove protector units from circuits which are not suspected of having abnormally high voltages present, proceed as follows. Grasp the cap of the protector unit with thumb and

forefinger and rotate 45° counterclockwise; then withdraw the protector unit. For ease in performing this operation, the KS-16567 tool should be used.

3.20 When it is necessary to remove protector units from circuits which are suspected of having abnormally high voltages present, insulating gloves (note in 1.04) should be worn and the KS-16567 tool should be used in all cases.

Removing 121-Type Protector Units

3.21 When the 121-type protector units are removed, the cable conductors may be automatically grounded. Therefore, before removing these protector units from circuits which have potential on the cable side (telegraph loops, carrier circuits, etc), the associated equipment should be taken out of service. It may be necessary to disconnect the equipment from the cable pair to prevent damage to the equipment. For this reason the modified B test clip with the M2EM cord is not recommended for use with the 121-type protector units.

3.22 Disassemble the protector unit by holding the cap in one hand and the sleeve (Fig. 4) with the other hand. Withdraw the sleeve (containing the heat coil and protector blocks) from the cap.

3.23 To remove the protector blocks from the sleeve, first withdraw the heat coil and then remove the blocks.

3.24 Discard porcelain blocks (33A or 33B), carbon blocks (32B), or dummy blocks (34A1) where provided having any of the defects listed below:

(a) Chips or cracks

(b) Carbon surfaces show evidence of glazing

(c) Carbon inserts are loose.

3.25 Inspect heat coils for the defects listed in 3.04. Heat coils may be removed from the protector unit without removing the sleeve from the cap.

Cleaning Protector Blocks and Carbons

3.26 Clean porcelain and carbon blocks, which pass inspection as outlined in 3.24, by brushing their operating surfaces with a typewriter brush to remove loose dirt and other foreign matter. In brushing the porcelain block, brush not only the surfaces of the carbon insert but the whole face of the porcelain around the insert.

3.27 Discard protector blocks if subject to any of the defects listed below:

(a) Dirt or other foreign matter which cannot be removed

(b) Carbon sparking areas which are scratched or show signs of soft or unduly roughened spots on those areas

(c) There is a black deposit on the porcelain extending from the carbon insert to the raised edge of the block on the moat side.

3.28 Reuse porcelain and carbon blocks which do not have any evidence of the defects outlined in 3.24 and 3.27.

Assembling and Placing Protector Units

3.29 Place the protector blocks in the sleeve of the protector unit (Fig. 4) before the heat coil is installed.

Note: If the ends of the sleeve have been spread too far apart to hold the blocks in place, they may be squeezed together with the fingers before the blocks are placed in the sleeve.

3.30 After the protector blocks (or dummy blocks) are in place, insert the heat coil so that the operating pin falls within the hole in the sleeve and the carbon or dummy block.

3.31 Then place the assembled sleeve containing the protector blocks and coil in the cap so that the end containing the protector blocks is within the cap.

Note: It may be necessary to rotate the sleeve slightly before it will enter the grooves within the cap.

3.32 The protector unit may then be held in the fingers or with the KS-16567 tool and inserted into the 300-type connector. With the unit in place, twisting it 45° counterclockwise leaves it in the open position; pushing it in to the limit and

twisting it 45° clockwise, leaves it in the cut-through position.

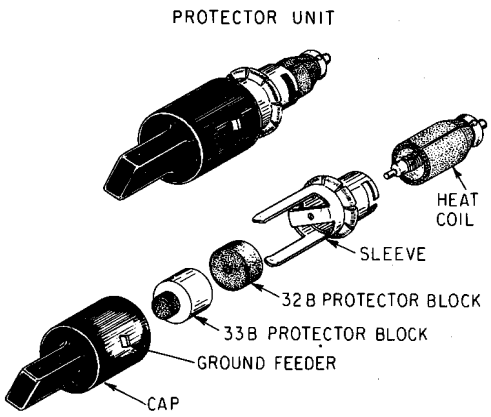

Fig. 4—Protector Unit and Components

C. 302- and 303-Type Connectors Removing Protector Units

3.33 To remove protector units from circuits which are not suspected of having abnormally high voltages present, proceed as follows. Grasp the handle of the protector unit and withdraw the unit from the connector jack.

3.34 When it is necessary to remove protector units from circuits which are suspected of having abnormally high voltages present, insulating gloves (note in 1.04) should be worn in all cases.

3.35 Protector units for the 302- and 303-type connectors may be tested without disassembly by using the KS-20100 L1 or L2 test set provided for this purpose. Protectors can be tested for tip and ring continuity and shorted or grounded carbon blocks. A burn out feature is provided to clear carbon blocks shorted by carbon dust or particles. Procedure for tests is covered in Section 201-208-501.

3.36 If the protector units for the 302- or 303-type connectors are found to be defective when tested on the KS-20100 L1 or L2 test set, they may be disassembled using the 760B tool assembly (Fig. 5).

Disassembling Protector Unit for 302-Type Connectors

3.37 Insert the protector unit into the 760B tool assembly per Fig. 5. Using the KS-6854 screwdriver, remove retaining screw from the base of the protector, and withdraw the protector shell. Heat coils and/or carbon blocks are now exposed for inspection and replacement.

Disassembling Protector Unit for 303-Type Connectors

3.38 Insert the protector unit into the 760B tool assembly per Fig. 5. Press down on protector handle to disengage protector shell retaining tabs and withdraw the protector shell. Heat coils and/or carbon blocks are now exposed for inspection and replacement.

3.39 If the porcelain block (33A or 33B) and carbon block (32B) contain any chips or cracks, they are to be discarded. If the carbon surfaces show evidence of glazing or if the carbon inserts are loose, they are to be discarded. In the 3A protector unit for 302-type connectors, carbon blocks are enclosed with a fusible alloy disc in a brass shell. If this unit tests defective on the KS-20100 L1 or L2 test set, the brass shell shall not be disassembled but must be replaced. Heat coils shall be inspected for the defects listed in 3.04.

Cleaning Protector Blocks and Carbons

3.40 Procedure for cleaning protector blocks and carbons is covered in 3.26 through 3.28.

Assembling and Placing Protector Units for 302- and 303-Type Connectors

3.41 Reassemble protector components per Fig. 6, and Fig. 7 using 760B tool to hold unit in place. When components are in place, replace protector shell. On the protector unit for 302-type connectors replace retaining screw. On the protector unit for 303-type connectors press down shell lightly. Place thumb and forefinger into recesses on 760B tool. Grasp base of protector unit. Raise base into shell until retaining tabs on shell engage base. Remove protector unit from 760B tool assembly.

3.42 Retest protector unit per Section 201-208-501. When protector is tested satisfactorily, replace protector into connector jack.

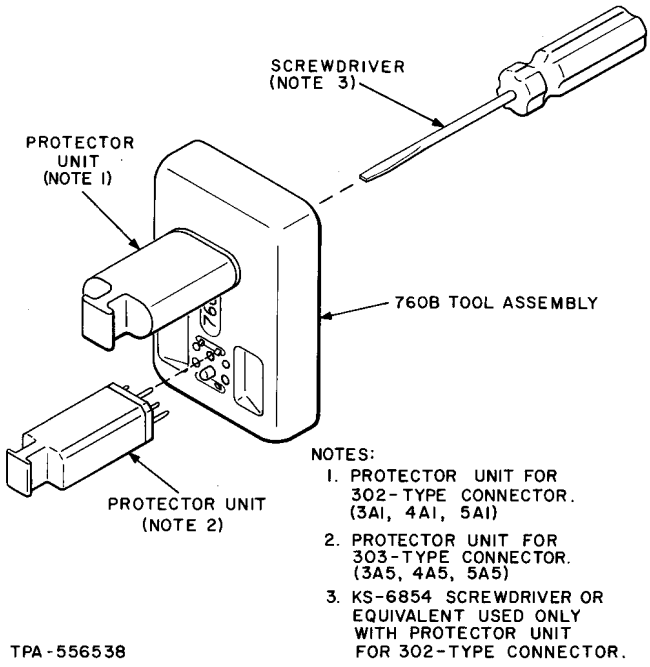

Fig. 5—760B Tool Assembly

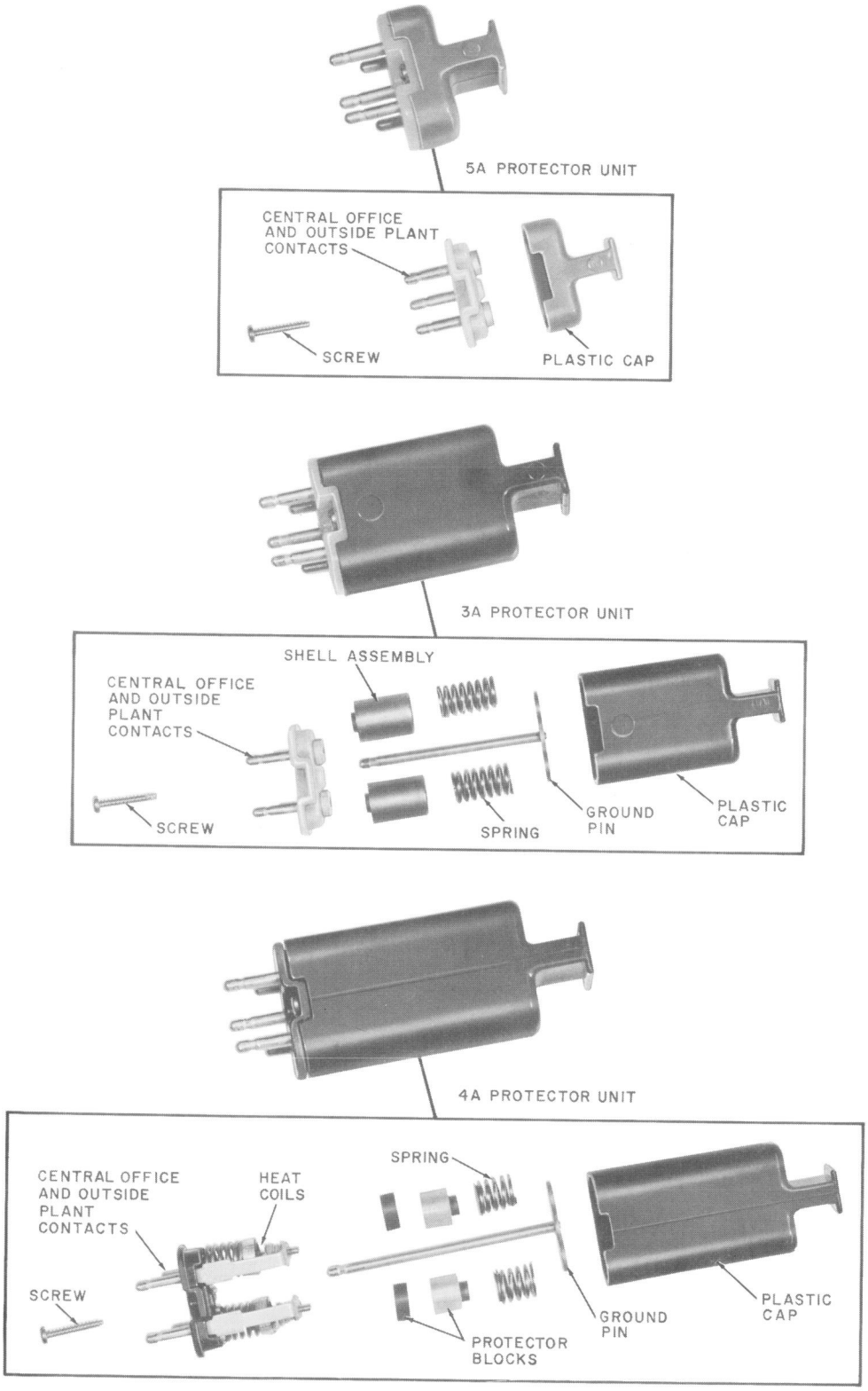

Fig. 6—Protector Units for 302-Type Connector

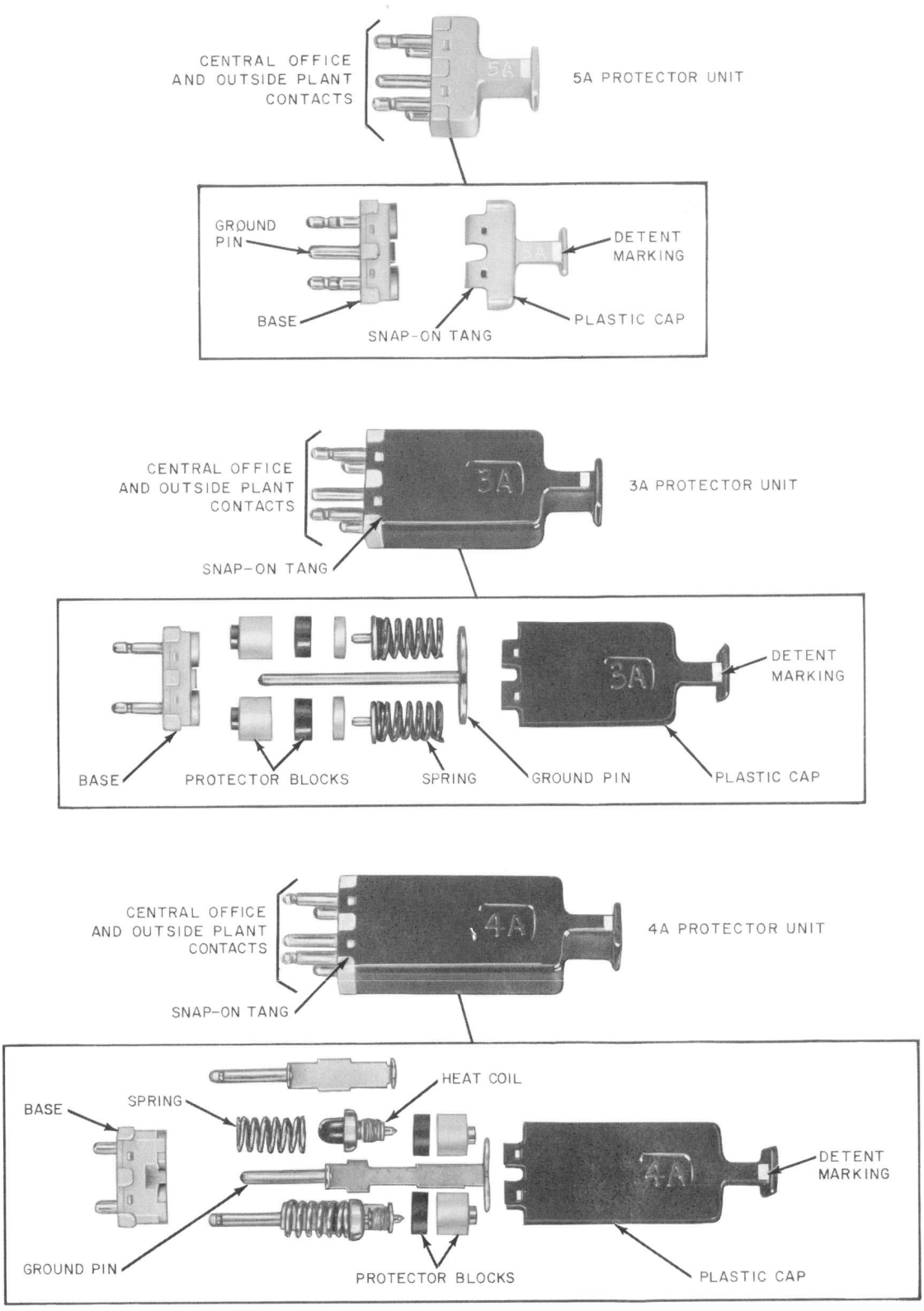

Fig. 7—Protector Units for 303-Type Connector