2-, 6-, AND 11-TYPE PROTECTOR UNITS DESCRIPTION AND MAINTENANCE

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1. GENERAL

1.01 This section covers the description and maintenance of 2-type (carbon block), 6-type (gas tube), and 11-type (gas tube) protector units.

1.02 This section is reissued to include information on 11A1A protector units and to revise text. Since this is a general revision, the arrows ordinarily used to indicate changes have been omitted.

1.03 The 2-type protector unit, when installed in a suitable mounting, provides a small air gap between a line conductor and ground. This air gap provides a path to ground when abnormally high voltages are applied to the line, such as might result from lightning or from contacts between telephone conductors and high voltage power wires.

1.04 The 6-type protector units are intended for use in areas where frequent service interruption is caused by the permanent grounding of carbon block protectors.

1.05 The 6-type protector units shall not be used for subscriber station protection unless they are installed in a protector such as the 123B1A which is specifically designed for that purpose. ***Do not replace carbon block protector units with 6-type protector units.***

1.06 The 11-type protector units are intended as replacements for carbon block protector units where their use is justified by frequent troubles with carbon block protectors. This protector unit may be used on customer stations and all other applications without parallel carbon blocks. ***Do not place carbon blocks in parallel with 11-type protector unit.***

2. PROTECTOR UNITS—DESCRIPTION

2A-Type Protector Units

2.01 The 2A-type protector units are described in Table A.

2B-Type Protector Units

2.02 The 2B-type protector units are described in Table B.

6- and 11-Type Protector Units

2.03 6- and 11-type protector units are described in Table C.

TABLE A

2A-TYPE PROTECTOR UNITS
(7/16 INCH CAST WELL OR NONCAST WELL)

PROTECTOR UNIT	FIG. NO.	PROTECTOR BLOCK (COLOR)	AIR GAP (INCHES)	NOMINAL BREAKDOWN VOLTAGE (VOLTS–DC)	USE	APPLICATION
2A1A	1	32A and 33B (White)	0.003	500	Subscriber Station Protection and Multipair Terminals	106C, 116C, 117B, and 134A1A Protectors, 57B1A Connecting Blocks, 1A4A, 6A3A, and 9A1A-Type Terminal Blocks NH-Type Cable Terminals
2A1B	2	32A and 39A (Blue)	0.006	800	Cable Protection and Protection of Rural or Urban Wire at Junction With Open Wire or Drop Wire	NC-Type Cable Terminal 3A2B-3, 6A4B-3, and 9A1B-Type Terminal Blocks 116-Type Protectors
2A1D	3	(Note 1) 33B (White)	(Note 1)	———	Dummy	Used as temporary replacement for 2A1A and 2A1B protector units in distribution terminals and terminal blocks to seal protector unit wells and prevent spacing assemblies from contacting metal well lining and grounding cable pair (Note 2)
2A1E	4	32A and 33C (Yellow)	0.010	1200	Special Applications	Supplementary lightning protection on open wire or rural wire line when used with 116- or 119-type protectors or for protection of joint use lines over 2.9 Kv used in 116-type protectors

Note 1: No carbon insert in 33B protector block.

Note 2: When 1530-type inductors are used at junctions of open wire or drop wire and cable containing N carrier pairs, replace the 2A1B protector unit in the cable terminal with 2A1D protector unit to make the 2A1B protector unit in the 1530 inductors function properly, (see Section 627-365-100).

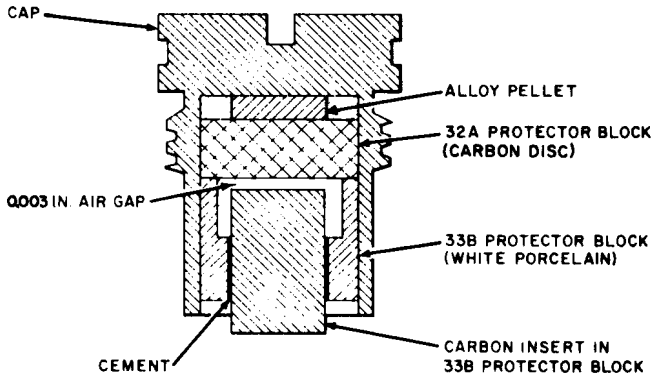

Fig. 1—2A1A Protector Unit

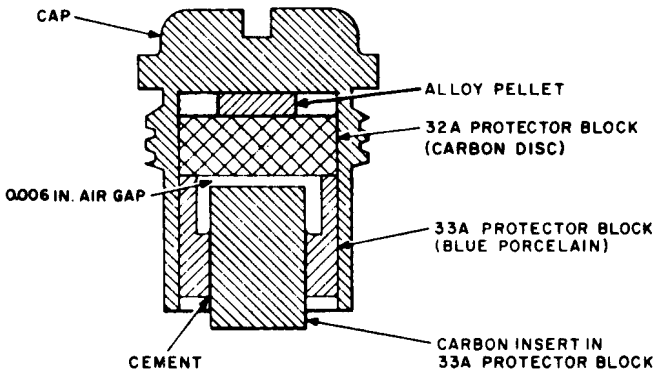

Fig. 2—2A1B Protector Unit

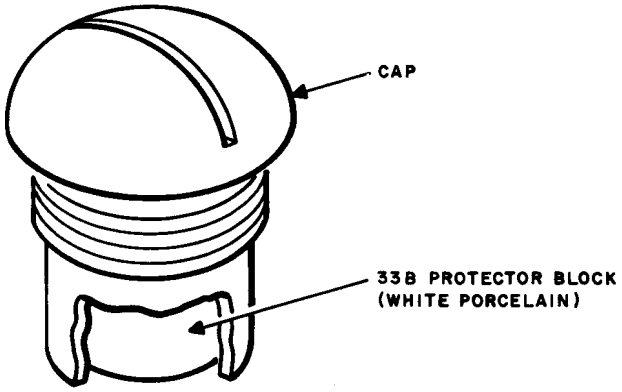

Fig. 3—2A1D Protector Unit

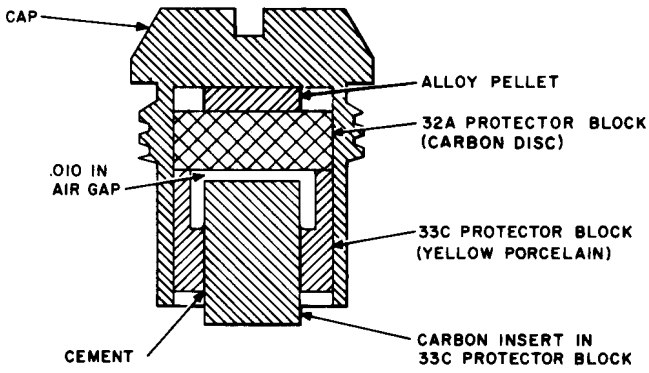

Fig. 4—2A1E Protector Unit

TABLE B

2B-TYPE PROTECTOR UNITS
(1/2-INCH CAST WELL)

PROTECTOR UNIT	FIG. NO.	SUPERSEDES[1]	PROTECTOR BLOCK (COLOR)	AIR GAP (INCHES)	NOMINAL BREAKDOWN VOLTAGE (VOLTS–DC)	USE	APPLICATION
2B2A	5	2B1A	32A and 33B (White)	0.003	500	Station Protection	123A1A, 123B1A, and 128A1A Station Protectors and 104- and 108-Type Drainage Protectors
2B2B	5	2B1B	32A and 33A (Blue)	0.006	850	Cable Protection	103- and 108-Type Drainage Protectors and 123A1B, and 129-Type Protectors
2B2E	5	2B1E	32A and 33C (Yellow)	0.010	1400	Special Application	123A1E Protectors

Note 1: 2B1-type protector units are equivalent to 2B2-type protector units except the earlier unit has a machined brass cap rather than stamped brass.

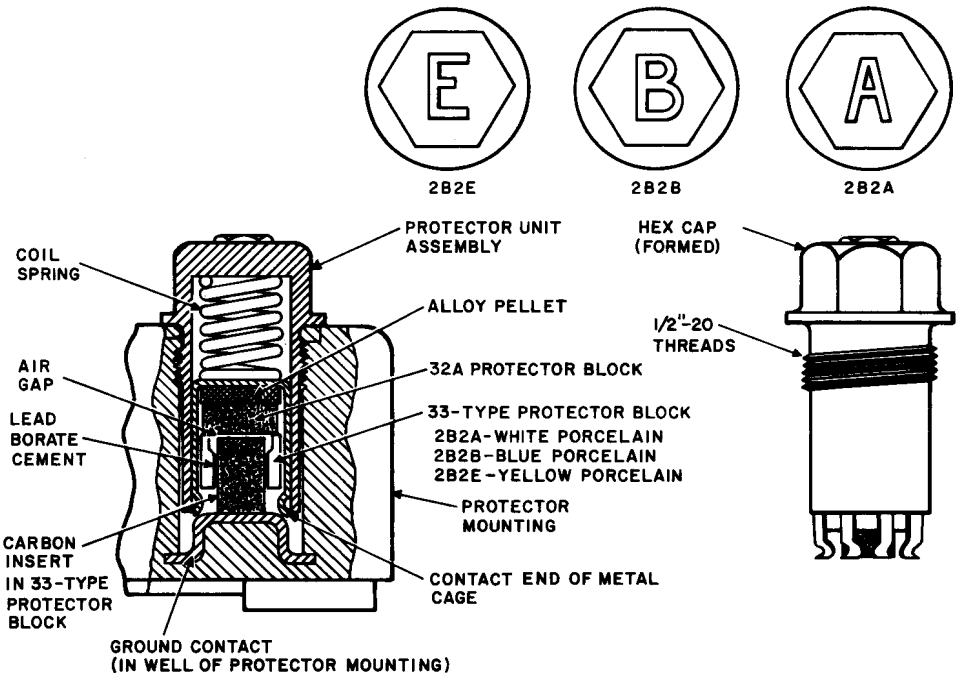

Fig. 5—2B-Type Protector Unit

TABLE C

6- AND 11-TYPE GAS TUBE PROTECTOR UNITS

PROTECTOR UNIT	FIG. NO.	NOMINAL BREAKDOWN VOLTAGE	USE	DIAMETER/ ASSOCIATED PROTECTOR WELL ASSEMBLY
6A1A	6	280	Direct field replacement of 2A-type protector units in high lightning areas (Note 1)	7/16-Inch Cast Well or Noncast Well
6B1A	7	280	Direct field replacement of 2B-type protector units in high lightning areas (Notes 1 and 2)	1/2-Inch Cast Well
11A1A (Note 4)	8	500	Direct field replacement for 2A1A protector units in 106C and 134A1A protectors, 1A4A and 6A3A terminal blocks, and NH-16 cable terminals in areas of high lightning and power exposure (Note 1)	7/16-Inch Cast Well or Noncast Well
11B1A (Note 4)	9	500	Direct field replacement of 2B2A protector unit in 123A1A- and 128A1A-2 type protectors for surge protection in high lightning or power exposure areas (Note 3)	1/2-Inch Cast Well

Note 1: 6-type and 11A1A protector units are not furnished with protectors, terminal blocks, etc, and must be ordered as required. Do not replace carbon block protector units with gas tube protector units.

Note 2: When used for station protection, they must be paralled with 2B-type protector units.

Note 3: 123E1A and 128E1A-2 station protectors are supplied with 11B1A protector units as standard 1- and 2- pair station protectors respectively.

Note 4: A recessed circle and white paint on the cap identify 11-type protector units.

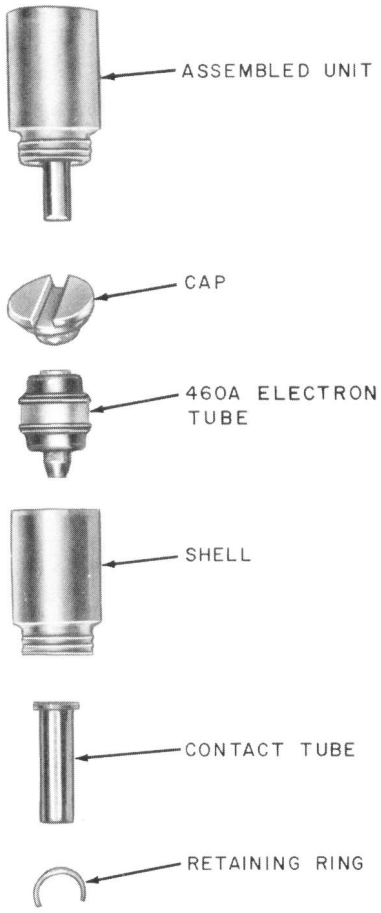

Fig. 6—6A1A Protector Unit

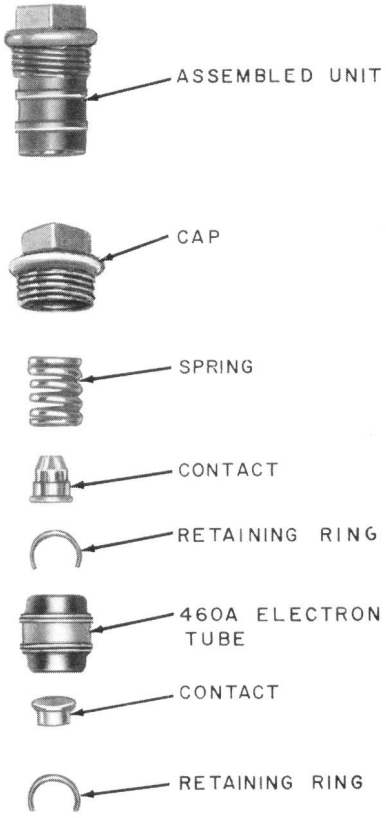

Fig. 7—6B1A Protector Unit

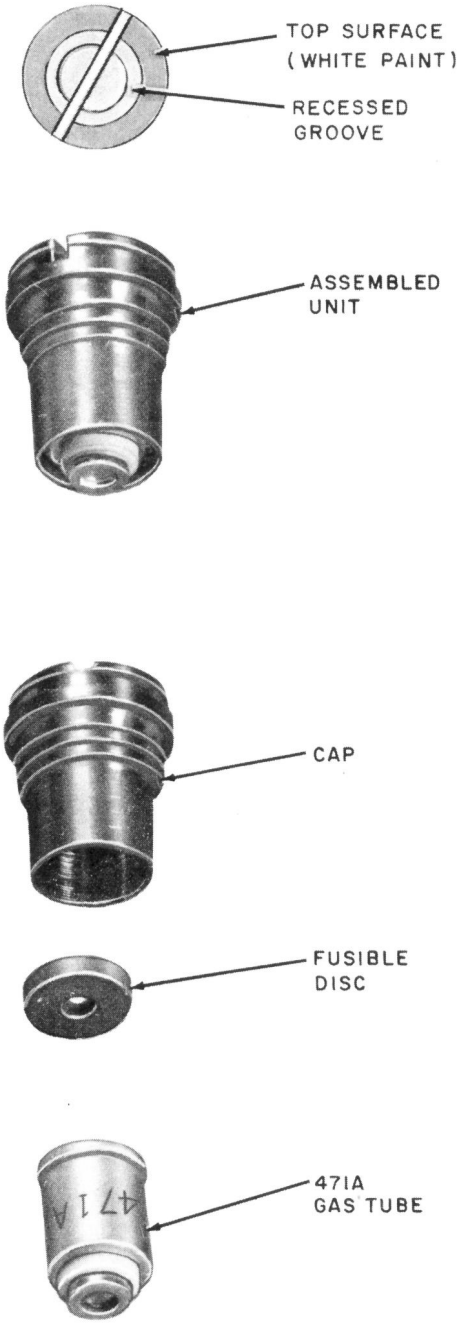

Fig. 8—11A1A Protector Unit

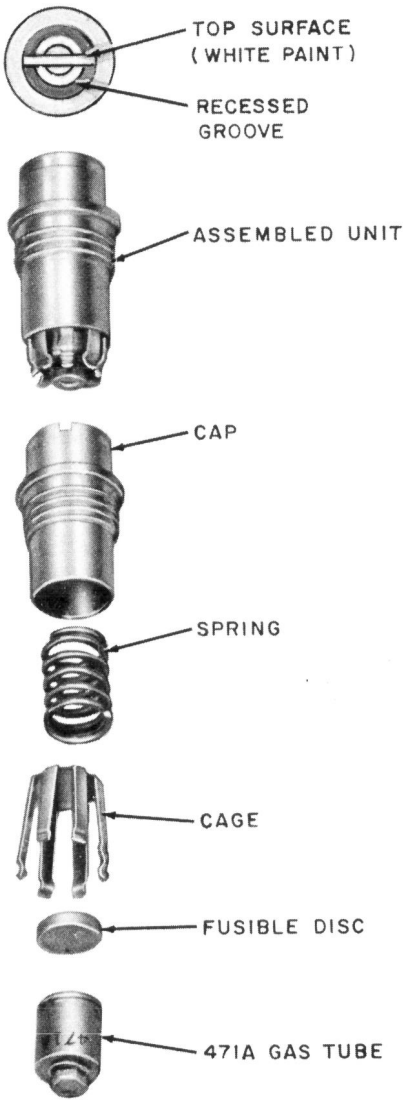

Fig. 9—11B1A Protector Unit

3. PROTECTOR UNITS—OPERATION

2A-Type Protector Unit

3.01 With the exception of the 2A1D (dummy) protector unit, the 2A-type protector unit consists of a 33-type protector block, a 32A protector block, and a fusible alloy spacer pellet assembled in a cylindrical metal cap.

3.02 The 33-type protector block consists of a cylindrical carbon electrode held in position in a hollow porcelain cylinder forming one electrode of the protector unit. The 32A protector block is a carbon disc which makes contact on one surface with the end of the porcelain block and on the other surface with the metal cap through the fusible alloy spacer to form the other electrode of the protector unit. The heat developed by continued current through the protector block melts this fusible alloy spacer and permits a spring loaded contact in the base of the protector unit well to push the protector block into the cap and make contact on the skirt of the brass cap. A metallic contact from line to ground is thereby established.

3.03 The operating sequence of the 2A-type protector unit is shown in Fig. 10.

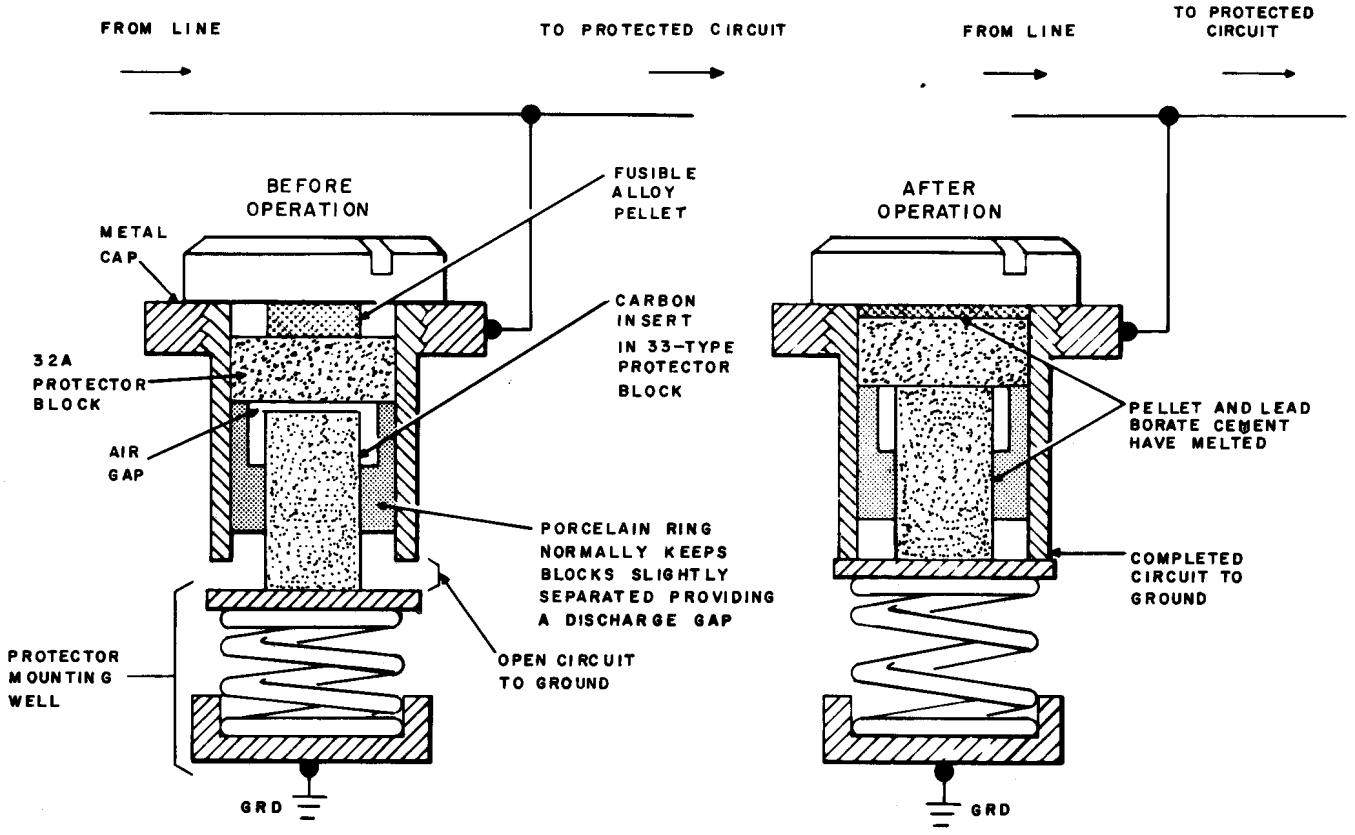

Fig. 10—2A-Type Protector Unit Operating Sequence

2B-Type Protector Units

3.04 The operating sequence of the 2B-type protector unit is shown in Fig. 11.

6-Type Protector Units

3.05 Each 6-type protector unit contains a 460A gas tube for protection against lightning surges in areas where severe and frequent storms cause grounding of the 2-type protector units. The 460A gas tube is a cylindrical ceramic unit containing two electrodes in an inert gas environment. When subjected to potentials above the breakdown voltage the gap between electrodes will operate and provide a discharge path to ground (Table C).

11-Type Protector Units

3.06 The components of the 11A1A protector unit (Fig. 8) are arranged so that during a lightning or a short duration power fault surge the 471A gas tube provides a path for the surge current to ground through its internal spark gap. During a power fault, the current causes the gas tube to heat and melt the fusible disc allowing the spring in the protector base to move the base terminal into contact with the edge of the protector unit cap providing a ground short.

3.07 The components of the 11B1A protector (Fig. 9) are arranged so that during a lightning surge or short duration power surge, the 471A gas tube provides ground for the surge current through its internal spark gap. A sustained power fault causes the gas tube to heat and melt the fusible disc allowing the spring to move the cage to contact ground providing protection to the customer.

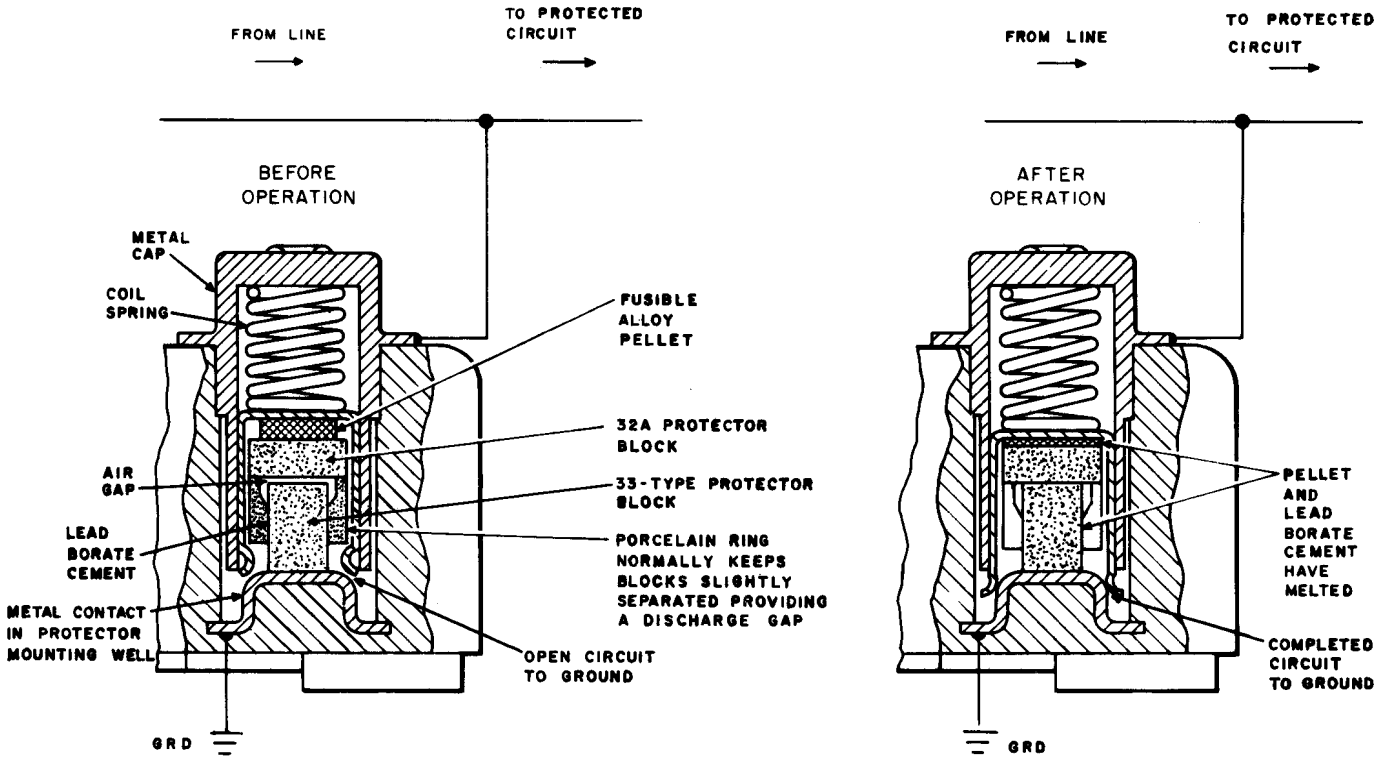

Fig. 11—2B-Type Protector Unit Operating Sequence

4. WELL ASSEMBLIES—DESCRIPTION

4.01 The protection apparatus housing the well assemblies for 2-type, 6-type, and 11-type protector units are of two designs: cast well and noncast well. The 2A-, 6A-, and 11A-type protector units are used in both the cast well and noncast well construction whereas the 2B-, 6B-, and 11B-type protector units are used ***only*** in the cast well construction. Table D lists the various protectors, terminals, and connecting blocks used with each type of well construction.

TABLE D

PROTECTOR APPARATUS

CAST WELL		NONCAST WELL	
7/16 INCH DIAMETER	1/2 INCH DIAMETER	7/16 INCH DIAMETER	
9A1A-Type Protector 9A1B-Type Protector			
106 Protector 112A Protector	103-Type Drainage Protector 104-Type Drainage Protector	3A2A-3 Terminal Block 3A2B-3 Terminal Block (49-Type Terminal Block)	
117B Protector 134A1A Protectors	108-Type Drainage Protector	60A1A-3 Connecting Block 60A1B-3 Connecting Block	
1A1A-16 Terminal Blocks 1A1A-26 Terminal Blocks 1A1B-26 Terminal Blocks 1B1A-54 Terminal Blocks	123A1A Station Protector 123A1B Station Protector 123A1E Station Protector 123B1A Station Protector	131A1A-26 Protector 133A1A-64 Protector	
1B2A-54 Terminal Blocks 1B3A-54 Terminal Blocks 1B4A-54 Terminal Blocks 1B5A-54 Terminal Blocks	128A1A Station Protector 129-Type Protectors	3A2B-3 Terminal Block 6A4AB-3 Terminal Block 60A1A Connecting Block 60A1B Connecting Block	Use P-376376 Stud and Sleeve Assembly
1A4A-10 Terminal Blocks 1A4A-16 Terminal Blocks 1A4A-25 Terminal Blocks 1A4A-50 Terminal Blocks		3A1A-3 Terminal Block 6A3A-3 Terminal Block 131A1A-26 Protector 133A1A-64 Protector 137A1A-64 Protector	Use P-13A683 Stud and Sleeve Assembly
NC-10 Cable Terminal NC-16 Cable Terminal NC-25 Cable Terminal NH-16 Cable Terminal			
NH-25 Cable Terminal 61A1B-16 Cable Terminal 61B1B-16 Cable Terminal			
57A2A-10 Connecting Blocks 57A2A-16 Connecting Blocks 57B1A-10 Connecting Blocks 57B1A-16 Connecting Block			
57B1A-25 Connecting Block 57B1A-50 Connecting Block 108A1B-16 Wire Terminal			

4.02 Figure 12 illustrates the 2A protector and spring and contact disc assembly in cast well design apparatus.

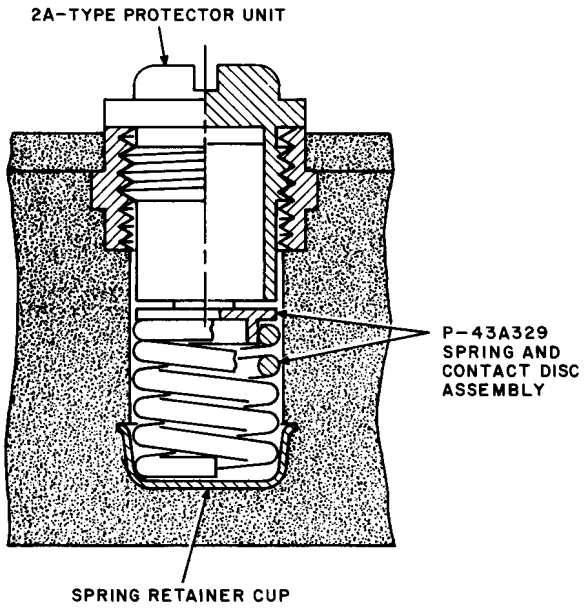

Fig. 12—Cast Well Construction

4.03 The spring and contact disc assembly of cast well design apparatus is rated at 30 amperes continuous as compared with the 15 ampere continuous rating for the spring, stud, and sleeve assembly used in noncast well design. In the event of a power contact, the 30 ampere rating ensures that a 24-gauge conductor will fuse before the spring and contact disc assembly is damaged by the heat.

4.04 Figure 13 illustrates the 2A-type protector unit and the spring, stud, and sleeve assembly in noncast well design apparatus.

5. MAINTENANCE

5.01 When clearing trouble on a line which contains 2-, 6-, or 11-type protector units, and when the testboard has indicated that there may still be a power contact, inspect the noncable portion of the line from the ground for any power contacts or evidences of damage from power contacts. Special care in making the inspection should be taken where lines run through trees or at times when visibility is limited. If a power contact is found, notify the proper authority so it may be corrected.

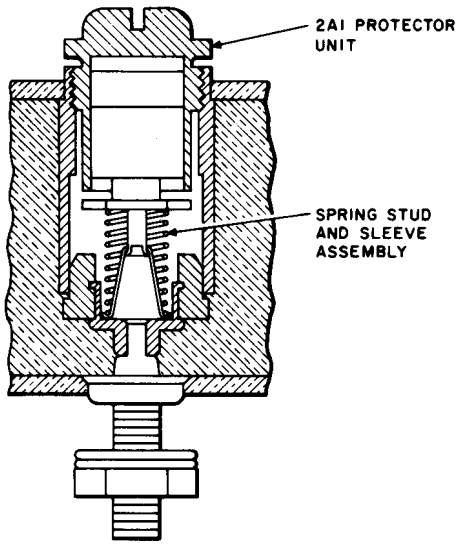

Fig. 13—Noncast Well Construction

DANGER: Do not work on the line until the power contact has been cleared. If no power contact is found but the testboard still has indications of a power contact, wear insulating gloves while working with the testboard to clear the line.

2-Type Protector Units

5.02 The 2A-type protector units screw into the well of the mounting such as a terminal or protector. Use a screwdriver to tighten or loosen the protector in the well.

5.03 When the 2-type protector unit has operated, it is removed and a new protector unit installed. No other maintenance or inspection is required for these units. (See paragraph 5.01.)

6-Type Protector Units

5.04 The 6-type protector unit is self-clearing and generally should require no maintenance. It is possible, however, that successive operations or the cumulative effect of heat may cause failure of the gas tube. In case of trouble, the entire

protector unit or protector should be replaced with a new unit or protector. If carbon protector blocks are in parallel with 6-type protector units, they should be checked and replaced if found in an operated condition.

11-Type Protector Units

5.05 The 11-type protector unit is self-clearing and should require no maintenance. However, if the protector unit should operate to the extent that the fusible disc melts, the unit must be replaced.

Well Assemblies

5.06 A heavy power or lightning surge occasionally burns brass or distorts the spring (in the spring, stud, and sleeve assembly) in noncast well apparatus causing permanent damage to the protector which cannot be corrected by replacing the protector unit. Where arc burns or welded metal indicate that the protector may have been damaged, remove the spring, stud, and sleeve assembly for inspection as described in paragraphs 5.07 and 5.08.

5.07 The KS-16646 tool or the B protector tool (Section 081-020-105) is used for removing and replacing spring, stud, and sleeve assemblies in noncast well apparatus (2A-, 6A-, and 11A-type only).

5.08 The spring-tempered pronged end of either tool is inserted in the protector unit well with the prongs parallel to the flat sides of the top of the stud. When the tool engages the stud and sleeve assembly, it can be removed from the protector unit well with a slight pulling motion. See Fig. 14.

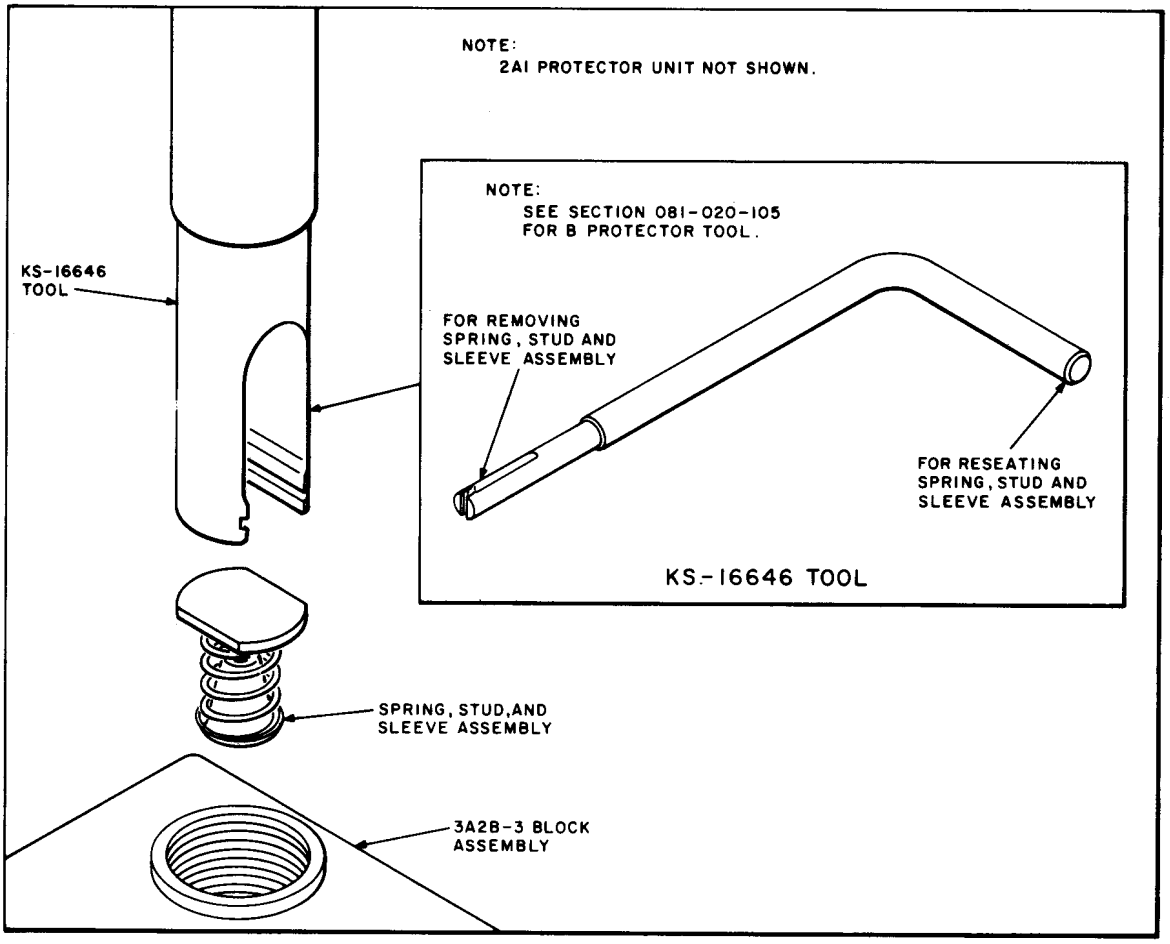

Fig. 14—Removing Assembly (Noncast Well)

5.09 The new spring, stud, and sleeve assembly is inserted in the protector unit well and set into place by the flat-faced end of the KS-16646 tool or the insertion section of the B protector tool. Apply sufficient force to properly seat the spring, stud, and sleeve assembly in the protector unit well.

5.10 The stud and sleeve assemblies used in the noncast well construction are indicated in Table E.

TABLE E

STUD AND SLEEVE ASSEMBLIES

STUD AND SLEEVE ASSEMBLY	TYPE OF PROTECTOR UNIT	HOW TO IDENTIFY
P-376376	2A1B, 2A1D, 2A1E	Plain Brass
P-13A683[1]	2A1A	Tinned

Note 1: The P-13A683 assembly is tinplated.