COMMON SYSTEMS MAIN INTER-CONNECTING FRAMES

COSMIC

TYPES OF PROTECTION

CONTENTS PAGE

1. GENERAL

1.01 This section covers the types of protection required for COSMIC.

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

2. PROTECTION CONSIDERATIONS

2.01 The purpose of central office protection is to ensure the safety of telephone plant personnel and to reduce the possibility and extent of equipment damage in the event that foreign potentials come in contact with outside plant.

2.02 In considering the type of protection apparatus required for a particular telephone plant layout, it is necessary to first determine whether the plant is considered to be exposed or unexposed.

2.03 Exposed and unexposed plants are defined as follows.

(a) ***Exposed Plant:*** Telephone plant that is subject to disturbance from lightning, subject to the possibility of contact with electrical circuits operating at more than 300 volts rms between conductors, or subject to rise in ground potential or low frequency induction is classified as ***exposed.***

(b) ***Unexposed Plant:*** Telephone plant that is not subject to possible contact with an electrical circuit operating at over 300 volts rms or not subject to the effects of lightning, rise in ground potential, or low frequency induction is classified as ***unexposed.***

2.04 In determining the exposure status of plant, the possibility of changes in exposure due to changes in the distribution system should be considered.

2.05 ***Buried Plant:*** Plant buried in built-up urban areas is not generally considered as exposed plant, and this situation does not change when plant is buried jointly with power company primary circuits, providing standard separations are maintained. Buried plant in urban areas becomes exposed if it is buried with random separation in a common trench with primary power circuits. It may also be connected to aerial plant that is exposed, thus exposing the buried plant. Buried plant outside of built-up areas must be considered as exposed due to lightning exposure.

3. CLASSES OF CONDUCTORS

3.01 Conductors entering a central office are generally classified with regard to the type of central office protection as exposed or unexposed. The application of protection in this section is divided into three classes as follows.

Class P applies to conductors requiring full protection consisting of protector blocks and heat coils.

Class TP applies to conductors requiring protector blocks only.

Class NP applies to conductors requiring neither heat coils nor protector blocks.

3.02 Sometimes for administrative purposes or for engineering reasons conductors which are usually considered to be in a certain class may be placed in a different class in accordance with local instructions.

4. MODULAR PROTECTOR FRAME

4.01 The modular protector frame (Fig. 1) consists of 12 vertical sections, each of which accommodates five 302-type connectors. Each connector has a terminating capacity for protecting 100 cable pairs for a total of 500 pairs per vertical or 6,000 pairs per module. Outside plant cable pairs and tie cable pairs from the MDF or CDF are terminated on wire-wrap terminals at the rear of the 302-type connectors in such a manner that the plug-in protector unit becomes the interface between outside plant and office equipment.

5. 302-TYPE CONNECTORS

5.01 The 302-type connector for use in the modular protector frame (Fig. 2) is supplied in two series. The 302A1 connector is supplied with a 24-gauge stub cable conductor. The 302B1 is supplied with a 22-gauge stub cable conductor. A series of number affixes assigned to the 302-type connectors (ie, 302A1-100) identifies the length of the cable stubs supplied with the connector. This number example indicates that the cable stub is 100 feet long.

5.02 The 302 Connector tip and ring pin-grip type female terminals for the protectors are gold plated. The ground terminal is solder plated and also serves as an orienting pin. A 50-pair terminal field of gold-plated test contacts is located at the top and bottom of the connector panel.

6. VOLTAGE AND CURRENT PROTECTION

A. Voltage Protection

6.01 ***Voltage protection*** is provided by the use of two carbon protector blocks for each conductor with an accurately spaced separation. One of the blocks is connected to the protector ground pin and the other to the conductor being protected. When the voltage exceeds 500 volts, the conductor will be grounded by arcing across the small airgap between the carbon protector blocks. If a heavy current flows across the airgap, the carbons may become permanently grounded. Protectors with protector blocks are required on ***all exposed*** circuits and may also be used on unexposed subscriber loop circuits for plant flexibility.

B. Current Protection

6.02 ***Current Protection*** is provided by the use of heat coils which are used to protect the telephone equipment against external currents with voltage too low to arc across the protector block or currents to low to cause a fault in the protective cable but still high enough to damage equipment if allowed to flow over a period of time. Such currents are called ***sneak currents*** and are guarded against by the use of heat coils in the protector unit. The heat coils consist of a coil of wire wrapped around a metal tube which is connected in series with the conductor to be protected. Soldered in the tube with low melting point alloy is a metal pin which is connected to the line side of the coil. If sufficient current flows through the coil to melt the alloy, this pin will move under spring pressure and thus connect the line to ground. As the line is connected to ground, the current is diverted from the central office equipment to ground, thus preventing damage to the central office equipment.

7. PROTECTOR UNITS

7.01 Protector units for COSMIC equipment (Table A) consists of the elements necessary to provide the required level of protection packaged in a plug-in unit (Fig. 3). See Table B for class of protection and protector units used. The types of protector units are as follows.

(a) ***4A Protector Unit:*** The 4A protector unit contains two heat coils and four protector blocks to provide ***current*** and ***voltage*** protection for the tip and ring conductors. This protector unit is used for ***class P*** protection.

(b) ***3A Protector Unit:*** The 3A protector unit contains four protector blocks to provide only ***voltage*** protection for the tip and ring conductors. This protector unit is used for ***class TP*** protection.

(c) ***5A Protector Unit:*** The 5A protector unit does not contain either heat coils or carbon blocks. It is a ***dummy*** protector unit which is used to complete tip and ring connections between outside plant and office equipment. This unit is used for ***class NP*** (no protection).

7.02 When the protector units are fully inserted into the connector, the outside plant and central office equipment are connected and protection is provided. Ground, for protection purposes, is provided for the heat coils and carbon blocks through the ground pin of the protector unit. The ground pin is connected to a vertical bus bar which in turn is strapped to two horizontal bus bars. These bars are grounded by the mounting screws securing the connector to the protector frame.

7.03 When the protector unit is pulled out to the detent position, the central office equipment is disconnected to isolate outside cable pairs for testing purposes and to deny service. In this position, protection is still provided on the outside cable pair. Pulling the protector unit out completely will remove all protection.

7.04 When the protector units are inserted into a jack group on the connector panel, they provide the following contact for one pair:

(a) Tip and ring to outside plant conductor (long pins).

(b) Tip and ring to central office equipment (short pins).

(c) Ground, which also serves as a orienting pin (center pin).

8. SPECIAL SERVICE PROTECTION

8.01 Special lines with high priority require special service protection. Protector units are color coded according to the type of service they serve as shown in Table B. Colored designation pins are inserted into the connector (Fig. 3) beneath the protector unit to designate the color of the protector to be used.

8.02 The 20A circuit guard, Fig. 4, is a brass cross-shaped metal guard designed to prevent accidental removal of the protector units from the 302 Connector. It is used on protectors serving circuits requiring special service protection or special safeguarding measures. Its design permits use on 3A-, 4A-, or 5A-type protectors. When the 20A circuit guard is installed, use of the designation pin is discontinued for the affected circuit.

TABLE A

PROTECTION UNITS (COSMIC)

CODE	COLOR	PROTECTOR BLOCKS	HEAT COILS (2 EACH)	CONTACT PIN PLATING
3A1A	BLACK	32B&33B	NONE	GOLD
4A1C			80A	
5A1D	GRAY	NONE	NONE	
3A2A	GREEN	32B&33B	NONE	
4A2C			81A	
5A2D		NONE	NONE	
3A3A	RED	32B&33B	NONE	
4A3C			80A	
5A3D		NONE	NONE	
3A4A	YELLOW	32B&33B	NONE	
4A4C			79A	
5A4D		NONE	NONE	

TABLE B

PROTECTORS AND CLASS OF PROTECTION

ITEM	CLASS P	CLASS TP	CLASS NP
Spare Conductors	4A1C Protector Unit Black Caps No Designation Pins	3A1A Protector Unit Black Caps No Designation Pins	5A1D Protector Unit Gray Caps No Designation Pins
Working Conductors	*Customer Lines*		
	4A1C Protector Unit Black Caps No Designation Pins	3A1A Protector Unit Black Caps No Designation Pins	5A1D Protector Unit Gray Caps No Designation Pins
	Battery Feeders		
	4A4C Protector Unit Yellow Caps Yellow Designation Pins	3A4A Protector Unit Yellow Caps Yellow Designation Pins	5A4D Protector Unit Yellow Caps Yellow Designation Pins
	Special Service Circuit (Note 1)		
	4A3C Protector Unit Red Caps Red Designation Pins	3A3A Protector Unit Red Caps Red Designation Pins	5A3D Protector Unit Red Caps Red Designation Pins
	Denied Circuit		
	4A2C Protector Unit (Note 2) Green Caps Green Designation Pins	3A2A Protector Unit Green Caps Green Designation Pins	5A2D Protector Unit Green Caps Green Designation Pins

Protector units (gold-plated pins) designated for 302-type connectors should only be used with 302A- or 302B1-type connectors (gold-plated terminals).

Notes:

1. A description of apparatus provided for guarding against service interruptions is covered in section 201-222-103.
2. No continuity between outside plant and central office.

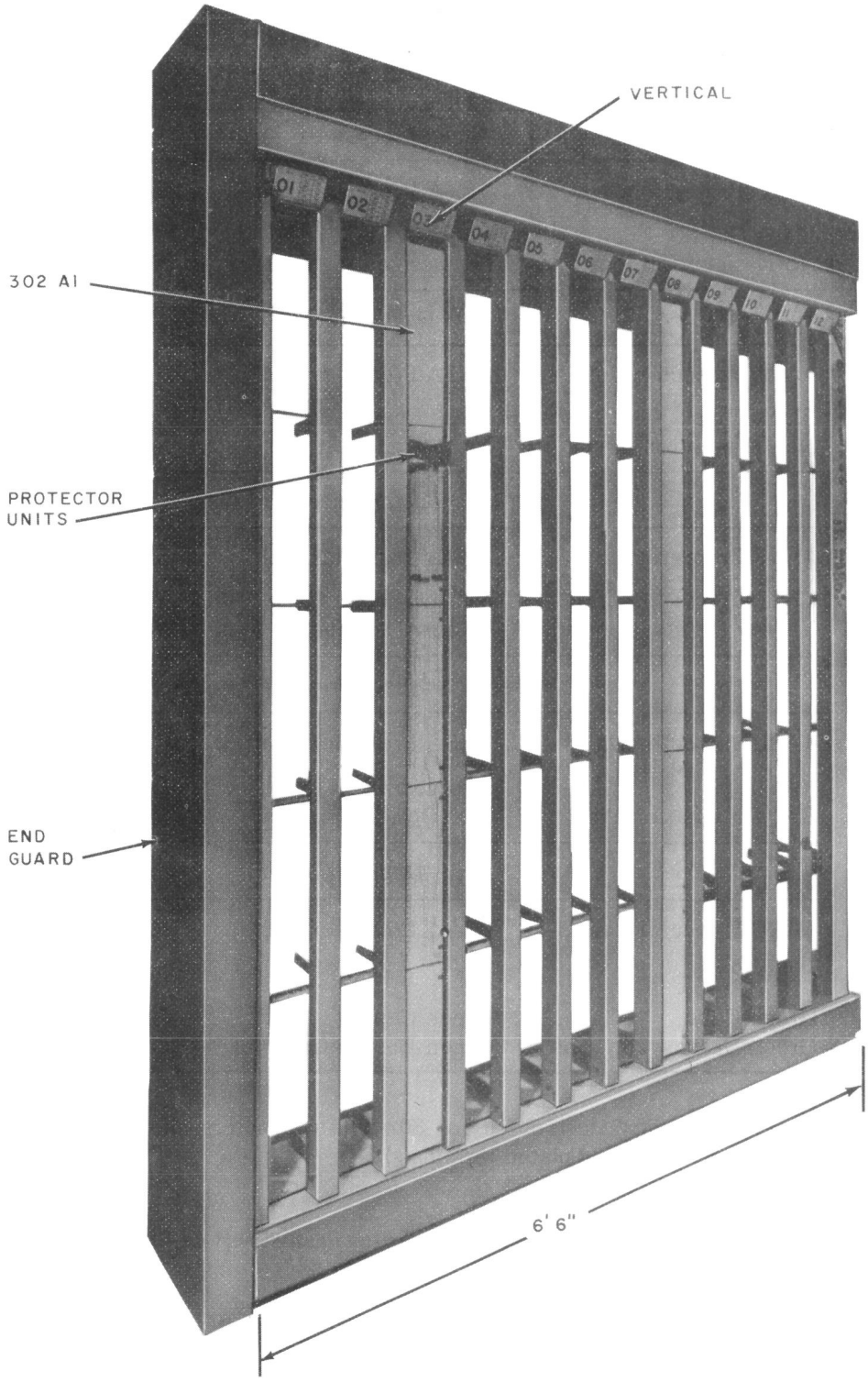

Fig. 1—Protector Frame Module—Front View

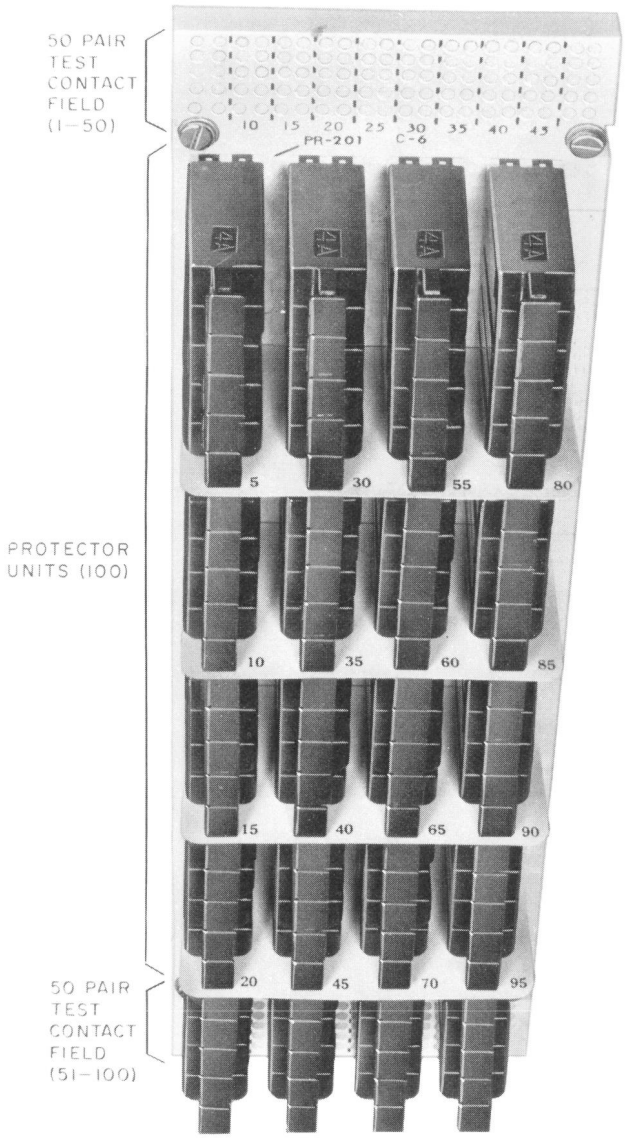

Fig. 2—302-Type Connector (With Protector Units Installed)

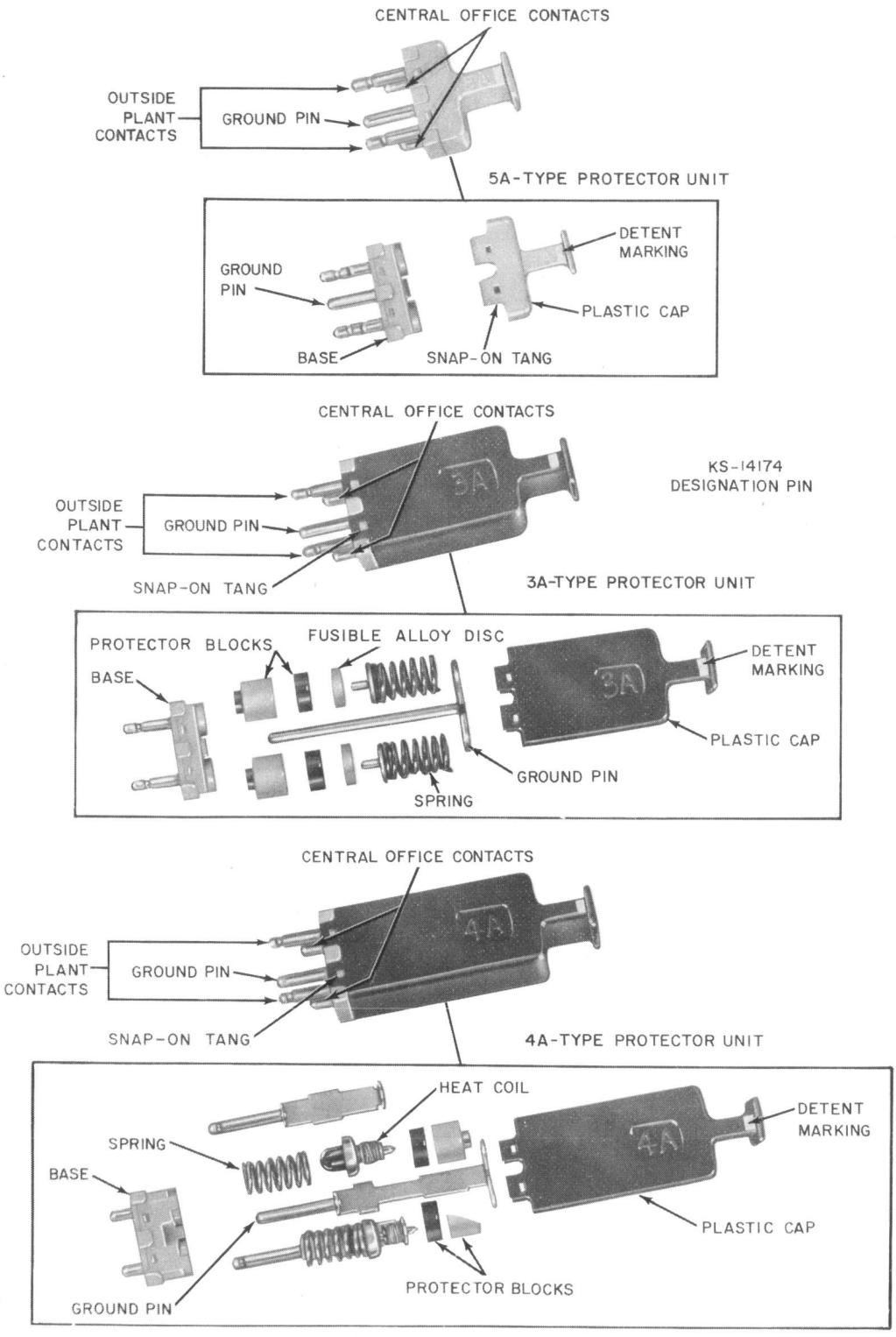

Fig. 3—Protector Units and Designation Pin (for Gold-Plated Terminal, 302-Type Connectors)

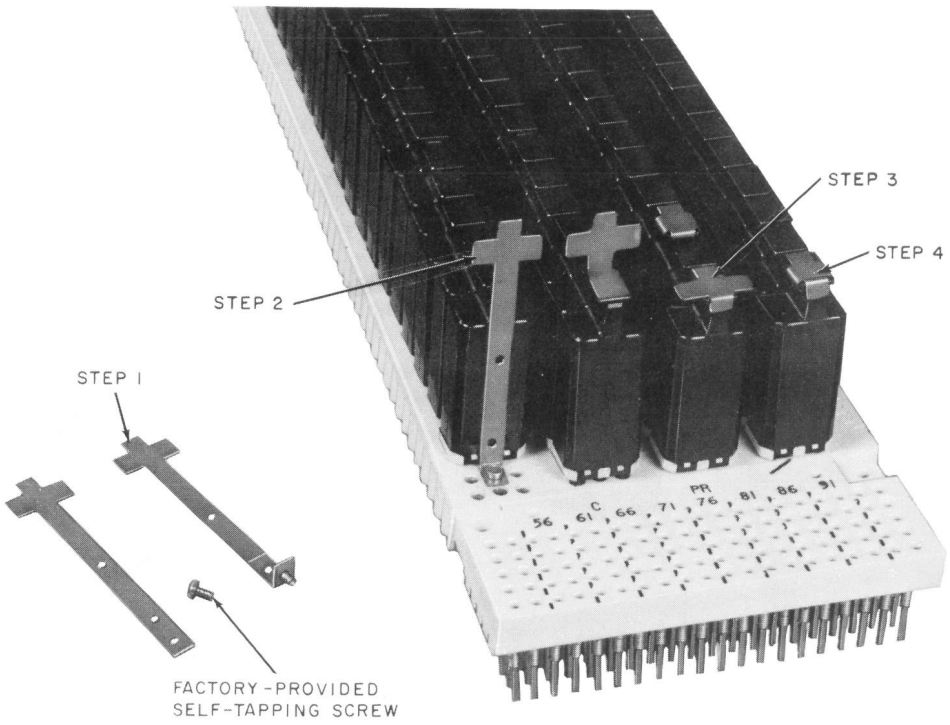

Fig. 4—20A Circuit Guard