

“COSMIC*” II
MAIN DISTRIBUTING FRAME SYSTEM
TYPES OF PROTECTION

CONTENTS	PAGE
1. GENERAL	1
2. PROTECTION CONSIDERATIONS	1
3. CLASSES OF CONDUCTORS	2
4. 307-TYPE CONNECTORS	2
5. VOLTAGE AND CURRENT PROTECTION	2
A. Voltage Protection	2
B. Current Protection	2
6. PROTECTOR UNITS	3
7. SPECIAL SERVICE PROTECTION	3
Figures	
1. 307-Type Connector Assembly—Front	4
2. 307-Type Connector Assembly—Rear	5
3. 4C-Type Protector Unit	6
Tables	
A. 4C-Type Protector Units	3

1. GENERAL

1.01 This section covers the types of protection required for the COSMIC II main distributing

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frame system.

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 root-mean-square (RMS) to ground, or subject to rise in ground potential or low frequency induction of more than 300 volts RMS to ground is classified as **exposed**.

(b) **Unexposed Plant:** Telephone plant that is not subject to the conditions described in (a) 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.

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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.

2.06 Refer to Section 918-216-100 for a description of the exposure status of various types of outside plant.

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 (voltage and current protection).
- **Class TP** applies to conductors requiring protector blocks only (voltage protection only).
- **Class NP** applies to conductors requiring neither heat coils nor protector blocks (no protection).

4. 307-TYPE CONNECTORS

4.01 The 307-type connector assembly, developed especially for the COSMIC II main distributing frame, consists of two components: the protector panel and the connecting block (Fig. 1 and 2). The protector panel accommodates 100 cable pairs. It is factory wired to either a 100-pair connecting block (307A1-100 or 307D1-100 connector) or two 50-pair connecting blocks (307B1-100 or 307E1-100 connector).

4.02 The protector panel has backplane wiring which interconnects to four 710-SD1-25 connectors rigidly held in a plastic bracket. These four connectors provide the connecting point for 100-pair cable stubs, of varying lengths, having four mating 710-BD1-25 connectors.

4.03 The 307C1-100 connector is used for protection and test access for T-carrier on shelf 1 of TMDFs. Four 710-SD1-25 splicing module connectors are provided to allow connection directly to the T-carrier office repeater bay via four 25-pair 609B cables. There are no connecting blocks associated with the 307 C1-100 connector.

5. VOLTAGE AND CURRENT PROTECTION

A. Voltage Protection

5.01 Voltage protection is provided by using two carbon protector blocks for each conductor with an accurately spaced air-gap separation. One of the blocks is connected to the protector ground pin and the other to the conductor being protected. When the voltage exceeds the breakdown of the air gap, it will arc over and current will flow to ground through the blocks. Continuously arcing across the airgap melts a fusible element causing the protector unit to become permanently grounded. Gas tube protectors may be used instead of carbon blocks and operate in a similar manner. Protector units with carbon blocks or gas tube protectors are required on **all exposed** circuits and may also be used on unexposed subscriber loop circuits for plant flexibility.

B. Current Protection

5.02 Current Protection is provided by heat coils which are used to protect the telephone equipment against external currents driven by a voltage too low to arc across the protector block or currents too 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 a low melting point alloy is a metal pin which is connected to the line side of the coil. If excessive current flows through the coil sufficiently to melt the alloy, this pin will move under spring pressure and 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.

6. PROTECTOR UNITS

6.01 There are several types of 4C-protector units used on the 307-connector. Table A identifies each type by color and application. Figure 3 identifies the parts of a protector unit. The purpose of a protector unit is to provide current and voltage protection to the inside plant equipment, except for the 4C12C type protector unit which provides continuity on circuits not requiring protection.

TABLE A

4C-TYPE PROTECTOR UNITS

CODE	APPLICATION	COLOR
4C1C, 4C1E	Standard Line	Black
4C2C, 4C2E	Denied Line	Green
4C3C, 4C3E	Special Line	Red
4C4C, 4C4E	PBX Battery	Yellow
4C9C, 4C9E	Reverse Tip/Ring	White
4C11C, 4C11E	Mini Bridge Lifter	Orange
4C12C	Dummy (No Protection)	Gray

6.02 The housings for all 4C-protector units have the same dimensions. This sameness permits testing the entire 100-pair protector field with a test shoe. Except for the special service protector unit (4C3C, red housing), the protector unit housing has recessed access holes for testing the outside plant tip and ring terminals. Test sets are also available for testing protector units individually.

6.03 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 or gas tubes 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.

6.04 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, voltage protection is still provided on the outside cable pair. Pulling the protector unit out completely will remove all protection.

6.05 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).

7. SPECIAL SERVICE PROTECTION

7.01 Special lines with high priority require special service protection. This protection is provided by the 4C3C protector unit which has a red housing.

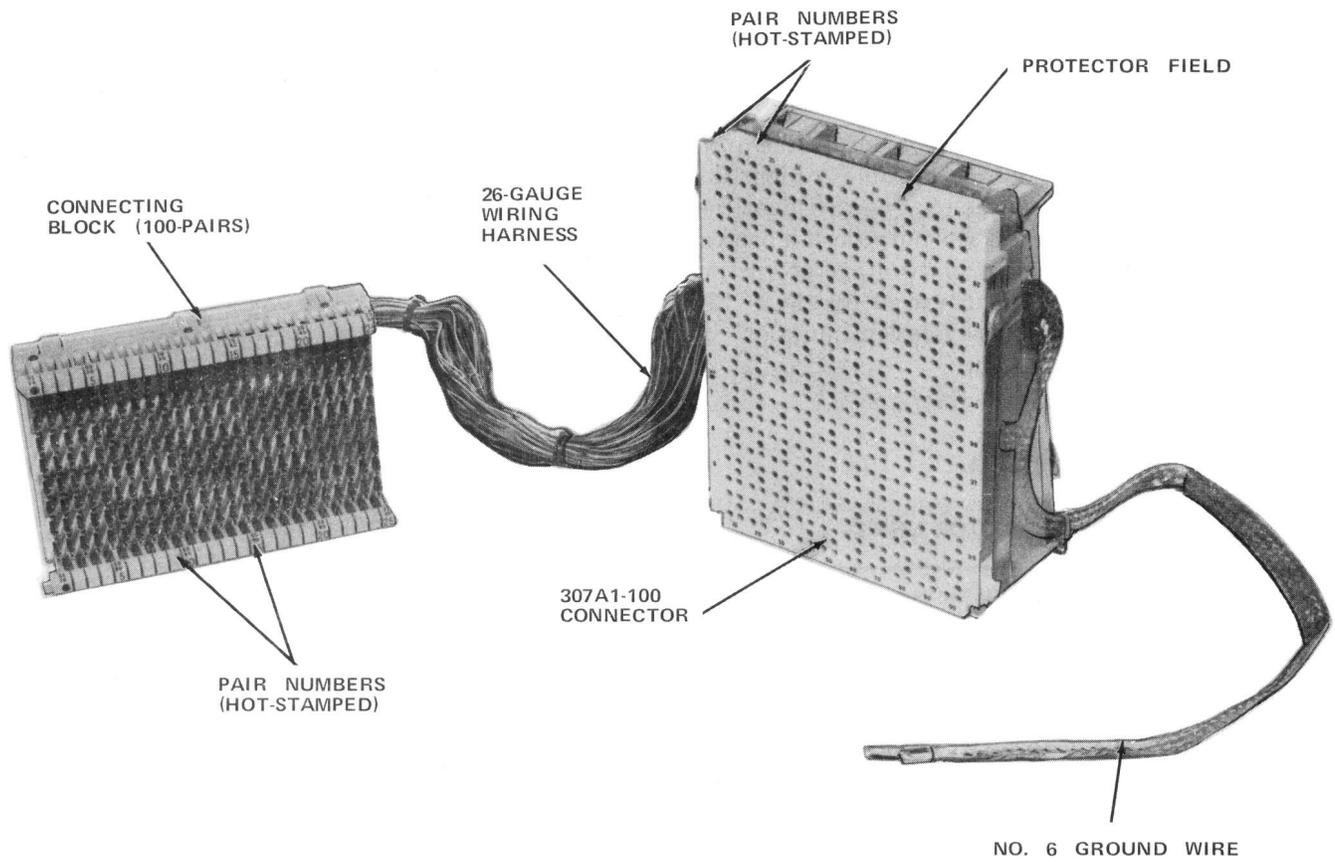


Fig. 1—307-Type Connector Assembly—Front

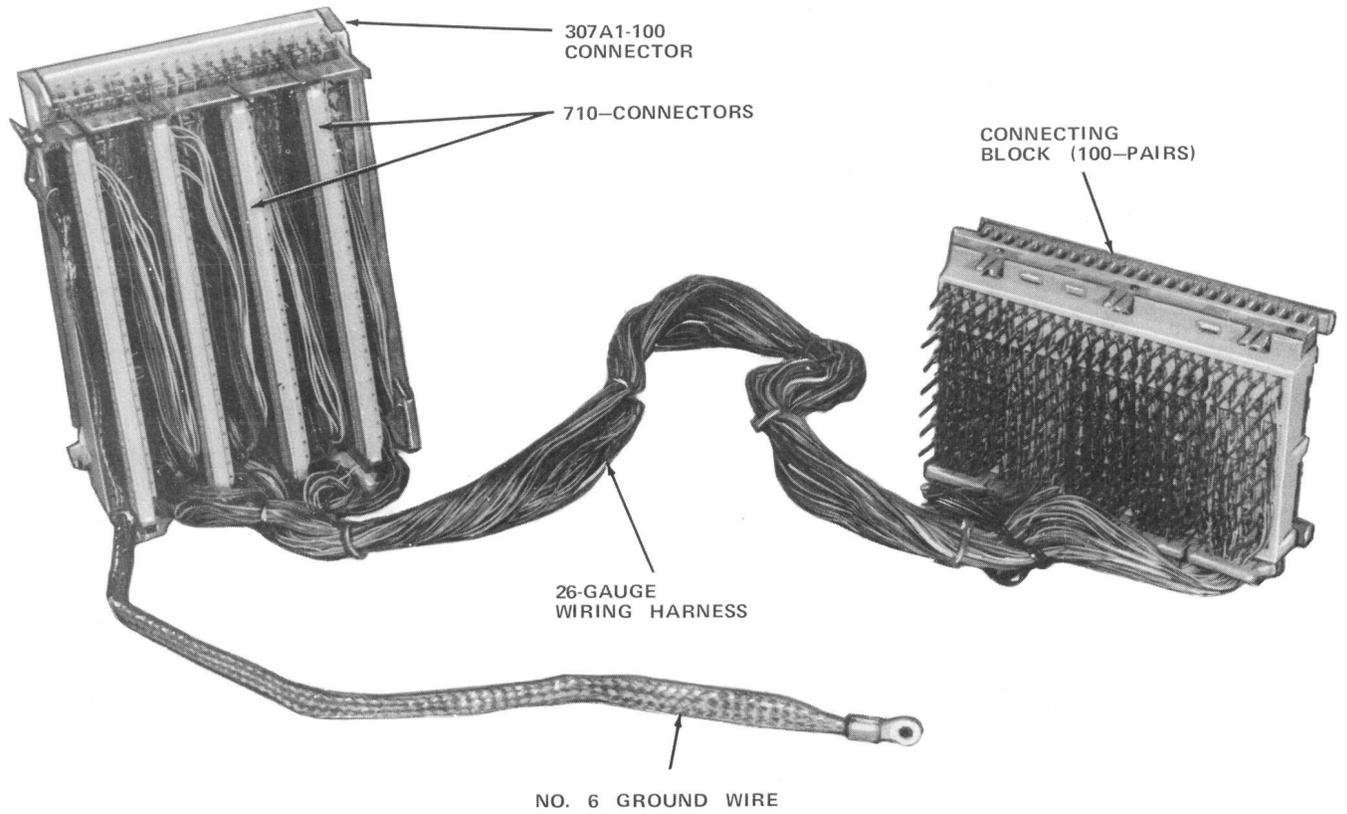


Fig. 2—307-Type Connector Assembly—Rear

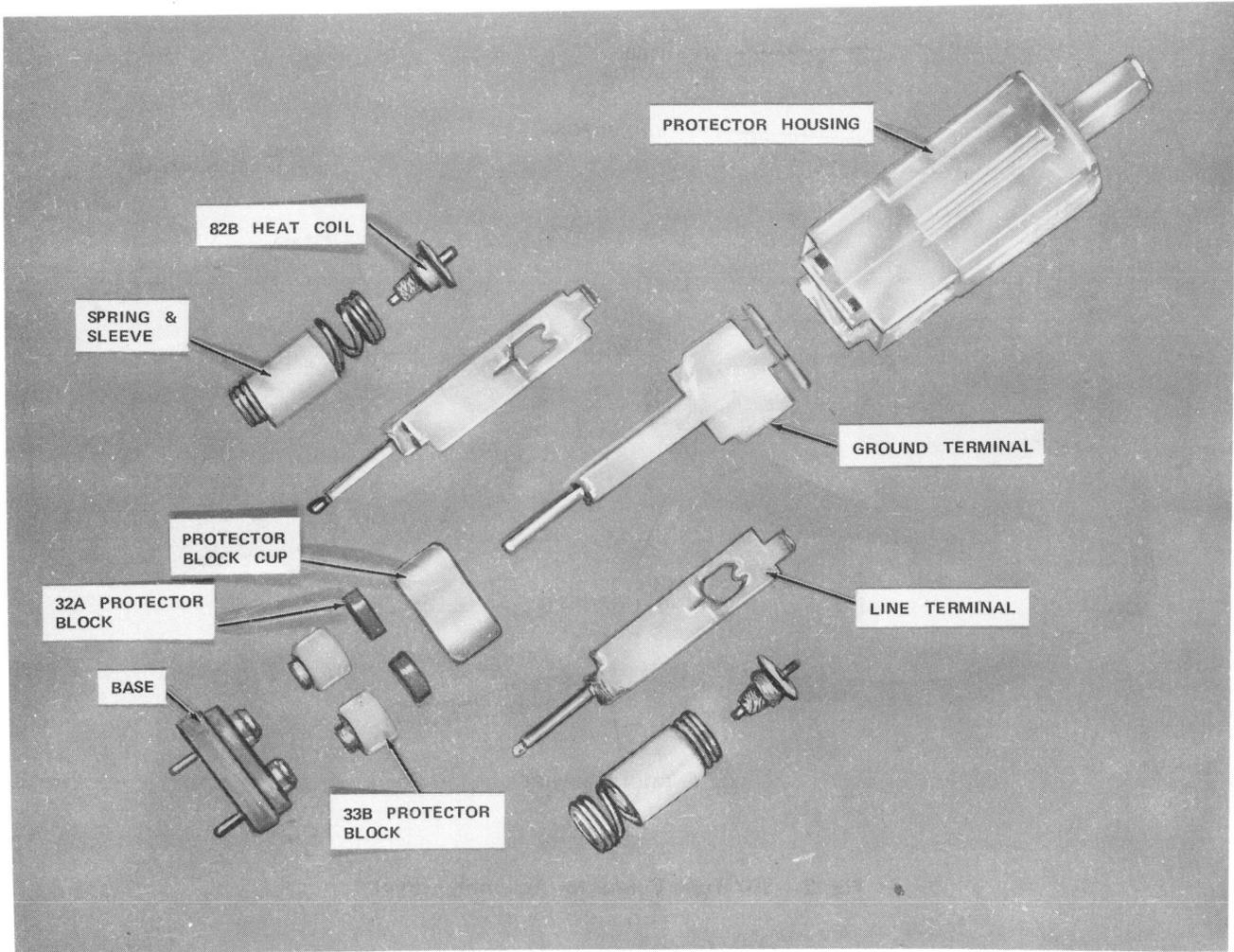


Fig. 3—4C-Type Protector Unit