

## ESS-TYPE MODULAR DISTRIBUTING FRAME

### TYPES OF PROTECTION

#### 1. GENERAL

1.01 This section covers the types of protection required for main distributing frames used with Electronic Switching Systems (ESS).

1.02 The reasons for reissuing this section are listed below. Since this is a general revision, no arrows have been used to denote significant changes.

- (1) To move protector unit information to Section 201-208-100
- (2) To move protector frame descriptive information to Section 201-219-101
- (3) To move 302-type connector information to Section 201-208-101
- (4) To generally update the information in this section.

#### 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 an outside plant.

2.02 In considering the type of protective 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:** A 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:** A 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 a plant, the possibility of changes in exposure due to changes in the distribution system should be considered.

2.05 **Buried Plant:** A plant buried in built-up urban areas is not generally considered as an exposed plant, and this situation does not change when a plant is buried jointly with power company primary circuits, provided standard separations are maintained. A 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 an aerial plant that is exposed, thus exposing the buried plant. A 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. Table A lists the type of protector units used for each class of conductors entering the central office. The application of protection in this section is divided into three classes as follows.

**Class P** applies to conductors requiring full protection consisting of carbon protector blocks and heat coils. This class of protection is provided by use of the 4-type protector units.

#### NOTICE

Not for use or disclosure outside the  
Bell System except under written agreement

**Class TP** applies to conductors requiring carbon protector blocks only. This class of protection is provided by use of the 3-type protector units.

**Class NP** applies to conductors requiring neither heat coils nor carbon protector blocks. This class of protection is provided by use of the 5-type protector units.

**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. PROTECTION SOURCES

**4.01** The ESS modular distributing frame was designed to be used in conjunction with a modular protector frame. However, protection may be provided from other frames within the office when deemed necessary. Section 201-219-101 provides descriptive information on the protector frames.

**4.02** The ED-1A220-31 modular protector frame mounts only the 302-type connector, while the ED-97898-31 frame mounts only the 308-type connector. See Section 201-208-101 for the description of the 302- and 308-type connectors. The connectors use the 3-, 4-, and 5-type protector units which provide the voltage and current protection needed for the distributing frame. Section 201-208-100 provides further information on the protector units.

#### 5. VOLTAGE AND CURRENT PROTECTION

##### A. Voltage Protection

**5.01** **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 3 mil separation between the carbon protector blocks. If a heavy current flows between the

carbon blocks, 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

**5.02** **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 carbon protector block or currents too low to interrupt fault current 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.

**5.03** Heat coils are used on **all exposed** circuits except toll circuits, subscriber loop pairs terminated in high frequency carrier cabinets, and pairs connected to electronic switching equipment. Various types of carrier circuits such as SLM, Subscriber Loop Carrier Systems (such as SLC-40, SLC-1, etc) and T Carrier on cable pairs classified as **exposed** require heat coils. These carrier circuits without protection leave the equipment vulnerable to a fire hazard. Toll circuits do not require heat coils, because they terminate on repeat coils or other impedance matching devices not subject to overheating from sneak currents. Where the number of toll circuits in a group is small compared with the exchange component, it is general practice to use the same type of terminating apparatus for the whole group for administrative reasons.

TABLE A

## PROTECTOR TYPE AND CLASS OF PROTECTION

ITEM	CLASS P	CLASS TP	CLASS NP
Spare Conductors	4-Type Protector Unit	3-Type Protector Unit	5-Type Protector Unit
	Black Caps No Designation Pins	Black Caps No Designation Pins	Gray Caps No Designation Pins
Working Conductors	<i>Customer Lines</i>		
	Black Caps No Designation Pins	Black Caps No Designation Pins	Gray Caps No Designation Pins
	<i>Battery Feeders</i>		
	Yellow Caps Yellow Designation Pins	Yellow Caps Yellow Designation Pins	Yellow Caps Yellow Designation Pins
	<i>Special Service Circuit</i>		
	Red Caps Red Designation Pins	Red Caps Red Designation Pins	Red Caps Red Designation Pins
	<i>Denied Circuit (See Note)</i>		
	Green Caps Green Designation Pins	Green Caps Green Designation Pins	Green Caps Green Designation Pins

*Note:* No continuity between outside plant and central office.