Cook Electric Protectors Description and Installation

Contents

(continued)

Contents, continued

General

Purpose

This practice:

- Describes the Types C-303, C-310, C-377, and C-388 protectors manufactured by Cook Electric Company, and protector modules required, per GTE Specifications GTS-8345 and GTS-8510.

  NOTE: **Functionally, all of the protectors are the same: the difference is in their physical makeup and size.**

- Provides installation procedures for the protectors.

Filing Instructions

This practice supersedes Issue 4, October 1989. Remove and discard Issue 4 and replace with this Issue 5 in your practices set.

Copyright and Responsibility

Disclaimer

Notice

Effective January 2, 198 1, the National Electrical Code required "listed" protectors in place of those "approved for the purpose." Therefore, unless Underwriters' Laboratories (UL) listing is obtained by the manufacturer, these and all other protectors can be installed on customer premises only if the installation complies with Section 90-02(b) (4) of the National Electric Code.

Usage

Protectors are used to terminate outside plant cables on the vertical side of a central office MDF, combined distribution frame, or a single-sided protector frame (electronic system application). Table 1 lists terminated pair capacities for the protectors when they are used on various standard-sized MDFs.

TABLE **1. Type "L" Frame Vertical Upright Capacities with C-388 and Other Protectors.**

MDF HEIGHT		---------PAIR CAPACITY---------						
Ft/Inches	**Meters**	**C-388**	**C-377**	**C-310**	**C-303**	**6800**	**300**	**3800/C-50**
7'-0"	2.13	600	600	400	300	200	100	100
8'-0"	2.44	700	700	500	400	300	200	200
9'-0"	2.74	800	800	600	400	300	200	200
11'-6"	3.50	1100	1100	800	600	400	300	300
14'-9"	4.42	1400	1400	1000	800	600	400	400

NOTE 1: The frame capacities listed above assume a standard 14-1/2 inches (368.3 mm) clearance between the floor and first connector position.

NOTE 2: Riser openings for cable stubs must be large enough to accommodate the increased number of cable pairs that results when making full use of the C-388 Main Frame protector termination capacity. See Exhibits 3 and 5 for typical riser opening dimensions required to handle various numbers of cable stubs.

Options

The protectors are available with or without:

- An attached cable stub.
- Plug-in protector modules.

The various Addition & Maintenance (A&M) options for the older Types C-303, C-310, C-377, and C-388 protectors are shown in Table 2. Exhibits 1, 2, 3, and 4 show the Types C-303, C-310, C-377, and C-388, respectively, with cable stubs.

Options, continued

TABLE 2. Protector Options

Type of Protector	Material Code No.	Cook Electric Part No.	Description - Protector Equipped With:
C-303	710349 A&M	303-0000	Interprotector ground strap and no cable stub or protector modules.
	711687 A&M	303-0022	A 22-gauge, 20-foot, Alvyn cable stub, interprotector ground strap, and no protector modules.
	711688 A&M	303-0042	A 24-gauge, 20-foot, Alvyn cable stub, interprotector ground strap, and no protector modules.
	711488 A&M	303-3000	100 Type 3A (303-0350) black protector modules, interprotector ground strap, and no cable stub.
	711482 A&M	303-3022	100 Type 3A (303-0350) black protector modules, a 22-gauge, 20-foot, Alvyn cable stub, and interprotector ground strap.
	711485 A&M	303-3042	100 Type 3A (303-0350) black protector modules, a 24-gauge, 20-foot, Alvyn cable stub, and interprotector ground strap.
	711489 A&M	303-4000	100 Type 4A (303-0450) black protector modules, interprotector ground strap, and no cable stub.
	711483 A&M	303-4022	Protector equipped with 100 Type 4A (303-0450) black protector modules, a 22-gauge, 20-foot, Alvyn cable stub, and interprotector ground strap.
	711486 A&M	303-4042	100 Type 4A (303-0450) black protector modules, a 24-gauge, 20-foot, Alvyn cable stub, and interprotector ground strap.

(continued)

Options, continued

TABLE 2. Protector Options (continued)

Type of Protector	Material Code No.	Cook Electric Part No.	Description - Protector Equlpped With:
C-310	711479 A&M	310-0000	Interprotector ground strap and no cable stub or protector modules.
	711480 A&M	310-0022	A 22-gauge, 20-foot, Alvyn cable stub, interprotector ground strap, and no protector modules.
	711481 A&M	310-0042	A 24-gauge, 20-foot, Alvyn cable stub, interprotector ground strap, and no protector modules.
	797542 A&M	310-0044	A 24-gauge, 40-foot, Alvyn cable stub, interprotector ground strap, and ***no*** protector modules.
	711691 A&M	310-3000	100 Type 3A (303-0350) black protector modules, interprotector ground strap, and no cable stub.
	711692 A&M	310-3022	100 Type 3A (303-0350) black protector modules, a 22-gauge, 20-foot, Alvyn cable stub, and interprotector ground strap.
	711693 A&M	310-3042	100 Type 3A (303-0350) black protector modules, a 24-gauge, 20-foot, Alvyn cable stub, and interprotector ground strap.
	711690 A&M	310-4000	100 Type 4A (303-0450) black protector modules, interprotector ground strap, and no cable stub.
	711556 A&M	310-4022	100 Type 4A (303-0450) black protector modules, a 22-gauge, 20-foot, Alvyn cable stub, and interprotector ground strap.
	711689 A&M	310-4042	100 Type 4A (303-0450) black protector modules, a 24-gauge, 20-foot, Alvyn cable stub, and interprotector ground strap.

(continued)

Options, continued

TABLE 2. Protector Options (continued)

Type of Protector	Material Code No.	Cook Electric Part No.	Descrlptlon - Protector Equipped With:
C-377	717103 A&M	377-0000	No cable stub or protector modules.
	717104 A&M	377-0022	A 22-gauge, 20-foot cable stub (down) and no protector modules.
	717105 A&M	377-0042	A 24-gauge, 20-foot cable stub (down) and no protector modules.
	717106 A&M	377-3000	Type 3A (303-0350) black protector modules and no cable stub.
	717107 A&M	377-3022	Type 3A (303-0350) black protector modules and a 22-gauge, 20-foot cable stub (down).
	717108 A&M	310-3042	Type 3A (303-0350) black protector modules and a a 24-gauge, 20-foot cable stub (down).
	717109 A&M	377-4000	Type 4A (303-0450) black protector modules and no cable stub.
	717110 A&M	377-4022	Type 4A (303-0450) black protector modules and a 22-gauge, 20-foot cable stub (down).
	717111 A&M	**377-4042**	Type 4A (303-0450) black protector modules and a 24-gauge, 20-foot cable stub (down).
C-388	797543 A&M	388-0000	No cable stub or protector modules.
	860321 A&M	388-0025	A 22-gauge, 50-foot, cable stub (down) and no protector modules.
	797541 A&M	388-004	A 24-gauge, 40-foot cable stub (down) and no protector modules.
	860322 A&M	388-0045	A 24-gauge, SO-foot cable stub (down) and no protector modules.

Dimensions

The overall dimensions of the protectors are as follows:

IF THE PROTECTOR IS...	DIMENSIONS ARE...
Type C-303	19-1/4 inches high x 4-3/8 inches wide
Type C-310	14-5/8 inches high x 5 inches wide
Type C-377	10-15/1 6 inches high x 6-3/8 inches wide
Type C-388	10.97 inches high x 3.53 inches wide

Description

Detailed Descriptions and Instructions

Detailed descriptions and installation/test instructions are included in each protector shipping carton.

Types C-303 and C-310 Protectors

Types C-303 and C-310 protectors consist of:

- Molded, flame-retardant plastic fastened to a metal mounting bar that also serves as the electrical ground.
- Two SO-pair test fields for access to outside plant pairs. The field for pairs l-50 is located at the top, and the field for pairs 5 1-00 (marked 100 on the Type C-3 10 protectors) is located at the bottom. (See Exhibits 1 and 2.)
- A group of 100 five-pin, grip-type jacks along the left side of the protector for accommodating the plug-in protector modules. Two pins of the five-pin jacks provide contact for T&R connection to outside plant conductors; two other pins provide contact for T&R connections to the CO equipment. The fifth pin provides a ground connection and serves as a polarization terminal.
- CO solderless terminals along the right side of the protector for terminating cross-connect jumpers from line terminal blocks.
- An integral fanning strip molded into the right-hand edge of the protector, with holes lined up with each row of solderless terminals. This fanning strip permits insertion and identification of jumper wire pairs. The terminals and holes are permanently marked in groups of five pairs, 5-00 on the Type C-303 protector, and S-100 on the Type C-3 10 protector.

NOTE: The Types C-303 and C-310 protectors do not have an alarm feature.

Types C-377 and C-388 Protectors

Types C-377 and C-388 protectors consist of:

- A protector base designed for quick installation on an MDF.

  AND

- protector modules that plug into the protector base.

The protector base is a one-piece, flame-retardant plastic molded panel fastened to an oblique angle mounting bracket.

NOTE: Oblique angle mounting is used for easy access and rapid grouping of pairs in stubs being wired to stubiess protectors. The mounting is quickly changed to the final straight-on position for wiring to the jumper terminals. Stubbed protectors are mounted directly in the **straight-on position.**

The protector base is equipped with:

- A group of 100 five-pin grip-type terminals. Four of these terminals provide contact for T&R connections between outside plant cable and the inside plant jumpers. The fifth terminal provides a ground connection to the ground terminal through a unique printed wiring card, and serves as a polarization terminal.
- Inside plant or CO and outside plant wire-wrap terminals located on the right side of the protector base. Outside plant terminals are covered with trough covers and arranged in alternate rows, thereby providing quick identification and easy access to the CO terminals. The terminals are designed for mechanically wire-wrapped connections. Central Office terminals are angled out to permit easy access with the wire-wrapping tool with the protector base in the straight-on position.
- Fanning strip holes provided in the oblique angle mounting bracket and along the rear side of the protector base. The fanning strip holes in the bracket contain colored plastic grommets to provide a means for grouping cable pairs by binder group colors (blue-orange-green-brown) for quick identification. Large sized fanning strip holes are also provided in the protector base for jumper pairs and are aligned with the rows of CO wire-wrap terminals. Each set of five terminals is identified by numbers (l-96) placed adjacent to the tie-wrap terminals on the side of the protector base.
- A test field on the front of the protector base. The test field is in two groups, top (pairs l-50) and bottom (pairs 5 l-00) for test access to outside plant pairs.

NOTE: The Types C-377 and C-388 protectors do not have an alarm feature.

Description

The single-sheath Alvyn cable stub is:

- Furnished per GTE Specification gts-851010.
- Factory-installed on protectors that are ordered with a cable stub.
- Available in 22- or 24- gauge conductors in a 20-foot length.

NOTE: Additional lengths, not to exceed 100 feet, are available in IO-foot increments.

The cable **stub consists** of:

- 101 pairs of tinned copper Polyvinyl Chloride (PVC) insulated conductors within a MYLAR* tape core wrapper and a corrugated aluminum shield under the outer PVC single sheath.
- A moisture dam **(not** a pressure dam) near the protector end, with a shield-grounding harness. The end of the grounding harness is connected to the metal mounting bar.

NOTE: **Single-sheath stub cables must not be maintained under continuous pressure.**

- **25-pair binder groups with a repeating color code sequence in each group The cable stub conforms to the standard insulation color cock. Binder colors are as follows:**

COLOR:	FOR PAIRS...
Blue-White	1 to 25
Orange-White	26 to 50
Green-White	51 to 75
Brown-White	76 to 100
Red-White	101

NOTE: The 101st pair, color coded red-white, is tied back in the cable harness as a spare pair.

The 22-gauge, 101-pair cable has a nominal Outside Diameter (OD) of 1.3 inches; the 24-gauge, 101-pair cable has a nominal OD of 1.1 inches.

When a protector base is ordered with a stub, the stub is furnished in a stub-down position. The stub can be changed to a stub-up position on the job side; however, it is recommended that protector bases be ordered with the stub-up position when this is a known requirement.

MYLAR' is a registered trademark of E. 1. DuPont de Nemours Company.

Stubless Protectors

Protectors without the factory-installed cable stub are available for those installations where the telephone company prefers to place its own cable of Alvyn design on the protectors. To meet flammability requirements, only GTE Standard terminating cable, per GTE Specification GTS-8510, may be used. GTS-85 10 covers both single and double sheath; order the desired type by Material Code (see GTE Telephone Operations Practice 903-020-070). All connections on the back of the protector are factory-wired and ready to accept the terminating cable. Temporary mounting brackets are provided to position the protector panel away from the MDF so that wiring may be performed. These mounting brackets are shipped with each stubless protector.

Size

The conductors in the stub cable of the protector should be at least two gauges larger than the wires in the fuse link or entrance cable. Refer to GTE Telephone Operations Practice 903-020-070.

Fuse Link or Entrance Cable

A fuse link (6-foot minimum length) or entrance cable of 24-gauge conductors or finer should be used when stubbing with 22-gauge conductors. When stubbing with 24-gauge conductors, the fuse link or conductors in the entrance cable should be 26 gauge. This ensures that the cable stub or wiring on the rear of the base will not fuse open on severe high current power faults. The current carrying capacity of the protectors is also designed to exceed the current carrying capacity of the 24- or 26-gauge fuse link in the event that a line should be subjected to a sustained power cross.

Protector Modules

Introduction

Since foreign voltages and currents are sometimes impressed on the plant by induction from or contact with power lines, or by lightning, devices are installed to limit voltages and currents by diverting them to ground. These devices reduce the probability of injury or damage.

All five-pin protector modules installed after January 1, 1990 **must** contain a solid state voltage limiting device and a current limiting device.

In addition, these protector modules must be used on any installation after January 1, 1990, of:

- SPC-type switches.
- Remote units where five-pin modules are applicable.
- Carrier terminations.
- Special service circuits including T span lines.

NOTE: The only exception is where the manufacturer's warranty policy specifies a particular five-pin module.

Two levels of voltage are available:

. 240 volts.
. 270 volts.

NOTE: The 270-volt model must be used:

- **In applications where multi-party ringing is available.**

  AND

- **On all T span applications.**

Standard Products

REFER TO...	FOR INFORMATION ON...
PSB ,	GTE standard solid state five-pin module protectors.
PSB #4303 OR PSB #2610	GTE Addition & Maintenance rated five-pin protectors for placement in central offices.
PSB #1953 OR PSB #4451	GTE standard five-pin protectors for building entrance terminals and for remote pad-mounted equipment.

Protector Module Options

Several types of Cook Electric and Sylvania protector modules area available to satisfy various conditions and protector bases. Refer to Tables 3A and 3D and/or the manufacturer's documentation (packaged with each unit) for the modules used with the protectors.

TABLE 3A. Protector Module Options for Addition & Maintenance (A&M)

Material Code No.	Cook Electric Part No.	Description
746017 A&M	303-0350	Type 3A protector module with black cover and 450-0Vdc MESA"' carbon arresters, each with fusible pellet. Overheated pellet grounds both line and drop. Module used for voice-frequency loops and trunks in electronic offices, but not in SxS offices.
746018 A&M	303-0370	Type 3A protector module with red cover and 450-Vdc MESA" carbon arresters, each with fusible pellet. Overheated pellet grounds both line and drop. Module used for voice-frequency loops and trunks in electronic offices, but not in SxS offices.

(continued)

MESA is a trademark of Northern Telecom, Inc.

Protector Module Options, continued

TABLE 3A. Protector Module Options for Addition 8z Maintenance (A&M) (continued)

Material Code No.	Cook Part No.	Descrlpllon
746020 A&M	303-0450	Type 4A protector moduIe with black cover, 450-Vdc MESA" carbon arresters, and non-resettable heat coils. Heat coil operation grounds both line and drop, but does not have alarm. Module used for voice-frequency loops and trunks in SxS offices.
746021 A&M	303-0470	Type 4A protector module with red cover, 450-Vdc MESA" carbon arresters, and non-resettable heat coils. heat coil operation grounds both line and drop, but does not have alarm. module used for switched special service lines in SxS offices.
746026 A&M	303-1054	Type 4A-size protector grounding module with green cover. Module used for unused pairs. It grounds line to reduce noise induction and provide protection, and leaves drop open.
746283 A&M	303-1053	Type 3SA-size protector grounding module with green cover. Module used for unused pairs. It grounds line to reduce noise induction and provide protection, and leaves drop open.
746284 A&M	303-1024	Type 5A-size protector grounding module with green cover. Module used for unused pairs. It grounds line to reduce noise-induction and provide protection, and leaves drop open.

Protector Module Options, continued

TABLE 3B. Central Office Solid State Protector Module

NOTE: Surgetor voltage protection and thermistor current limiting devices are designed for voltage and current protection or voltage protection only. The specifications for the current and voltage modules are as follows:

240 or 270 VDC breakdown; 250 ma maximum holding current; 300 amps peak surge current; and over current protection has resistive shutdown <1 sec. at 10 amps RMS. Surgelife is indefinite.

The specifications for the voltage only unit are as follows:

130 ma maximum holding current; peak holding current is 100A (10 x 1000 us) 300A (1.2 x 50 us). Surgelife is indefinite.

The 5-pin modules of both units are interchangeable with existing 5 -pin modules. Available in tin and gold-plated pins. Detents for easy disconnect while retaining protection. Units are available in environmentally sealed design for building entrance terminal and MUX applications. Insertion loss for voltage and current module at T1 bit rate is .5dB.

Material Code No.	Sylvania Part No.	Description
741743	6SC-BG	Module Protector, SS CO 6SC-BG Voltage and current protection. 240 volt unit. Gold pins. Black housing.
74 1744	6SC-BT	Module Protector, SS CO 6SC-BT Voltage and current protection. 240 volt unit. Gold pins. Red housing.
741745	6SC-RG	Module Protector, SS CO 6SC-RG Voltage and current protection. 240 volt unit. Gold pins. Red housing.
741746	6SC-RT	Module Protector, SS CO 6SC-RT Voltage and current protection. 240 volt unit. Tinned pins. Red housing.
741748	6SCA-BG	Module Protector, SS CO 6SWCA-BG voltage and current protection. 270 volt unit. Gold pins. Black housing.
741750	6SCA-BT	Module Protector, SS CO 6SCA-BT Voltage and current protection. 270 volt unit. Tinned pins. Black housing.

(continued)

Protector Module Options, continued

TABLE 3B. Central Office Solid State Protector Module (continued)

Material Code No.	Sylvania Part No.	Description
741751	6SCA-RG	Module Protector, SS CO 6SCA-RG Voltage and current protection 270 volt unit. Gold pins. Red housing.
741753	6SCA-RT	Module Protector, SS CO 6SCA-RT Voltage and current protection. 270 volt unit. Tinned pins. Red housing.
741755	6ECA-BG	Module Protector, SS CO 6ECA-BG Voltage and current protection. 270 volt unit. Gold pins. Black housing. Environmentally sealed.
741756	6ECA-BT	Module Protector, SS CO 6ECA-BT Voltage and current protection. 270 volt unit. Tinned pins. Black housing. Environmentally sealed.
741759	6ECA-RG	Module Protector, SS CO 6ECA-RG Voltage and current protection. 270 volt unit. Gold pins. Red housing. Environmentally sealed.
74 1762	6ECA-RT	Module Protector, SS CO 6ECA-RT Voltage and current protection. 270 volt unit. Gold pins. Red housing. Environmentally sealed.
741763	6EC-BG	Module' Protector, SS CO 6EC-BG Voltage and current protection. 240 volt unit. Gold pins. Black housing. Environmentally sealed.
741764	6EC-BT	Module Protector, SS CO 6ED-BT Voltage and current protection. 240 volt unit. Tinned pins. Black housing. Environmentally sealed.
741765	6EC-RG	Module Protector, SS CO 6EC-RG Voltage and current protection. 240 volt unit. Gold pins. Red housing. Environmentally sealed.
741766	6EC-RT	Module Protector, SS CO 6EC-RT Voltage and current protection. 240 volt unit. Tinned pins. Red housing. Environmentally sealed.

Protector Module Options, continued

TABLE 3C. Central Office Solid State Protector Module

NOTE: SIDACtor" voltage protection devices. Units have a minimum holding current of 260 ma and are designed to ground both sides of unit instantaneously when either tip or ring is triggered.

Material Code No.	Sylvania Part No.	Description
741769	6SSD-BT	Module Protector, SS CO 6SSD-BT Voltage protection only. 240 volt unit. Tinned pins. Black housing.
741770	6SSD-RT	Module Protector, SS CO 6SSD-RT Voltage protection only. 240 volt unit. Tinned pins. Red housing.
741772	6SSD-RG	Module Protector, SS CO 6SSD-RG Voltage protection only. 240 volt unit. Gold pins. Red housing.
741773	6SSD-BG	Module Protector, SS CO 6SSD-BG Voltage protection only. 240 volt unit. Gold pins. Black housing.
740005	6ESE-BT	Module Protector, SS CO Voltage protection only. 270 volt. Tinned pins. Black housing. Environmentally sealed.

TABLE 3D. Central Office Solid State Protector Module

NOTE: SIDACtor" voltage and thermistor current limiting S-pin protection devices. Units have 150 ma sneak current protection. Insertion loss at T1 bit rate is 0.30dB. Series loop resistance is four ohms tip and four ohms ring. Protectors are designed to ground both sides of unit instantaneously when either tip or ring is triggered.

Material Code No.	Sylvania Part No.	Description
740013	6SPD-BG	Module Protector Solid State Voltage and current 215-265 volts. Gold pins. Black housing.
740014	6SPD-BT	Module Protector Solid State voltage and current 215-265 volts. Tin pins. Black housing.

(continued)

SIDACtor is a trademark of Teccor Electronics, inc.

Protector Module Options, continued

TABLE 3D. Central Office Solid State Protector Module (continued)

Material Code No.	Sylvania Part No.	Description
740015	6SPD-RG	Module Protector Solid State voltage and current 215-265 volts. Gold pins. Red housing.
740016	6SPD-RT	Module Protector Solid State Voltage and current 215-265 volts. Tin pins. Red housing.
740017	6SPD-WG	Module Protector Solid State Voltage and current 215-265 volts. Tip/Ring reversal. Gold pins. White housing.
740018	6SPD-T	Module Protector Solid State Voltage and current 215-265 volts. Tip/Ring reversal. Tin pins. White housing.
740032	6SPE-BG	Module Protector Solid State Voltage and current 270-350 volts. Gold pins. Black housing.
740034	6SPE-BT	Module protector Solid State Voltage and current 270-350 volts. Tin pins. Black housing.
740036		Module Protector Solid State Voltage and current 270-350 volts. Gold pins. Red housing.
740037	6SPE-RT	Module Protector Solid State Voltage and current 270-350 volts. Tin pins. Red housing.
740038	6SPE-WG	Module Protector Solid State Voltage and current 270-350 volts. Tip/Ring reversal. Gold pins. White housing.
740039	6SPE-WT	Module Protector Solid State voltage and current 270-350 volts. Tip/Ring reversal. Tin Pins. White housing.

Description

The modules are equipped with five contact pins and a plastic housing (Exhibit 5). The plastic housing is made of self-extinguishing plastic insulating material. When inserted into the protector, the contact pins provide the following contacts for one cable pair:

- Tip and ring to outside plant conductors (long pins).
- Tip and ring to CO equipment (short pins).
- Ground, which also serves as a polarization pin.

Modules Inserted Into the Protector Base

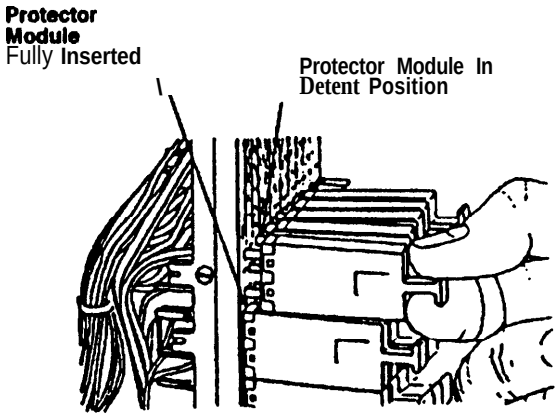
When the modules are fully inserted into the protector base, the outside plant and CO equipment are connected together. The grounding pin is connected to provide continuity through the protector base mounting bar and inter-protector ground straps to the copper ground bar at the base of the MDF.

Module Pulled to Detent Position

When the protector module is pulled to the detent position (see illustration following this paragraph), the CO equipment is disconnected from the outside plant cable pairs, while leaving the outside plant cable pairs protected.

All protector fields must be equipped with plug-in protector modules in the detent position to:

- Afford protection from outside voltage sources.
- Serve as readily available spares.
- Lessen the possibility of foreign particle build-up.



NOTE: This illustration shows the Type C-303 protector.

Protector Module Pulled to Detent Position

Overview

Installation of the various protectors is similar. Where differences occur, they are explained in the respective sections of this practice. For additional information, refer to the installation instructions packaged with each unit.

Precautions

Observe the following precautions when unpacking, storing, and installing the protector.

- Do not leave open holes to the cable vault unattended at any time. They must be kept closed if unattended. Refer to GTE Telephone Operations Practice 237-050-200.
- Do not leave the protector at locations where it may be exposed to the weather (e.g., loading dock). Always store the protector in a dry location.
- Do not remove the protector from its protective carton until the MDF is ready for the installation of the protector.
- Use caution when unpacking the protector from its shipping carton. Do not damage the contents.
- For those protectors that have factory-installed cable stubs, do not bend the cable stub in an unusually tight radius. Table 4 presents acceptable cable radius bends.

TABLE 4. Typical Alvyn Tip Cable (Dual Insulated) Flexibility

Conductor Size	Nominal Number of Pairs	Outside Cable Diameter (Inches/mm)	Approximate Minimum Bending Radius (inches/mm)	Weight Per 1000 Foot (pounds)
22 AWG	100	1.3/33.02	16/406.40	820
	200	1.8/45.72	22/558.80	1530
	300	2.1/53.40	25/635.00	2220
	400	2.4/60.96	30/762.00	2900
	600	2.9/73.66	35/889.00	4270
24 AWG	100	1.1/27.94	131330.20	570
	200	1.4/35.56	174/431.80	1010
	300	1.7/43.18	20/508.00	1490
	400	1.9/48.26	23/584.20	1920
	600	2.3/58.42	27/685.40	2790

Adapters and Mounting Brackets

Unless the MDF verticals are specifically drilled for the type protector being installed, the adapters or mounting bars listed in Table 5 are required. Hardware for mounting the frame adapters should be obtained locally.

NOTE: Frames H-884222, H-884223, H-884224, and H-884225 require that the end of the transverse mounting bar be sawed off so that it does not interfere with installing the adapters on the MDF verticals.

TABLE 5. Mounting Bars and Brackets

Used With Protector Type	Material Code No.	Cook Electric Part No.	Description
C-310 C-303	710305	303-1044	Mounting bar for mounting one connector on grid distributing frame. Used at PABXs.
C-310 C-303	712762	303-1045	23-inch, double-grid distributing frame for mounting 12 terminal blocks or six mounting bars (303-I044). Use used at PABXs.
C-310 C-303	712764	303-1046	23-inch, single-grid distributing frame for mounting six terminal blocks or three mounting bars (303-1044). Used at PABXs.
C-310 C-303	712763	303-1047	19-inch, single-grid distributing frame for mounting five terminal blocks or two mounting bars (303-1044). Used at PABXs.
C-310	712761	303-1048	19-inch, double-grid distributing frame for mounting 10 terminal blocks or four mounting bars (303-1044). Used at PABXs.
C-310	763789	310-1063	Mounting bar for wall-mounting protector. Does not include nuts and bolts.
C-303 C-310	746341	22-1052	Mounting bar for mounting protectors on 9-foot Cook Electric Company MDF vertical. Includes bolts and nuts (84-0005).

(continued)

Adapters and Mounting Brackets, continued

TABLE 5. Mounting Bars and Brackets (continued)

Used With Protector Type	Material Code No.	Cook Electric Part No.	Description
C-303 C-310	746342	22-1054	Mounting bar for mounting protectors on 1 l-foot, 8-inch Cook Electric Company MDF. Includes bolts and nuts (84-0005).
C-303	746343	22-1074	Adapter for mounting protectors on 9-foot and 1 l-foot, 8-inch MDFs (H-884222 and H-884223) that are drilled for Type 3800 protectors.
C-303	746346	22-1075	Adapter for mounting protectors on 9-foot and 11-foot, 8-inch MDFs (H-885641-3 and H-885641-10).
C-303	746344	22-1077	Adapter for mounting protectors on 9-foot and 11-foot, q8-inch MDFs (H-884224 and H-884225) that are drilled for Type 3800 protectors.
C-303	746345	22-1084	Adapter for mounting protectors on 9-foot and 11-foot, 8-inch MDFs (H-885641-1 and H-885641-2).
C-303	746339	22-1409	Adapter for mounting protectors on 9-foot MDFs (H-886104 and H-886105) that are drilled for Type 3800 protectors. Adapter includes screws and ground strap (23-2466).
C-303	746340	22-1410	Adapter for mounting protectors on 11-foot, 8-inch MDFs (H-886106 and H-886107) that are drilled for Type 3800 protectors. Adapter includes screws and ground strap (23-2466).
C-377 C-388	717112	377-1670	66-inch bar for mounting six protectors on 6-foot MDF.
C-377 C-388	717113	377-1671	76-inch bar for mounting seven protectors on 8-foot MDF.

(continued)

Adapters and Mounting Brackets, continued

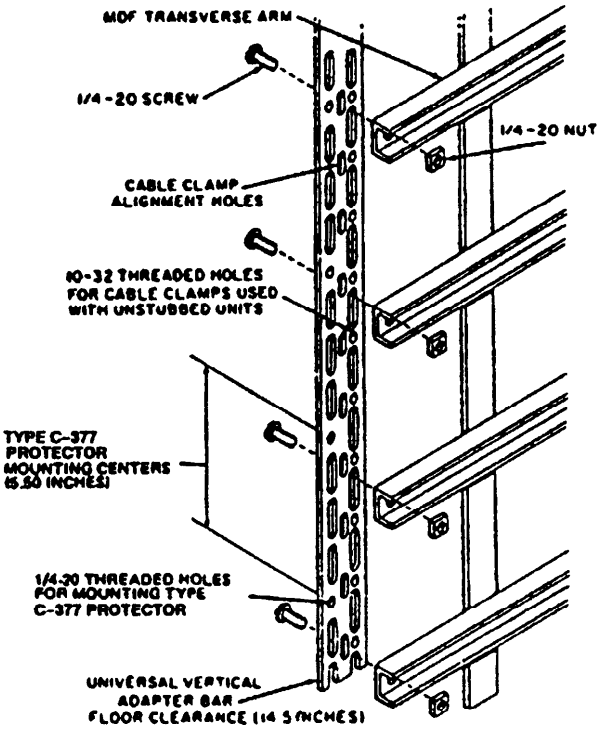
TABLE 5. Mounting Bars and Brackets (continued)

Used With Protector Type	Material Code No.	Cook Electric Part No.	Description
C-377 C-388	717114	377-1672	88-inch bar for mounting eight protectors on 9-foot MDF.
C-377 C-388	717115	377-1673	98-inch bar for mounting nine protectors on 10-foot MDF.
C-377 C-388	717116	377-1674	88-inch bar for mounting all protectors on 11.5-foot MDF.

Universal Vertical Adapter Bar

Types C-377 and C-388 protectors require a universal vertical adapter bar to accommodate the compact spacing dimensions of the protector base. This adapter bar is used:

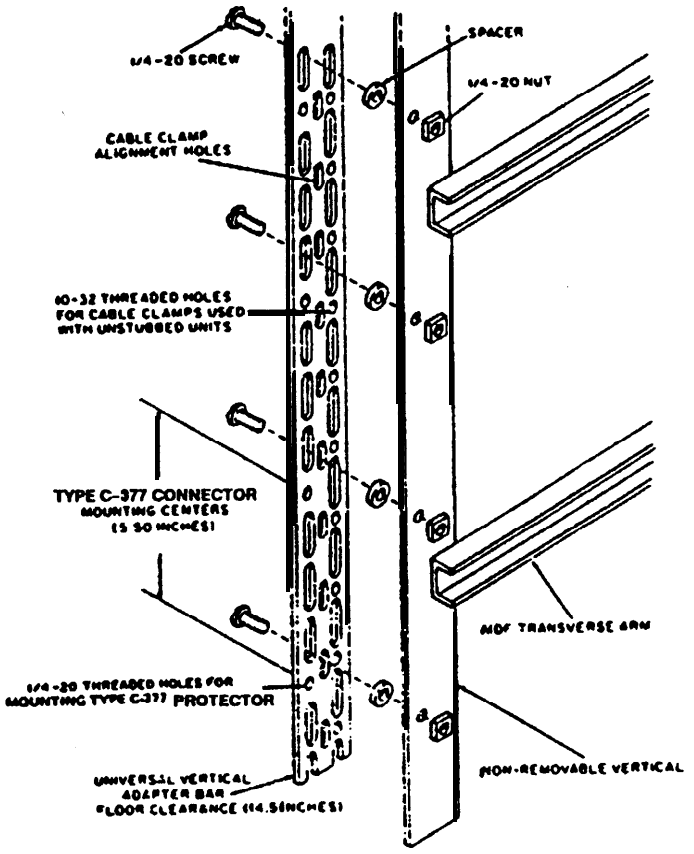
- In place of the normal vertical (with 8-inch centers for mounting holes) by bolting to the ends of the transverse arms (see illustration).



Installation of Universal Vertical Adapter Bar on Nonremovable MDF Vertical

Installing Universal Vertical Adapter Bar, continued

- When the normal vertical cannot be removed. In this case, the adapter bar is bolted to the side of the existing vertical, with spacer washers to provide proper screw (see clearance illustration) .



Installation of Universal Vertical Adapter Bar on Nonremovable MDF Vertical

Stubbed Protectors

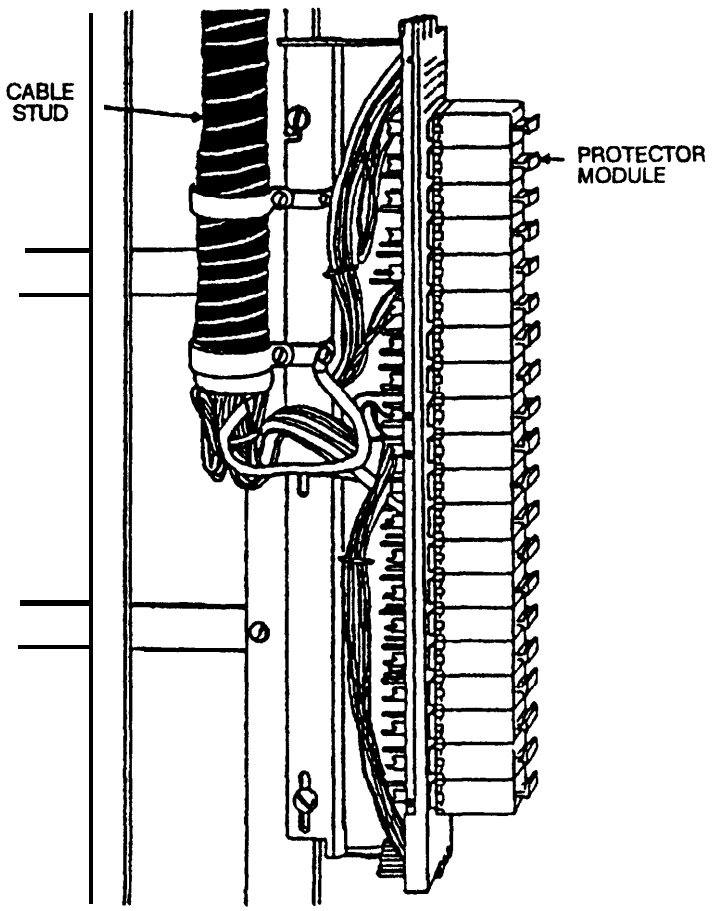
To install a stubbed protector, perform the following procedure.

STEP	INSTALLING A STUBBED PROTECTOR
1	Open a hole of appropriate size to the cable vault by removing the floor plates leading to the vault. **NOTE: Four 22-gauge cables require a 4-inch minimum hole. Six 22-gauge cables require a 4-1/2-inch minimum hole.**
2	Remove any existing fanning strip from the applicable vertical mounting frame that may be present.

(continued)

Stubbed Protectors, continued

STEP	INSTALLING A STUBBED PROTECTOR
3	Remove the protector from its shipping carton by: a. Grasping the cable stub near the protector where the cable clamps are situated. b. Carefully lifting up the protector. **CAUTION: Do not damage the solderless terminals.**
4	At locations where there is no cable vault or the cable stub goes to the top of the frame, **remove** the cable clamps on the cable stub from the mounting bar. Carefully turn the cable stub around 180° and screw in the cable clamps and the grounding harness at the alternate holes provided in the mounting bar (see illustration).



Cable Stub Turned 180 Degrees on Mounting Bar

(continued)

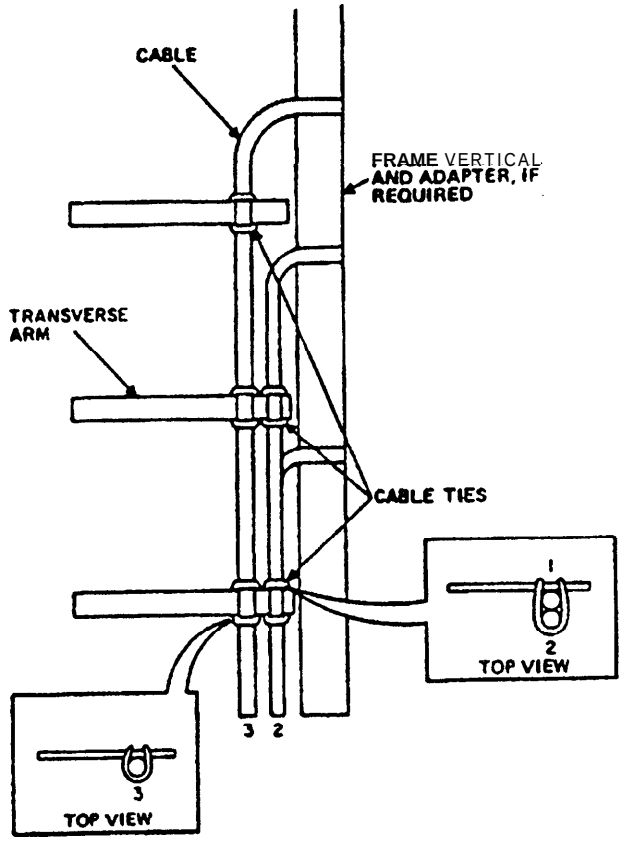
Stubbed Protectors, continued

STEP	INSTALLING A STUBBED PROTECTOR
5	Place a protector mounting screw into the frame at the hole designated for the keyhole slot on the mounting bar. **NOTE: The head of the screw should be situated on the left side of the vertical when the vertical side of the frame is faced.** Turn the screw two or three revoiutions into the frame. If adapters are mounted to the frame, place the mounting screw in the corresponding hole of the adapter instead of the frame.
6	Insert the cable stub of the protector into the opened hole for vault installation, or situate the cable stub over the frame where overhead or over-rack installation is required. Remove any cable twists that may be present.
7	Attach the protector to the left side of the vertical, beginning at the bottom of the frame. Hang the protector by positioning the keyhole slot of the mounting bar on the loose mounting screw. Align the mounting bar holes with those of the vertical, and screw the other two mounting screws into the frame. **NOTE: Do not tighten the mounting screws until all required protectors on the vertical are in place.**
8	Repeat Steps 2 through 7 until all protectors required on each vertical are in place.
9	Connect the interprotector ground straps as shown in Exhibit and connect the vertical ground straps from the lowest mounted protector to the MDF copper ground bar as shown in Exhibits 7 and 8. NOTE: **On any vertical where the lower protector positions are unequipped, fabricate and connect a long ground strap from the lowest equipped protector to the MDF ground bar as shown in Exhibit 9.**
10	Align the protectors and tighten all mounting screws.

(continued)

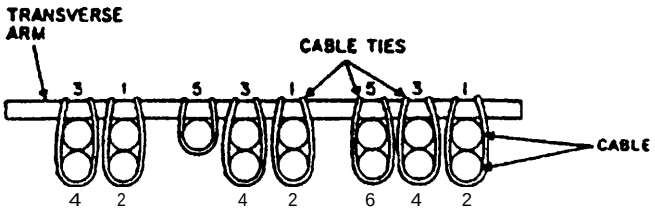
Stubbed Protectors, continued

STEP	INSTALLING A STUBBED PROTECTOR
11	Attach the stub cables to the transverse arms using cable ties or lacing cord as shown in the following illustration.



Terminating Cable Attachment to MDF

Use a 14-inch cable tie for tying the cables. Four, five, and six cable stubs should not be grouped in a single bundle; they should be arranged in groups of two cables. The following illustration depicts the method of bundling cables.



(continued)

Stubbed Protectors, continued

STEP	INSTALLING A STUBBED PROTECTOR
12	Tighten cable ties to 50 pounds of tension using a cable tie installation tool (GTE Telephone Operations Practice 075-170-100). **NOTE: Set the tension knob on the tool handle at STD (standard).**
13	Perform Steps 2 through 12 for each vertical that requires protectors.
14	Test the Types 3A and 4A protector modules for carbon dust, as described in GTE Telephone Operations Practice 243-150-200.

Stubless Protectors

When stubless protectors are to be installed, it is recommended that 101-pair GTS-899510 terminating cable be used. The 101-pair Alvyn cable allows the use of:

- Multiple end caps at the cable vault splice.

  AND

- A standard tying arrangement on the transverse arms.

To install a stubless protector, perform the following procedure.

STEP	INSTALLING A STUBLESS PROTECTOR
1	Remove any existing fanning strip from the applicable vertical mounting frame that may be present.
2	Remove the protector from its shipping carton by: a. Grasping the metal mounting bar. b. Carefully lifting up the protector. **CAUTION: Do not damage the soiderless terminals.**
3	Place a protector mounting screw into the vertical (beginning at the bottom) at the hole designated for the keyhole slot on the mounting bar. **NOTE: The head of the screw should be situated on the left side of the vertical when the vertical side of the frame is faced.** Turn the screw two or three revolutions into the frame. If adapters are mounted to the frame, place the mounting screw in the corresponding hole of the adapter instead of the frame.

(continued)

Stubless Protectors, continued

STEP	INSTALLING A STUBLESS PROTECTOR
4	Hang the protector on the left side of the vertical by positioning the keyhole slot of the mounting bar on the loose mounting screw. Align the mounting bar holes with those of the vertical, and screw the other two mounting screws into the frame.
5	Measure the required length of terminating cable to reach from the protector to the splice location in the cable vault. Add: • 24 inches of cable to this length for wire wrapping the protector terminals. AND • A required amount for the splice closure in the cable vault.
6	Butt the cable 24 inches from the end. Remove the sheath, shield, and MYLAR tape from the butted end and bind the 25-pair binder groups with colored cable ties used as cable bundle markers. Install a shield bonding clip on the butted cable end as described in GTE Telephone Operations Practice 605-100-205.

IF USING...	THEN INSTALL A...
Single-sheath terminating cable	Moisture dam near the conductor end. This dam prevents free breathing of the cable and the possibility of moisture collecting near the vault splice because of the temperature and humidity differences between the cable vault and the MDF.
Double-sheath terminating cable	Pressure dam near the protector end. Install per GTS Specification GTS-8501.

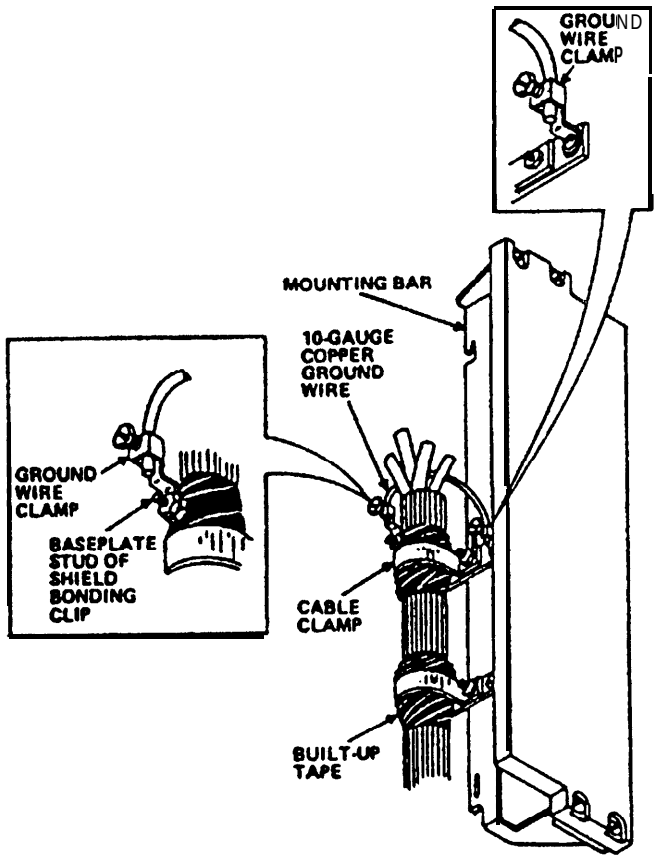
NOTE: Consult the work order or project engineer for this requirement.

7	Place the unbutted end of the cable through the floor plates and into the cable vault.
8	Insert the butted end of the cable into the cable clamps attached to the mounting bar. Position the cable so that the bonding clip is just above the top portion of the top cable clamp. Mark the location of both cable clamps on the sheath of the cable.

(continued)

Stubless Protectors, continued

STEP	INSTALLING A STUBLESS PROTECTOR
9	As shown in the following illustration, wrap two layers of B sealing tape around the cable sheath at the marked locations. Place one half-lapped layer of 3/43-inch vinyl tape over the B sealing tape, taking care not to cover the baseplate stud of the bonding clip. On each cable clamp, loosen the screw that is not attached to the mounting bar. Position the built-up tape under the cable clamps, then tighten the screws on the clamps.

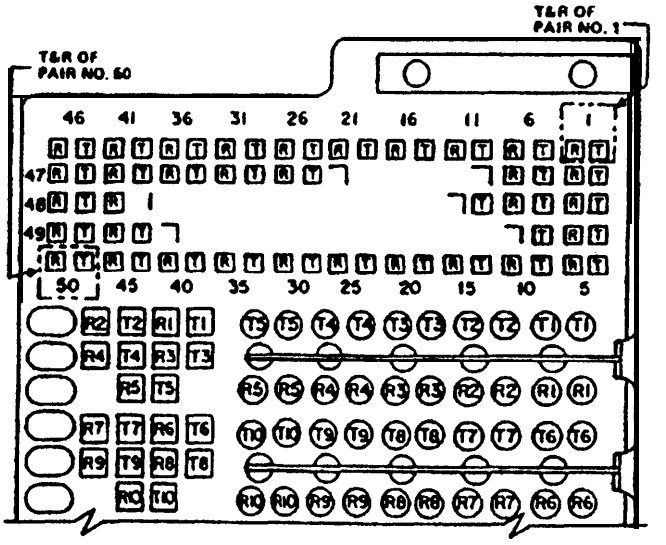


10	Tie the terminating cable to the transverse arms with 14-inch white ties or lacing cord. Tighten each cable tie to 50 pounds of tension using the cable tie installation tool (GTE Telephone Operations Practice 075-170-100). **NOTE: Set the tension knob on the tool handle at STD (standard).**
11	Remove the mounting screws from the top and bottom front panel of each protector. Retain the screws. Mount the small and the large temporary mounting brackets shipped with each protector to the mounting bar with the screws provided. Connect each protector panel to its associated small and large temporary mounting brackets with the retained screws.

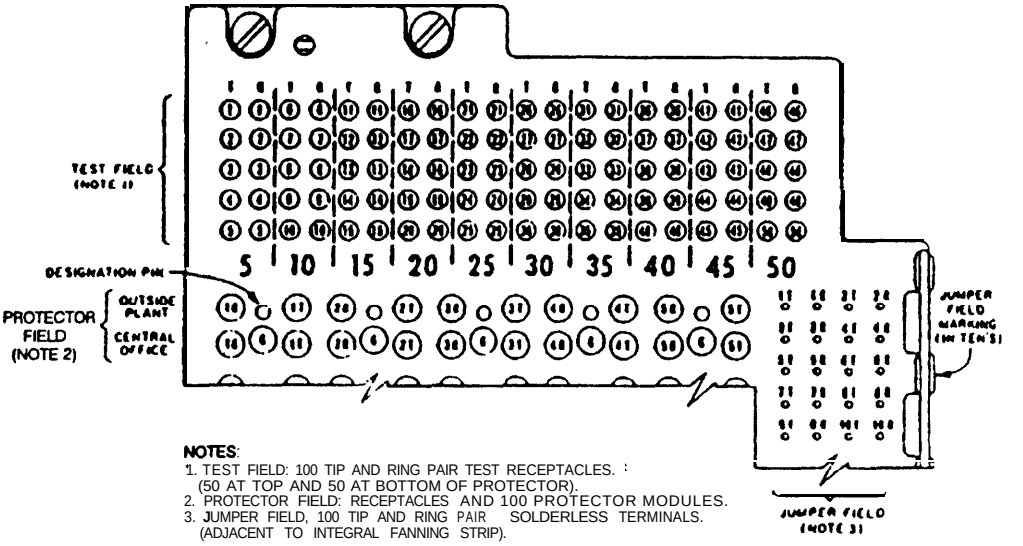
(continued)

Stubless Protectors, continued

STEP	INSTALLING A STUBLESS PROTECTOR
12	Arrange the cable pairs in the proper manner to reach the test fields of the protector. The l-50 pairs should be connected to the top test field, and the 5 l-100 pairs should be connected to the bottom test field. The No. 1 pair terminal at the rear of the protector test field is the upper right, horizontal, solderless terminal pair (see following illustrations). The pair numbering proceeds downward in consecutive order to pair No. 5, then starts a new row immediately to the left of pair No. 1 and proceeds downward again to pair No. 10. The pairing continues in this manner until it progresses to the left side of the protector panel. The bottom test field follows the same pair numbering plan, but from 51 to 100.



Rear of Type C-303 Protector Showing Cable Pair Numbering of Test Field



Rear of Type C-310 Protector Showing Cable Pair Numbering of Test Field

(continued)

Stubless Protectors, continued

STEP	INSTALLING A STUBLESS PROTECTOR
	Connect the pairs to the proper terminals using a wire-wrap tool as described in GTE Telephone Operations Practice 075-630-101.
14	After all pairs have been wire-wrapped, dress the pairs in a neat manner and tie with white cable ties (Exhibits 1 and 2).
15	Remove the protector panel from the temporary brackets and reconnect it to the mounting bar. Take approximately 5 inches of lo-gauge insulated copper ground wire and place one end of the wire in a lo-gauge ground wire clamp (see the illustration in Step 9, Page 28). Secure the wire with the clamp bolt. Place the ground wire clamp over the baseplate stud of the shield bonding clip and secure the clamp by tightening the locknut on the base-plate stud. Secure the other end of the wire to the mounting bar using another lo-gauge ground wire clamp.
16	Connect the interprotector ground straps as shown in Exhibits 6 and 7. Connect the vertical ground strap from the lowest mounted protector to the MDF copper ground bar as shown in Exhibits 7 and 8. NOTE: **On any vertical where the lower protector** positions **are unequipped, fabricate and connect a long ground strap from the lowest equipped protector to the** MDF **ground bar as shown in Exhibit 9.** Align the protectors and tighten all mounting screws.
17	Install the next protector above the first protector by repeating Steps 3 through 16. Install all protectors on the vertical in the same manner.
18	Test the protector modules as described in the manufacturer's instructions.

Grounding Methods, Types C-377 and C-388 Protectors

Types C-377 and C-388 protectors may be grounded by:

- **The basic ground method –** (Exhibit 7) – Connects the protector ground wiring to the mounting bracket and to ground straps. Ground is then supplied to the protector from the MDF ground bus through the MDF and the ground straps. This type of grounding is accomplished by using an interprotector ground strap (supplied) between each ground screw and a long ground strap from the last ground screw to the ground bus.

  OR

- **The independent ground method –** (Exhibit 7) - Similar to the basic method except that the ground terminal is isolated from the mounting bracket. Ground is then supplied from the ground bus through linked ground straps to each protector and no ground circuit is carried through the MDF. This type of grounding requires that a fiber washer (supplied) be placed under the ground screw and ground strap terminals to insulate the ground plane from the mounting bracket.

NOTE: Other local procedures may also be used, but be sure to use the ground terminal on the protector for ground wires.

Cable and Circuit Marking, Types C-303 and C-310 Protectors

A space is provided on the front panel of the protector (immediately above the bottom test field) to mark the cable number and pair count. Cable markers, numbered 1 to 100 or 01 to 3501, are available as listed in Table 6.

TABLE 6. Accessories

Accessory	Material Code No.	Part No.	Descrtplion
Ground Straps	763107	Cook Electric. 23-2466	26.5-Inch Vertical Ground Strap (Exhibit 8). Required to connect each vertical of Types C-303 and C-310 protectors to MDF ground bus bar when standard protector grounding is used.
	767503	Cook Electric 023-7712	11.5-Inch Replacement Interprotector Ground Strap (Exhibit 7). Furnished initially with each Type C-377 protector.
	767504	Cook Electric 689-0955	28.5-Inch Ground Strap (Exhibit 7). Required to interconnect each vertical of Type C-377 protectors to the MDF ground bus.

(continued)

Cable Cicruit Marking. Types C-303 and C-310 Protectors, continued

TABLE 6. Accessories (continued)

Accessory	Material Code No.	Part No.	Descrlption
Ground Straps, continued	767568	Cook Electric 23-4333	8.25-Inch Replacement Interprotector Ground Strap (Exhibit 6). Furnished initially with each Type C-310 protector.
	767572	Cook Electric 23-3272	S-S-inch Replacement Interprotector Ground Strap (Exhibit 6). Furnished initially with each Type C-303 protector.
Test Cords, Protectors and Jacks	580868	Cook Electric 303-1008	50-Pair H-Test protector (Exhibit 13). Plugs into either top or bottom test field on protector to provide terminals for testing with a test probe, thereby minimizing damage to gold-plated test field contacts.
	580879	Communications Technology Corporation C-4914	Carrying case accommodates two 50-pair front tap shoe cord assemblies.
	580913	Cook Electric 303-1001	Single-Pair Test Cord (Exhibit 10). Equipped with test field test probe at one end and two insulated alligator clips at the other end. Used to test a single cable pair (testing toward outside plant). Provides means to short a pair, ground a shorted pair, or ground T&R side of a pair. This test cord may be used to connect one cable pair from test field to a short, ground, or test equipment while protector module is in detent position.
	580914	Cook Electric 303-1012	20-Foot, Four-Conductor Test Cord (Exhibit 11). Equipped with a five-pin module position test plug on one end and a WECO No. 289-0B plug on the other end. Permits testing of an individual cable pair (out) or its associated CO equipment (in). It is also used to extend one pair from protector module jack to MDF test trunk jack.

(continued)

Cable Circuit Marking, Types C-303 and C-310 Protectors, continued

TABLE 6. Accessories (continued)

Accessory	Material Code No.	Part No.	Description
Test Cords, Protectors and Jacks, continued	58015	Cook Electric 303-1013	20-Foot, Four-Conductor Test Cord. Same as the 303-1012 cord except equipped with five-pin module test plug only; other end of cord is unequipped to permit test circuit connections as may be desired to meet local conditions. This end is normally equipped with a D-57099-A plug, which must be ordered separately. Used same as 303-1012 cord.
	637215	Communications Technology Corporation C-4920	50-Pair Front Tap Shoe (Exhibit 12) Equipped with a SO-pair tap shoe on one end, two 25-pair Cinch-Jones female protectors on the other end, and a 15-foot SO-pair cord. Used to connect test equipment rapidly to 50 consecutive pair terminations on MDFs and for making cable transfers.
	763609	Cook Electric 303-1026	MDF Test Jack Assembly (Exhibit 14). Contains two jacks that accept test cords equipped with WECO No. 289-B plugs as on 303- 10 12 test cord. Mounts on MDF vertical. Jacks may be wired to remotely located test equipment.
Terminal Protector Guards	582272	Cook Electric 303-1019	Red Test-Point Insulator Button (Exhibit 15). Placed into the recess for the contacts on test fields to isolate an individual test contact during testing with a SO-pair front tap shoe or H-test protector, to identify special services.
	746053	Cook Electric 303-1020	Red Circuit Designation Pin (Exhibit 16). Used to mark the position of a special circuit protector module (red) when module is removed. It is inserted into the blind hole of the protector module jack opposite the ground pin termina!.
	746054	Cook Electric 545-l 137	Red Plastic Terminal Caps (Exhibit 17). Used to mark and protect line terminals of special circuits (red). It fits snugly over a solderless terminal that has a wire connection in place.

(continued)

Cable and Circuit Marking, Types C-303 and C-310 Protectors, continued

TABLE 6. Accessories (continued)

Accessory	Material Code No.	Part No.	Description
Cable Pair Markers	746272	Cook Electric 303-1067	Cable Pair Marker. Numbered 1 to 100 in increments of 5. Adhesive backed for mounting on side of type C-303 protectors.
	746273	Cook Electric 303-1068	Cable Pair Marker. Numbered 01 to 3501 in increments of 100. Adhesive backed for mounting on front of Type C-303 or C-310 protectors.
Repair Kit	584380	Cook Electric 303-1052	Protector Repair Kit. Contains the following: • Terminals for CO and outside plant module receptacle. • Terminals for terminal field. • Terminals for test point. • Wire set No. 1, jumpers from module CO terminals to CO terminals. • Wire set No. 2, jumpers from moduie outside plant terminals to test point terminals. • Install&ion tool for CO and test point terminals.

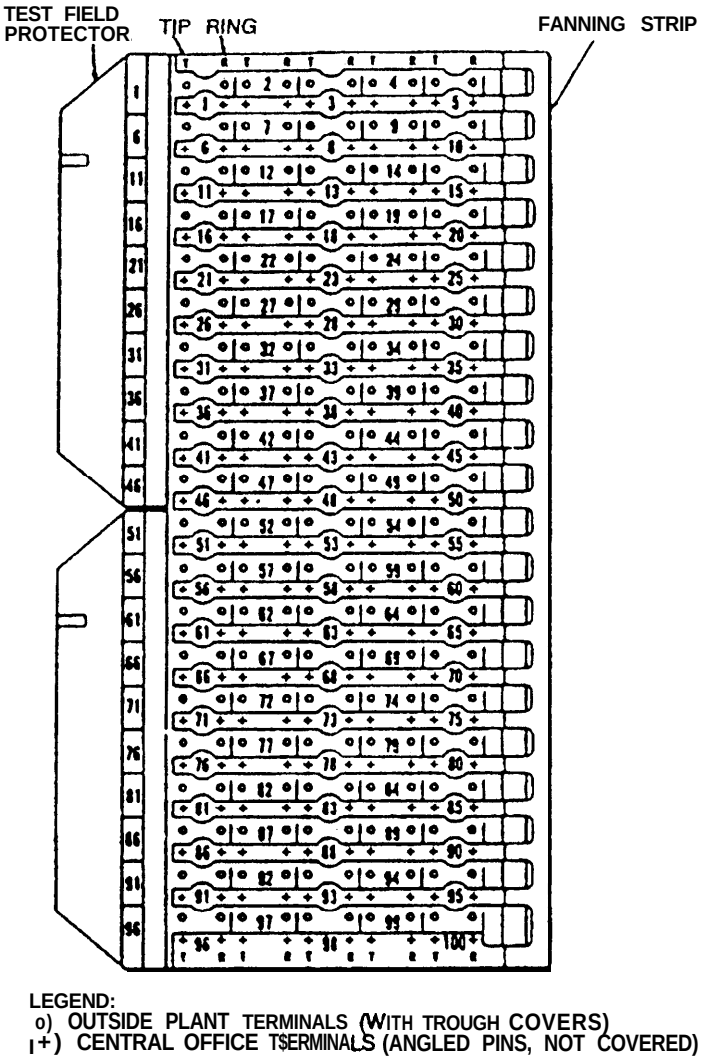
Marking and Jumpering, Type C-377 Protectors

The side of the lower test field is provided with a space to mark the cable number and pair count for the protector. After marking, the protector can be jumpered. Central Office terminals are angled out for easy access when the protector is in the straight-on position.

Terminal numbers are:

- Marked in black, on both sides of the test field, with a number for the beginning of every set of five terminals (1, 6, 11, 16, etc.). Refer to the following illustration.
- Molded into the protector base between the rows of terminals (three numbers per row: 1, 3, 5; 6, 8, 10; etc.). Refer to the following illustration.

Marking and Jumpering, Type C-377 Protectors, continued



Type C-377 Protector Terminal Assignments (Viewed from Wire-Wrapped Side)

All jumper wires are routed through the protector base fanning strip holes before being wire-wrapped to the desired terminal. Use the fanning strip hole adjacent to the terminals being wired. Then replace the plastic jumper field cover.

The two final steps in the installation of the protector are:

- The entrance cable splicing.

  AND

- The CO-to-outside plant jumper connections.

Splice the cable stub to the fuse link cable or entrance cable using Table 7 as a guide. The cable stub is wired with standard cable wire color coding.

Marking and Jumpering, Type C-377 Protectors, continued

TABLE 7. Cable Pair Color Codes

Cable Pair Group	Binder Color	Cable Pair Subgroup	Tip Wire Color	Ring Wire Color (For Each tIP Wire Color)
1to 25	Blue	1 to 5	White	1st wire - Blue
		6 to 10	Red	2nd wire - Orange
		11 to 15	Black	3rd wire - Green
		16 to 20	Yellow	4th wire - Brown
		21 to 25	Violet	5th wire - Slate
26 to 50	Orange	26 to 30	White	Same as above
		31 to 35	Red	
		36 to 40	Black	
		41 to 45	Yellow	
		46 to 50	Violet	
51 to 75	Green	51 to 55	White	Same as above
		56 to 60	Red	
		61 to 56	Black	
		66 to 70	Yellow	
		71 to 75	Violet	
76 to 100	Brown	76 to 80	White	Same as above
		81 to 85	Red	
		86 to 90	Black	
		91 to 95	Yellow	
		96 to 100	Violet	

Push each protector module in to the fully inserted position from the detent position. The outside plant and CO are then connected.

Marking and Jumpering, Type C-388 Protectors

Spaces to mark the cable number and protector pair count are provided on the protector front, to the left of the CO jumper terminal field. Refer to Exhibit 12.

The CO jumper terminal field is located on the front of the protector. Terminals numbers are marked in black; 1 and S are at the top, 967 and 100 are at the bottom. There is a number for every five terminal pair (5, 10, 15, etc.) along the right side of the jumper field. The terminal pins measure .045 x .OSO inches (1.14 mm x 1.27 mm), and provide a straight-forward access for wire-wrap tools with the protector mounted in the straight-on position.

Two fanning strips are provided for routing of the CO jumper wires. One of the fanning strips is at the right front edge of the protector, to the right of the jumper terminal field, while the other is at the right rear of the protector base. The front fanning strip facilitates jumper running, in that it is designed to permit jumper wires to be fed through the side slits into the holes. These holes are designed to provide two “lock” positions for dressing wires while jumpering. Use both the rear and front fanning strip holes that line up with the row of jumper terminal pins at which the jumper pair terminates. The neat and orderly routing of jumper wires is thus insured.

Marking and Jumpering, Type C-388 Protectors, continued

The recommended jumpering procedure is as follows:

STEP	JUMPERING PROCEDURE
1	Insert five pairs of jumper wires through the rear fanning strip hole. Feed them through the respective slit in the front farming strip, dressing wires back and out of the way in the first "lock" position of the front fanning strip hole. Refer to Exhibit 13.
2	Bring the first pair forward and through the slit into the second "lock" position of the fanning strip hole and to the front of the jumper terminal field.
3	Dress each wire along the top of the appropriate row of terminals, and wire-wrap to the respective terminal pins. Refer to the detail segment of Exhibit 14.
4	Repeat Steps 2 and 3 for each remaining jumper pair.
5	Dress the slack to the rear of the protector so that the jumper pairs run neatly from the terminal field across the protector back-plane cover. **NOTES:** **1. It is suggested that the twist be left in the jumper pairs, or that the pairs be otherwise identified, to make it easier to find them during future tracing of jumper wires.** **2. Refer to Table 7, Page 36, for cable pair color codes.**

Accessories

Overview

The following paragraphs describe the various accessories available for use with the protectors. Table 6, Page 31 provides the material code number, manufacturer, and part number for each accessory.

Single-Pair Test Cord

The single-pair test cord plus into the test fields to make tests on the tip and ring lines of a pair (Exhibit 10). A plug on one end of the cable matches the holes for a pair in the test field. The other end of the test cord is terminated with alligator clips for connection to test equipment. Use the single-pair test cord as follows.

Single-Pair Test Cord, continued

STEP	USING THE SINGLE-PAIR TEST CORD
1	Push the plug into the test field to make contact with the pair to be tested.
2	Monitor the pair to be sure it is not being used.
3	Pull the protector module for the pair being tested into the detent position. Attach test equipment to the alligator clips of the test cord.
4	Make the desired tests.
5	Remove the test equipment and cord when testing is completed.
6	Return the protector module to the fully-inserted position.

Four-Conductor Test Cord

The four-conductor test cord plugs into the protector module socket after the module is removed (Exhibit 11). Tests can be made toward the outside plant or toward the CO. One end of the test cord has a plug with the same pin arrangement as a protector module. Test cord 303-1012 has a dual telephone plug on the other end for connection to a 303-1026 test jack or to test equipment. Test cord 303-1013 has no termination on the cable and may be wired in to meet local requirements. Use the test cords as follows:

STEP	USING THE FOUR-CONDUCTOR TEST CORD
1	Monitor the line to be sure it is not being used.
2	Remove the protector module from the pair to be tested.
3	Insert the module plug into the protector module position.
4	Connect the other end of the cord to the test equipment.
5	Make the required tests.
6	After testing: a. Remove the test plug. b. Replace the protector module. **NOTE: Be sure that the CO is connected to the outside plant.**

50-Pair Front Tap Shoe

A 50-pair front tap shoe can be connected to either of the protector test fields for multipair outside plant testing and cable arrangements (Exhibit 12). Use the shoe as follows:

STEP	USING THE FOUR-CONDUCTOR TEST CORD
1	Remove the plastic cover from the spring-loaded terminals of the shoe.
2	Carefully place the shoe into position against the protector test field. Be sure clamps are behind the test field. Finger tighten the wing nuts.
3	Attach the other end of the cord to test equipment or another test shoe.
4	If the tests or rearrangements require that the CO be disconnected, pull the protector modules into the detent position. **NOTE: Return the modules to the fully-inserted position after testing is completed.**
5	Remove the test equipment and the test shoe.

50-Pair H-Test Protector

The 50-pair H-test protector plugs into either the top or bottom test field on the protector to provide terminals for testing with a test probe (Exhibit 13). Wear and damage to the test field contacts is thereby minimized.

Main Distributing Frame Test Jack Assembly

The 303-1026 MDF test jack assembly mounts on an MDF vertical (Exhibit 14) and contains two jacks compatible with the plug on the 303- 10 12 test cord (Table 6, Page 31). This plug is equivalent to Western Electric plug No. 289B. These jacks may be wired to remotely located test equipment.

Terminal Protector Guards

A test-point insulator button (Exhibit 15) may be used to isolate contacts during testing. A red circuit designation pin (Exhibit 16) may be used to mark the position of a special circuit protector module when the module is removed. The pin fits into the blind hole opposite the ground pin terminal on the front of the protector base. A red plastic cap (Exhibit 17) may be used to mark and protect the wire-wrapped terminals of special circuits.

Type C-303 Protector Repair Kit

The following replacement procedures are to be used to replace broken and/or defective test points, module receptacle, and CO terminals on the Type C-303 protector (base) assembly. Table 6, Page 31 contains a descriptive listing of all parts in the kit. The following charts provide the replacement procedures.

STEP	REMOVING AND REPLACING A BROKEN OR DEFECTIVE MODULE RECEPTACLE/TERMINAL
1	Remove the jumper wire from the broken or defective terminal using a wire-wrap removal tool.
2	Remove the terminal from the protector base by repositioning the mounting tabs to clear the mounting hole in the plastic base and remove the terminal.
3	Install the new terminal and secure it by repositioning mounting tabs to the original position of the removed terminal.
4	Reconnect the wire to the replaced terminal by using one of the following methods: • Rewrap and solder the original jumper wire. OR o Rewrap and solder the original jumper wire. completely remove the jumper from the connecting terminal using a wire-wrap removal tool, and connect the new jumper to both terminals using the wire-wrap tool.

Remove and replace a broken or defective CO cross-connect (terminal field) terminal as follows:

STEP	REMOVING AND REPLACING A BROKEN OR DEFECTIVE CO CROSS-CONNECT (TERMINAL FIELD) TERMINAL
1	Remove the jumper wire from the broken or defective terminal with the wire-wrap removal tool.
2	Using a 40- to 60-watt soldering iron, apply heat to the defective terminal for approximately 10 seconds and, using pliers (gas type), slowly pull on the terminal and remove it from the plastic base.

(continued)

Type C-303 Protector Repair Kit, continued

STEP	REMOVING AND REPLACING A BROKEN OR DEFECTIVE CO CROSS-CONNECT (TERMINAL FIELD) TERMINAL
3	To install the new terminal, use the installation tool supplied, and proceed as follows: a. Place the terminal into the hole of the installation too!. b. Place the terminal/tool into the hole of the plastic base assembly and, with a small amount of force, start the terminal into the hole. c. Fully insert the terminal by tapping a hammer against the installation tool and terminal. **NOTE: The terminal is fully installed when the installation tool makes contact with the plastic protector assembly.**
4	Reinstall wire to the replaced terminal by either of the following methods. • Rewrap and solder the original jumper wire. OR • Select the appropriate jumper (wire set No. 1) from the kit, completely remove the jumper wire from the connecting terminal with the wire-wrap removal tool, and install the new jumper to both terminals with the wire-wrap tool.

Remove and replace a broken or defective test point terminal as follows:

STEP	REMOVING AND REPLACING A BROKEN OR DEFECTIVE TEST POINT TERMINAL
1	Remove the jumper wire from the broken or defective terminal with the wire-wrap removal tool.
2	Remove the defective terminal by placing the terminal (CO terminal field), part No. 323-10 13, into the hole of the installation tool and use this tool terminal combination to push and/or hammer the defective terminal out of the plastic base protector.
3	Replace the new terminal by installing the terminal by hand into the test terminal hole and, using the installation tool and hammer, tap the terminal into the fully seated position.
4	Reconnect the wire to the replaced terminal by either of the following methods. • Rewrap and solder the original jumper wire. OR • Select the appropriate jumper (wire set No. 2) from the kit, completely remove the jumper wire from the connecting terminal with the wire-wrap removal tool, and install the new jumper to both terminals with the wire-wrap tool.

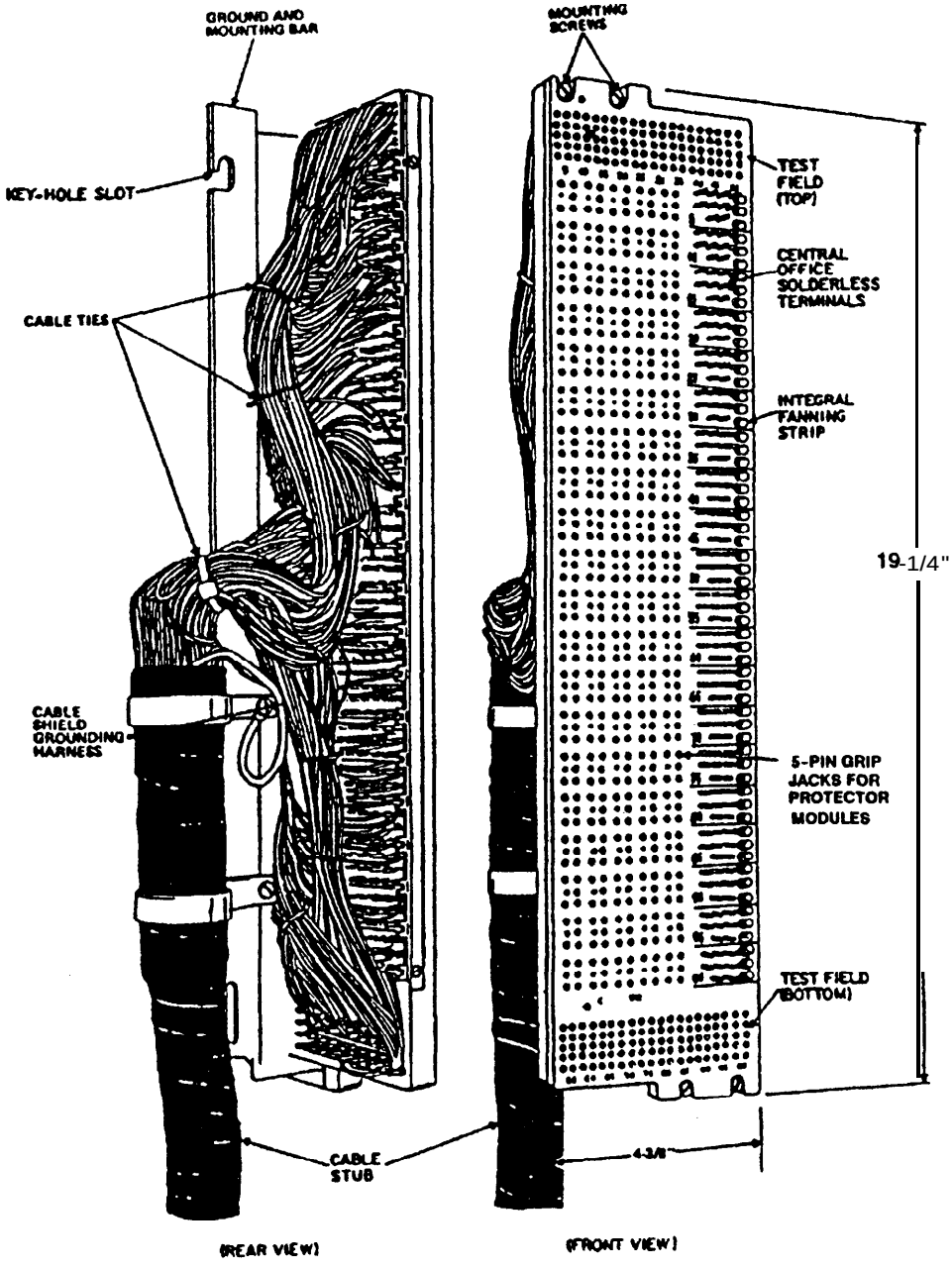


Exhibit 1 - Type C-303 Protector With Cable Stub

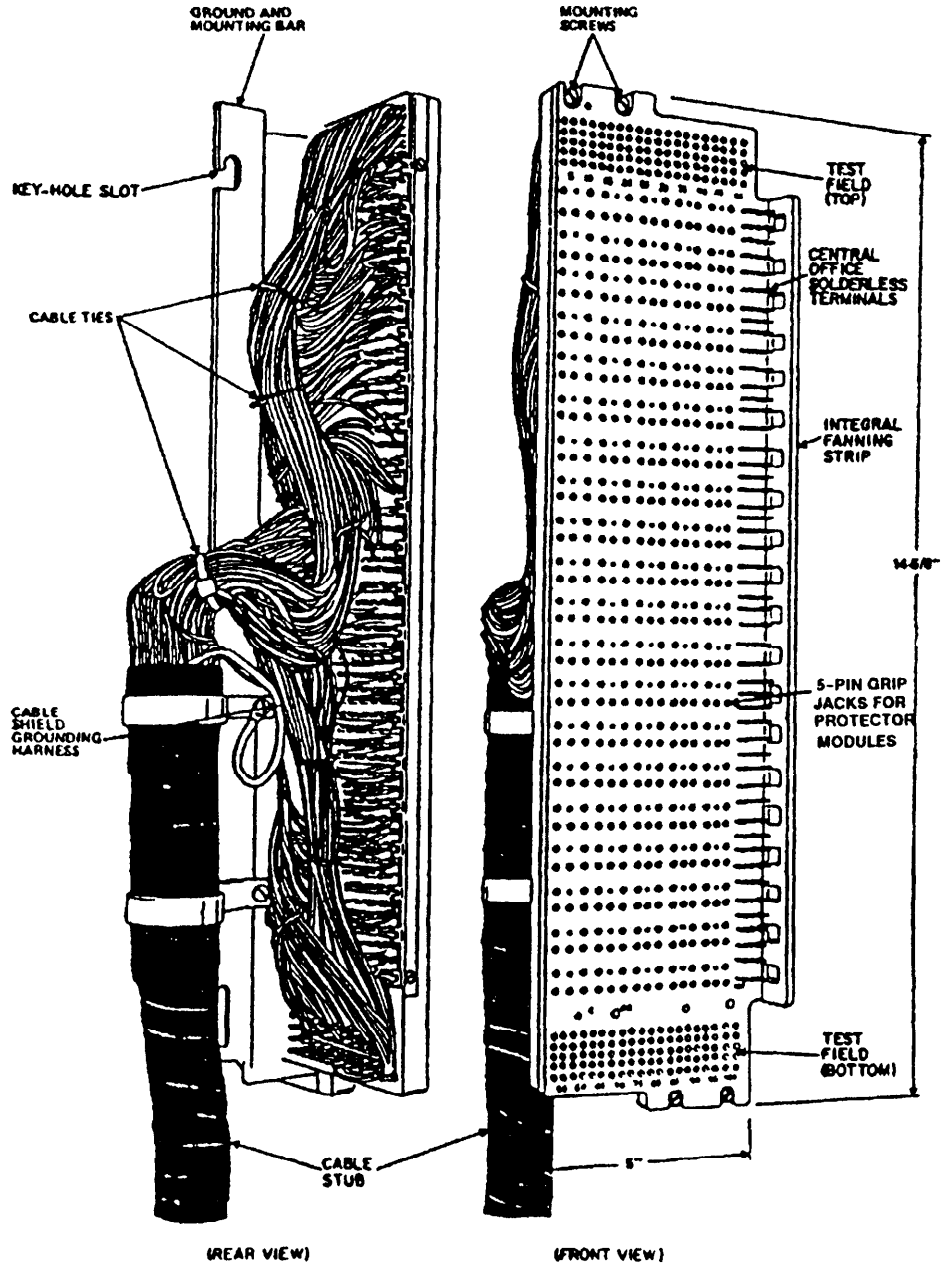


Exhibit 2 - Type C-310 Protector With Cable Stub

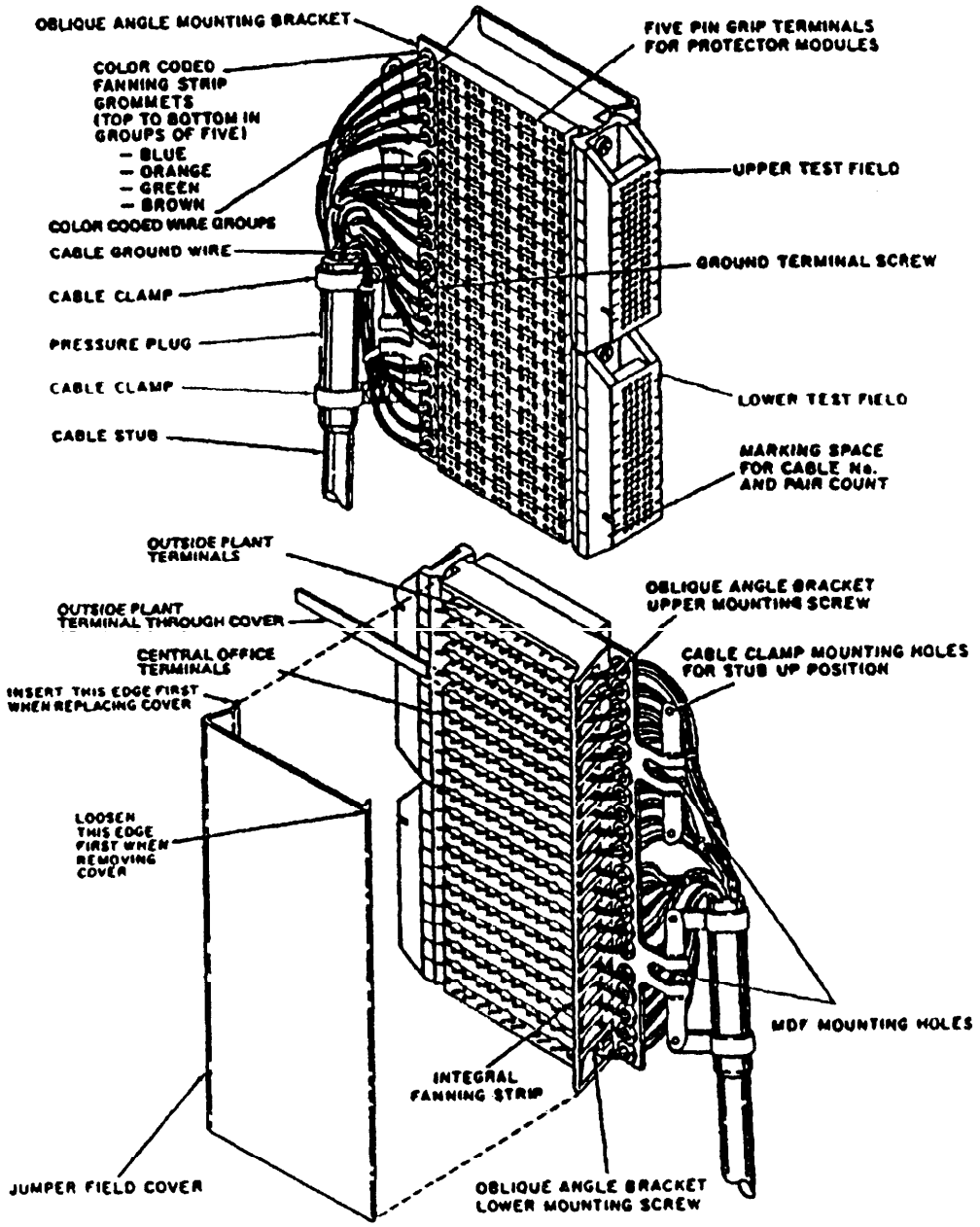
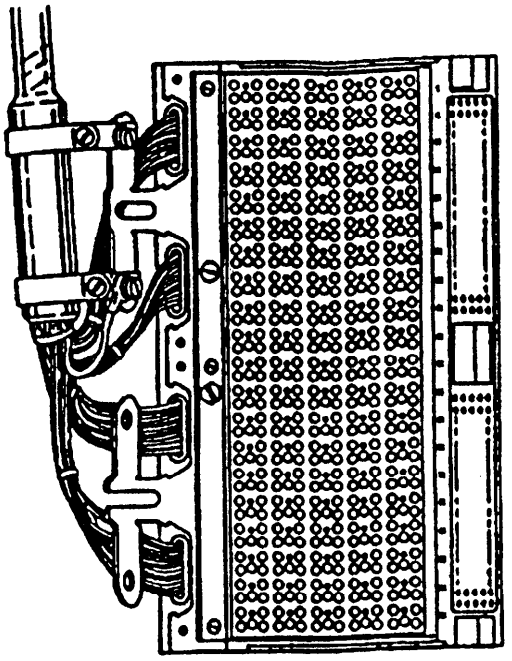
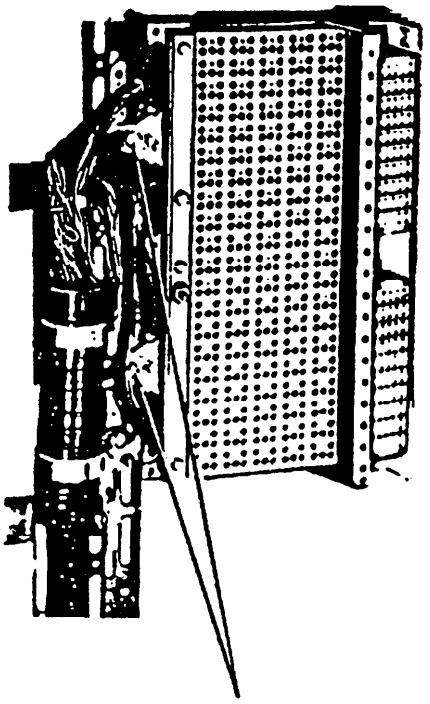


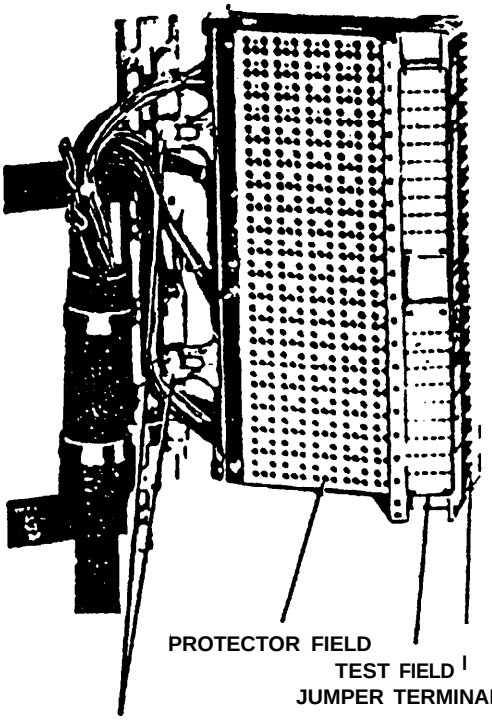
Exhibit 3 – Type C-377 Protector With Cable Stub



C-388 CONNECTOR IN -STUB-UP" POSITION



MOUNTING BRACKETS ON 1/4-20 SCREWS IN STRAIGHT-ON POSITION



MOUNTING BRACKET ON 1/4-20 SCREWS IN ANGLED POSITION

Exhibit 4- Type C-388 Protector With Cable Stub

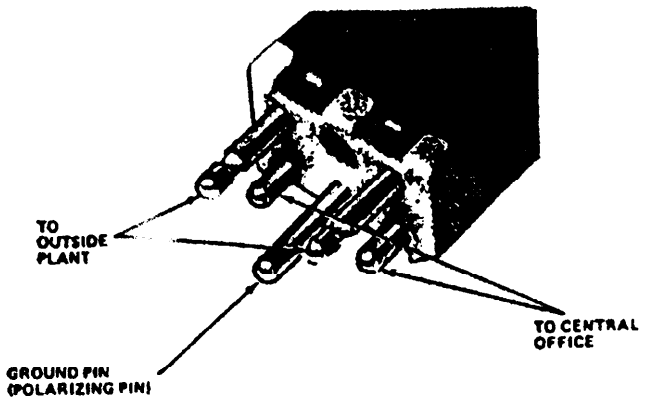
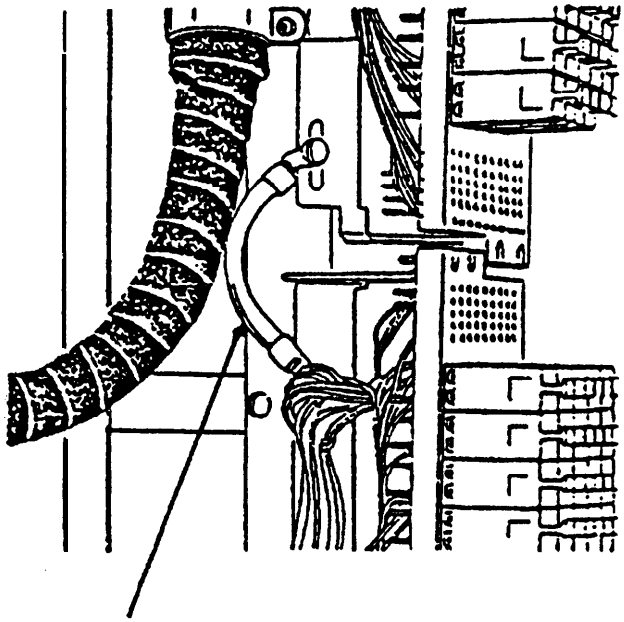


Exhibit 5 - Protector Module Pins



5.5 INCH (TYPE C-303) OR
1.25 INCH (TYPE C-810) OR
11.5 INCH (TYPE C-377
INTERPROTECTOR GROUND STRAP
NO. 6 AWG (023-7712)

Exhibit 6- Interprotector Ground Strap, Types C-303, C-377, and C-310 Protectors

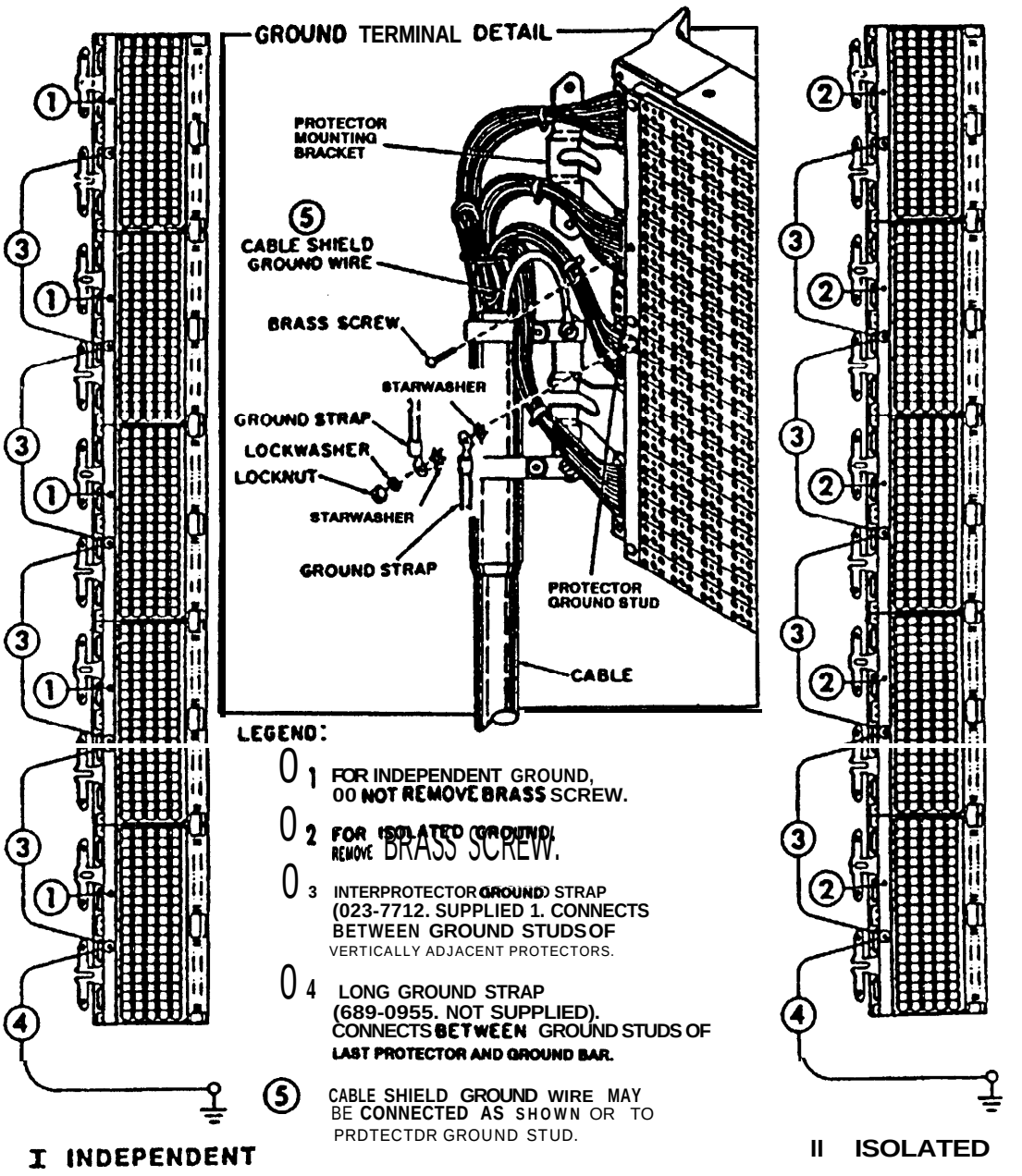


Exhibit 7 - Protector Grounding Method, Types C-377 and C-388 Protectors

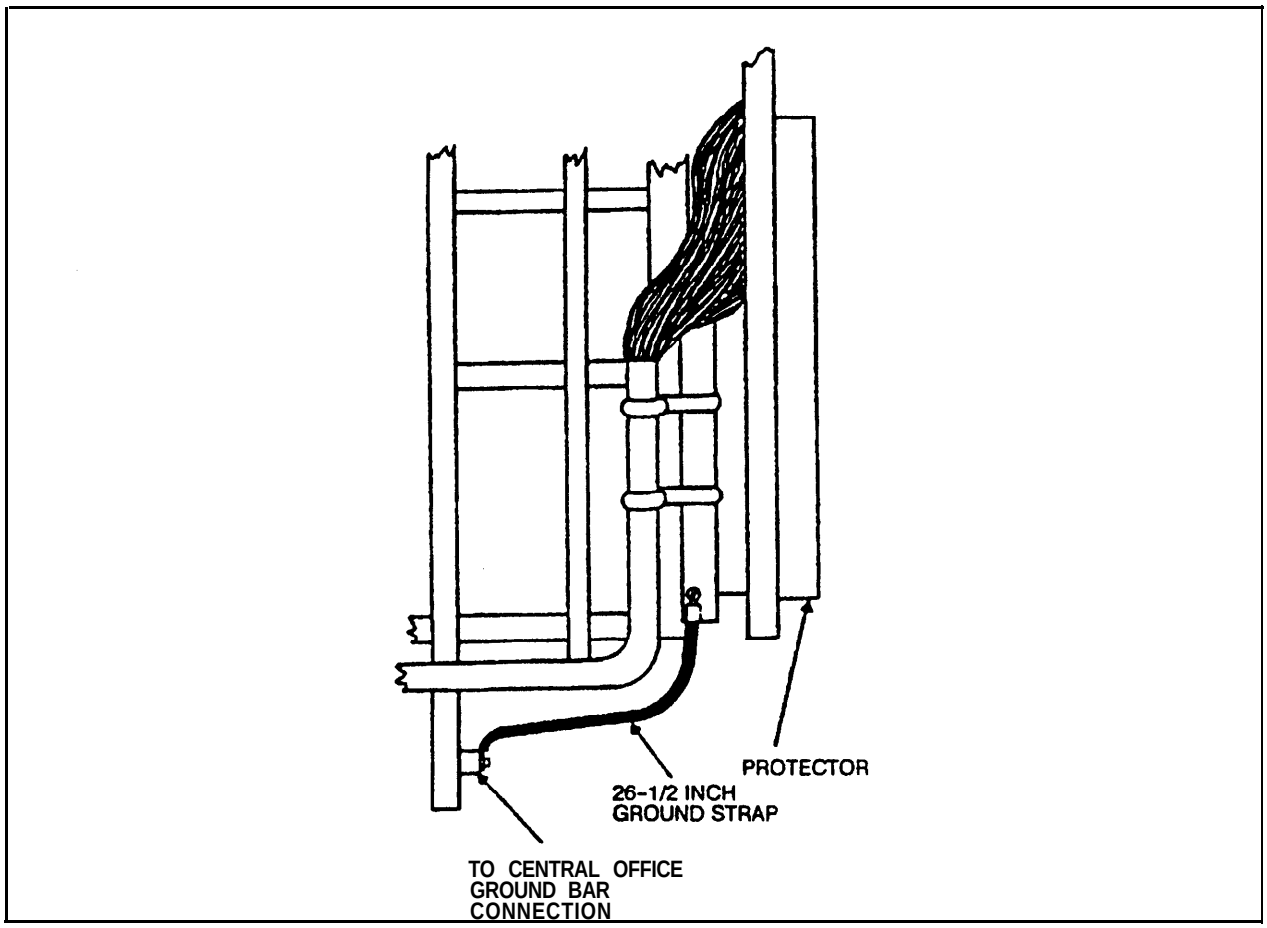


Exhibit 8 - Vertical Ground Strap Connection, Types C-303 and C-310 Protectors

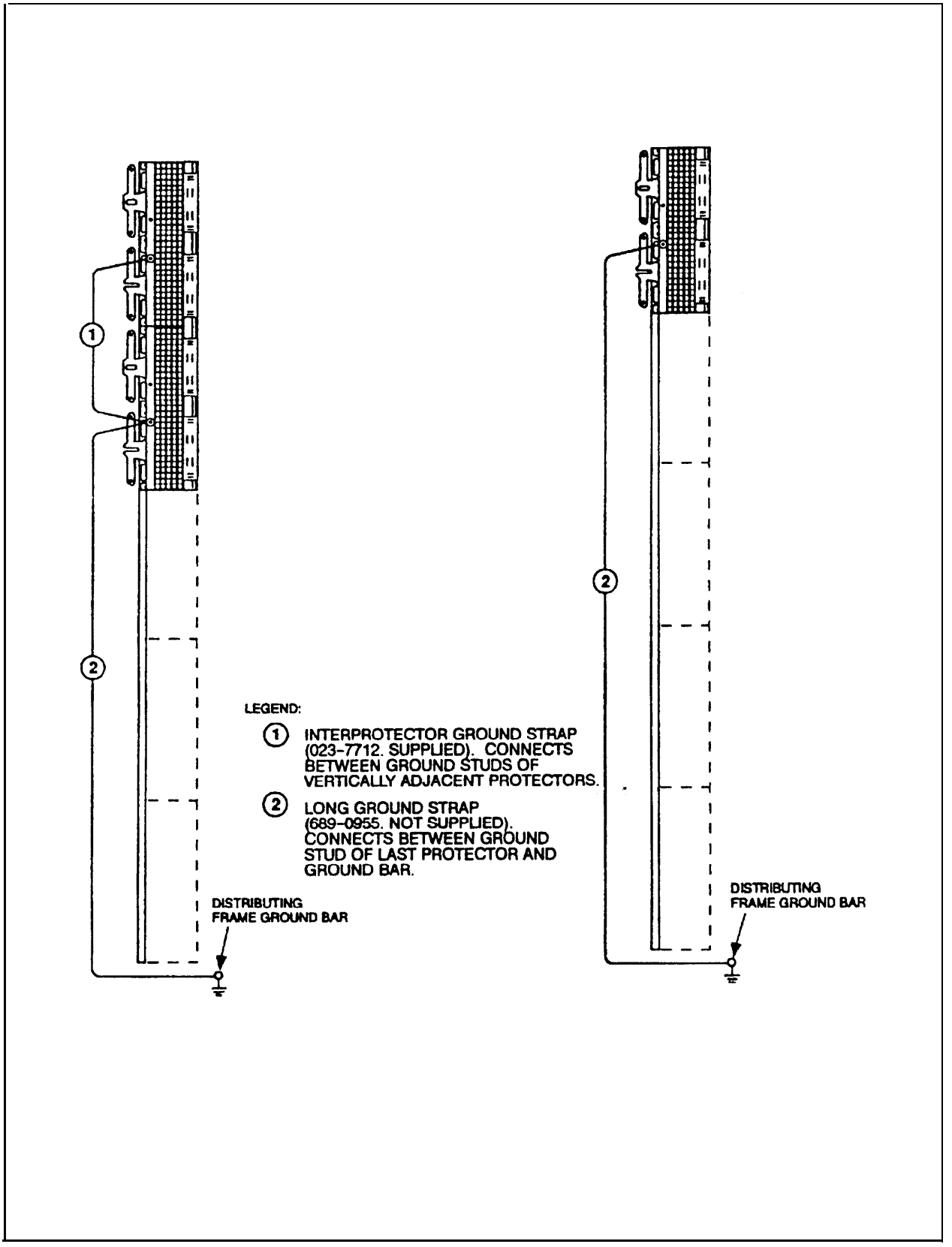


Exhibit 9 - Grounding Partially Equipped Protectors

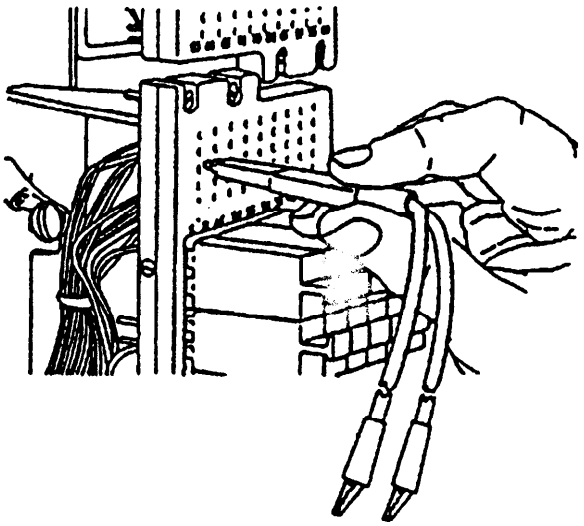


Exhibit 10 – Single-Pair Test Cord

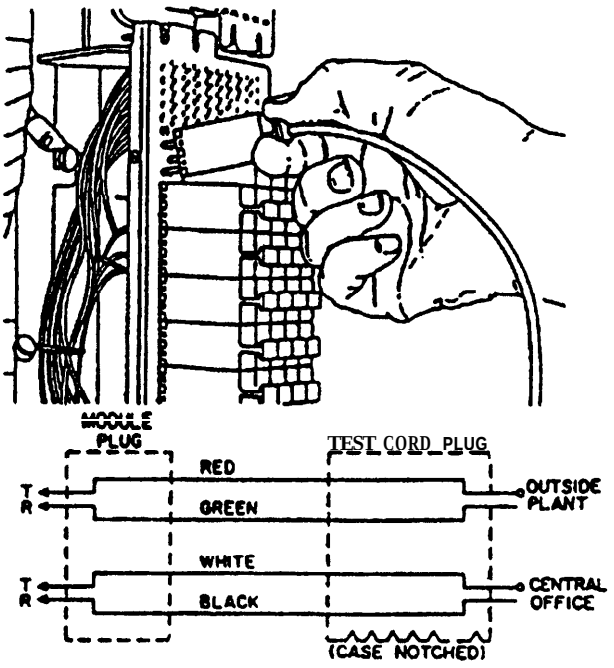


Exhibit 11 – Four-Conductor Test Cord

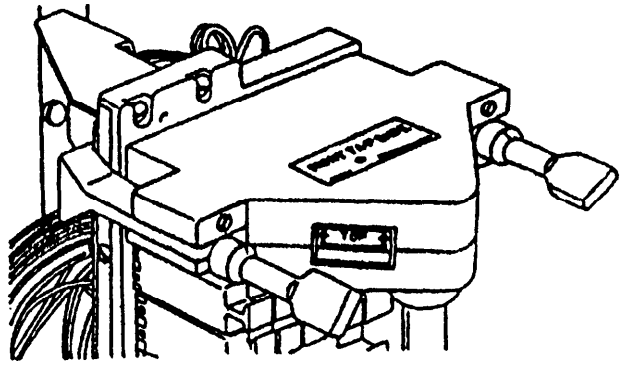


Exhibit 12 – 50-Pair Front Tap Shoe

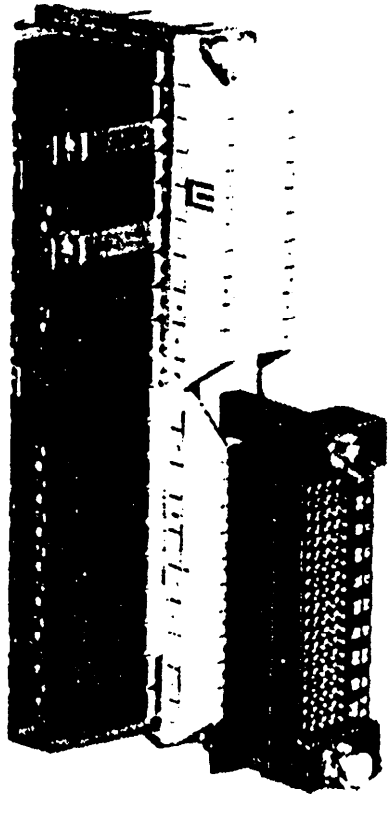


Exhibit 13 – X-Test Protector

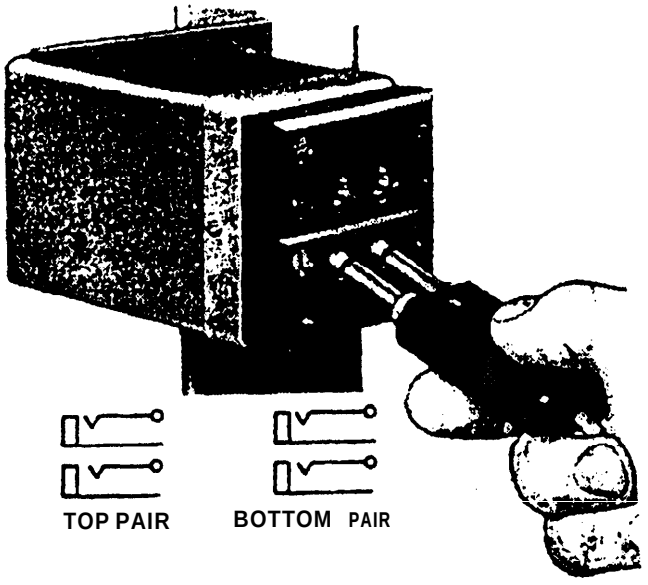


Exhibit 14 - MDF Test Jack Assembly

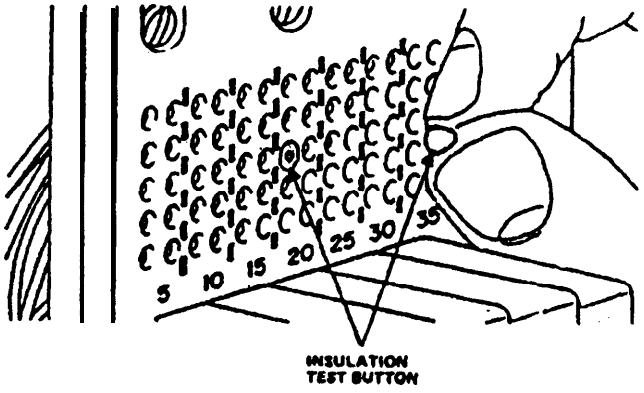


Exhibit 15 - Test-Point Insulator Button

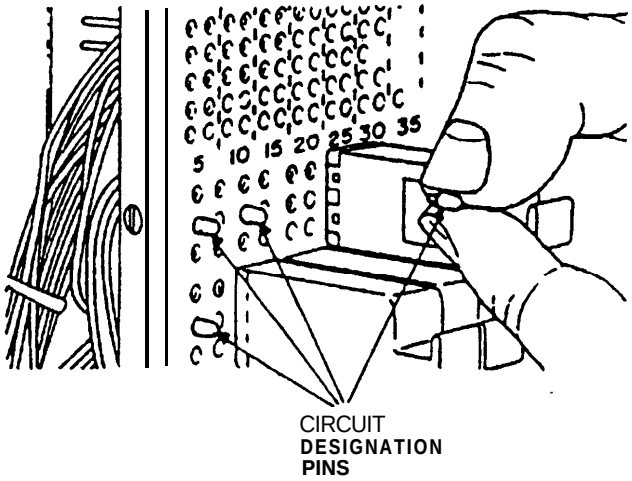


Exhibit 16 - Circuit Designation Pin

Exhibit 17 - Cap for Wire-Wrapped Terminals