



COOK ELECTRIC

6201 OAKTON STREET
MORTON GROVE, ILLINOIS 60053
Telephone: 312-967-6600

TECHNICAL PRACTICES BULLETIN

Practice C-102.006

Publication Issue 4, November 1974

Description and Installation

TYPE C-303

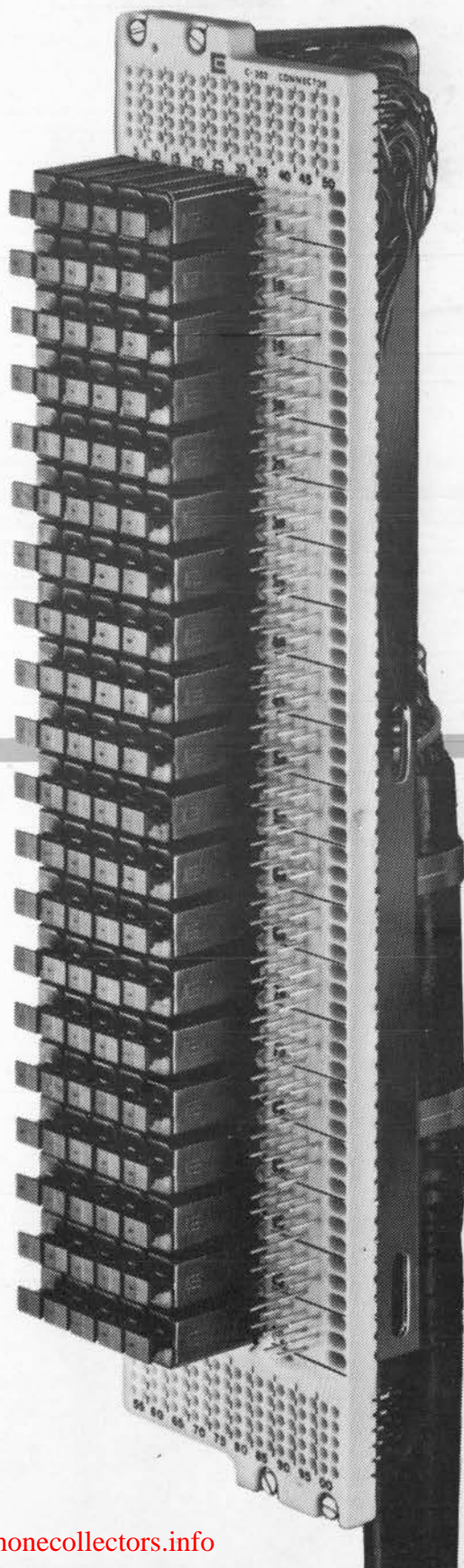
MAIN

FRAME

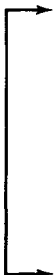
CONNECTOR

CONTENTS

	Page
1.00 General	1
2.00 Description of Connector	3
3.00 Module Description	4
4.00 Precautions	9
5.00 Installation-Stubbed	9
6.00 Installation-Stubless	12
7.00 Marking and Jumpering	13
8.00 Testing	13
9.00 Testing & Clearing Carbons	15
10.00 Accessories	16



NOTE



Revision 4 of this publication is being issued to clarify figure 1, expand paragraph 2.04, correct figure 7, revise figures 10 and 11, revise paragraph 5.05, revise paragraph 5.10, expand paragraph 10.04, add a schematic diagram to figure 28, and to expand paragraph 10.09.

TYPE C-303 CONNECTOR

1.00 GENERAL

- 1.01 The C-303 Connector (see figure 1) is a 100 pair unit used for terminating outside plant cables in central offices or customer premise locations where current (heat coils) and voltage (carbon arrestors or gas tube) protection is required. The connector can be used without protection if only the termination features are desired.
- 1.02 The C-303 Connector consists of a connector base designed for installation on a main distribution frame (MDF) and connector modules which plug into the base. The C-303 Connector provides features for testing, identification of incoming circuits, and disconnection of outside cable pairs in addition to current and voltage protection through the use of several types of connector modules. This 100 pair capacity connector is available with or without a cable stub.
- 1.03 Pair capacities of main distributing frames equipped with C-303 Connectors are shown below. (Standard frames allow 14-1/2 inches between the bottom connector and the floor.)

MDF Height (Feet)	No. of Pairs Terminated
7	300
8	400
9	400
11-1/2	600
14-3/4	800

Capacities of 7 foot frames can be increased to 400 pairs and 9 foot frames to 500 pairs by increasing the length of the vertical mounting bar. This will reduce the 14-1/2 inch clearance between the floor and bottom connector.

- 1.04 Connector modules available are:
- Type 3A Protector - MESATM carbon arrester protection.
 - Type 4A Protector - Heat Coil and MESA carbon arrester protection.
 - Type 5A - Straight-Thru (Unprotected) circuit continuity only.
 - Type 6A Protector - Fail-Safe gas arrester protection.

NOTE:

1. REFER TO FIGURE 10 FOR MOUNTING DIMENSIONS.
2. REFER TO FIGURE 15 FOR TERMINAL, TEST FIELD, AND CIRCUIT DETAILS

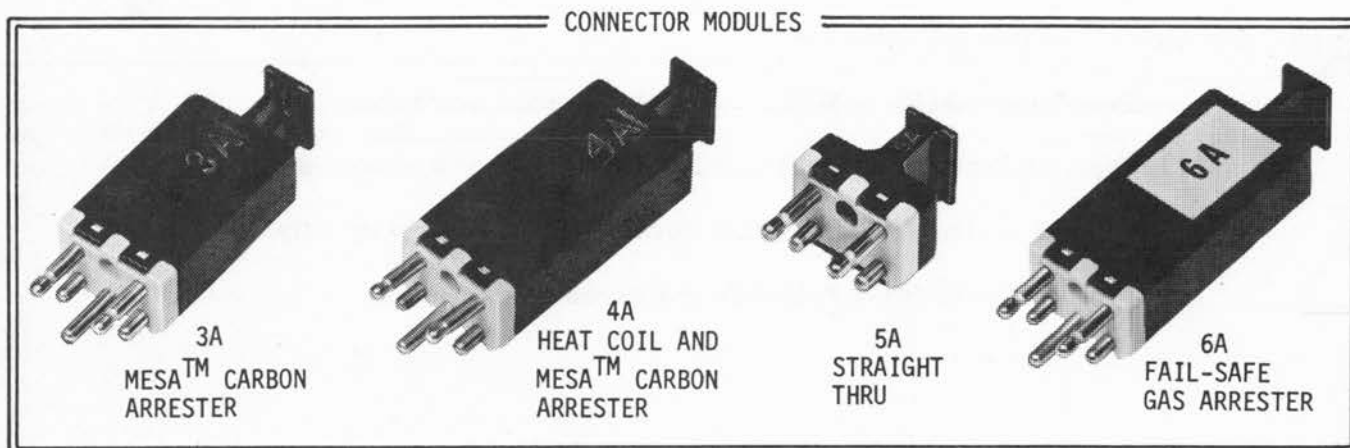
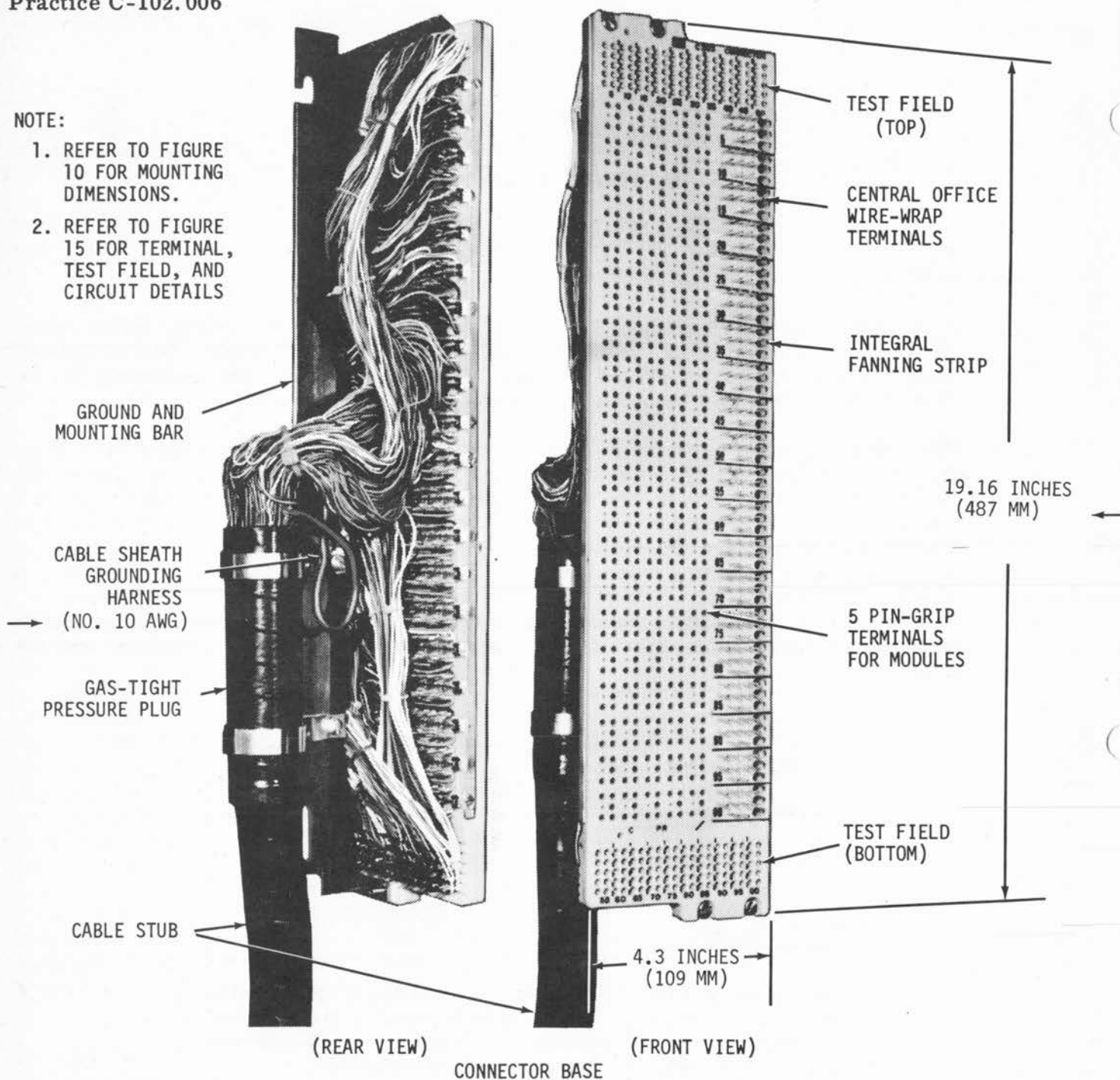


Figure 1

2.00 DESCRIPTION OF C-303 CONNECTOR BASE (See Figure 1)

- 2.01 The connector base is a one piece flame retardant plastic molded panel fastened to a rugged metal mounting bar. The mounting bar is the electrical ground for the connector base. The panel is equipped with a group of 100 five-pin grip type terminals. Four of these terminals provide contact for tip and ring connections between incoming cable and switching equipment. The fifth terminal provides a ground connection which also serves as a polarization terminal.
- 2.02 Central office wire-wrap terminals, arranged for mechanically wire wrapped connections, are located on the front right hand side of the panel for termination of cross-connect jumpers from line terminal blocks. An integral fanning strip is molded into the right hand edge of the connector base. The large sized holes in the strip are aligned with each row of central office wire-wrap terminals to permit easy insertion and identification of wire pairs.
- 2.03 A test field is located at the top and bottom of the front panel. The test field is in two groups of 50 pairs each for test access to outside plant pairs.
- 2.04 The connector base is furnished with or without a cable stub. When a connector base is ordered with a stub, the standard length is 20 feet and is furnished in a "stub-down" position. (The stub can be changed to a "stub-up" position on the job site, however, it is recommended that connector bases be ordered with the "stub-up" position when this is a known requirement.) Extra length stubs, in increments of 10 feet, are available on request. The 101 pair ALVYN cable used for stubbing has a PVC sheath with tinned 22 or 24 gauge wire, PVC and polyethylene conductors. Cable shield is connected directly to the C-303 Frame Hardware with a No. 10 AWG ground strap. (The 22 gauge wire, 100 pair cable has a nominal O.D. of 1.3 inches, and 24 gauge wire, 101 pair cable has a nominal O.D. of 1.1 inches.) All cable stubs are fitted with a gas tight pressure plug. The primary purpose of this plug is to allow for pressure testing of the vault closure. CAUTION: These stub cables must not be maintained under continuous pressure. It will be necessary to plug the main cable as close as practical to the vault splice.
- 2.05 When the cable entering the central office is exposed to possible contact with power conductors operating at voltages above 300 volts, the wires in the stub cable of the connector should be at least two gauges larger than the wires in the fusing link or entrance cable.
- 2.06 A fuse link or entrance cable of 24 gauge wire or finer should be used when stubbing with 22 gauge wire. When stubbing with 24 gauge wire the fuse link or wires in the entrance cable should be 26 gauge. This will insure that the cable stub or wiring on the rear of the base will not fuse open on power faults of long duration.
- 2.07 Unless otherwise specified, all connector bases are wired for standard "B" type main frame application. Consult Cook Electric for special ordering information on "A" type main frame applications. (Prestubbed connector bases are not available for "A" type frame applications.)



3.00 CONNECTOR MODULE DESCRIPTION (See Figures 2 through 7)

3.01 Connector modules available are:

- a. Type 3A Protector - MESATM carbon arrester protection.
- b. Type 4A Protector - Heat Coil and MESA carbon arrester protection.
- c. Type 5A - Straight-Thru (Unprotected) circuit continuity only.
- d. Type 6A Protector - Fail-Safe gas arrester protection.

The modules are available with color coded plastic cases to identify special circuits.

3.02 All connector modules except Type 5A are furnished with five contact pins and in a plastic housing (see figure 2). The plastic housing for the module is made from a self-extinguishing plastic insulating material. When inserted into the connector base, the contact pins provide the following contact for one cable pair:

- a. Tip and ring to outside plant (O.P.) conductors (long pins).
- b. Tip and ring to central office (C.O.) equipment (short pins).
- c. Ground, which also serves as a polarization pin.

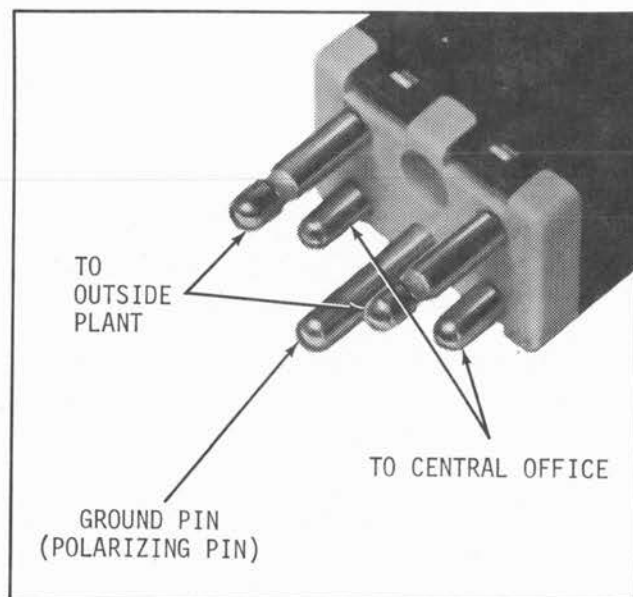


Figure 2

3.03 When the connector modules are fully inserted (see figure 3) into the connector base, the outside plant and central office equipment are connected. The grounding pin is connected to provide continuity through the connector base mounting bar and inter-connector ground straps to the copper ground bar at the base of the main distribution frame.

3.04 When the connector module is pulled out to the detent position (see fig. 3), the central office equipment is disconnected from the outside plant cable pairs. In the detent position, protection is provided only for the outside plant cable pair.

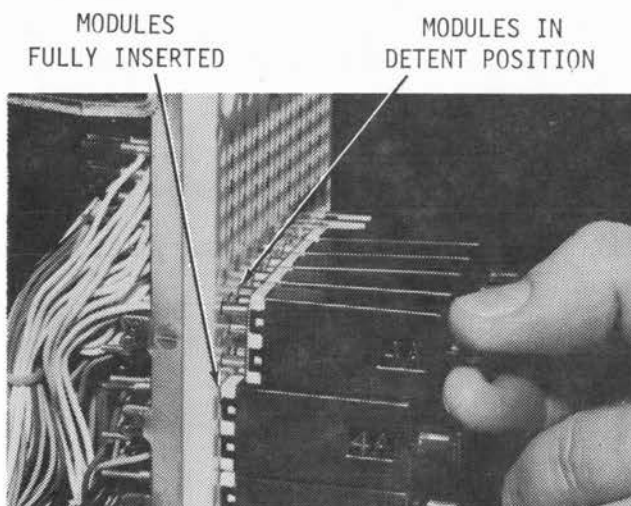


Figure 3

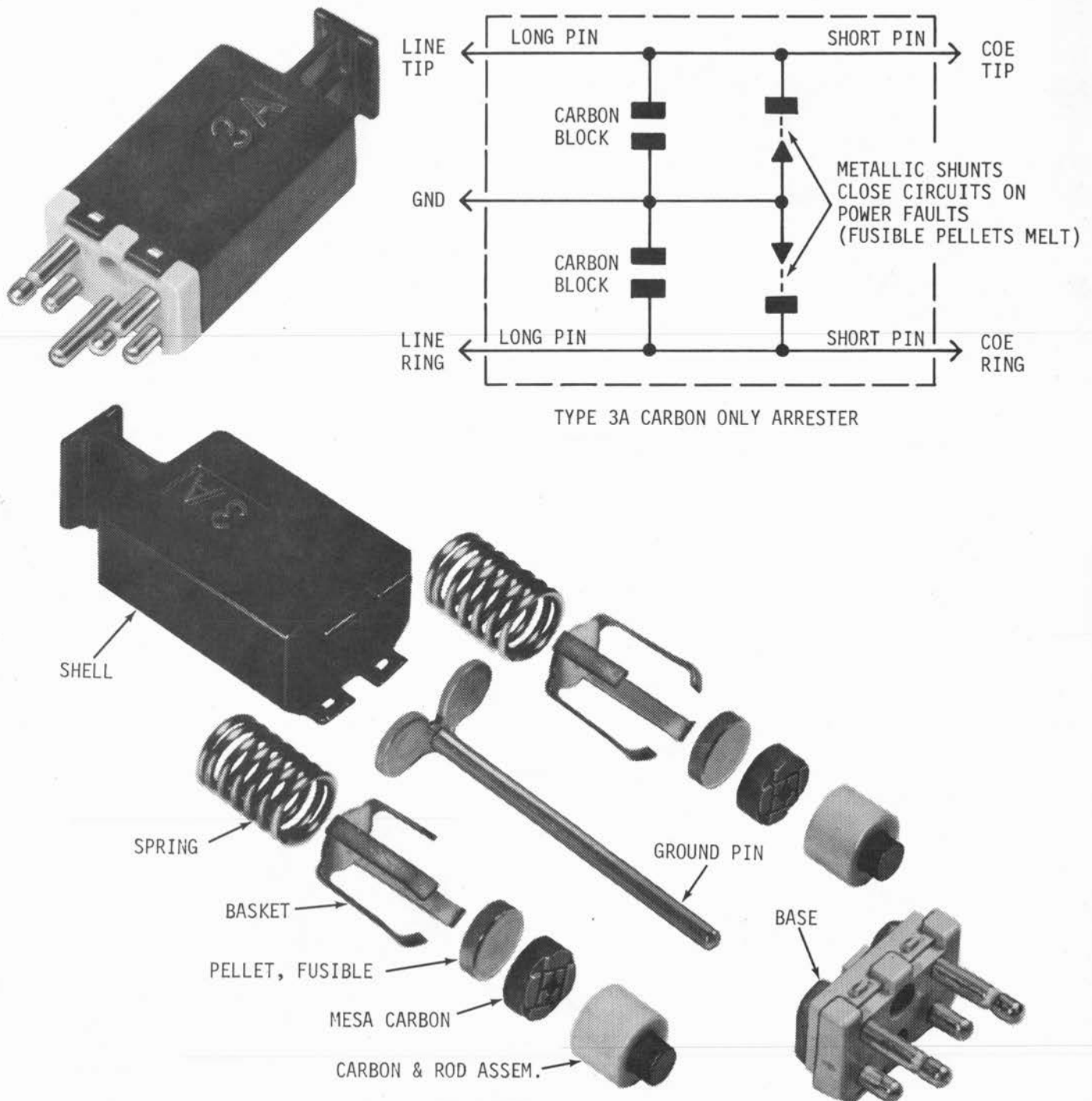


Figure 4

- 3.05 The Type 3A Protector provides voltage protection with MESA™ carbon air-gap blocks and a fusible metal alloy.

SPECIFICATIONS:

Nominal Voltage Breakdown	450V
Protection Type	MESA™ Carbon Block
Typical Power Cross Fail-Safe Time	1.8 Sec (30A Pwr Cross)
Housing Number	3A
Housing Color	Black (Standard Circuit) Red (Special Circuit)

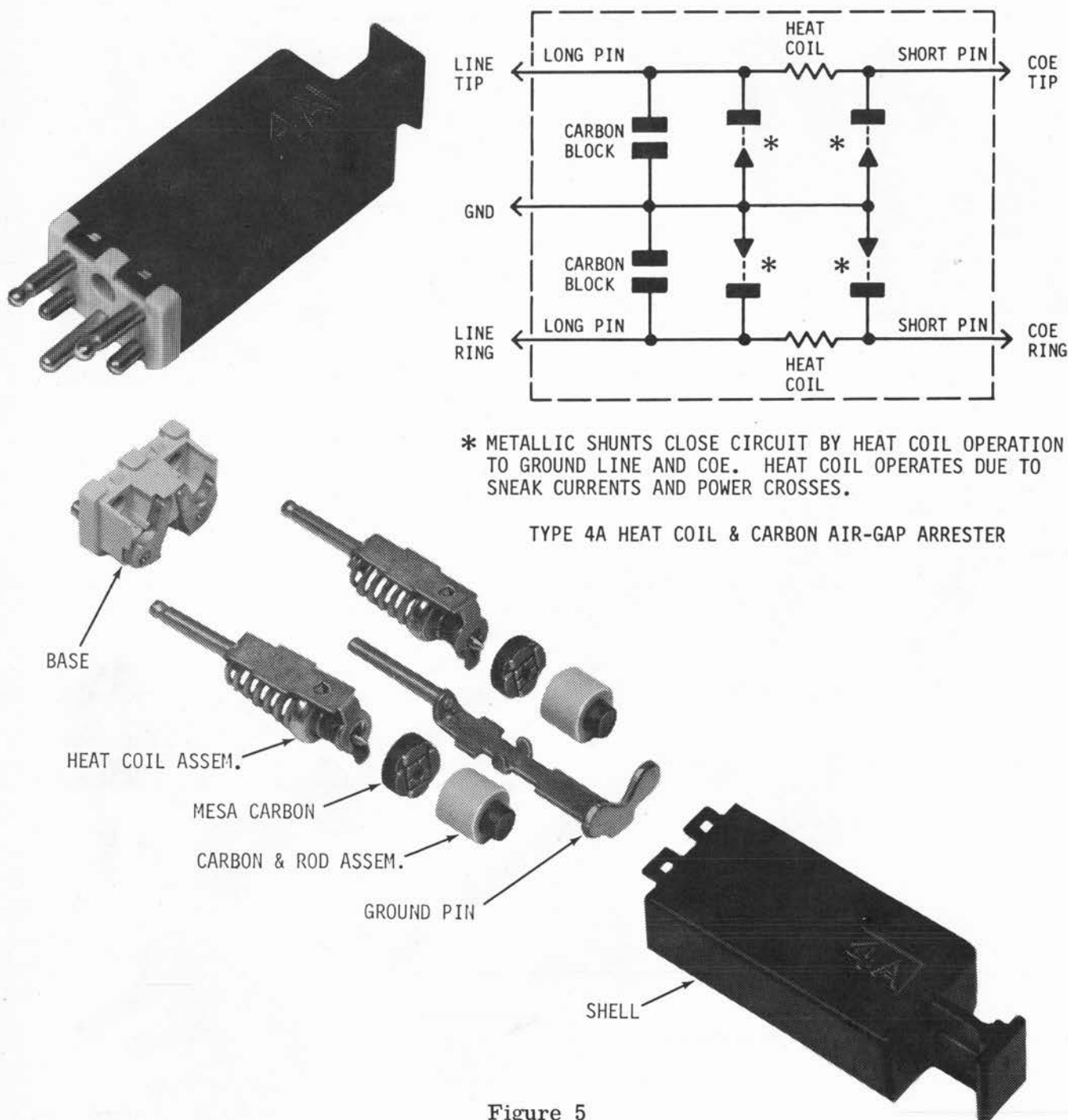


Figure 5

- 3.06 The Type 4A Protector provides voltage protection, sneak current protection, and power fault protection with MESA carbon blocks and heat coils.

SPECIFICATIONS:

Nominal Voltage Breakdown	450 V
Approx. Resistance	3.45 Ω
Current Load (3 hour limit)	0.35A
Current Load (10 second limit)	1.0A
Protection Type	Carbon Block and Heat Coil
Housing Number	4A
Housing Color	Black (Standard Circuit) Red (Special Circuit)

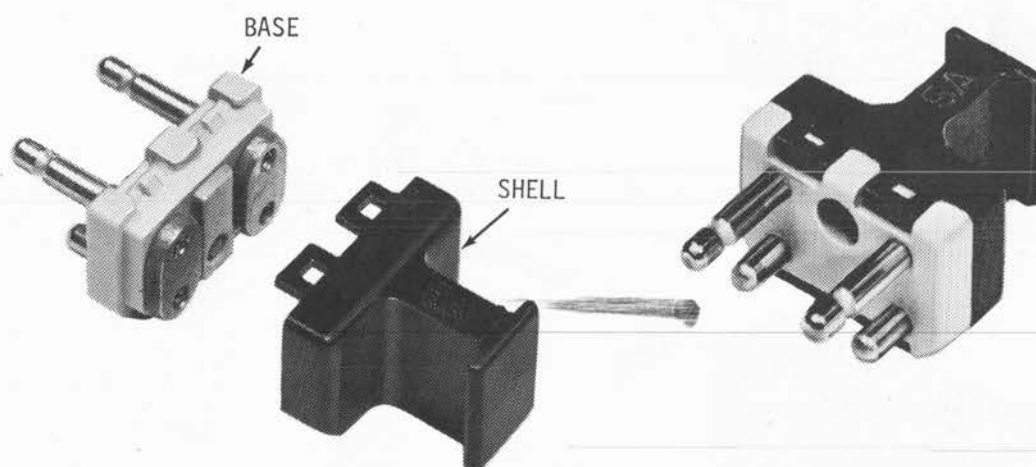
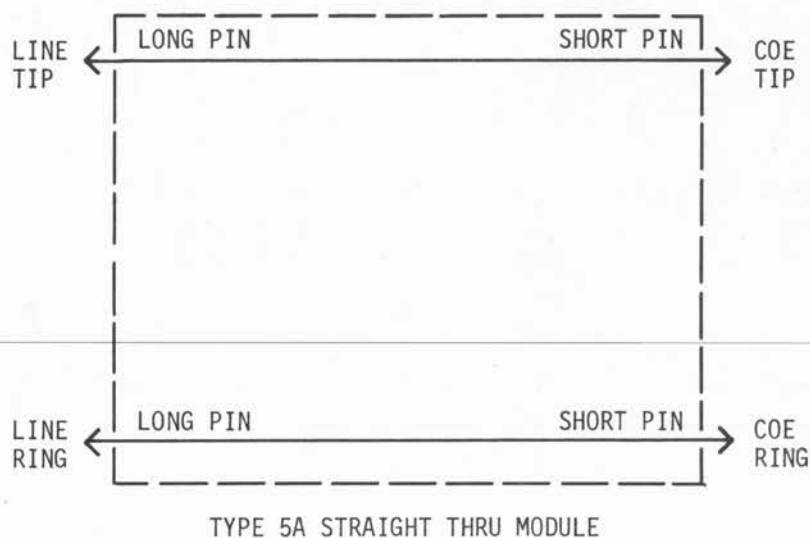


Figure 6

- 3.07 The Type 5A Module provides circuit continuity where no protection is required. This unit is suggested for use in unexposed central office circuits that do not require protection.

SPECIFICATIONS:

Protection Type	None (Straight-Thru)
Housing Number	5A
Housing Color	Black (Unprotected Circuit)
	Red (Unprotected Special Circuit)
	Yellow (Unprotected Circuit), with Long Shell (same size as 4A)

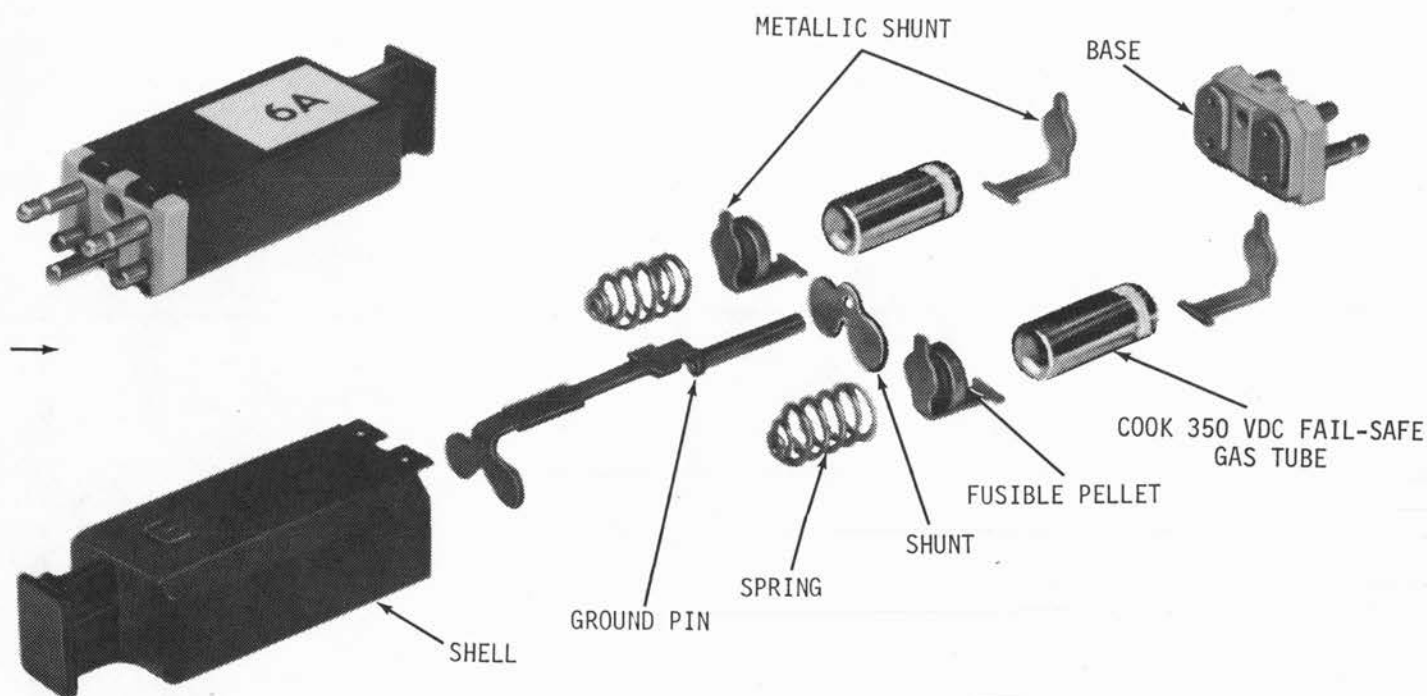
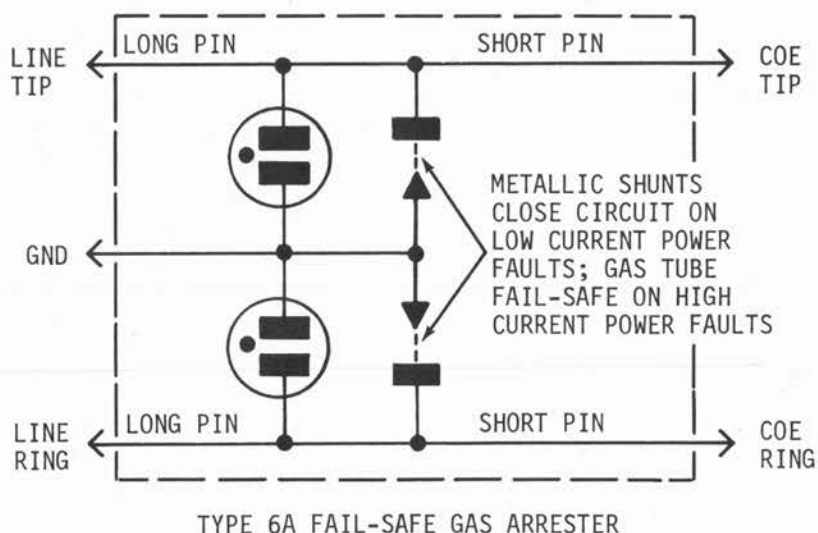


Figure 7

- 3.08 The Type 6A Protector provides voltage protection with fail-safe gas arresters. This self-restoring gas arrester will shunt transient voltages to ground and return to normal in microseconds. Refer to Cook Electric Technical Practices Bulletin C-302.006 for additional gas tube information.

SPECIFICATIONS:

Protection Type	Fail-Safe Gas
Nominal Voltage Breakdown	350 VDC
Housing Number	6A
Housing Color	Black (Standard Circuit) Red (Special Circuit)

4.00 PRECAUTIONS

- 4.01 Store the C-303 Connector and modules in a dry location. Do not leave the units on loading docks or in outside locations where they may be exposed to the weather.
- 4.02 When unpacking the connector from its shipping carton, use care so as not to damage the connector, modules, or stub. (See figure 8.)
- 4.03 To avoid damage - - - DO NOT BEND THE CABLE STUB IN A SHORT RADIUS.
- 4.04 Do not remove the connector from its protective carton until it is ready for installation on the frame.
- 4.05 The connectors are shipped with the connector modules in the "detent" position.
- 4.06 It is not necessary to remove the connector modules to install the connector.

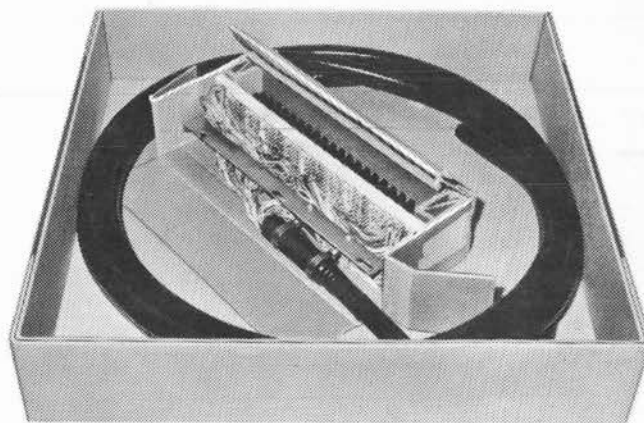


Figure 8

5.00 INSTALLATION - STUBBED CONNECTORS

- 5.01 Prior to installing the C-303 Connector, open the cable entrance slots or ferrules in the floor in accordance with local instructions. (For overhead cable, first follow instructions in paragraph 5.10.) If there are fanning strips on the frame vertical, remove them. The C-303 Connector has a fanning strip as an integral part of the connector panel.
- 5.02 Mark the cable number and pair count of each connector stub cable and attach to the stub cable prior to placing it through the floor to the vault.
- 5.03 Remove the connector from the shipping carton and route the stub cable into the cable vault from in front of the vertical side of the distributing frame. Remove any cable twist that may be present.

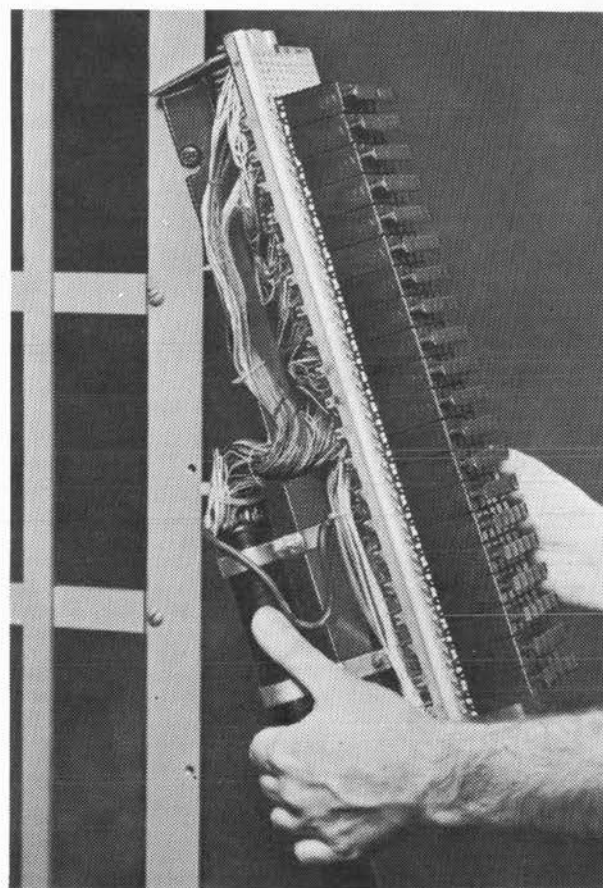


Figure 9

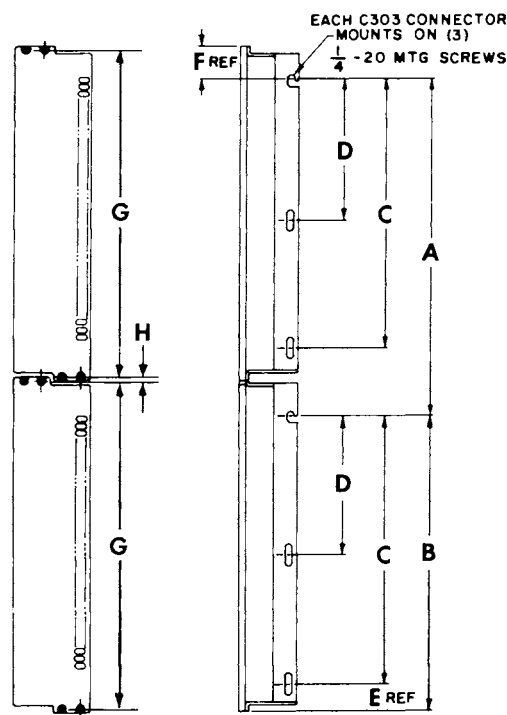
5.04 Attach the C-303 Connectors to the left side of the distributing frame vertical mounting bar, beginning at the lower end of the frame. Use the screws furnished with the connectors. Place the top screw in the vertical mounting bar for the connector. Hang the connector on this screw using the key-hole slot on the C-303 mounting bar. (See figures 9 and 10.) Screw in the remaining screws after hanging the connector.

5.05 Two methods may be used to connect the C-303 Connector to electrical ground (see figure 11).

- a. Basic Ground Method. Use the short ground strap, supplied with the unit, to connect between the mounting bar screws of adjacent connectors (see A, figure 11). Repeat this procedure between each pair of connectors on the same vertical. Connect the bottom mounting screw on the low-

est connector to a 1/4-20 terminal on the main frame copper ground bar, using a long (24-in.) ground strap, part No. 023-2466.

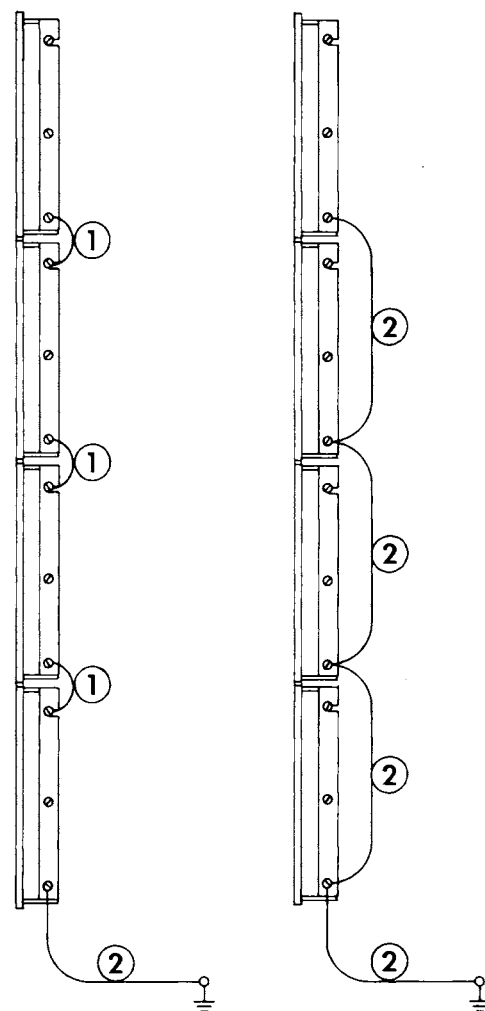
- b. Independent Ground Method. Use a long (24-inch) ground strap, part No. 023-2466, to connect between the bottom mounting bar screw of each connector mounting bar (see B, figure 11). Connect the mounting bar screw on the lowest connector to the 1/4-20 terminal on the main frame copper ground bar, using a long (24-inch) ground strap, part No. 023-2466.



C-303 CONNECTOR MOUNTING DIMENSIONS

DIM.	INCHES	MM
A	19	483
B	17	432
C	15-1/4	387
D	7-3/4	197

DIM.	INCHES	MM
E	1-3/4	44
F	2-1/8	54
G	18-3/4	476
H	1/16	1.59



A. Basic

B. Independent

LEGEND:

1. SHORT GROUND STRAP (SUPPLIED)
2. LONG (24 IN.) GROUND STRAP (023-2466)

- 5.06 Tighten all mounting screws after all of the connectors and ground straps are placed in position on the vertical mounting bar.
- 5.07 The clamps on the pressure plug of the connector stub should be carefully bent to the vertical mounting bar, so the stub cable can be out of the way for future work at the frame. (See figure 12.)
- 5.08 The stub cables of all connectors on a vertical mounting bar should be neatly arranged against the transverse arms of the frame. Lash the stub cables to these transverse arms in a neat manner.
- 5.09 Close the cable entrance slots, or ferrules, in the floor in accordance with local instructions.
- 5.10 The cable stub may be turned 180 degrees (see figure 13) at locations where there is no cable vault or the stubs go to the top of the frame. But use this method only if no other cabling routing is possible. Handle the cable very carefully to avoid breaking wires. Be sure enough clearance is available for molded end of cable stub above top of connector base before using this method. (If the "stub-up" requirement is known in advance, order the C-303 Connector with the cable stub already mounted in the "stub-up" position.) Change the cable position as follows:
- Remove cable clamps from pressure plug and mounting bar.
 - Turn cable stub 180 degrees.
 - Reinstall cable clamps in the alternate holes provided.
- 5.11 **IMPORTANT.** Test the protectors for carbon dust or other shorting per the procedure provided in para. 9.00. After all protectors are cleared, then proceed with paragraph 5.12.

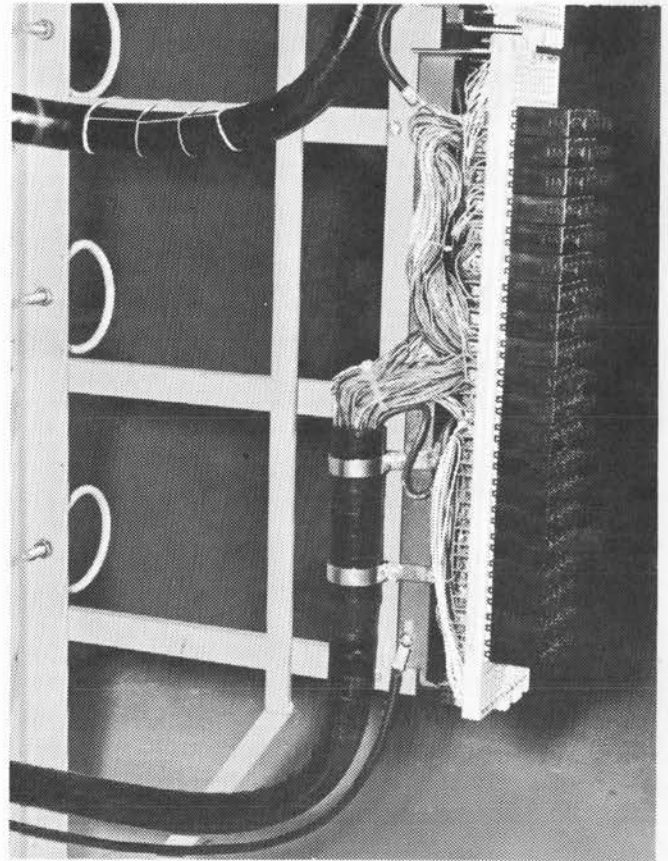


Figure 12.

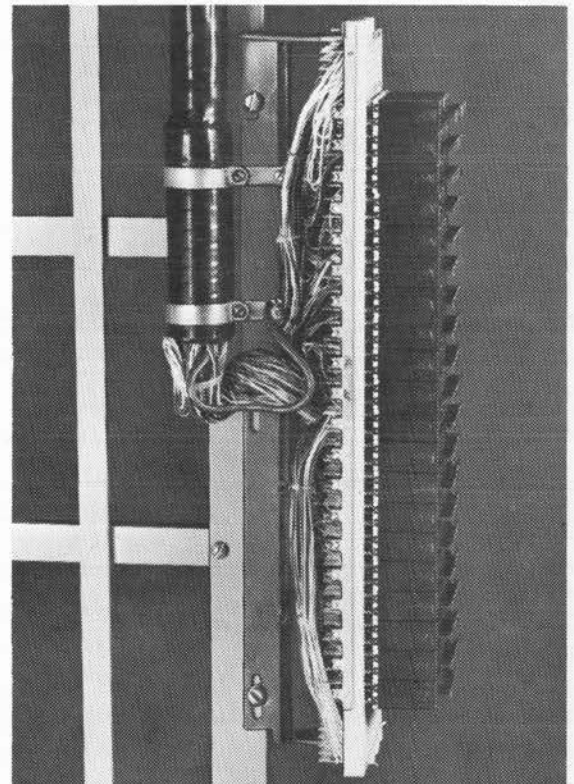


Figure 13.

- 5.12 Splice the cable stub to the entrance cable. The cable stub is wired with standard cable wire color coding.

Cable pairs can be matched to the central office jumper field as follows:

Cable Pair Group	Binder Color	Cable Pair Sub Group	Tip Wire Color	Ring Wire Color for Each Sub Group of 5 Tip Wire Colors
1-25	Blue	1-5, 26-30, 51-55, 76-80	White	1st Wire - Blue
26-50	Orange	6-10, 31-35, 56-60, 81-85	Red	2nd Wire - Orange
51-75	Green	11-15, 36-40, 61-65, 86-90	Black	3rd Wire - Green
76-100	Brown	16-20, 41-45, 66-70, 91-95	Yellow	4th Wire - Brown
		21-25, 46-50, 71-75, 96-100	Violet	5th Wire - Slate

For example, cable pair 57 would be in the green binder and have a red tip wire and an orange ring wire.

6.00 INSTALLATION - STUBLESS CONNECTORS

- 6.01 Install connector base as described in paragraphs 5.01 to 5.07 and paragraph 5.11.
- 6.02 Follow detailed stubbing instructions (Cook Electric Drawing No. 323-0063) which are packed with each stubless C-303 Connector. These instructions

include the temporary mounting of stubless connector and complete wiring diagram. See figure 19 for photograph of stubless connector in wiring position.

- 6.03 After wiring has been completed, remove temporary mounting brackets and reassemble connector base to its mounting bracket.

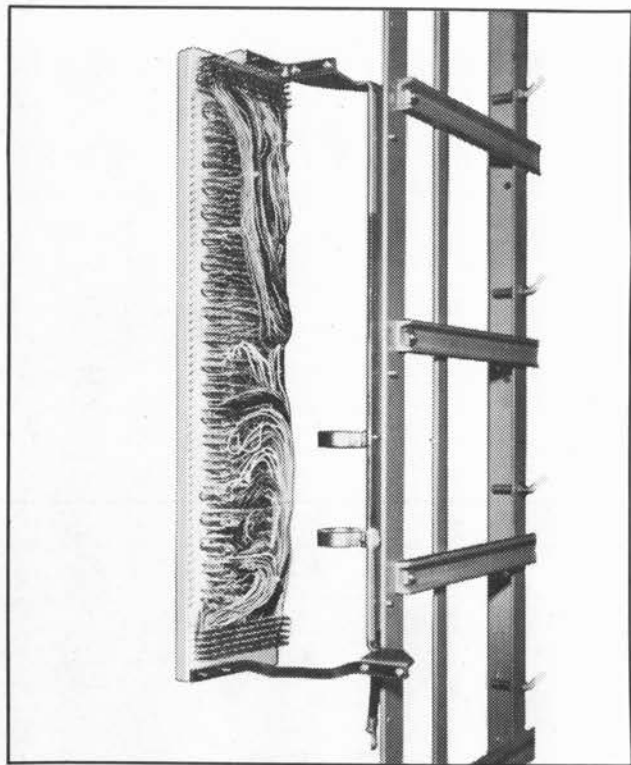


Figure 14

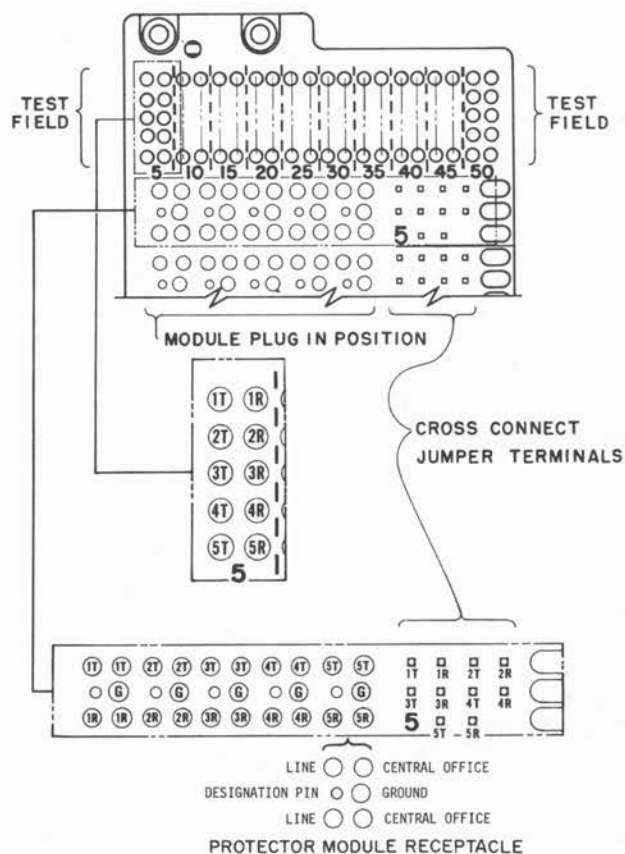


Figure 15

7.00 MARKING AND JUMPERING

- 7.01 Test Fields. (See figure 15.) Each connector panel test field is permanently pre-marked in black numbers in increments of every five pairs. Each pair of test contacts has tip-left and ring-right. A space is provided immediately above the bottom test field to mark the cable number and pair count. (See figure 16.)
- 7.02 Jumper Field. (See figure 15.) The connector panel is permanently pre-marked in black numbers, with a black dividing line, adjacent to every fifth pair of wire-wrap terminals on the right face of the panel to assist in pair identification when placing central office jumpers.
- 7.03 Fanning Strip. The fanning strip with holes for entrance of the central office jumpers is on the front of the panel immediately to the right of the wire-wrap terminals. Each group of 5 cable pairs have 3 fanning strip holes to facilitate easy access of the jumper wires from the line terminal blocks to the connector wire-wrap terminals. (See figure 17.)
- 7.04 Connection of Central Office to Outside Plant. All that is required to make the connection is to push each connector module to the fully inserted position from the detent position. The outside plant and central office equipment are then connected.

8.00 TESTING

- 8.01 The C-303 connector base has a 50 pair test field at the top and bottom of each 100 pair unit. This is connected directly to the outside plant cabling and the outside plant terminals of the protector modules. Each test field is grouped in 10 rows of 5 pairs that are clearly marked. (See figures 15 and 18.)

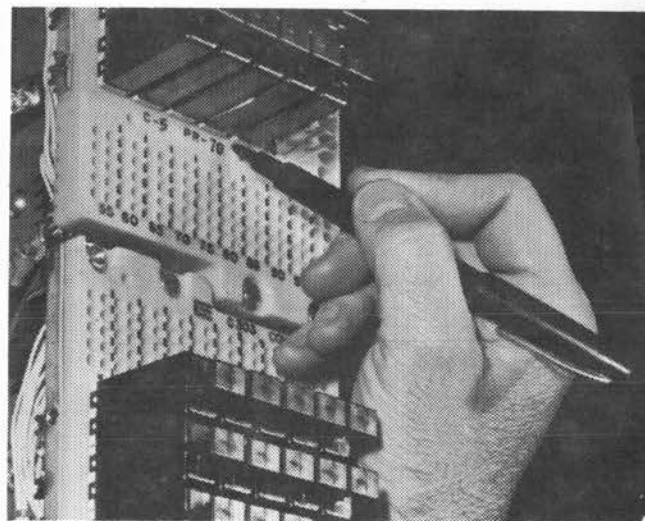


Figure 16

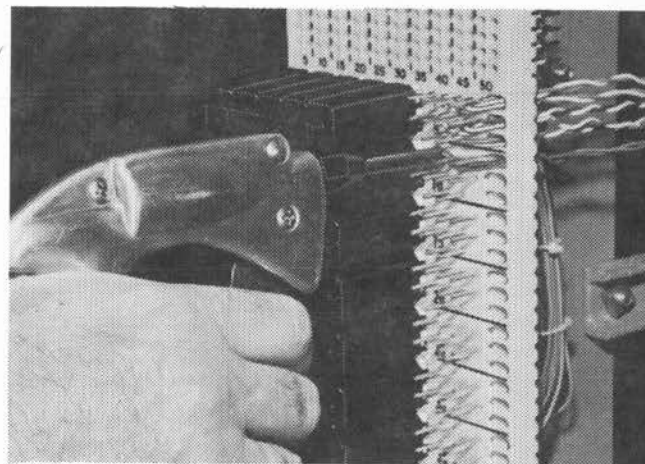


Figure 17

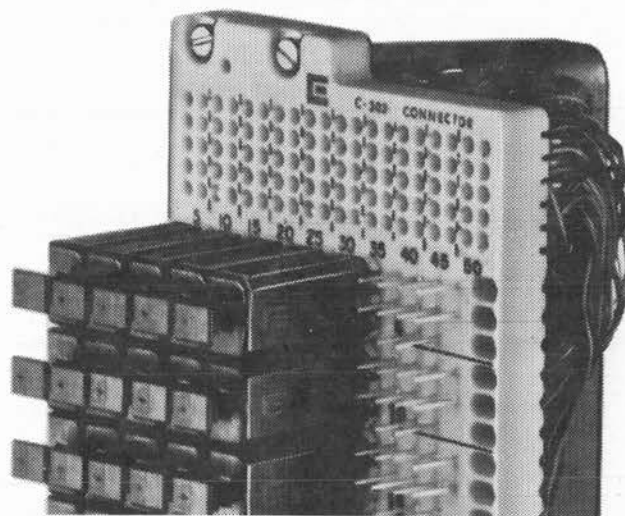


Figure 18

Single Pair Test Cord 303-1001

- 8.02 A single pair test cord, as shown in figure 19, can be used to test toward outside plant. Push the plug into the test field to make contact with the pair to be tested. Monitor to determine that the line is not being used. Attach test equipment to the test cord and pull the connector module for that pair into the detent position. After testing is completed, push the connector module in to assure that the central office is again connected to the outside plant. Then remove the test cord.

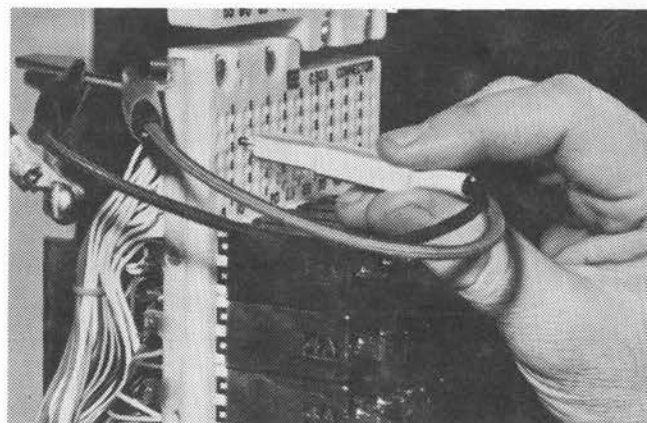


Figure 19

Four-Conductor Test Cords 303-1012 and 303-1013

- 8.03 A four-conductor test cord (303-1012) shown in figure 20, can be used to test either toward the outside plant or toward the central office from the connector. First monitor on circuit to be tested to determine that the line is not being used. Remove the connector module of the pair to be tested and push the test cord plug into that position. The other end of the cord can be plugged directly into test equipment or a test jack that is cabled to a distant location. After testing, remove test plug and replace connector module making certain that the office is again connected to the outside plant. (Cord 303-1013 is equipped with the five-pin module plug only. The other end of the cable may be connected as desired to meet local conditions.)

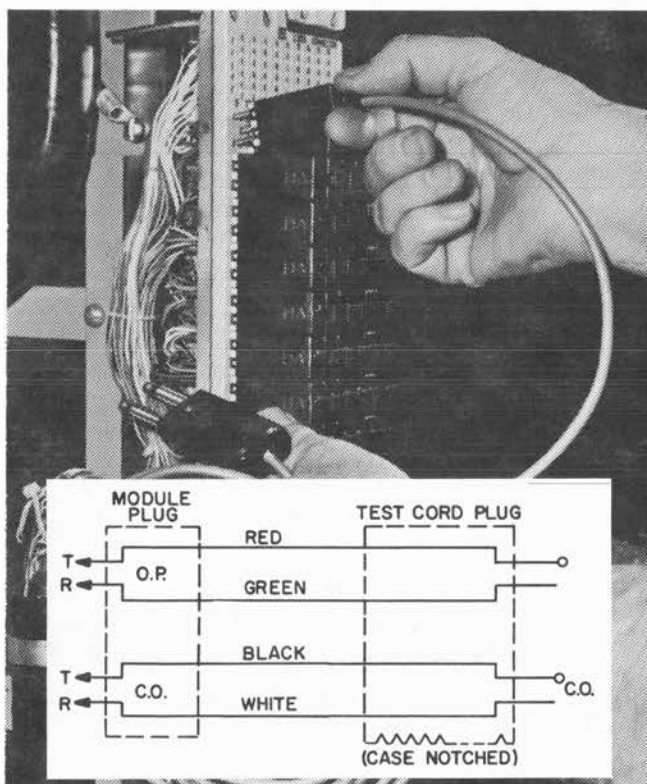


Figure 20

Fifty Pair Front Tap Shoe 303-1004

- 8.04 A 50 pair test shoe, as shown in figure 21, can be used for multi-pair outside plant testing and cable rearrangements. Remove the plastic cover from the spring-loaded terminals of the shoe. Carefully put the shoe into position against the connector test field. Make certain that clamps are behind connector. Turn wing nuts finger tight. Attach other end of cord to group test equipment or another test shoe. If the tests



Figure 21

or rearrangements require that the office be disconnected, pull connector modules into the detent position. After testing, connector modules should be put into the position desired.... either detent or completing the circuit between the central office and outside plant.

"H" Test Connector 303-1008

- 8.05 The "H" Test Connector (see figure 22) plugs into either the top or bottom test field on the C-303 Connector to provide terminals for testing with a test probe. Damage to the test field contacts is thereby minimized.

MDF Test Jack Assembly 303-1026

- 8.06 This assembly mounts on an MDF vertical (see figure 23) and contains two jacks compatible with the plug on Test Cord 303-1012. This plug is similar to WECO plug No. 289B. These jacks may be wired to remotely located test equipment.

9.00 TESTING AND CLEARING CARBONS

- 9.01 The following procedure may be used to test 3A and 4A Protectors and remove any carbon dust which may accumulate in the carbon block gap. This procedure shall be performed prior to splicing the cable stub into the entrance cable and with the protectors in the detent position.

NOTE

Be sure modules are in detent position before testing.

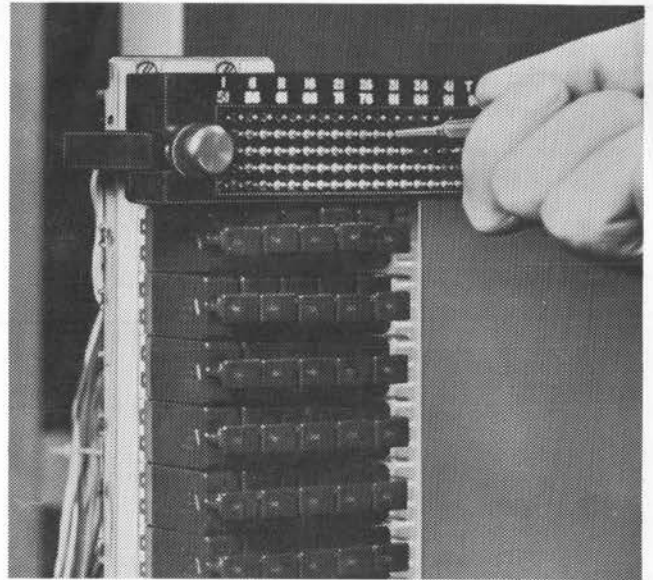


Figure 22

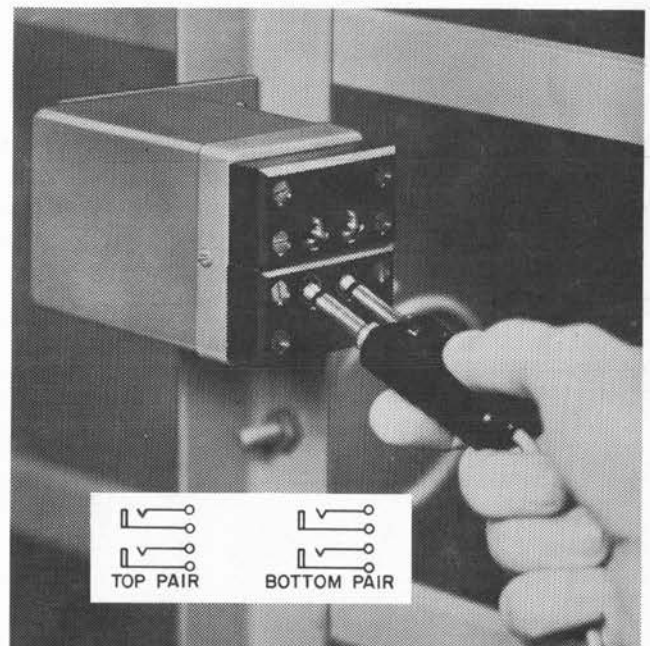
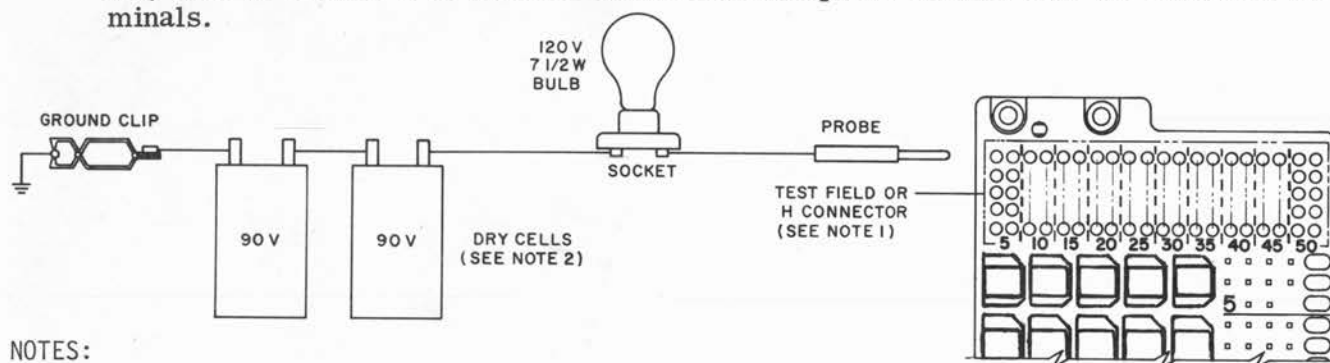


Figure 23

- 9.02 Connect test equipment as shown in figure 24. Touch the test probe to each tip and ring test terminal located on the top and bottom test fields. Use a blunt probe when contacting the test field to avoid damaging the gold plated test field contacts. Single pair test cord 303-1001 is an excellent probe to use for this purpose. This dual contact probe permits clearing both tip and ring circuits simultaneously when the clip leads are tied together and connected to the lamp and battery circuit. "H" Test Connector 303-1008 may also be used if it is desired to avoid all test probe contact with the test field terminals.



NOTES:

1. USE A BLUNT PROBE FOR CONTACTING TEST FIELD WHEN H CONNECTOR IS NOT USED TO AVOID DAMAGING THE GOLD PLATED CONTACTS.
2. A 130 BATTERY OR DC POWER SUPPLY, + OR - GROUND, MAY BE SUBSTITUTED FOR THE DRY CELLS.

Figure 24

- 9.03 The test probe should remain in contact with the test terminal for one full second or longer. If a carbon-dust condition exists, the light bulb will illuminate. The flow of current should burn out the carbon dust and the lamp will then extinguish. If the lamp remains illuminated, remove the protector and replace with a new unit. Test the new protector in the same manner.

10.00 ACCESSORIESHorizontal Mounting
Bracket 022-1023

- 10.01 This bracket permits mounting the C-303 Connector horizontally on a 19-inch relay rack. Protection can be provided to carrier equipment and other relay rack mounted equipment not protected through the MDF. (See figure 25.)

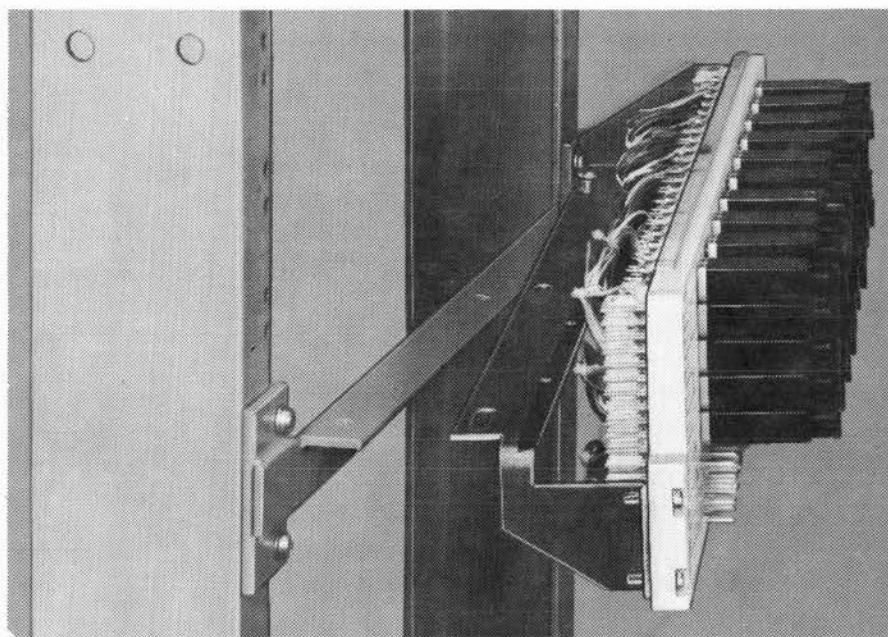


Figure 25

Connector Mounting Bar Adapter
323-1073

- 10.02 Provides compatible mounting for the C-303 Connector on any manufacturer's frame. Adapter attaches to C-303 Connector mounting bar. (See figure 26.) Mounting screws are not included.

Denied Service Grounding Module
(Green)

- 10.03 This green colored module is used to temporarily disconnect a subscriber line. The module provides a permanent ground on all terminated outside plant cable pairs not being used or in an idle condition and prevents noise induction to adjacent circuits. Control office equipment is disconnected. The module is available in three case sizes: 3A case (303-1053), 4A case (303-1054), and 5A case (303-1024).

- 10.04 This module is used to temporarily disconnect a subscriber line. The module is colored green for easy identification. The module circuit connects the line to ground to prevent noise induction to adjacent circuits. (See figure 27.)

Warning Module 303-1016

- 10.05 This white colored connector module is used as a warning marker for high voltage testing. The handle is marked "HI-V" in red for easy identification. No connections are made between any of the pins of this module. (See figure 28.)

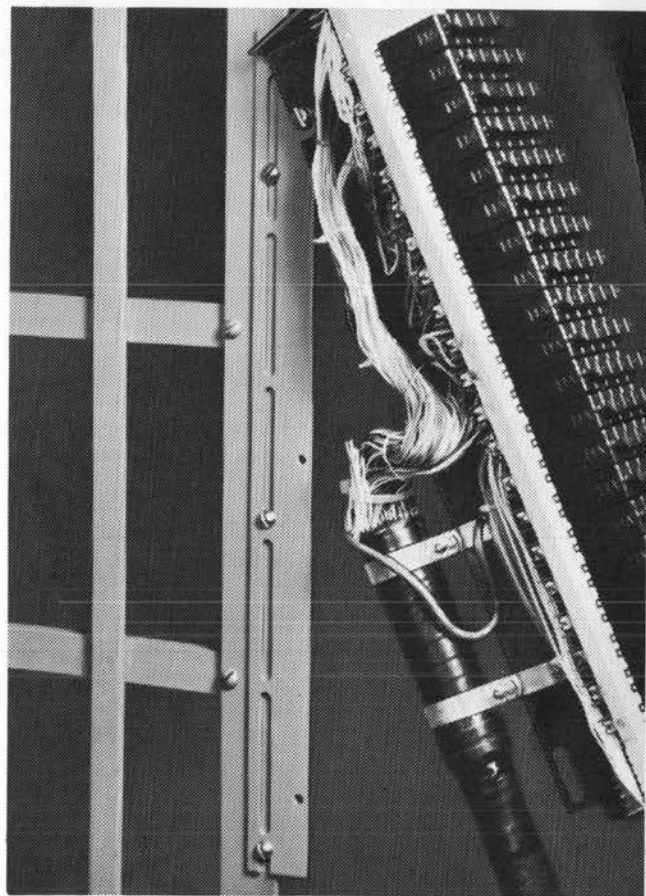


Figure 26

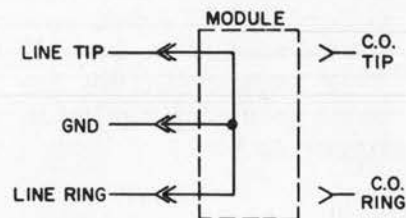
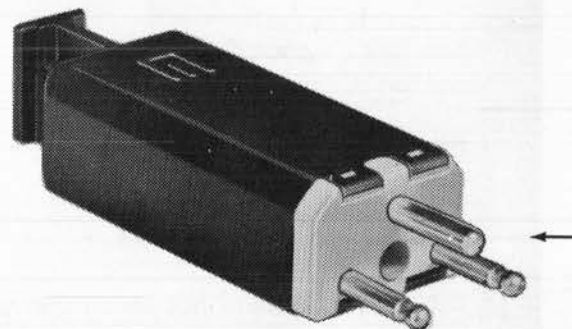


Figure 27

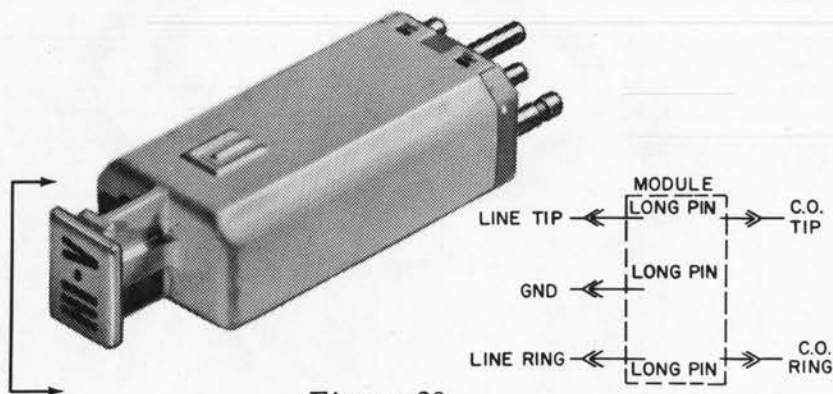


Figure 28

Test Point Insulator Button 303-1019

- 10.06 The test point insulator button fits into the recess for the contacts on the test fields. The button may be used to isolate contacts during testing with the Front Tap Shoe or "H" Test Connector. (See figure 29.)

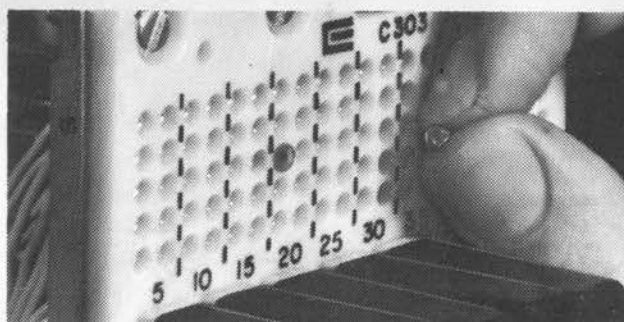


Figure 29

Wire-Wrap Terminal Cap 545-1137

- 10.07 This red colored plastic cap may be used to mark and protect the wire-wrap terminals of special circuits. The cap is designed to fit snugly over a wire-wrap terminal with a wire wrapped in place. (See figure 30.)

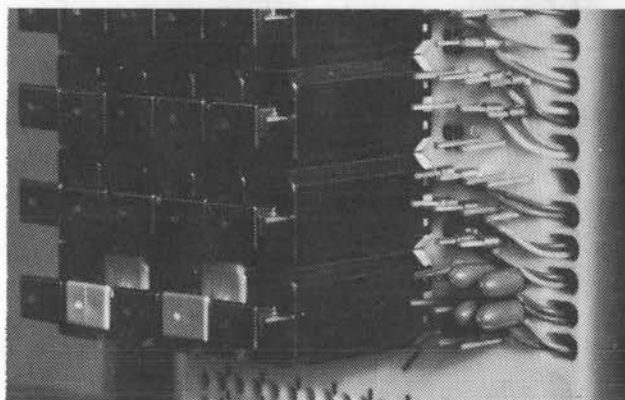


Figure 30

Circuit Designation Pin 303-1020

- 10.08 The red colored circuit designation pin is used to mark the position of a special circuit connector module (red) when the connector module is removed. The pin fits into the blind hole opposite the ground pin terminal. (See figure 31.)

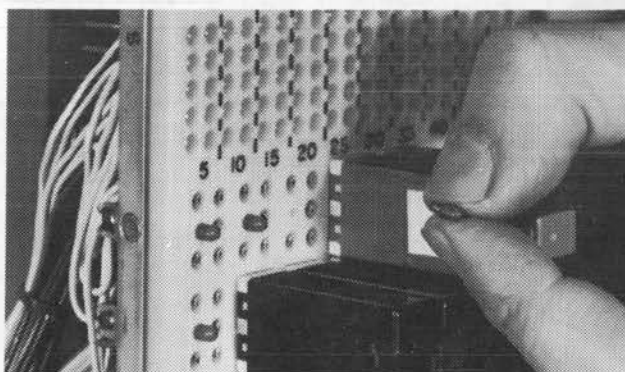


Figure 31

Long Ground Strap 023-2466

- 10.09 This long ground strap (26-1/2 inch), No. 6 AWG is used to connect the bottom 1/4-20 mounting screw of the lowest connector in a MDF to the MDF copper ground bar when the basic grounding method is used. (See figure 32.)

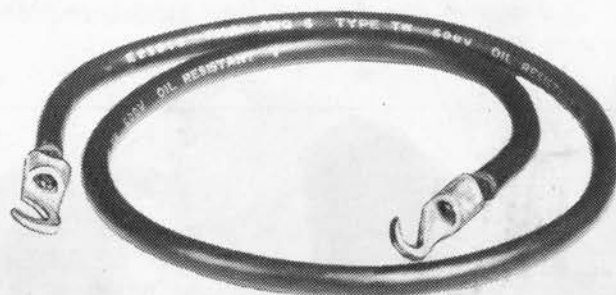


Figure 32

000 P1
0000 99