

Figure 1

1. General

1.1 This document describes the installation of the C-388 & CG-388 Main Frame Connector (both stubbed and stubbles) manufactured by Bourns, Inc.

2. Description

2.1 The C-388 & CG-388 main frame connectors (Figure 1) are compact 100-pair units used to terminate outside plant (OP) cable in central office (CO) or customer premise locations. The connectors accommodate a variety of protector modules to provide over voltage (solid state or gas tube arresters) and/ or over current (heat coil or PTC) cable pair protection, or can be used without protection (using straight-thru modules) if only the termination features are desired.

2.2 The C-388 Main Frame Connector has tin-alloy plated protector field receptacle contacts and the CG-388 has gold plated protector field receptacle contacts.

2.3 C-388 & CG-388 main frame connector features include facilities for termination of OP cable pairs and CO jumpers, identification of incoming circuits, connection/ disconnection of OP cable pairs from CO equipment, and testing.

The C-388 & CG-388 main frame connector mounting bracket offers attachment to the distributing frame, and permits angled and straight-on mounting. The jumper terminal field is front-mounted for accessibility. Connector design allows easy field conversion to isolated ground if required.

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3. Precautions

3.1 The following precautions are included per requirement of the Underwriters Laboratories Inc. ®:

3.1.1 National Electrical Code Requirements: The installation of this product, including any field-installed components, shall meet all applicable federal, state, and local laws and regulations and, if unrestricted, comply with articles 800, 820 and all other appropriate requirements of the National Electrical Code, ANSI/NFPA 70.

3.1.2 Only products marked "for indoor or outdoor use" or "for outdoor use" are suitable for outdoor use. Products without this marking are not suitable for outdoor use and are implied to be suitable for indoor use only.

3.1.3 The use of a fuse link for each and every line is recommended when connecting any equipment to the telephone circuit. For typical applications, a one-foot or longer length fuse link of at least two wire sizes smaller than the typical wire gauge in use within the circuit is recommended.

3.1.4 It is recommended that any components added to this product be both listed to the purpose and compatible.

3.1.5 Risk of electrical shock- Protector is not to be used without the arrester assembly installed.

3.2 Storage: If the C-388 & CG-388 main frame connectors are not to be installed immediately, storage in a dry location. Avoid leaving the units on loading docks or other locations that are exposed to weather conditions.


Note: *Do not remove the connector, or the protector modules, from the packing carton until all preparations for installation on the distributing frame have been completed.*

3.3 Unpacking: Use caution when removing either C-388 & CG-388 main frame connector from the shipping carton to avoid damage to the connector base, protector modules, or cable stub (if present).

3.4 Handling Cable Stub (if present): Do not bend cable stub into a tight curve. Damage to the conductors inside the cable stub may result from the undue stress. A 22 AWG cable with 100 pair will have an outside diameter of 1.3 inches and a minimum bend radius of 16 inches. A 24 AWG cable with 100 pair will have an outside diameter of 1.1 inches and a minimum bend radius of 13 inches.

4. General Installation Information

4.1 Cable Stub Information (stubbed connectors only): Stubbed C-388 & CG-388 main frame connectors can be ordered with either 22 or 24 AWG wire cable stubs. All cable stubs are fitted with a moisture dam plug. The plug prevents the entry of moisture into the cable sheath due to the breathing action of the cable that can occur during temperature changes.

 **CAUTION:** *These cables must not be maintained under constant pressure.*

4.2 Fuse Link Requirements:

4.2.1 When the cable entering the CO is exposed to possible contact with power conductors operating at, or above, 300 volts, it is recommended that the wires in the cable stub of the C-388 & CG-388 main frame connectors be at least two gauges larger than the wires in the fusing link or entrance cable.

4.2.2 It is recommended that a fuse link, at least 6 feet (1.828 meters) in length, or entrance cable of 24 gauge wire (or finer) be used with connectors stubbed with 22 gauge wire; a fuse link or entrance cable of 26 gauge wire is recommended for use with connectors stubbed with 24 gauge wire. This ensures that the cable stub does not open on severe high current power faults. The current carrying capacity of the C-388 & CG-388 main frame connectors is designed to exceed the current carrying capacity of 33 gauge copper wire, in the event that a line is subjected to a sustained power fault.

4.3 Installing Universal Connector Mounting Bars (standard "L" and "FW-9" frames):

4.3.1 Universal connector mounting bars are used when the existing distributing frame connector mounting bars are not tapped to accommodate the C-388 & CG-388 main frame connectors' compact mounting dimensions, or when installing stubbles units. The connector mounting bars are slotted to permit them to be attached to almost any type of standard "L" and "FW-9" frames. Mounting hardware required to attach the bars to the frame is supplied. Tapped holes are provided on 5 1/2-inch (139.70 mm) centers, properly spaced for the C-388 & CG-388 main frame connector mounting. Also provided are cable stub mounting holes required for field stubbing of stubbles connectors.

NOTE: *Modular distributing frames are provided with grids tapped to mount the C-388 & CG-388 main frame*

connectors, thereby eliminating the need for connector mounting bars.

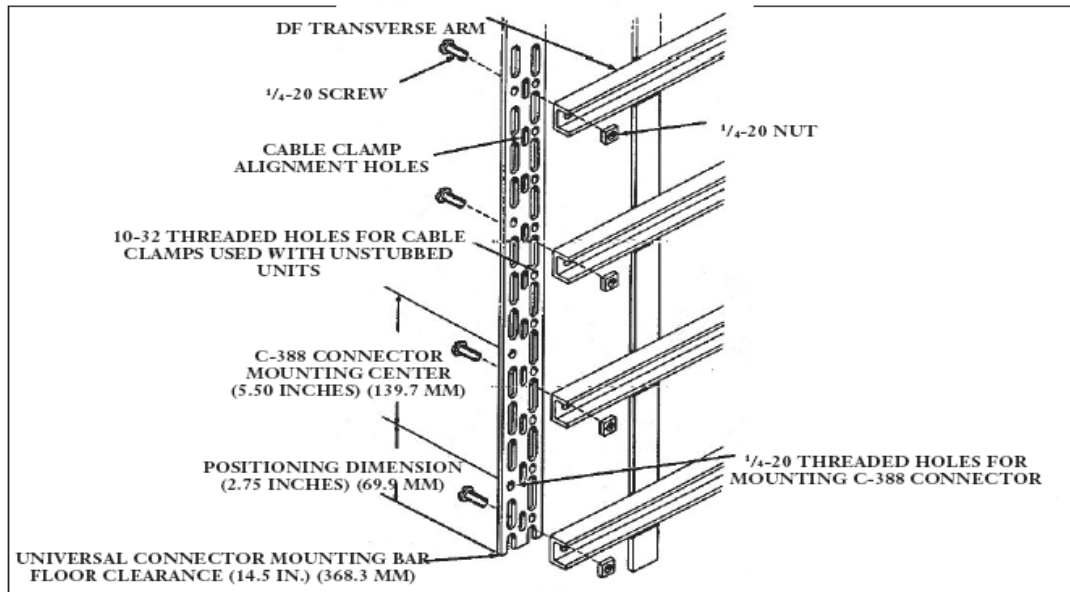


Figure 2

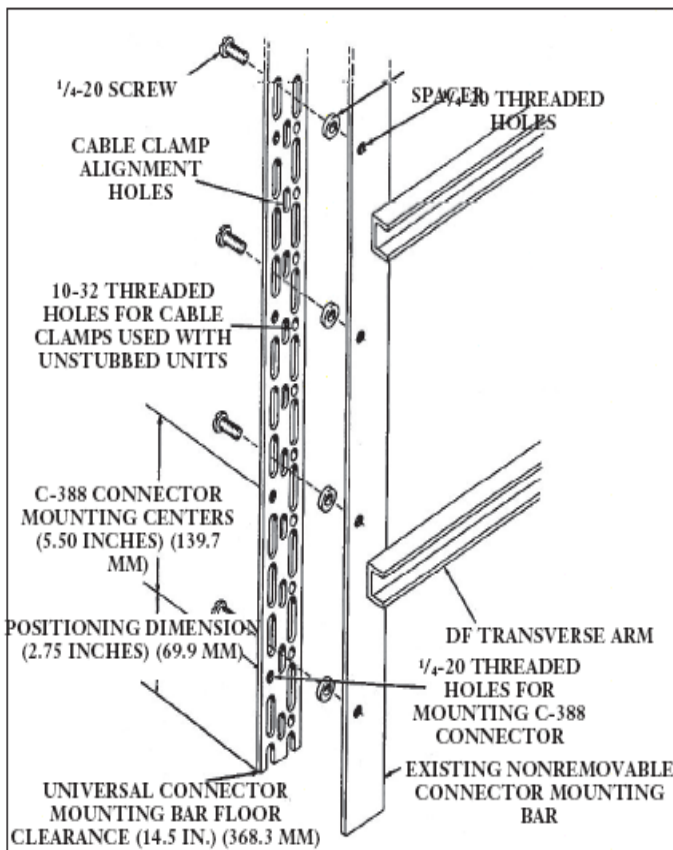


Figure 3

4.3.2 The universal connector mounting bar is marked to indicate which end is to be located toward the top. Be sure that all mounting bars are installed correctly on the distributing frame, or the connectors may not line up at the same height on the frame

4.3.3 On distributing frames with removable connector mounting bars, the universal connector mounting bar is used in place of the existing bar by attaching it to the ends of the transverse arms (Figure 2).

4.3.4 If the existing connector mounting bar cannot be removed, the universal mounting bar is bolted directly over the existing bar. The spacer washers (included with the mounting hardware) must be installed between the universal connector mounting bar and the nonremovable bar to provide clearance for the tips of the connector mounting screws. The universal connector bar should not extend beyond the edge of the existing bar (Figure 6).

NOTICE: Be sure to handle the cable very carefully to avoid breaking the internal wires.

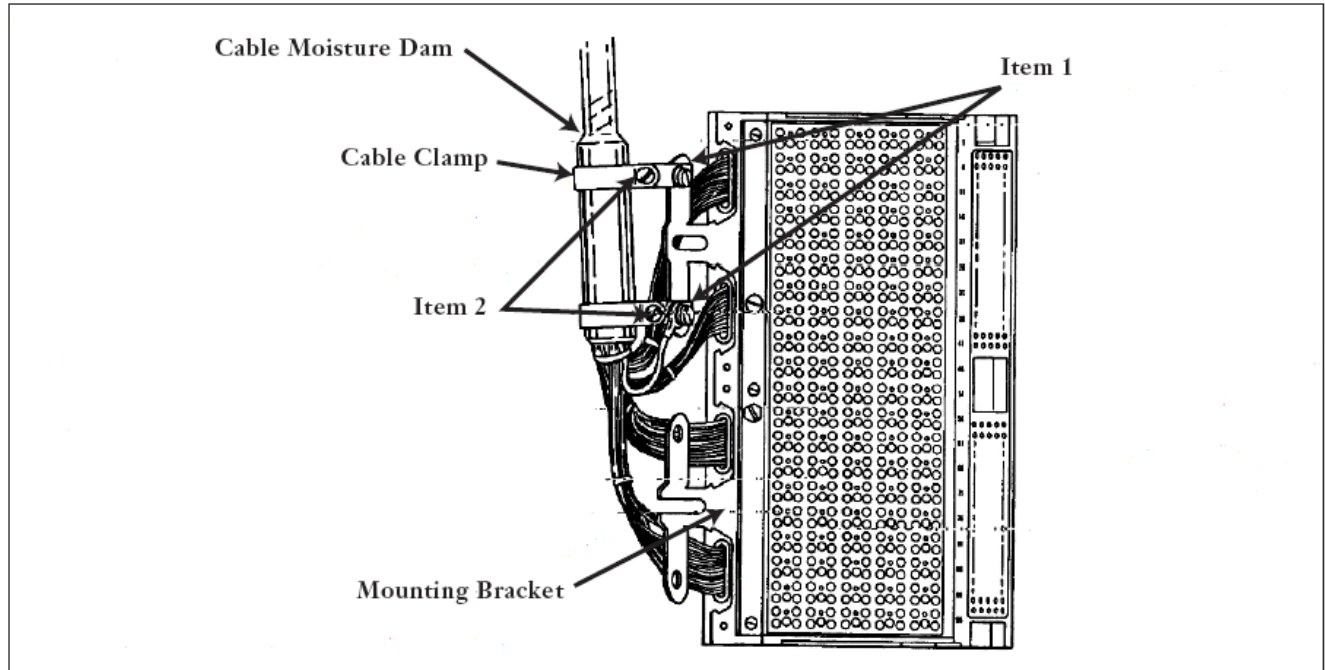


Figure 4

4.4 Changing the C-388 & CG-388 Connectors from "Stub-down" to "Stub-up" (stubbed connectors only): Although the C-388 & CG-388 main frame connectors are available in the "stub-up" position, it may be necessary to change an existing "stub-down" to "stub-up" if one is not available. If this is the case, use the following procedure (Figure 4):

- Remove the two screws (item 1) attaching the cable clamps to the lower section of the connector mounting bracket.
- Remove the two screws, washers, and nuts (item 2) holding the cable clamps on the cable stub moisture dam plug.
- Replace the cable clamps on the upper section of the connector mounting bracket, using the screws removed in step 1.
- Carefully turn the cable stub 180 degrees and fit the moisture dam plug into the cable clamps.
- Secure the cable clamps on the moisture dam plug with the screws, washers, and nuts removed in step 2.

4.5 Installing C-388 & CG-388 Connectors on the Distributing Frame:

4.5.1 The initial steps required to mount the C-388 & CG-388 connectors on the distributing frame are different for "stubbed" and "stubbles" units. However, once these initial steps have been completed, the remainder of the installation process is the same.

4.5.2 Prior to installing the connectors, open the riser holes in the floor per local procedures. Remove any fanning strips from the distributing frame connector mounting bars involved in this installation. The C-388 & CG-388 main frame connectors have fanning strips built into the connector base.

5. Initial Steps for "Stubbed" Connectors

5.1 Mark the cable number and pair count on the connector cable stub. Depending upon "stub-down" or "stub-up" configuration, place the cable stub through the riser hole beneath the appropriate connector mounting bar, or to the overhead superstructure above the mounting bar.

NOTE: For "stub-down" applications, it is recommended that connector installation start at top of frame and work downward; for "stub-up" applications, start at the bottom and work upward.

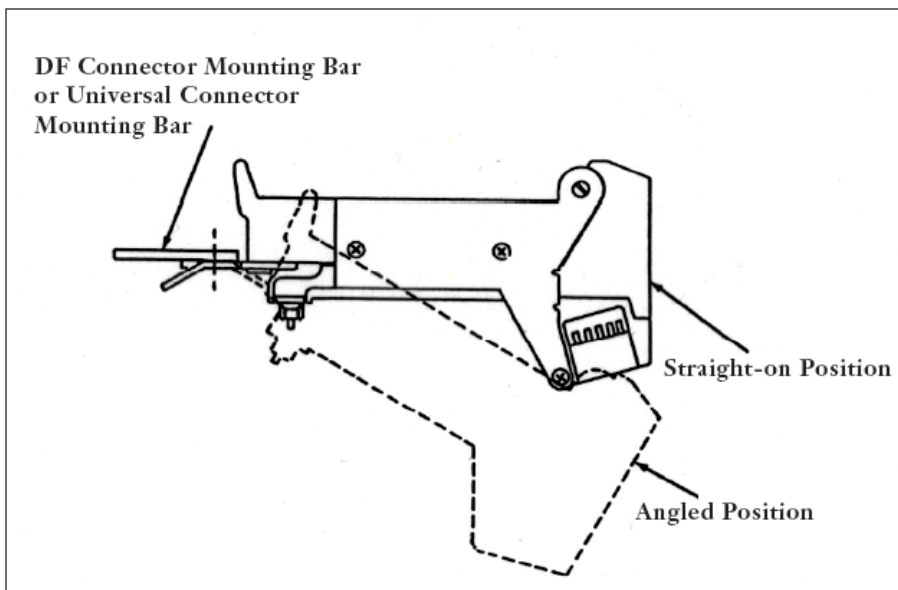


Figure 5

5.2 Locate the two tapped holes on the left side of the connector mounting bar that are to be used for mounting the connector. See Figure 5, which shows an example mounting of the C-388 & CG-388 main frame connectors to a universal mounting bar. Partially thread one of the two 1/4-20 slotted hex-head screws into the lower mounting hole. Slide the open slot of the lower section of the mounting bracket with the vertical, insert and partially thread the other 1/4-20 slotted hex-head screw into the upper mounting hole.

NOTE: If access to the mounting screws is difficult, the use of a short 3/8-inch (9.53mm) nut driver may be helpful.

5.3 Proceed to Section 7, Completing Connector Mounting.

6. Initial Steps for “Stubbles” Connectors

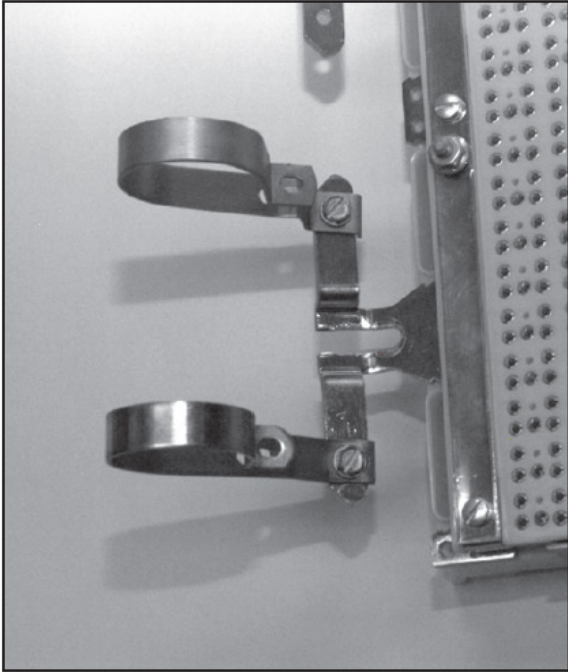


Figure 6

6.1 Installing the Cable Clamps and Cable Stub:

6.1.1 Mount the cable clamps to the connector mounting bracket (Figure 6).

6.1.2 Obtain desired cable stub, wired with standard color-coded cable, and formed with moisture dam plug and shield ground wire. Cable pairs for terminal connections are to be approximately 24 inches (609.6mm) long, or as long as necessary to ensure pair identification. Use locally approved procedures for cable grounding and moisture sealing.

6.1.3 Depending upon “stub-down” or “stub-up” configuration, place the cable stub through the riser hole beneath the appropriate connector mounting bar, or on the overhead superstructure above the mounting bar, and mount the cable stub moisture dam in the cable clamps. Mark the cable number and pair count on the cable stub mounted in the clamps.

6.2 Prepare Cable Stub Binder Groups and Mount C-388 & CG-388 Connectors:

6.2.1 Position the C-388 or CG-388 main frame connector at the left side of the connector mounting bar, and slide the open lower slot of the mounting bracket under the head of

the screw that was previously installed. Line up the upper hole of the mounting bracket with the upper mounting hole of the connector, and partially thread the other ¼-20 slotted-head hex screw into the upper hole. Position the connector on the two ¼-20 mounting screws in the angled mounting position, and tighten the screws (Figure 5).

6.2.2 Separate, identify, and mark the four 25-pair color binder groups of the cable stub. To allow for a dress loop, tie each binder group with a cable tie approximately 9 inches (228.6mm) from the moisture dam plug (Figure 7). This provides a strain-relief for the wires and provides an additional length of wire if repair becomes necessary.

6.2.3 Locate the two tapped holes on the distributing frame connector mounting bar for mounting the C-388 & CG-388 main frame connectors. From the left side of the connector mounting bar, partially thread one of the ¼-20 slotted hex-head screws into the lower mounting hole.

NOTE: *If the distributing frame does not provide properly spaced mounting holes, use accessory universal mounting bars, attached to the existing frame.*

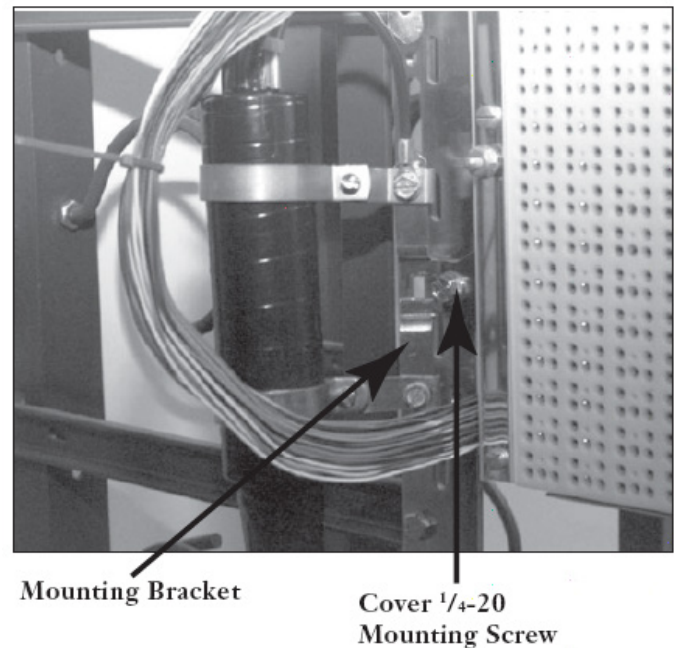


Figure 7

6.2.4 Remove the back cover from the C-388 or CG-388 main frame connector. With the connector in hand, feed the four 25-pair binder groups through the four elongated ports in the connector base. Feed pairs 1 through 25 through the top port, pairs 26 through 50 through the next port, etc. Pull the binder groups through the ports in the connector base to the strain-relief's (cable ties) previously installed (Figure 9).



Cable Ties Around
Binder Groups

Figure 8

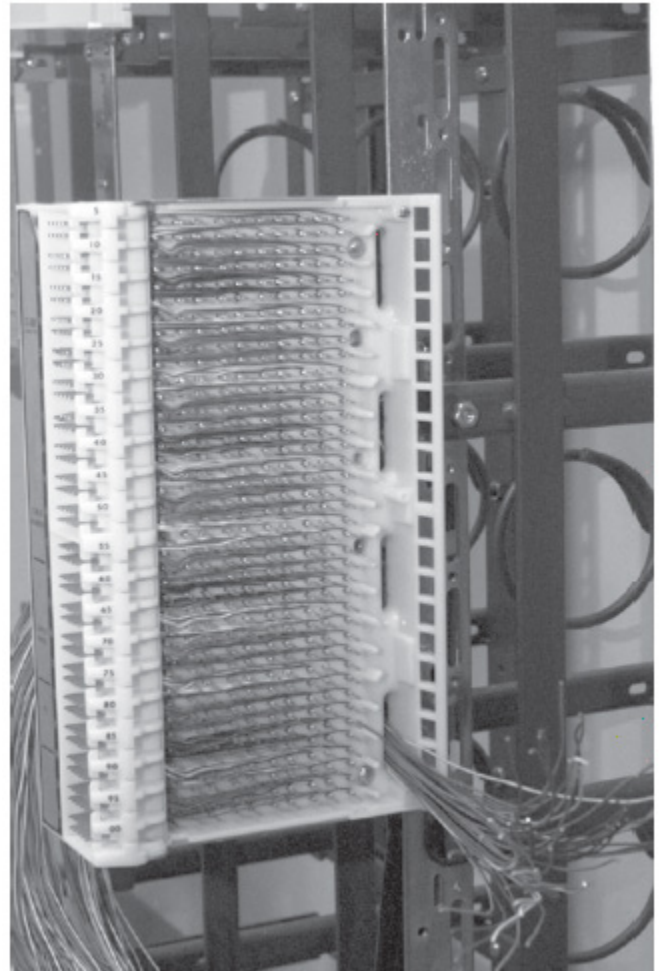


Figure 9

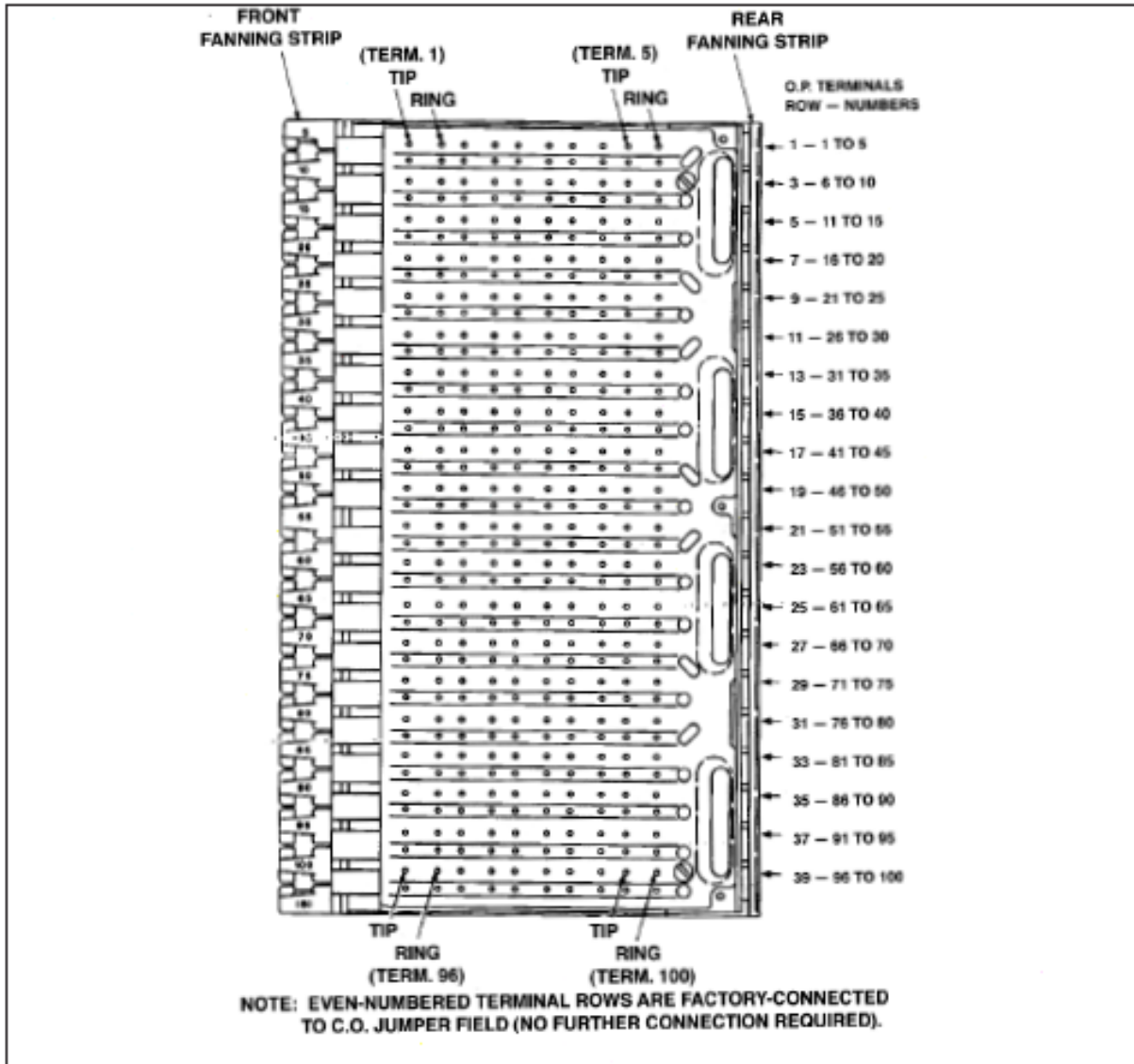


Figure 10

6.3 Connecting OP Pairs:

6.3.1 Separate each 25-pair binder group into five 5-pairs groups, following standard cable wire color coding (Table 1). Using the vertical row of plastic pins extending out along the right of the OP terminal field as guide, dress each 5-pair group of wires to its appropriate row of OP terminals, and wire-wrap each pair of wires to its respective OP terminal pins (Figure 10).

6.3.2 The OP terminal pins are located in the odd-numbered rows: 1,3,5, etc. Pairs are numbered from left to right: 1,2,3,4,5; five pairs per row. The pin on the left is for the tip connection; the pin on the right is for the ring connection. The even-numbered rows provide the factory installed connections to the CO jumper field.



Figure 11

6.3.3 After all OP terminal connections are made, install the back cover on the OP terminal field. To install the back cover, position it vertically so that the two long molded clamps are lined up with the terminal pins on the connector, and press straight inward until the clamps slide over the terminal pins and the cover is held in place (Figure 11).

6.3.4 The remainder of the installation procedures in this publication refer to both "stubbed" and "stubbles" connectors.

7. Completing Connector Mounting.

7.1 Change C-388 or CG-388 connector to straight-on mounting. Loosen the two 1/4-20 hex-head screws mounting the connector to the connector mounting bar. Slide the connector mounting bracket toward the rear of the frame until the connector is in the straight position (do not use force); retighten the 1/4-20 screws. Note that in Figure 5 the position for angled mounting is also shown; this is used for field stubbing of stubbles units.

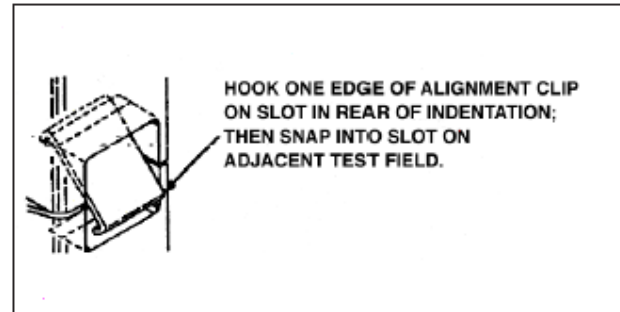


Figure 12

7.2 Install alignment clips. When all C-388 or CG-388 main frame connectors have been mounted on the connector mounting bar, install alignment clips, supplied as part of the connector assembly, between the test fields of adjacent connectors, lining up all connectors. To install the alignment clip, position the clip in the indentation between adjacent test fields, hook one edge of the clip into the slot on one connector; press the clip inward until it snaps into place in the slot of the adjacent connector (Figure 12).

7.3 Arranging Cable Stubs:

7.3.1 Route all cable stubs against the transverse arms and other parts of the distributing frame to provide a neat and orderly routing to the floor riser holes or overhead superstructure. It is recommended that the cable clamps on the cable stub moisture dam plugs be bent back to the vertical so the cable stubs are out of the way of future work on the frame. Lash cable stubs to the transverse arms, and other locations, if necessary.

7.3.2 For "stub-down" applications, seal the riser holes in the floor in accordance with local practices.

8. Grounding Methods

8.1 Grounding of the C-388 & CG-388 connectors can be easily accomplished by either the independent or the isolated grounding methods (Figure 14).

8.2 Independent Grounding Method:

8.2.1 Electrical connection is established between protection ground and framework ground at the C-388 & CG-388 connector with a brass screw. The brass screw is located approximately 3 inches above the connector ground stud. Connection is made between the connector ground bus and the connector mounting bracket. All units are shipped in this configuration.

8.2.2 To establish the protector ground path for vertically adjacent C-388 & CG-388 connectors, attach the supplied interconnector ground strap (p/n 023-7712) to the connector ground stud (Figure 13). Make sure to use the supplied washers on the connector ground stud to separate the captivating nut and the connector ground bus from the ground strap lugs. The locknut and washers reduce the likelihood of loose connections being caused by movement of the ground straps.

8.2.3 To complete the ground path of the C-388 & CG-388 connectors on each vertical, attach a ground strap to the main distributing frame ground bar on the ground stud of the nearest connector. The accessory ground strap is 28 inches (711.2 mm) long, no. 6 AWG. Accessory ground straps of various lengths are available.

8.3 Isolated Grounding Method:

8.3.1 Isolation of the protection ground path from the framework is maintained at the C-388 and CG-388 connector. Isolation between the connector ground bus and the connector mounting bracket is accomplished by removing the brass screw that is located approximately 3 inches above the connector ground stud.

NOTE: All units are shipped with the brass screw in position unless a special configuration connector assembly has been specified.

8.3.2 To establish the protector ground path for vertically adjacent C-388 & CG-388 connectors, attach the supplied interconnector ground strap to the connector ground stud. Make sure to use the supplied washers on the connector ground stud to separate the captivating nut and the connector ground bus from the ground strap lugs. The lockout and washers reduce the likelihood of loose

connections being caused by movement of the ground straps (Figure 13).

NOTE: When an isolated grounding method is used, local requirements may dictate a connection between the cable shield ground and the protector ground stud. The cable shield ground may be removed from the mounting bracket and attached to the connector ground stud. Washers should be used to separate the locknut and connector ground bus from the ground strap lugs, as described above.

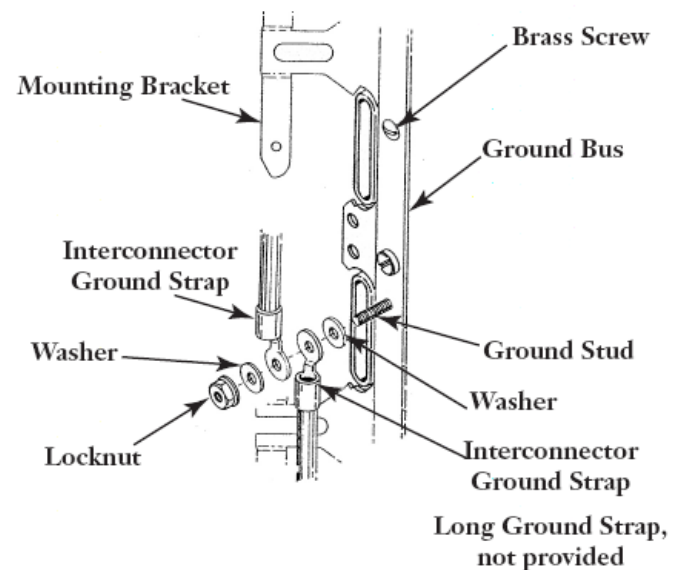


Figure 13

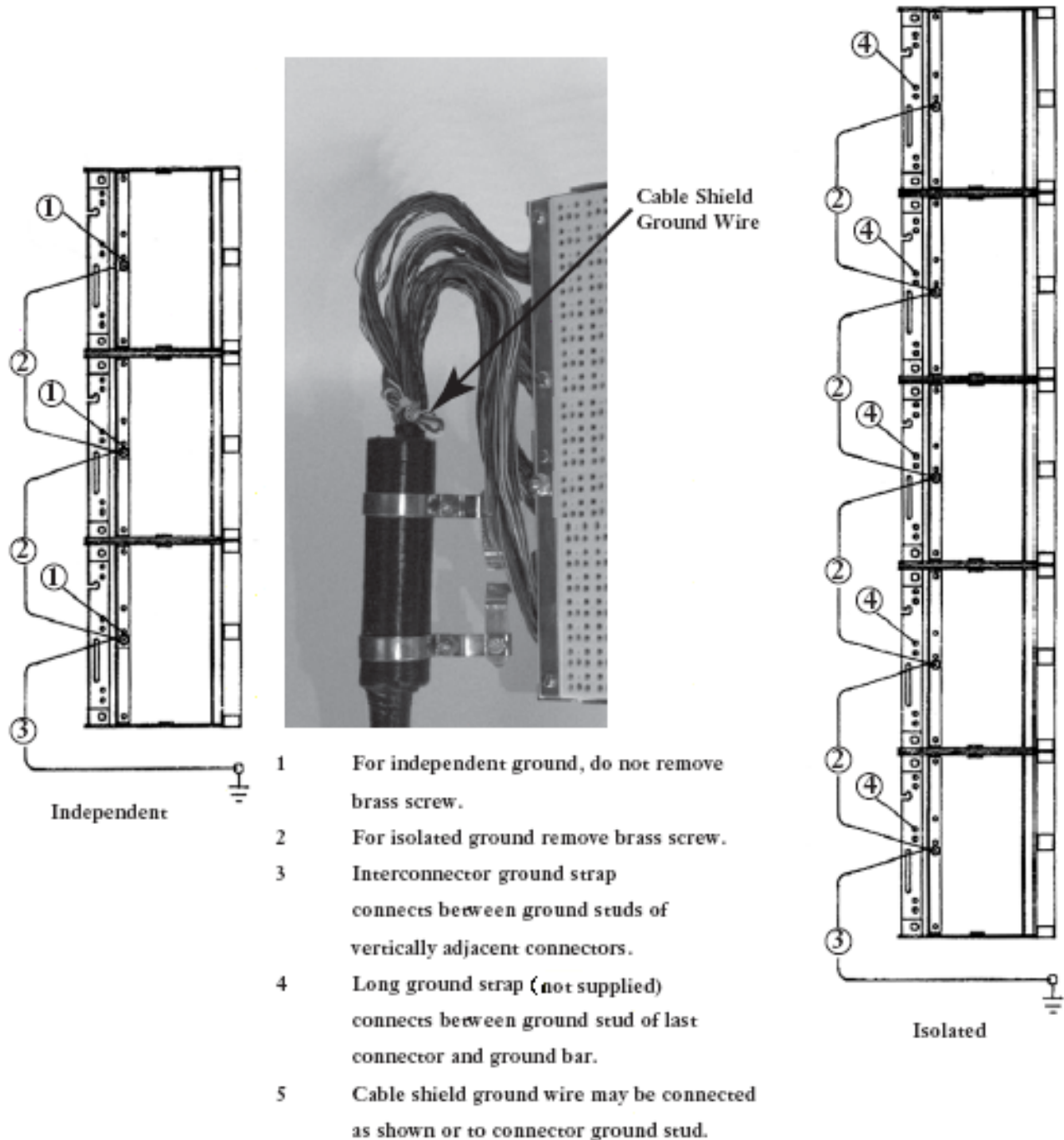


Figure 14

9. Installing and Testing the Protector Modules

9.1 Protector modules come packaged in a separate carton. The protector module mounting field is keyed so that the protector modules can only be installed in one way (Figure 15 inset).

When a module is initially installed, it should be placed in the “detent” position (Figure 15).

9.2 The detent position provides protection to the OP (outside plant) pairs, but keeps the OP pairs disconnected from the CO equipment.

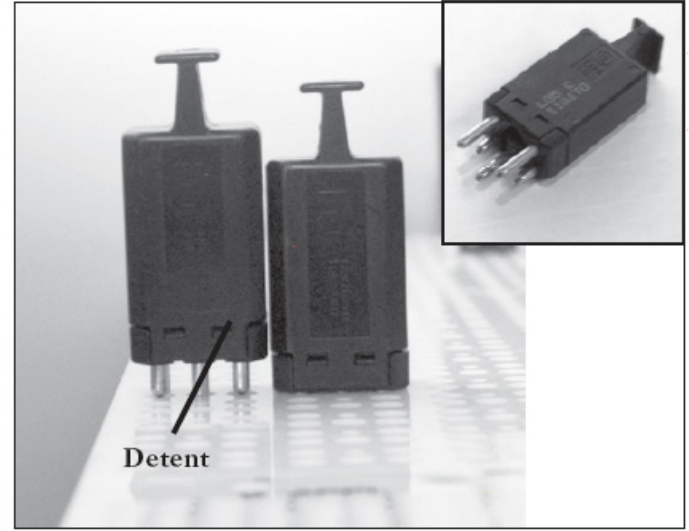


Figure 15

10.2 The cable stub is wired using standard cable wire color coding. Cable stub pairs can be matched to entrance cable pairs according to the color code information given in Table 1.

CAUTION: *Protectors are not considered grounded until a locally approved ground has been fully connected to the grounding system of the connector.*

10. Splicing Cable Stub to Entrance Cable

10.1 The C-388 main frame connector is ready to be jumpered to the CO equipment. Leave the protector modules in the detent position to prevent any line faults appearing on the CO jumper terminals during the jumpering process.

Cable pair group	Binder color	Cable pair subgroup			Tip wire color	Ring wire color (for each tip wire color)
1 - 25	Blue	1	-	5	White	1st wire-blue
		6	-	10	Red	2nd wire-orange
		11	-	15	Black	3rd wire-green
		16	-	20	Yellow	4th wire-brown
		21	-	25	Violet	5th wire-slate
26 - 50	Orange	26	-	30	White	1st wire-blue
		31	-	35	Red	2nd wire-orange
		36	-	40	Black	3rd wire-green
		41	-	45	Yellow	4th wire-brown
		46	-	50	Violet	5th wire-slate
51 - 75	Green	51	-	55	White	1st wire-blue
		56	-	60	Red	2nd wire-orange
		61	-	65	Black	3rd wire-green
		66	-	70	Yellow	4th wire-brown
		71	-	75	Violet	5th wire-slate
76 - 100	Brown	76	-	80	White	1st wire-blue
		81	-	85	Red	2nd wire-orange
		86	-	90	Black	3rd wire-green
		91	-	95	Yellow	4th wire-brown
		96	-	100	Violet	5th wire-slate

Table 1 – Cable Pair Color Codes

11. Marking and Jumpering



Figure 16

11.1 Marking: Spaces to mark the cable number and connector pair count are provided on the connector front, to the left of the CO jumper terminal field (Figure 16).

11.2 Jumpering:

11.2.1 The CO jumper terminal field is located on the front of the connector. Terminal numbers are marked in black: 1 and 5 are at the top, 96 and 100 are at the bottom. These are a number for every five terminal pairs-5,10,15,etc.-along the right side of the jumper field. The terminal pins measure .045 x .050 inches (1.14mm x 1.27 mm), and provide straight for wire-wrap tools with the connector mounted in the straight-on position.

11.2.2 Two fanning strips are provided for routing of the CO jumper wires. One of the fanning strips is at the right rear of the connector 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 the 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 ensured.

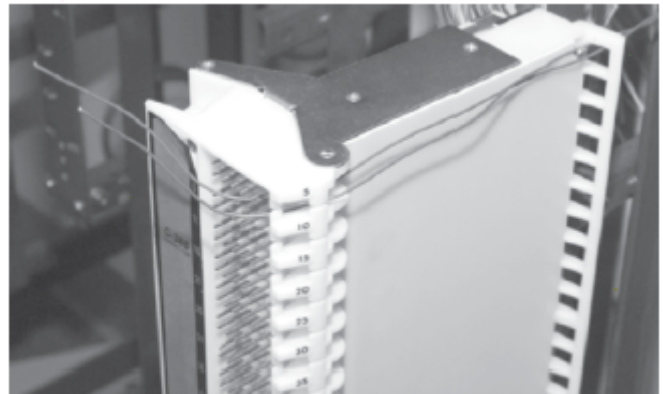


Figure 17

11.2.3 The recommended jumpering procedure is as follows:

- Insert five pairs of jumper wires through the rear fanning strip hole, feed them through the respective slit in the front fanning strip, dressing wires back and out of the way in the first "lock" position of the front fanning strip hole (Figure 17).
- 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.
- Dress each wire along the top of the appropriate row of terminals, and wire-wrap to the respective terminal pins.
- Repeat steps 2 and 3 for each remaining jumper pair.
- Dress the slack to the rear of the connector so that the jumper pairs run neatly from the terminal field across the connector backplane cover.

NOTE: *It is suggested that the twist be left in the jumper pairs, or that the pairs, or that the pairs be otherwise identified to make it easier to find the during future tracing of jumper wires.*

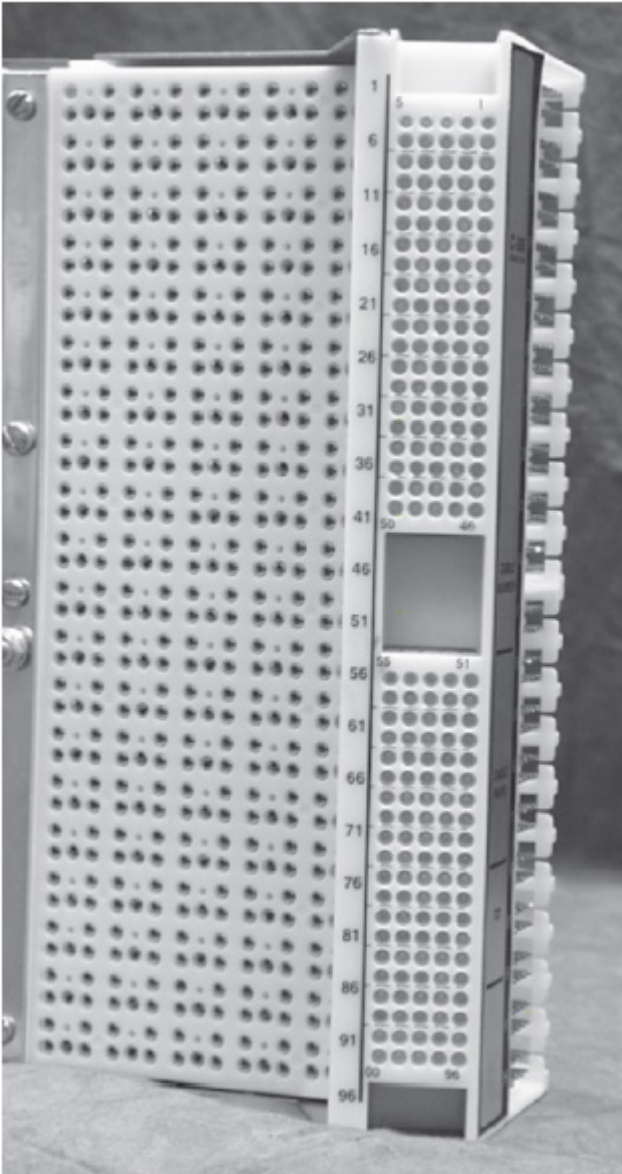


Figure 18

12. Connecting CO and OP Pairs

During installation, the protector modules have been in the detent position, which keeps the CO equipment disconnected from the outside plant while still providing protection to the OP pairs.

When installation is completed, push each protector module into its fully inserted position.

This action connects the central office pairs to the outside plant pairs, and completes the installation procedure.

13. Testing

13.1 The connector has an angled test field, located to the left of the CO jumper field. This test field is divided into two 50-pair groups of gold-plated test field contacts, top and bottom, for access to the outside plant pairs. The test field is designed to accommodate standard test equipment.

13.2 Test points are connected internally to the OP terminal field pins, and, subsequently, to the outside plant cable, with a separate connection for the tip and ring of each pair. Every five terminal pairs are marked in black-1,6,11,etc.- along the left edge of the test field. Terminal pairs are numbered from right to left (5,4,3,2,1). The upper pin of the pair is the tip connection; the lower pin is the ring connection (Figure 18).

13.3 Protector modules may be placed in the detent position while testing is in progress. In this position, the central office is disconnected from the outside plant, but protection is still provided to the OP pairs. If testing is done from the test field location, be sure that the test voltages used do not exceed the protector module breakdown voltage.