



## 410- and 410M-Type Unprotected Connectors Description, Use, Installation, and Repair Procedures

Contents	Page	Contents	Page
<b>1. Overview</b>	2	<b>Figures</b>	
<b>2. Description</b>	5	1. High Density 410 and Angled 410M Unprotected Connectors	3
<b>3. Installation</b>	10	2. Typical Application with Digital Loop Carrier System	4
Installing the 410- and 410M-Type Connectors	10	3. 410-Type (Right) and 410M-Type Connector (Left)	6
Marking the 410- and 410M-Type Connectors	14	4. 410-Type Connector — Front View	7
Field Wiring of 410 and 410M Connectors	17	5. 410-Type Connector — Left Side View	8
<b>4. Repair Procedures</b>	18	6. Mounting Arrangement for the 410- or 410M-Type Connectors Using Existing Mounting Holes	11
Precautions	18	7. Mounting Arrangement for the 410- or 410M-Type Connectors at the Top of a Tall Conventional MDF Vertical	12
Tools and Materials	18	8. Mounting Arrangement for the 410- or 410M-Type Connectors at the Bottom of a Tall Conventional MDF Vertical	13
Removing and Replacing Defective Terminals	18	9. 410/410M Mounting Instruction and Template	15
Tip or Ring Terminal	19	10. Marking Cable and Pair Numbers	16
Cross-Connect Terminals	22	11. Tip or Ring Terminal	19
<b>5. Associated Equipment and Reference Documents</b>	22	12. 410/410M Right Side-View	20
Associated Equipment	22	13. 410-Type Connector with Side Cover Removed	21
Warning Markers, Guard, Indicators, and Insulator (AT&T 201-208-106)	22		
Reference Documents	22		

**Contents** **Page**

---

**Tables**

A. 410- and 410M-Type Connectors	9
B. 410- and 410M-Type Connector Termination Capacities	10

**1. Overview**

---

**1.01** This practice covers the description, use, installation, and repair procedures for the 410- and 410M-type unprotected connectors.

**1.02** Whenever this practice is reissued, the reason(s) for reissue will be listed in this paragraph.

**1.03** This practice contains a **CAUTION** admonishment.

**1.04** AT&T welcomes your comments on this practice. Your comments will aid us in improving the quality and usefulness of AT&T documentation. Please use the Feedback Form provided at the end of this practice.

**1.05** Additional copies of this practice and any associated appendixes may be ordered from the AT&T Customer Information Center as follows:

- Call 1-800-432-6600  
or
- Complete Form IND 1-80.80 and mail to:

AT&T Customer Information Center  
Attention: Order Entry Department  
2855 N. Franklin Road  
P.O. Box 19901  
Indianapolis, IN 46219-1999

**1.06** These high density unprotected connectors are used for terminating and cross-connecting circuits on the Main Distributing Frame (MDF). They are ideal for termination of loop carrier terminals and/or derived pairs from pair-gain systems (Figure 1). A schematic, showing protected loop terminal application and derived pair terminations for pair gain systems, is shown in Figure 2.

**1.07** The 410- and 410M-type unprotected connectors provide test access, service denial, and cross-connect capabilities for the vertical side of the MDF. However, the 400-type connectors do not have the capability to provide protection and have no ground system.

**1.08** This practice is published by:

Document Development Organization  
AT&T Network Systems  
2400 Reynolda Road  
Winston-Salem, NC 27106-4696

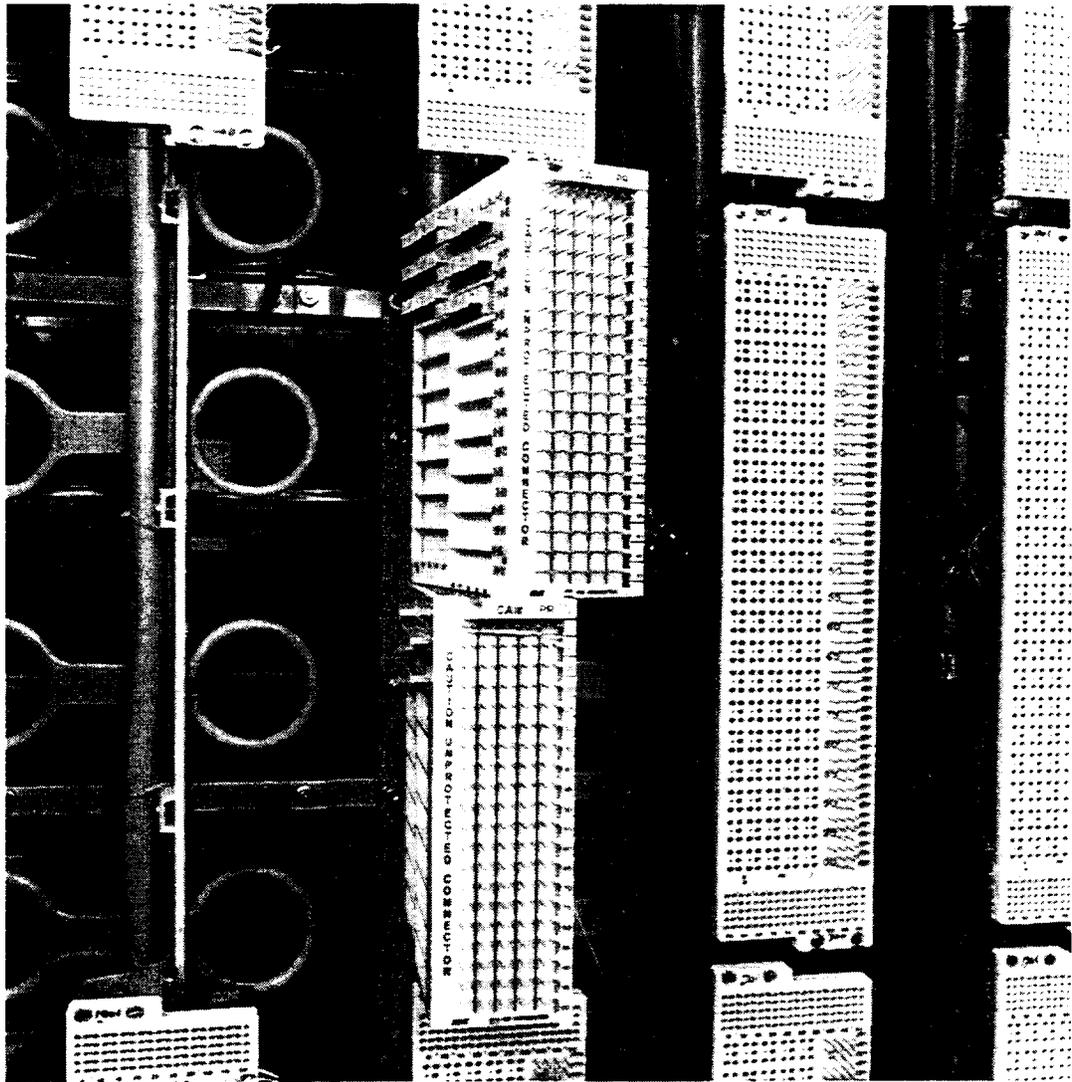


Figure 1. High Density 410 and Angled 410M Unprotected Connectors

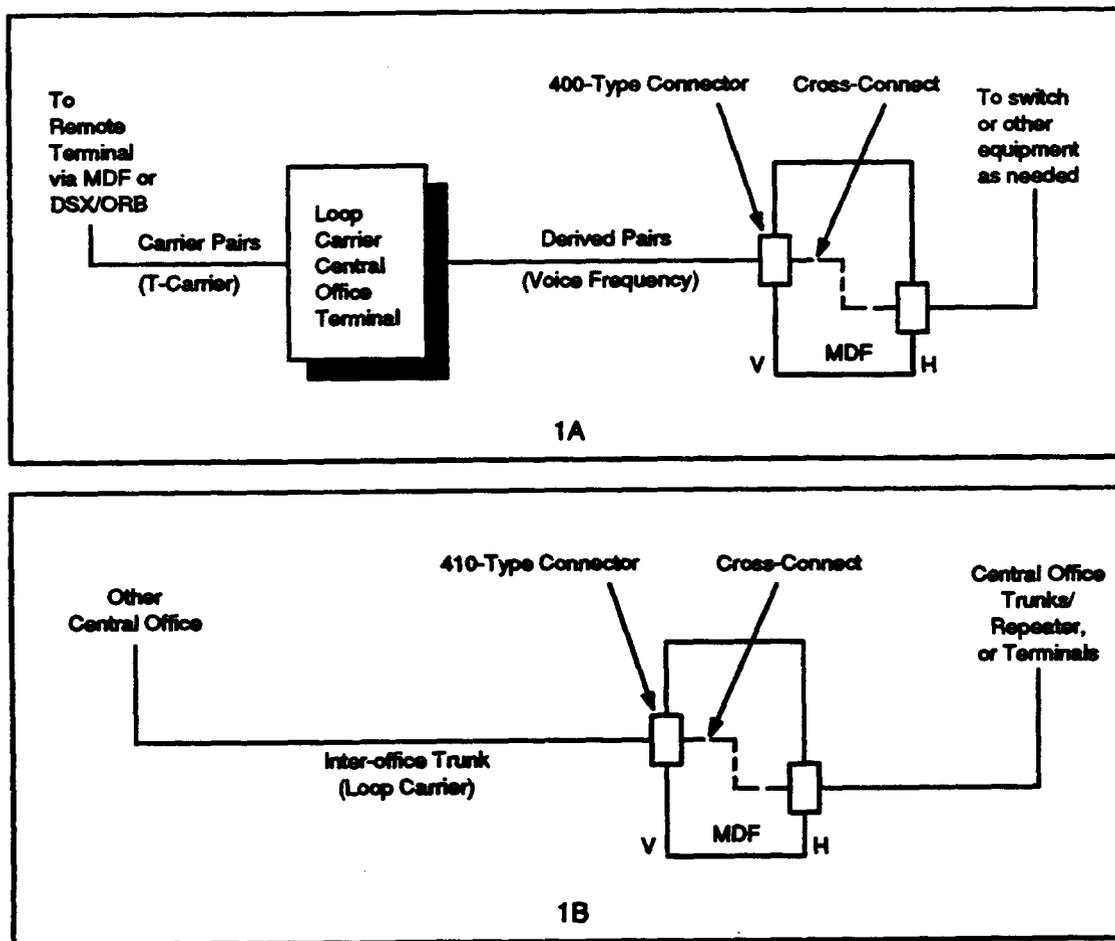


Figure 2. Typical Application with Digital Loop Carrier System

## **2. Description**

---

**2.01** Two series of high density 410-type unprotected connectors (410 and 410M) are offered for convenience and ease of installation on low-profile or tall conventional distributing frames. The 410- and 410M-type connectors are similar, except that the 410M uses an angled mounting

arrangement. The 410M-type connector mounting bracket is at a 12.5-degree angle to provide improved visual and physical access to the plug-in field while maintaining front access to the cross-connect field. Figure 3 shows the 410-type and 410M-type connectors. Figure 4 shows the 410-type connector front view. Figure 5 shows 410M-type connector left side view.



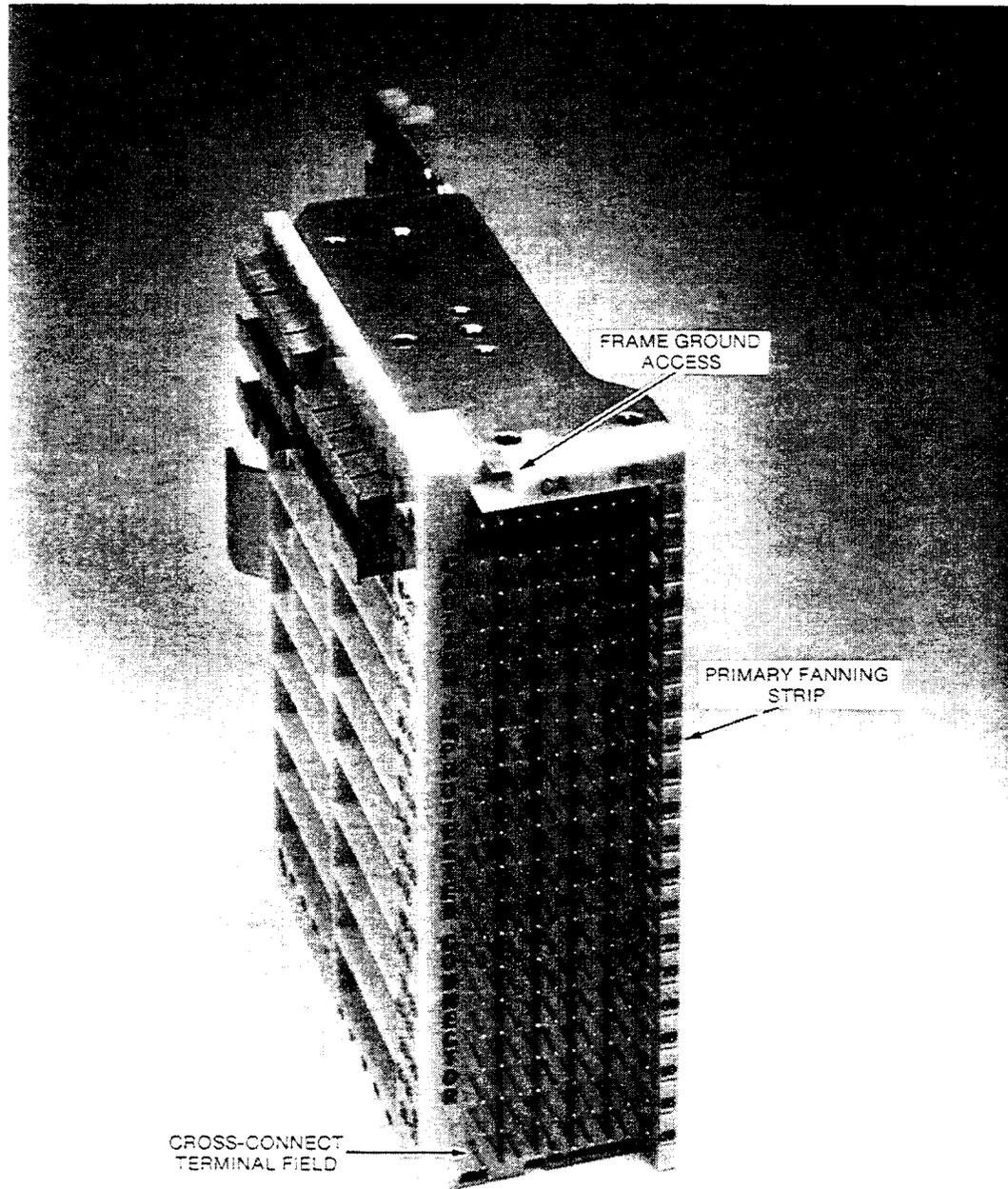


Figure 4. 410-Type Connector — Front View

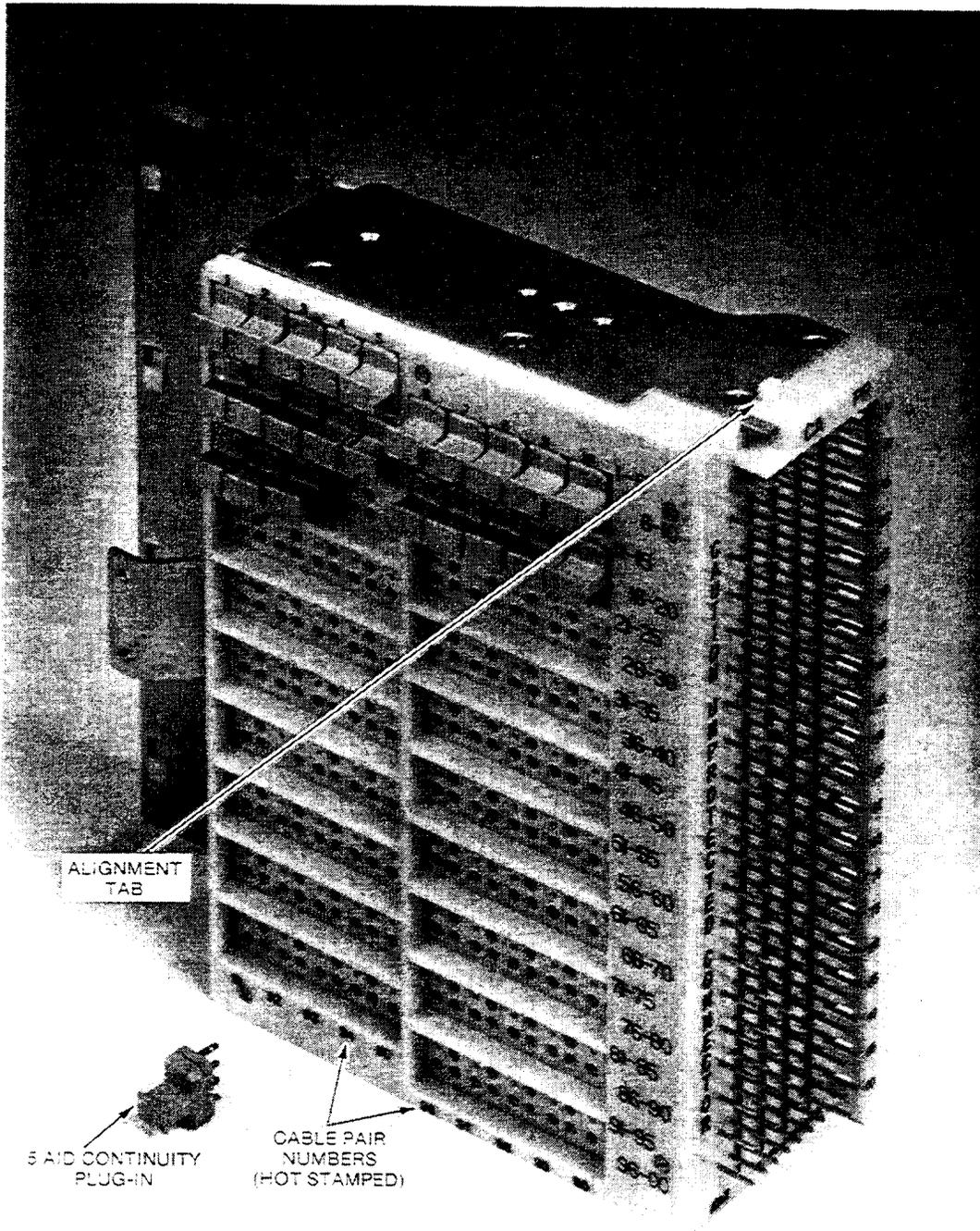


Figure 5. 410-Type Connector — Left Side View

**2.02** The 410- and 410M-type connectors consist of plastic panels measuring 9-3/8 inches (23.81 cm) high by 3-1/2 inches (8.89 cm) wide (with 5-type, continuity-only, protector units installed). The connectors extend 7 inches (17.78 cm) from vertical frame mountings. The left face has two 5 by 10 arrays for 100 of the 5-type protector units.

**2.03** These connectors are ideal for cross-connecting and terminating Voice Frequency "derived" pair circuits of loop carrier central office terminals on MDFs and also terminating outside plant cables that do not require protection, for example, metropolitan areas with underground plant.

**2.04** A front-facing cross-connect field (toward the work aisle) and snap-through fanning strips simplify cross-connects and facilitate running jumper wires. A single wire-wrap cross-connect field is offered that has bridging or back-tapping capability and is compatible with the 89-type high density central office connecting blocks. (See Figures 4 and 5.)

**2.05** Pair identification is hot stamped at the factory on the protector unit panel, cross-connect field, and fanning strips for quick, positive cable pair identification requiring minimal field stenciling (cable number and pair count only).

**2.06** These connectors are stubless and are cabled in the field. Factory connectorized units with 710, 711, or miniature ribbon-type connectors, may be made available on request.

**2.07** Table A lists the description, codes, and ordering information for the 410- and 410M-type connectors. Items coded with the letter "P" included are packaged with one hundred 5A1D continuity only plug-ins. All of the 410- and 410M-type connectors are equipped with single wire wrap cross-connect terminals.

**Table A. 410- and 410M-Type Connectors**  
(Note)

Code	Comcode
410E1 — 100	106003817
410ME1 — 100	106246671
410E1P — 100 *	106003883
410ME1P — 100 *	106246812

**Note:** Other 410-type unprotected connector options, such as factory connectorized units with 7-10, 7-11, or miniature ribbon-type connectors, can also be made available on a special basis. Please contact your AT&T Sales Representative for ordering information.

\* Packaged with 5A1D protector units (quantity — 100).

### 3. Installation

#### Precautions

- 3.01** Store the connectors in a dry location. Do not leave these units on loading docks or in locations exposed to the weather.
- 3.02** When unpacking the connector, open the carton on the side marked "OPEN FROM THIS SIDE".
- 3.03** Do not remove the packing material from the connector until it is ready for installation on the vertical frame.

#### Installing the 410- and 410M-Type Connectors

- 3.04** The 410- and 410M-type connectors are installed on conventional distributing frames. AT&T 201-220-101 describes the conventional distributing frames.
- 3.05** The termination capacities of vertical main frames equipped with 410- and 410M-type connectors are shown in Table B.

**Table B. 410- and 410M-Type Connector Termination Capacities (Note)**

Height of Vertical Main Frame	No. of Terminations Per Vertical
7 feet (2.13 m)	600 Pairs
8 feet (2.44 m)	800 Pairs
9 feet (2.74 m)	1000 Pairs
11 feet 6 inches (3.51 m)	1200 Pairs
12 feet 5 inches (3.79 m)	1200 Pairs*
14 feet 5 inches (4.40 m)	1200 Pairs*

\* A maximum of 1200 pairs per vertical is recommended to avoid possible jumper and cable congestion in the vertical.

**3.06** The 410M-type connector has the same features as the 410-type connector except the mounting bracket is at a 12.5-degree angle (Figure 3). It is not recommended that the 410- and 410M-type connectors be mixed on the same vertical.

**⇒ NOTE:**

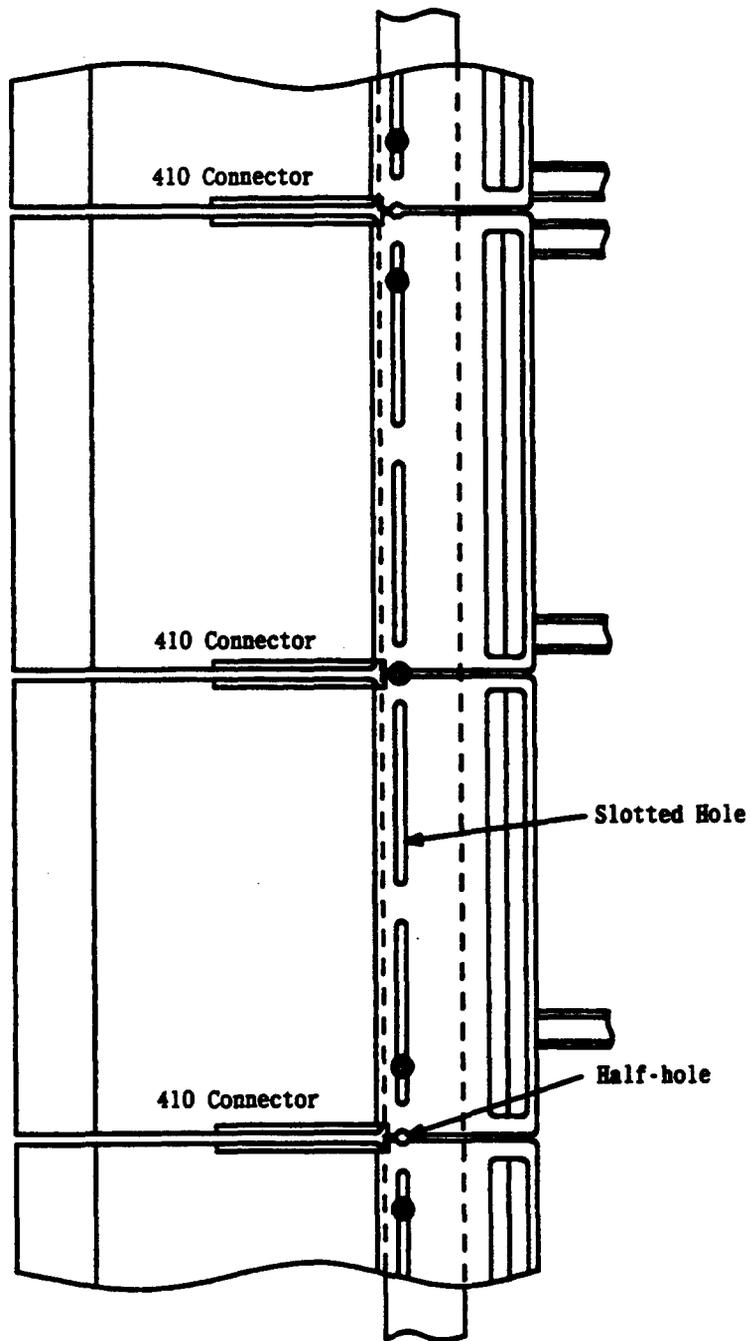
Because the 410M-type connector has an angled mounting bracket, it is recommended that the 410M-type connectors not be mounted on the vertical immediately to the left of a vertical containing other type connectors. When mounting to the left, one frame vertical should be skipped.

**3.07** Prior to installing 410- or 410M-type connector(s), proceed as follows:

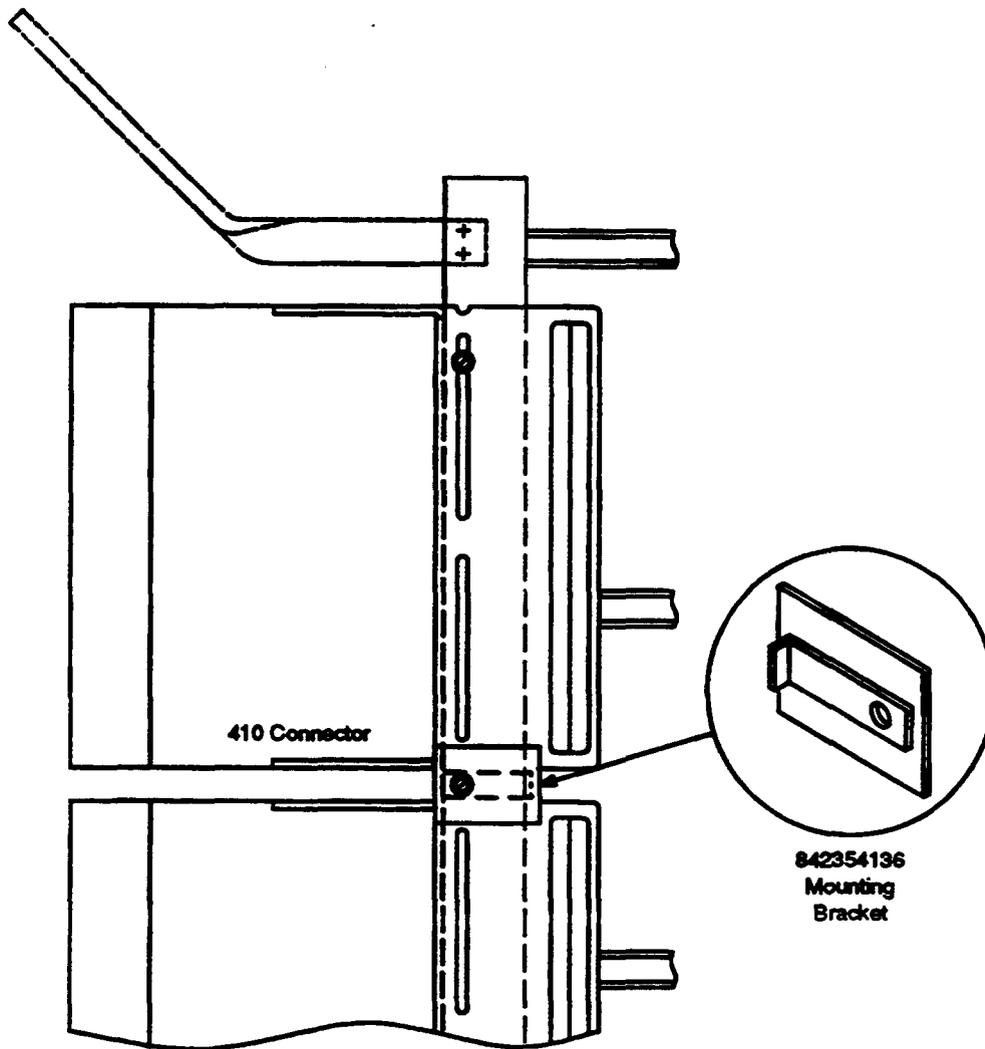
- (1) If required, open the cable entrance slots or ferrules in the floor, in accordance with local instructions.
- (2) Mark the cable number and pair count of each cable to be terminated on a linen tag or glass tape and attach to the connector and cable prior to mounting.

***For all conventional MDFs which have mounting holes drilled for mounting C50-, 300-, 301-, and 303-type connectors, use the mounting holes for the 410- or 410M-type connectors as shown in Figure 6. The mounting bracket of the connector has two slotted mounting holes and a half hole at each end. Each connector is attached to the frame vertical by using one slotted hole and one half hole. Since the mounting hole pattern differs at the top and bottom of most tall conventional MDF verticals, a mounting bracket may be required. The mounting bracket (842354136) must be ordered separately. See Figures 7 and 8 for mounting bracket installation.***

For low profile conventional distributing frames (LPCDFs) ED-97754 manufactured in 1976 and later, frame mounting holes have been incorporated on the verticals to accommodate the 410-type connector as well as all standard AT&T connectors.

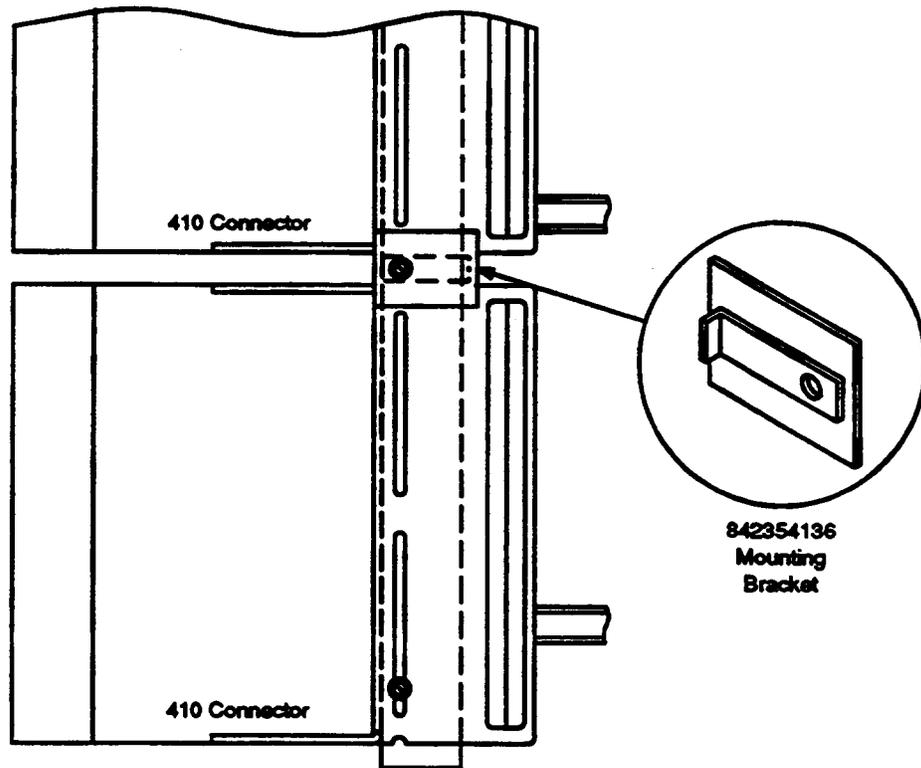


**Figure 6. Mounting Arrangement for the 410- or 410M-Type Connectors Using Existing Mounting Holes**



---

**Figure 7. Mounting Arrangement for the 410- or 410M-Type Connectors at the Top of a Tall Conventional MDF Vertical**



**Figure 8. Mounting Arrangement for the 410- or 410M-Type Connectors at the Bottom of a Tall Conventional MDF Vertical**

**3.08** Install 410- or 410M-type connectors as follows:

**⚠ CAUTION:**

- (1) When the 410- or 410M-type connector is used initially, it may be necessary on some frames to extend the guard rail and the ladder track toward the aisle to compensate for the additional depth of the connector as mounted on the frame vertical.

Attach the connectors to the **right side** of the distributing frame vertical mounting bar. Use the screws furnished with the connectors. Install both screws through the mounting bracket on each connector and attach to the vertical bar. Do not tighten the screws. Continue placement of the balance of the connectors until the vertical is filled with the maximum number of connectors.

- (2) Sprays and cleaners can damage plastic parts. Do not apply any sprays or cleaners to this product that have not been approved. Be especially careful not to expose any plastic parts to chemicals containing trichloroethane, such as certain cleaning fluids and lubricant sprays.

**⇒ NOTE:**

A mounting instruction sheet (Figure 9) is packed with each connector. It contains a template for marking the frame vertical for ease of installation. If mounting holes are not

available on the frame, drill and tap a No. 12-24 NC threaded hole as per the instruction sheet. Two screws are used to mount the connectors for adequate grounding purposes.

- (3) Tighten the mounting screws after all of the connectors are placed on the vertical mounting bar.
- (4) Neatly arrange the field wired cables of all connectors on the vertical mounting bar against the transverse arms of the frame. Lash the cables to these transverse arms in a neat manner, using lacing twine or cable ties.
- (5) Seal any cable entrance slots or ferrules in the floor in accordance with local instructions and/or fire protection practices.

**3.09** When a 410- or 410M-type connector is mounted immediately to the right of a 303-type connector, it is recommended that one frame vertical be skipped to facilitate access to 303-type connectors for running cross-connects.

**Marking the 410- and 410M-Type Connectors**

**3.10** Use the B or W transfer stenciling kit, as described in AT&T 081-860-105, for marking the cable and pair numbers. AT&T 636-200-011 covers the marking of main frames. Mark the 410- and 410M-type connectors in a manner similar to that shown in Figure 10.

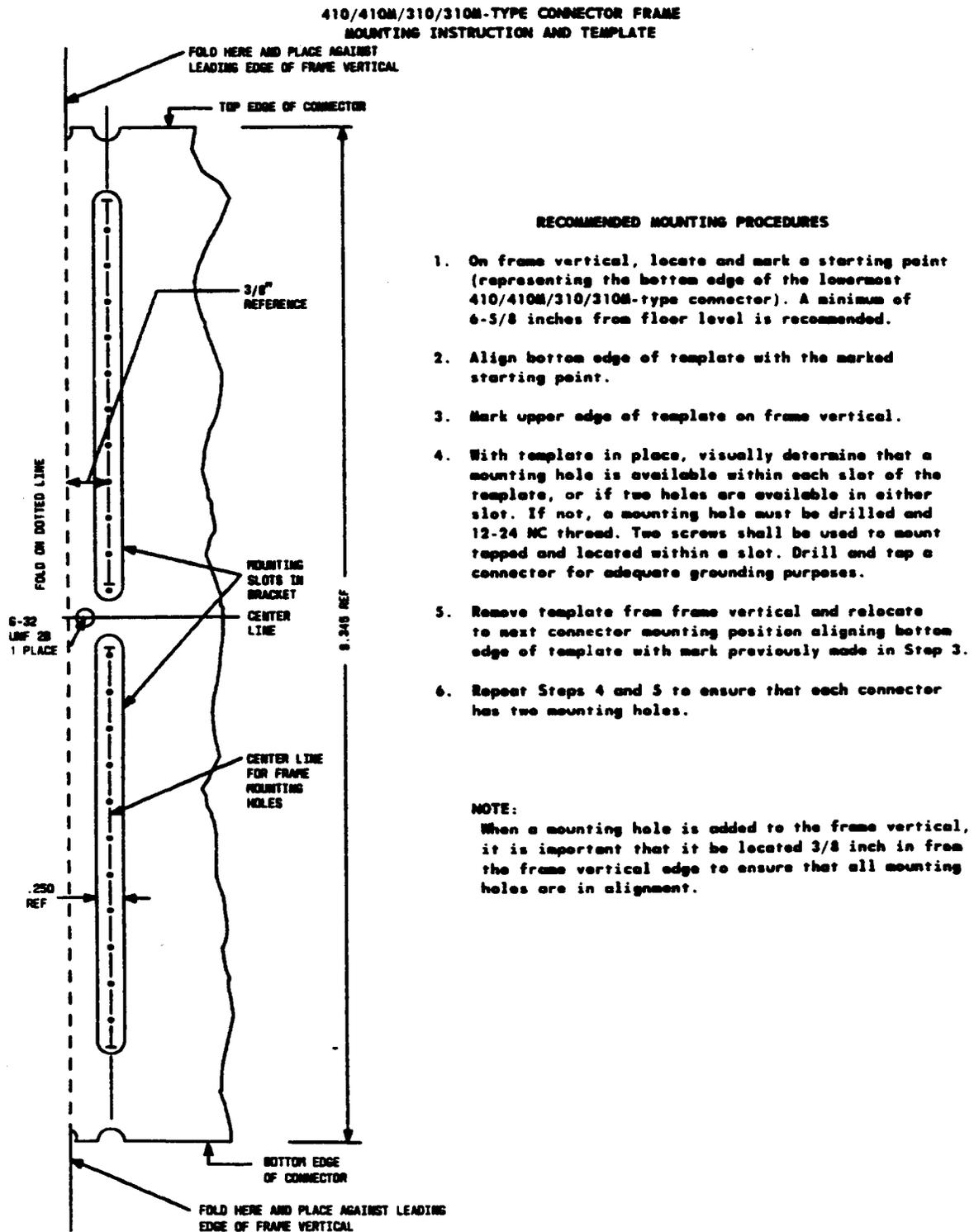


Figure 9. 410/410M Mounting Instruction and Template

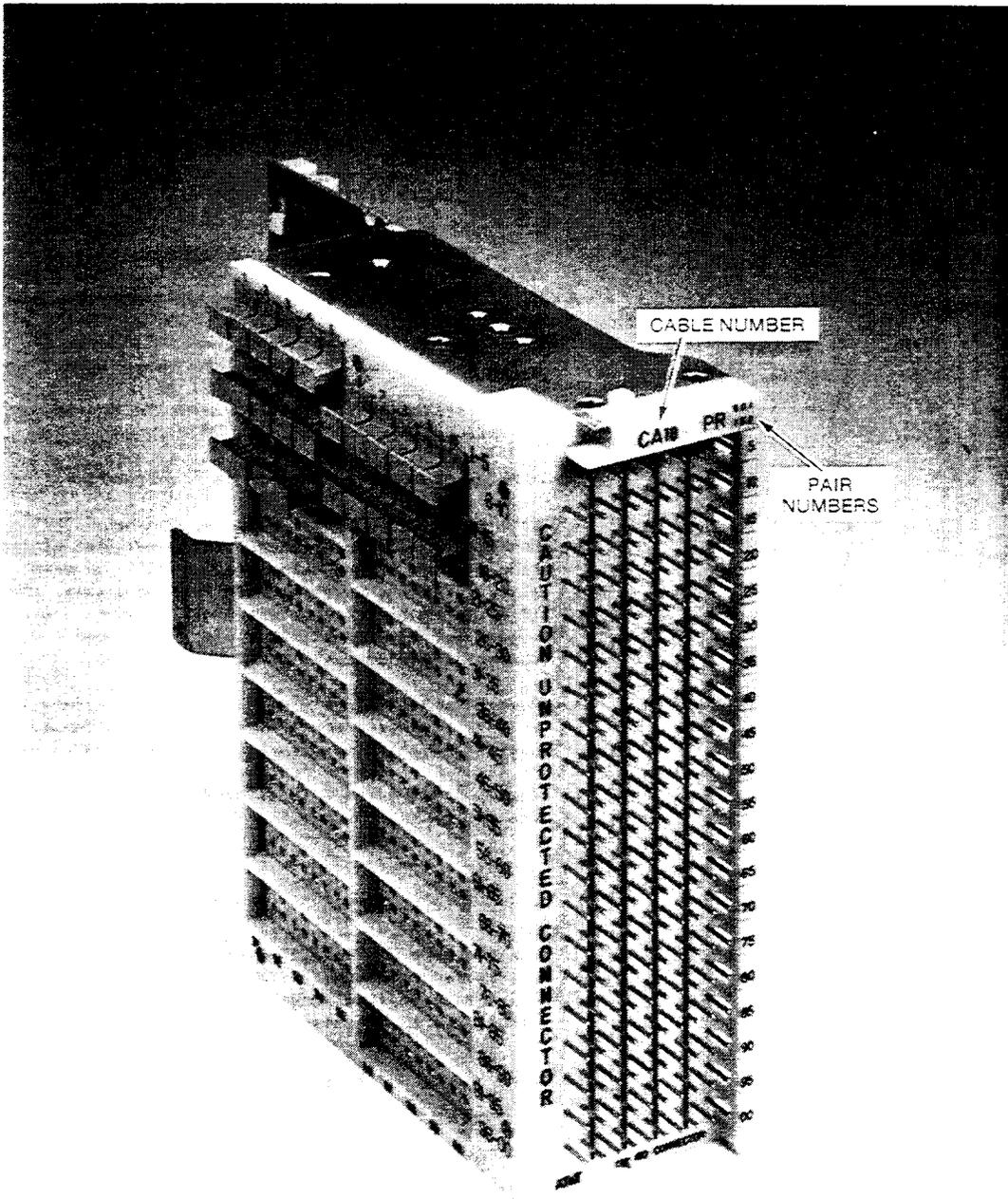


Figure 10. Marking Cable and Pair Numbers

## Field Wiring of 410 and 410M Connectors

- 3.11** For applications where the 410/410M is intended to terminate outside plant cables that do not require protection, stub cable selection should be made in accordance with general guidelines to provide an appropriate fuseable link between the outside plant feeder and the C.O. Apparatus (400-type unprotected connector).
- 3.12** Bonding of the aluminum shield in the stub cable to the unprotected connector should be provided in accordance with acceptance local practice. Non-terminated stub cable equipped with associated bonding hardware and factory installed moisture barrier may be secured from your AT&T Account Representative.
- 3.13** Stub cable termination may be performed either on frame-mounted apparatus or on unmounted apparatus in a work bench environment. Procedures for cable end preparation, loose conductor wire dress, identification of proper terminals, wire-wrapping requirements, and strain relief are covered in paragraphs 3.15 through 3.20.
- 3.14** For applications where the 410/410M is intended to terminate derived voice frequency pairs from T-carrier central office terminals, the following procedures are recommended:
- 3.15** The switchboard cable is solderless wire-wrapped to terminals on the right side of the connector unit. For ease of connecting, we advise that the unit be positioned in a manner that the right side is facing outward. The unit will have to be temporarily secured with twine or nylon ties at the approximate position on the frame.
- 3.16** After the unit is secured, the side plastic cover is removed by removing the screw on the right side. The terminals should be exposed once the cover is removed. (See Figures 11 and 12.)
- 3.17** The conductor leads feed through the openings at the rear of the block. A plastic grommet should be with the block in position. The grommets protect the conductor leads from the metal work. On jobs where the grommets are not provided, the leads must be protected by using PVC sheathing or gray PCV Tape.
- 3.18** The number 1 position is the far upper right-hand corner. The positions move from right to left and top to bottom. The terminal rows are staggered in groups of five (5) positions. Each position has four (4) terminals for tip and ring and one for ground.
- 3.19** The cable leads are fanned ten pairs per opening. The leads are measured, cut, and stripped on a five group (pair) bases. These leads are then solderless wire-wrapped, per AT&T 069-132-811, to the proper pin locations. The size of cable used between the Central Office Trunk (COT) and the connector/protector unit can vary. Only the first 96 locations on the 310 connector are used. The last four positions are spares. If a 96-pair cable is used, the leads are wired in order; that is, the first 24 pairs are wired in order, the first pair of the next binder then becomes the 25th pair, etc. If a 100-pair cable is used, the 25th pair or violet-slate pair is dropped from each binder. These spare leads are left long enough to reach the furthest terminating point. They are identified and taped back to the cable to be used as spares. After all leads are terminated and verified, the plastic side is replaced. The ties supporting the block are then removed.
- 3.20** Each cable connection should be continuity tested between their respective (from) and (to) terminations until all terminated conductors have been verified.

**⇒ NOTE:**

Use of conductor colors should not be employed during verification operations.

## 4. Repair Procedures

**4.01** Before making repairs to the apparatus referred to in this part, craft personnel should be familiar with the contents of the following practices.

Number	Title
AT&T 069-132-811	<i>Punched or Wire-Type Terminals (Not Having Notches or Perforations) Method of Making and Removing Wrapped Connections</i>
AT&T 069-140-811	<i>Soldered Connections — Using Soldering Coppers — Method of Making and Removing.</i>

### Precautions

**4.02** This practice covers only those parts that can be replaced in the field. No attempt should be made to replace parts not designated.

**4.03** Exercise extreme care when removing, connecting, and replacing terminals to prevent damage to adjacent connections and to avoid crosses to operating circuits.

**4.04** The ends of wire previously used for a solderless wrapped connection or soldered connection shall not be reused for subsequent connections. The end of the wire must be cut off and reconnected by solderless wrapping or soldering. Except in cross-connection fields, it will be necessary to splice the wire if there is not enough slack to provide the number of turns required for solderless wrapped connections. In cross-connection fields, the wire shall be rerun to provide sufficient length for a solderless wrapped connection (AT&T 069-132-811).

## Tools and Materials

**4.05** The following is a list of the tools and materials used in repair procedures:

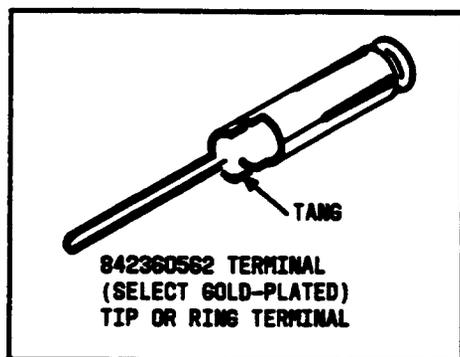
Code/Spec No.	Description
AT-7860	B long-nose pliers
658B	Terminal extractor
AT-7825	4-inch (10.16 cm) E screw driver
—	Off-set screwdriver
—	Wrench, 5/16-inch (7.87 mm) box or open-ended
401787726	Cable ties
KS-6320	Orange stick
KS-16748	Insertor
—	Sleeving
AT-7424	E rosin-core solder
KS-8740	Soldering copper
KS-16363,L3	Wire-wrap gun
KS-20827,L1 or KS-20551	Wire unwrapping tool
R-2916	Twine.

### Removing and Replacing Defective Terminals

**4.06** Two types of terminals are replaceable on the 410- and 410M-type connectors. They are the tip or ring and the cross-connect terminals. The following paragraphs detail the removing and replacing of these terminals.

### Tip or Ring Terminal

**4.07** To remove the 842360562 tip or ring terminal (Figure 11), proceed as follows.



**Figure 11. Tip or Ring Terminal**

- (1) Using an off-set screwdriver, remove the back cover (side of connector) by removing the screw holding the cover to the bracket (Figure 12). Figure 13 shows the cover removed.
- (2) On the wiring side of the connector, tag and remove the leads from the terminal to be replaced.
- (3) Using the B long-nose pliers, close the tangs on the terminals or break the terminal flush with the back side of the connector panel.
- (4) Remove the terminal from the front side of the connector panel.

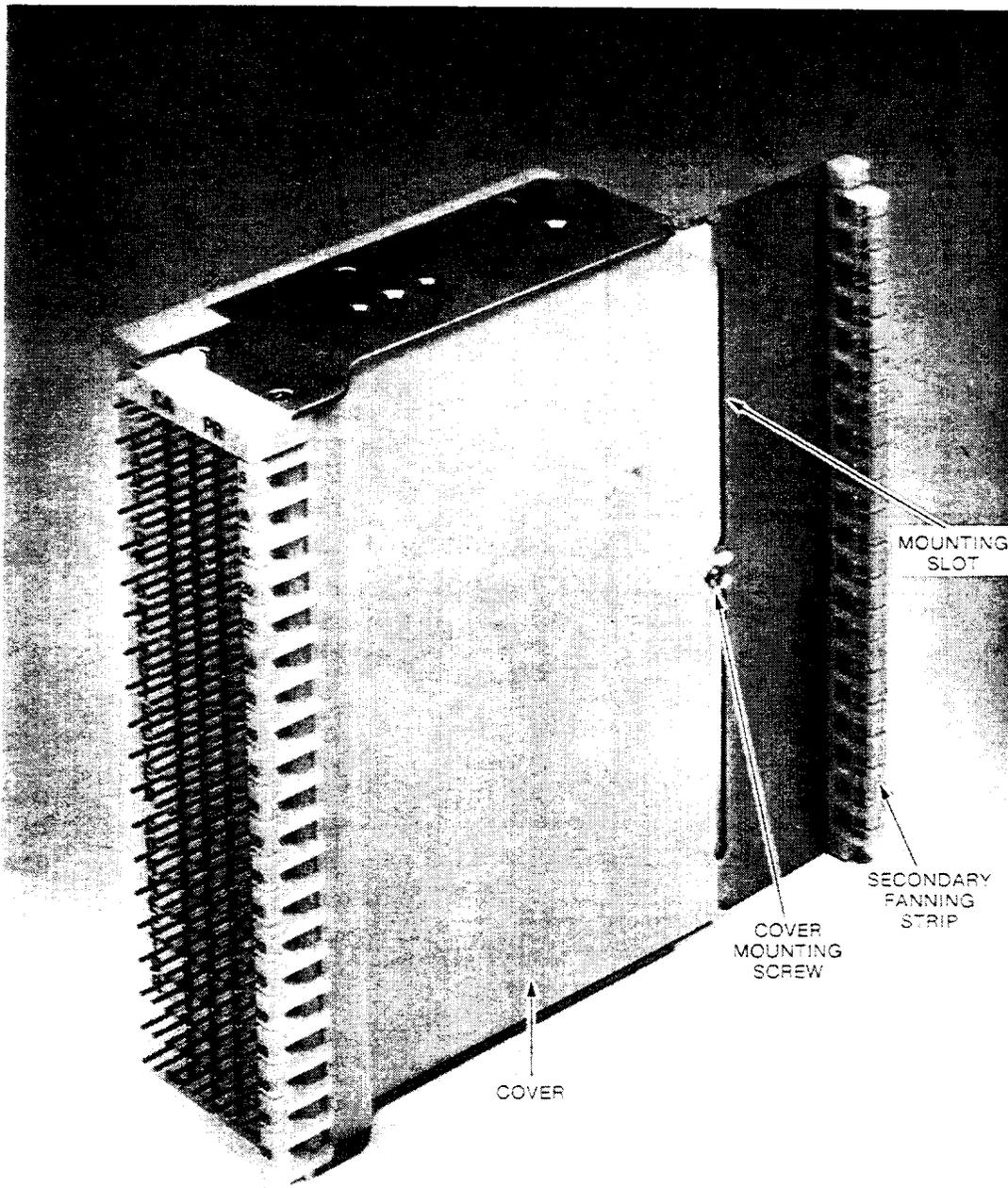


Figure 12. 410/410M Right Side-View

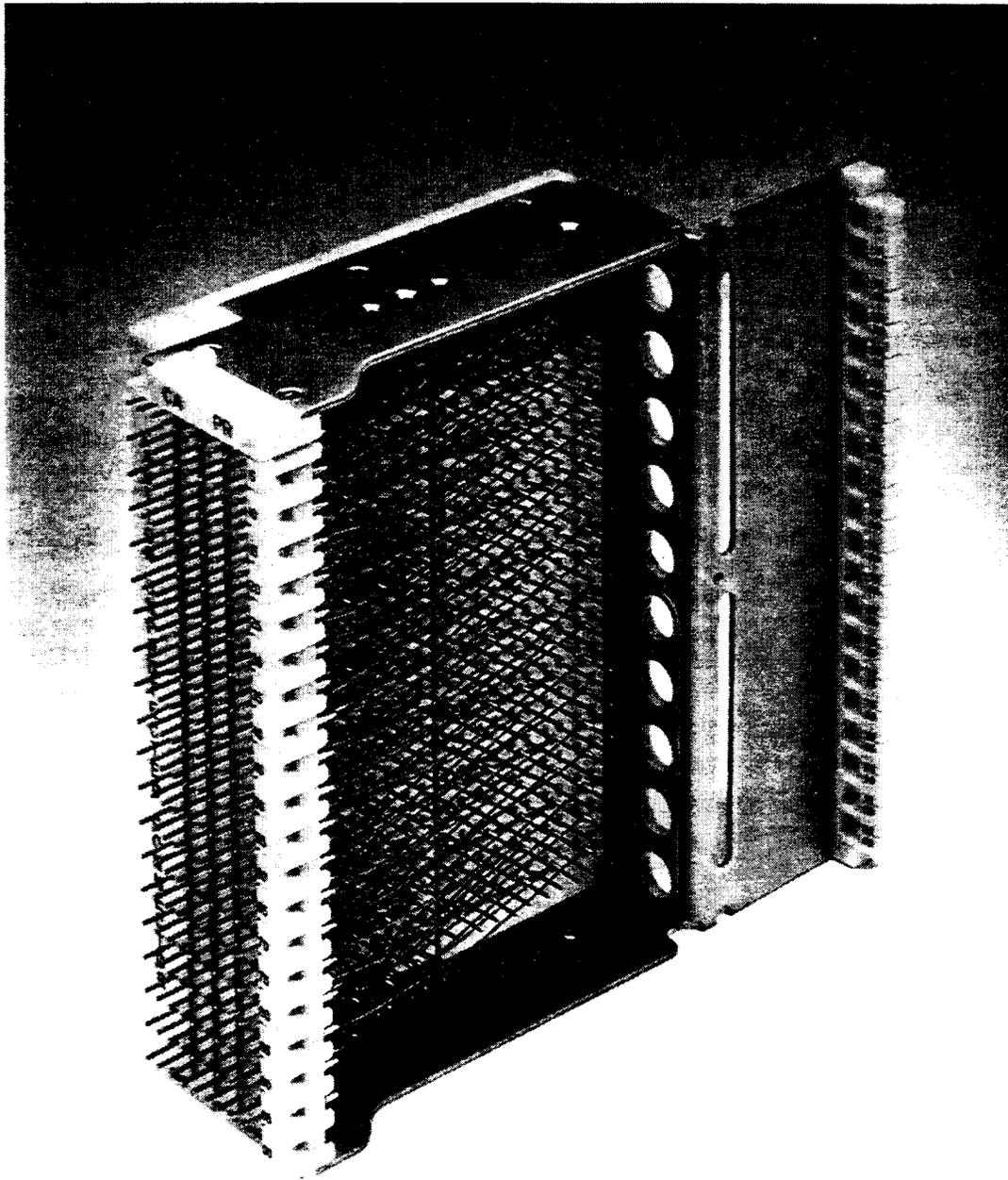


Figure 13. 410-Type Connector with Side Cover Removed

- 4.08** To replace the 842360562 tip or ring terminal, proceed as follows:
- (1) On the front of the connector panel, properly orient the new terminal and insert it into the same hole from which the old terminal was removed.
  - (2) Using the fingers, push the terminal into the hole as far as possible.
  - (3) Insert a protector unit into the connector to hold the terminal in place.
  - (4) On the wiring side of the connector, use the B long-nose pliers to pull the terminal into its proper position. Pay attention to the orientation of the terminal. Determine that the terminal is in the correct position by observing the position of adjacent terminals.
  - (5) Using the B long-nose pliers, carefully spread the tangs of the terminal to lock the terminal in place in the connector panel.
  - (6) Reconnect all leads to the terminal.
- ⇒ NOTE:**  
Prior to making connections to the terminal, refer to paragraph 4.04.
- (7) Replace the back cover by reversing the procedure of paragraph 4.07, Step 1.

### Cross-Connect Terminals

**4.09** The cross-connect terminals cannot be easily replaced without unfastening the connector and moving it out from the framework vertical. For this reason, no removal or replacement procedures are given. If it is necessary to replace one of these terminals or the top or bottom insert, contact your local AT&T Account Executive.

## 5. Associated Equipment and Reference Documents

**5.01** The following equipment and AT&T Practices are associated with this document.

### Associated Equipment

5-Type Continuity Only Plug-in Units (AT&T 201-208-100)

Mounting Bracket (Comcode 842354136), used for tall frames only, top and bottom.

### Warning Markers, Guard, Indicators, and Insulator (AT&T 201-208-106)

E Warning Marker (Comcode 400614202)  
 E Sign (Comcode 400359196)  
 KS-22596 Guard (Comcode 402800627)  
 KS-6660 Indicator (Comcode 996698239)  
 KS-16847 Indicator (Comcode 997726088)  
 KS-16604,L2 Insulator (Comcode 400809042)

### Reference Documents

Number	Title
AT&T 069-132-811	<i>Punched or Wire Terminals (Not Having Notches or Perforations) — Method of Making and Removing Wrapped Connections</i>
AT&T 069-140-811	<i>Soldered Connections Using Soldering Coppers — Method of Making and Removing</i>
AT&T 081-860-105	<i>Transfer Stenciling Kits — Description and Use</i>
AT&T 201-206-050	<i>Cable Terminating Apparatus-Selection — Distributing and Protector Frames</i>

<b>Number</b>	<b>Title</b>
AT&T 201-208-100	<i>3-, 4-, and 5-Type Protector Units — Description, Use, Maintenance and Test Procedures</i>
AT&T 201-208-103	<i>Tools and Aids — Distributing and Protector Frames</i>
AT&T 201-208-106	<i>Test Equipment, Cords, Plugs, Warning Markers, Guards, Insulators, and Indicators — Description and Use — Distributing and Protector Frames</i>
AT&T 201-220-101	<i>Conventional Distributing Frames — Description</i>
AT&T 201-220-301	<i>Terminal Strips — Method of Making Connections</i>
AT&T 201-220-501	<i>Conventional Distributing Frames — Inspections</i>
AT&T 201-220-801	<i>Terminal Strips — Repair Procedures</i>
AT&T 636-200-011	<i>Marking Main Frames — Pair and Cable Numbers</i>

**5.02** The AT&T Practices listed in paragraph 5.01 are stocked in Indianapolis, Indiana, at the AT&T Customer Information Center. To order copies:

- Call 1-800-432-6600

or

- Complete Form IND 1-80.80 and mail to:

AT&T Customer Information Center  
Attention: Order Department  
2855 N. Franklin Road  
P.O. Box 19901  
Indianapolis, IN 46219-1999