303-, 305-, 309-, AND 310-TYPE CONNECTORS
INCLUDING WARNING MARKERS, GUARDS, INSULATORS, AND INDICATORS
DESCRIPTION
CONVENTIONAL DISTRIBUTING FRAMES

CONTENTS PAGE

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1. GENERAL

1.01 This practice describes the 303-, 305-, ▶309-,◀ and 310-type connectors and the warning markers, guards, insulators, and indicators used with the connectors.

1.02 The reasons for reissuing this practice are listed below. Revision arrows have been used to denote significant changes. The Equipment Test List is not affected.

(a) To add 309-type connectors to title of section

(b) To add a new paragraph 1.07 covering the 309-type connectors

(c) To add reference to 309-type connector in paragraphs 1.01, 1.08, 1.10, and 4.05

(d) To change Part 2 (C) to Part 2 (D) and add a new Part 2 (C) covering 309-type connector

(e) To change paragraph 2.10 to include the warning (abuse of test terminals) as part of the paragraph.

(f) To change numbering of paragraphs ***from*** 2.13 through 2.18 ***to*** 2.22 through 2.27, respectively, and add new paragraphs 2.13 through 2.21 covering 309-type connector

(g) To change numbering of paragraph ***from*** 3.04 ***to*** 3.05 and add a new paragraph 3.04 containing a warning, plus additional information, concerning breakdown testing

(h) To change numbering of paragraphs ***from*** 4.06 and 4.07 ***to*** 4.07 and 4.08, respectively, and add a new paragraph 4.06 containing a danger admonishment, plus additional information, concerning the removal of the KS-19478, L1, guard

(i) To change numbering of figures ***from*** 4 through 11 ***to*** 6 through 13 and add new Fig. 4 and 5 showing 309-type connector

(j) To change designation of Table C to Table D and add a new Table C listing 309-type connector codes

(k) To make other minor changes throughout the section.

1.03 These connectors are used for terminating and protecting outside plant cables on conventional distributing frames.

1.04 The older 303-type solder-plated terminal connectors (designated 303A2, B2, C2, etc) ▶and the 303A3 and 303C3 are rated manufacture discontinued (Mfr Disc.) and are replaced with the newer 303A4. The 303B3 and 303D3 are also Mfr Disc. and are replaced by the 303B4. These connectors are equipped with reversible (swivel-mounted) stub cables which eliminates the need to order specific up or down mounted stub arrangements.◀

1.05 The 303-type connectors are used in place of the 300-type connectors and the C- and E-type protectors on distributing frames for a 100-percent increase in capacity.

1.06 The 305- and 310-type connectors are designed primarily for use with the low profile conventional distributing frames (LPCDF). However, they can be used on tall conventional distributing frames, provided a termination density of 1200 pairs per frame vertical is not exceeded. This capacity is based on the use of the newer DT 22P distributing frame wire. Practice 201-220-101 provides further information on the DT wire types.

▶**1.07** The 309-type connector is limited for use on the ED-97754-74 LPCDF and the ED-97755-72 low profile double-sided protector frame (LPDSPF). The bivertical arrangement of the 309-type connector does not allow intermixing other connectors on the same frame.◀

1.08 The 303- 305-, ▶309-,◀ and 310-type connectors provide features for voltage protection, current protection, testing, identification of special circuits, and disconnection of the outside cable pair from the central office equipment.

1.09 The older 303A1-, 303B1-type, etc, connectors can be modified to include the features of the 303A2-, 303B2-type, etc, or the 303A3-, 303B3-type, etc, connectors by the use of the D-180540 modification kit. The modification kit is covered in Practice 201-208-805.

1.10 The 3- and 4-type protector units are used with the 303-, 305-, and 310-type connectors to provide electrical protection. ▶Only the 4C-type protector units are used on 309-type connectors.◀ The 5-type protector units are used on the 303- and 305-type connectors where electrical protection is not required (continuity only). The 4B12C (continuity only) protector unit is used only on the 310-type connector. Protector units must be ordered separately. Section 201-208-100 provides additional information on the protector units.

2. DESCRIPTION

A. 303-Type Connector

2.01 The 303-type connector is a molded plastic panel 4-5/16 inches wide and 19-3/16 inches long. The connector has 100 groups of 5-pin, socket-type terminals. On the newer 303A3-, 303B3-type, etc, connectors, four of the terminals (tips and rings) are gold plated. The fifth terminal (center) is solder plated and provides for a ground connection. On the 303-type connector, rated Mfr Disc., all five terminals are solder plated. The 303-type connector is shown in Fig. 1.

2.02 Adjacent to and associated with each horizontal row of socket-type terminals is a related grouping of five pairs of wire-wrap terminals for connection to central office jumpers. Each individual socket-type terminal is factory wired to a corresponding wire-wrap terminal. A fanning strip for disbursing the jumper wires to the wire-wrap terminal is a molded part of the plastic panel.

2.03 Pair identification is provided by hot stamping block numerals in increments of 5 on the connector panel. The numerals are between each horizontal row of pin-grip terminals and associated wire-wrap lugs.

2.04 A 50-pair group of individually recessed gold-plated test contacts is located at the top and bottom of each connector panel. Pair identification for the test terminals is stamped in black numerals under each double row of gold-plated test contacts.

2.05 The test contacts are accessible from the front for attaching test connectors to accommodate the necessary cable testing equipment. Practice 201-208-106 provides information on the cords and test connectors.

2.06 Table A lists the various codes of 303-type connectors, the connectors rated Mfr Disc. stub cable size, and the stub mounting direction.

B. 305-Type Connector

2.07 The 305-type connector is a completely enclosed unit which measures 9-3/8 inches high, 1-7/8 inches wide (without protector units installed) and extends 7-1/2 inches outward from the frame vertical. The 305-type connector is shown in Fig. 2 and 3.

2.08 The outer surface of the 305-type connector has provisions for cable number and pair number stamping. The left side is factory stamped for protector unit identification. The right side is factory stamped to identify tip and ring terminals.

2.09 The molded plastic panel of the 305-type connector is equipped with a field of terminals for accepting 3-, 4-, or 5-type protector units. Tip and ring terminals are gold plated to accept the gold-plated tip and ring terminals of the protector units. The ground terminals are solder plated.

2.10 ***Warning: The connector test terminals are gold plated. Any abuse, such as locating tone with a probe, shorting or grounding pairs with long-nose pliers, etc, will damage the test terminals.*** The 305-type connectors have a 100-pair test terminal field (200 terminals) located on the left side of the connector. The terminal field is adjacent to the protector unit array and allows for the attachment of the M and N test connectors.

2.11 The 305-type connector is designed to be mounted on the right side of the distributing frame verticals. It occupies half the vertical space of the 303-type connector.

2.12 Table B lists the various codes of 305-type connectors, stub cable size, and the stub mounting direction.

C. ▶309-Type Connector

2.13 The 200-pair, 309-type connector (Fig. 4 and 5) measures 11-1/8 inches wide, 11 inches high, and extends 3-7/8 inches outward from the frame vertical. This front facing connector consists of two separate 100-pair units, mounted on adjacent verticals. This frame application is designated as a bivertical concept. Nine 200-pair connectors can be mounted on one bivertical bay of a 9-foot high LPCDF (ED-97754-74).

2.14 Each 100-pair connector unit has a separate protector unit panel and a related cross-connect panel. The molded cross-connect panel incorporates an angled designation strip (Fig. 4 and 5) that identifies the beginning or end of each row of

protector units on one side and identifies the T and R cross-connect terminals on the other side. The cross-connect field is arranged in a blue and white checkerboard pattern of 10-pair groups. A separate blue plastic fanning strip is attached to the side of the cross-connect panel and contains additional identification of the T and R cross-connect terminals.

2.15 An angled designation strip divides the two 100-pair protector unit groups and provides additional identification of the protector units. The molded plastic protector unit panels are recessed, in relation to the cross-connect panels, so that the tops of the protector units, the cross-connect terminals, the angled designation strips, and the fanning strips are all in the same vertical plane.

2.16 The 309-type connector does ***not*** have a test terminal field. The 4C-type protector units have test lands (or holes) that provide access for testing outside plant conductors. Special service circuits are equipped with 4C3C or 4C3E protector units (red housing) that do not have test lands. Multipair (100) testing is accomplished by using the U test connector (AT-9007). The P2FL test cord is used for testing a single pair through the 4C-type protector unit.

2.17 The 309-type connector has two standard factory-connected, color-coded, 100-pair stub cables containing 22- or 24-gauge tinned-copper polyvinyl chloride (PVC) insulated conductors, a mylar tape core wrap, and a corrugated aluminum shield under an outer PVC sheath.

2.18 The stub cables are equipped with swivels enabling the stubs to be mounted in either an up or down position. A stubless connector is also available. Table C contains a list of 309-type connectors.

2.19 In addition to the U test connector for multipair testing and the P2FL test cord for single pair testing, the following standard plug-in test cords are used with the 309-type connector:

(a) W2GL, used to access a vacant protector unit position

(b) W2GM, used for high voltage breakdown tests

(c) W4CM, used for making manual and automatic Varley measurements.

2.20 The bivertical arrangment of 309-type connectors requires two distributing rings in each alternating vertical bay. Using two distributing rings in place of one eliminates the interweaving of jumpers and produces a more organized arrangement of wiring. The distributing rings attached to odd numbered verticals are colored orange. The ones attached to even numbered verticals are colored gray.

2.21 On the LPCDF (ED-97754-74), the area at the top of the frame usually devoted to the designation board is used for 309-type connectors. Consequently, the designation information is displayed on the frame guard rail.◀

▶D.◀ 310-Type Connector

2.22 The 310-type connector is a completely enclosed, molded plastic unit, which measures 9-3/8 inches high, 4 inches wide (with 4C-type protector units installed) and extends 7 inches outward from the frame vertical yet fits within the existing guard rail (Fig. 6). The protector units are arranged in two adjacent 5×10 arrays with each group of five units separated by a plastic divider for ease of identification.

2.23 The 310-type connector is interchangeable with the 305-type connector. However, it is recommended that only one type be used on a frame vertical. Like the 305-type, the 310-type connector may be used on LPCDFs for compression purposes. It may be used on tall conventional distributing frames but not more than twelve connectors (1200 pairs) should be mounted on any one vertical. Two 310-type connectors can be mounted in the space required for one 303-type connector. Eight connectors can be mounted on each vertical (800-pair) of the 8-foot high LPCDF (ED-97754-70, Group 1) while ten connectors can be mounted on each vertical (1000-pair) of the 9-foot high LPCDF (ED-97754-70, Group 2). Tip and ring terminals are gold-plated while the ground terminals are solder-plated. All the test field terminals are gold-plated.

2.24 As shown in Fig. 6, the 310-type connector has a front facing wire-wrap cross-connect field and a front facing 100-pair test terminal field. ***Only*** 3- or 4-type protector units are used on this connector. Circuits that require continuity only (no protection), usually provided by 5-type protector units, must be equipped with 4B12C protector units.

2.25 A 100-pair T test connector (AT-8987) and a single pair test cord (P2FM) are used on this connector. Other test cords used on the 303- and 305-type connectors are also applicable to the 310-type connector. A new guard (KS-22956) is available for special service protection on the test field. Other special service markers applicable to the 303- and 305-type connectors may be used on the 310-type connector.

2.26 ▶Table D◀ lists the various codes of 310-type connectors, stub cable size, and the stub cable mounting position. In addition to those listed in the table, a stubless connector is available for use with pair gain systems.

2.27 Primary and secondary "snap through" fanning strips are located adjacent to the cross-connect field and towards the rear of the mounting bracket. They provide pair identification which will facilitate an orderly arrangement of jumper wires. Because of the high density achieved in the cross-connect field, only the new, smaller plastic-insulated DT 22P distributing frame wire should be used for cross-connecting to the 310-type connector.

3. WARNING MARKERS

3.01 Warning markers are used on the connectors when abnormally high voltages are employed (such as break-down tests). Pairs subjected to high voltages should be isolated from central office equipment and a warning marker should be used on these pairs.

3.02 The ***E warning marker (AT-8590)*** is a red molded plastic unit with white lettering at one end and three mounting prongs on the other end. This warning marker is inserted in place of the protector unit, as shown in Fig. 7, to alert personnel of a high voltage being applied on the particular outside plant pair.

> ***Note:*** The E warning marker does not provide protection or circuit continuity when inserted into the connector panel.

3.03 The ***E warning sign (AT-8325)*** is furnished with cords for securing it to the sides of the connector as shown in Fig. 8. The cords may be tied around the wiring horns, cross arm supports, cable stubs, ground bars, or through fanning strip holes, whichever is most accessible. The combined use of the E warning sign and the E warning marker reduces the danger of exposure to high voltage by identifying both sides of the connector.

3.04 ▶***Warning: Equipment damage may occur if arcing or smoke is seen when applying a breakdown test.*** An observer is required when performing a breakdown test on the connector. A talking path must be set up prior to testing between the observer stationed at the distributing frame and the employee with the breakdown set. If arcing or smoke is seen, the observer should immediately inform the employee applying the voltage that the fault has broken down and no further voltage should be applied.◀

3.05 Warning markers and signs should not be removed or the pairs restored to normal until notified by the test desk or cable locating bureau according to local instructions.

4. GUARDS, INSULATORS, AND INDICATORS

4.01 Guards, insulators, and indicators are used on the connectors to prevent service interruptions, equipment damage, and personal injury.

4.02 On the 303-type connectors, whenever a circuit is associated with a special service line, it is designated by a ***KS-14174, L7, designation pin*** (red). The designation pin is inserted into the hole provided for this purpose as shown in Fig. 9. A protector unit with a red housing is then inserted into the connector jack. Circuits, other than special service, are identified with various colored designation pins and protector unit housings of the same color. Additional information on the KS-14174 designation pins and protector units is given in Practice 201-208-100.

> ***Note:*** ▶Because of the mounting orientation of the 305- and 310-type connectors, the use of the KS-14174 designation pins is not recommended.◀

4.03 The ***20A circuit guard*** is a cross-shaped metal strip used to prevent accidental removal of protector units from the 303-type connector. This guard is used on circuits requiring special safeguarding measures (SSM). The guard is designed with three holes, spaced for use with the 3-, 4-, and 5-type protector units. Progressive steps for the installation of the guard are given below and shown in Fig. 10.

(1) Determine the proper hole and snip off any excess material at the notched edges adjacent to the hole.

(2) Insert the factory provided self-tapping screw into the selected hole and bend the strip to a 90° angle close to the head of the screw.

(3) Place the bent end of the guard into the protector location and install the screw into the designation pin hole.

(4) After the guard is attached to the connector panel, insert the protector unit into the connector panel.

(5) Bend the three tabs over and around the edges of the "T" shaped pull handle of the protector unit. The protector unit is locked in place.

4.04 The ***KS-16604, L2, terminal punching insulator*** (Fig. 3) is a red plastic insulator used on the wire-wrap terminals of the connectors. This insulator, one per terminal, is used where special service circuits are terminated on the connector.

4.05 The ***KS-19478, L1, guard*** (Fig. 2 and 11) is used to cover the recessed tip and ring terminals associated with special service circuits on the test terminal fields of the 303- and 305-type connectors. On 310-type connectors, a KS-22596 guard is used. ▶On 309-type connectors, no guard is provided since the connectors do not have a test field.◀ The guard prevents accidental contact with the test terminals and deliberately acts as an obstruction to circuit interference from the contacts of a test connector.

4.06 ▶***DANGER: Use of the wrong tool can be hazardous to personnel.*** Use long-nose pliers to remove the KS-19478, L1, guard from the test terminal field on 303- and 305-type connectors. If it is necessary to pry the guard with a screwdriver (never a knife), exercise extreme caution by prying it very slowly.◀

4.07 The ***KS-21168, L1, terminal punching insulator*** (Fig. 12) is a red, flame retardant, plastic insulator used to protect a pair of cross-connect terminals of the 303- and 305-type connectors. The insulator covers the two wire-wrap cross-connections when associated with special service lines and prevents accidental contact.

4.08 The ***KS-6660 indicator*** (Fig. 13) is a red plastic ring 1/2-inch in diameter. This indicator must be placed on wires before they are terminated. The ***KS-16847 indicator*** (Fig. 13) is a red cellulose-acetate spiral ring, 3/8-inch in diameter. The split-ring feature of this indicator permits placing or removing the indicator on terminated wires. Either one of these indicators should be used when a terminal punching insulator is used.

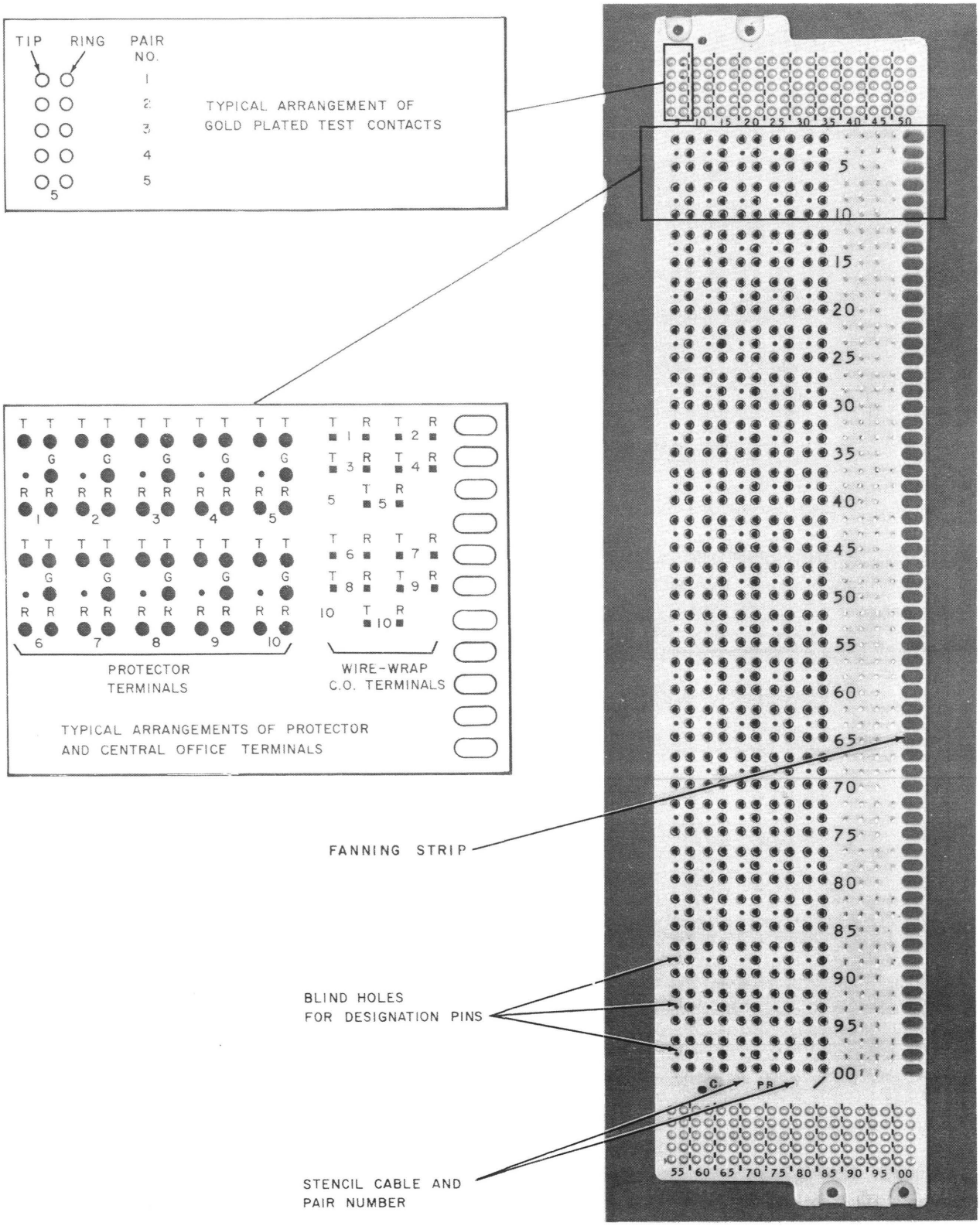
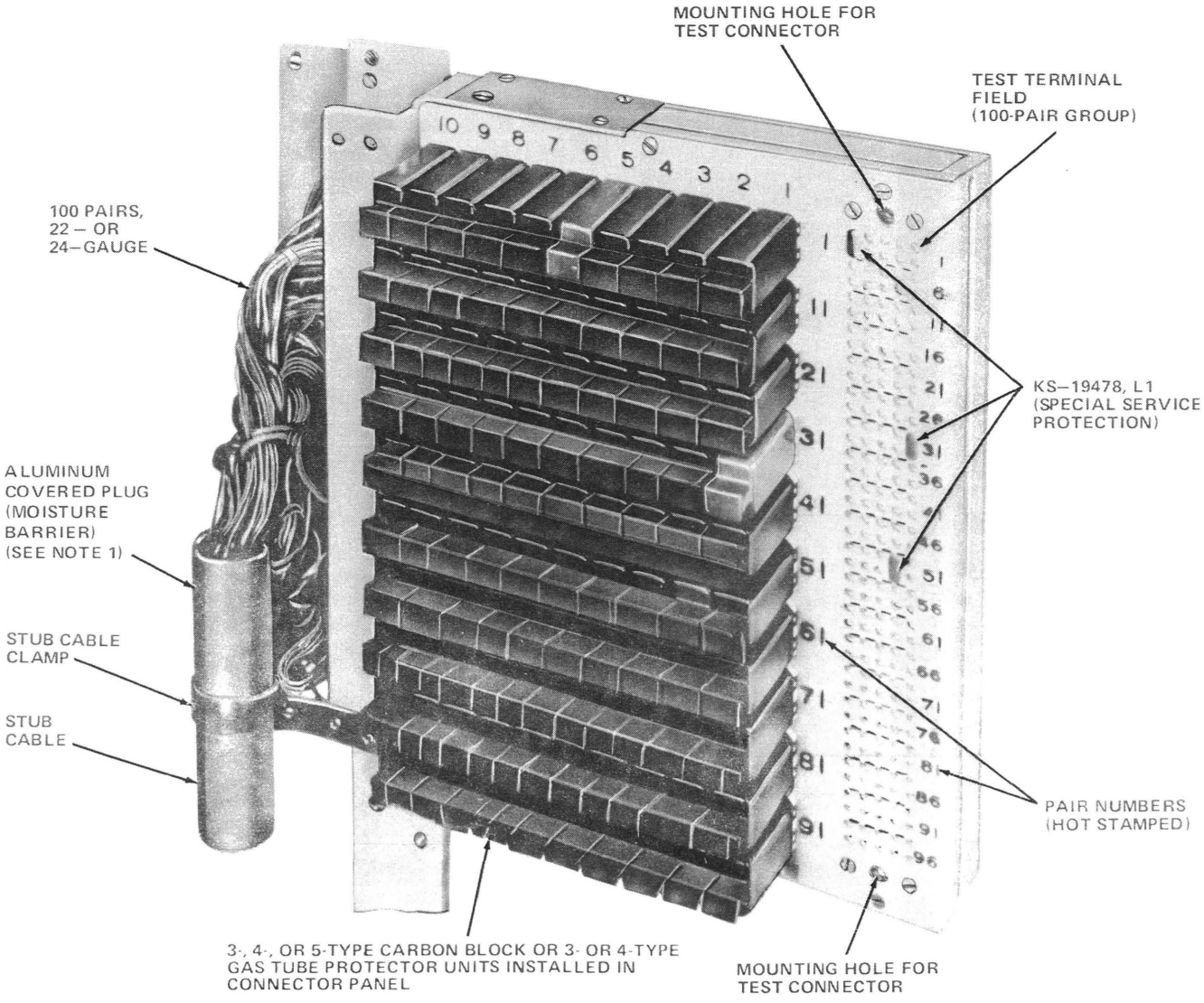
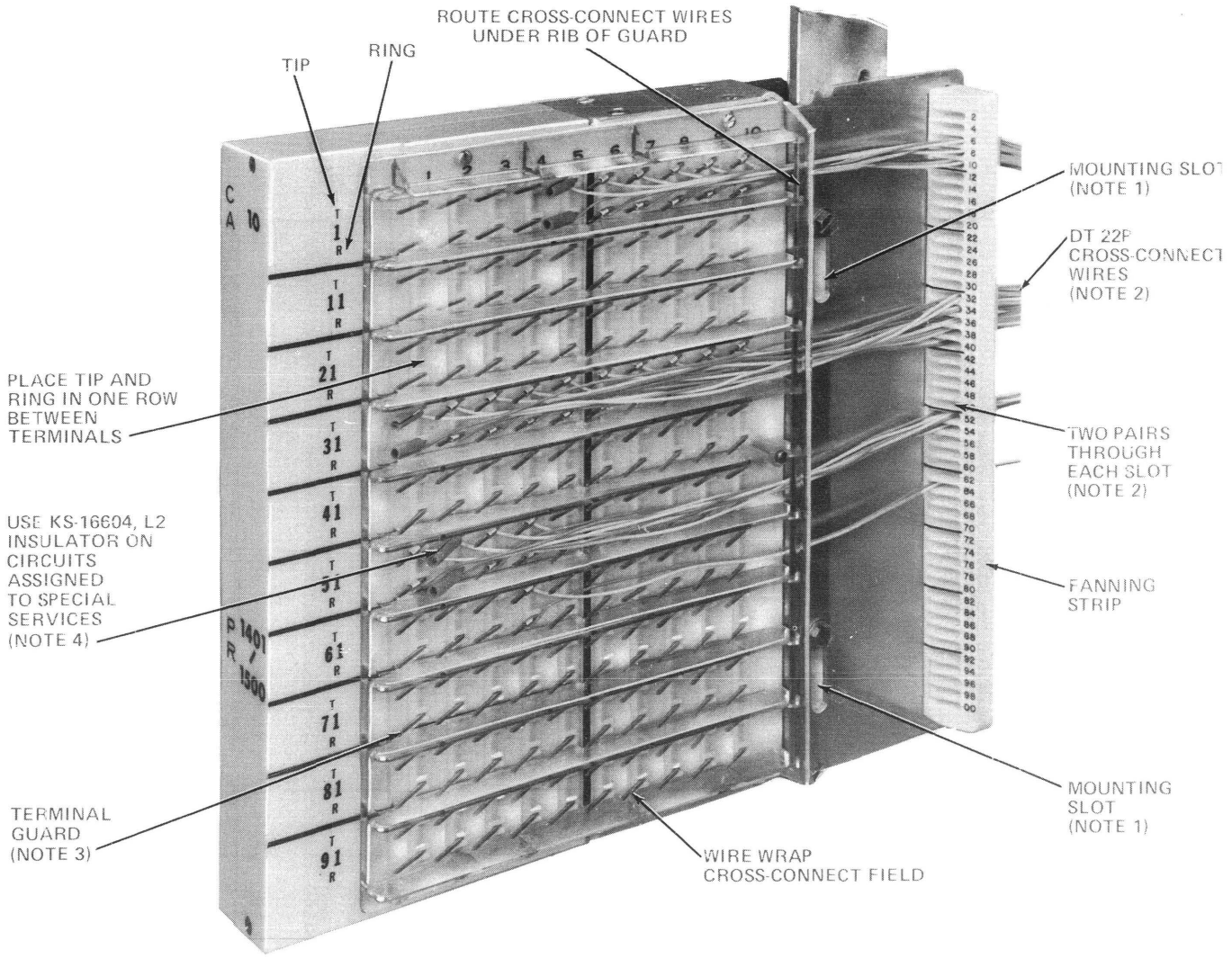


Fig. 1—303-Type Connector Panel



NOTE:
1. FACTORY–INSTALLED PLUG PREVENTS MOISTURE FROM ENTERING THE CO SPLICE DUE TO "BREATHING" ACTION OF CABLE DURING CHANGES IN TEMPERATURE.

Fig. 2—305-Type Connector—Left Side View



NOTES:

1. THE 305-TYPE CONNECTOR MOUNTS ON THE FRAME VERTICAL IN AN ORIENTATION WHICH IS 90 DEGREES FROM CONVENTIONAL MOUNTING OF MAIN DISTRIBUTING FRAME CONNECTORS.
2. BECAUSE OF HIGHER DENSITY ACHIEVED IN THE CROSS-CONNECT FIELD, USE ONLY DT 22P CROSS-CONNECT WIRE.
3. ENTIRE CROSS-CONNECT FIELD IS PROTECTED BY A REPLACEABLE TERMINAL GUARD (842355604).
4. IF THE TERMINAL INSULATOR FITS LOOSELY ON THE WIRE-WRAPPED CONNECTION, THE INSULATOR SHOULD BE COMPRESSED WITH A PAIR OF PLIERS PRIOR TO INSTALLING IT ON THE TERMINAL.

Fig. 3—305-Type Connector—Right Side View

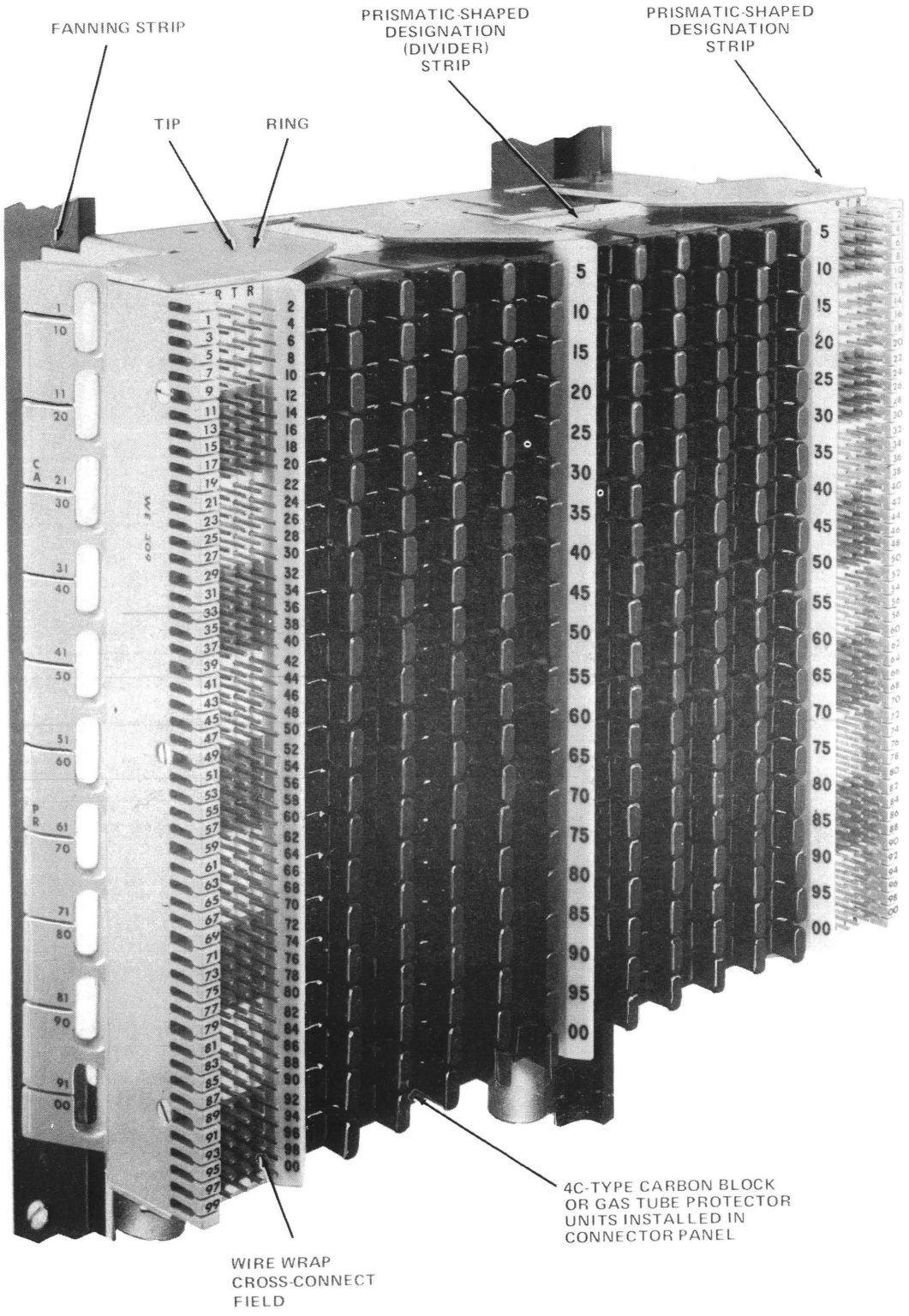


Fig. 4—309-Type Connector Left Side View

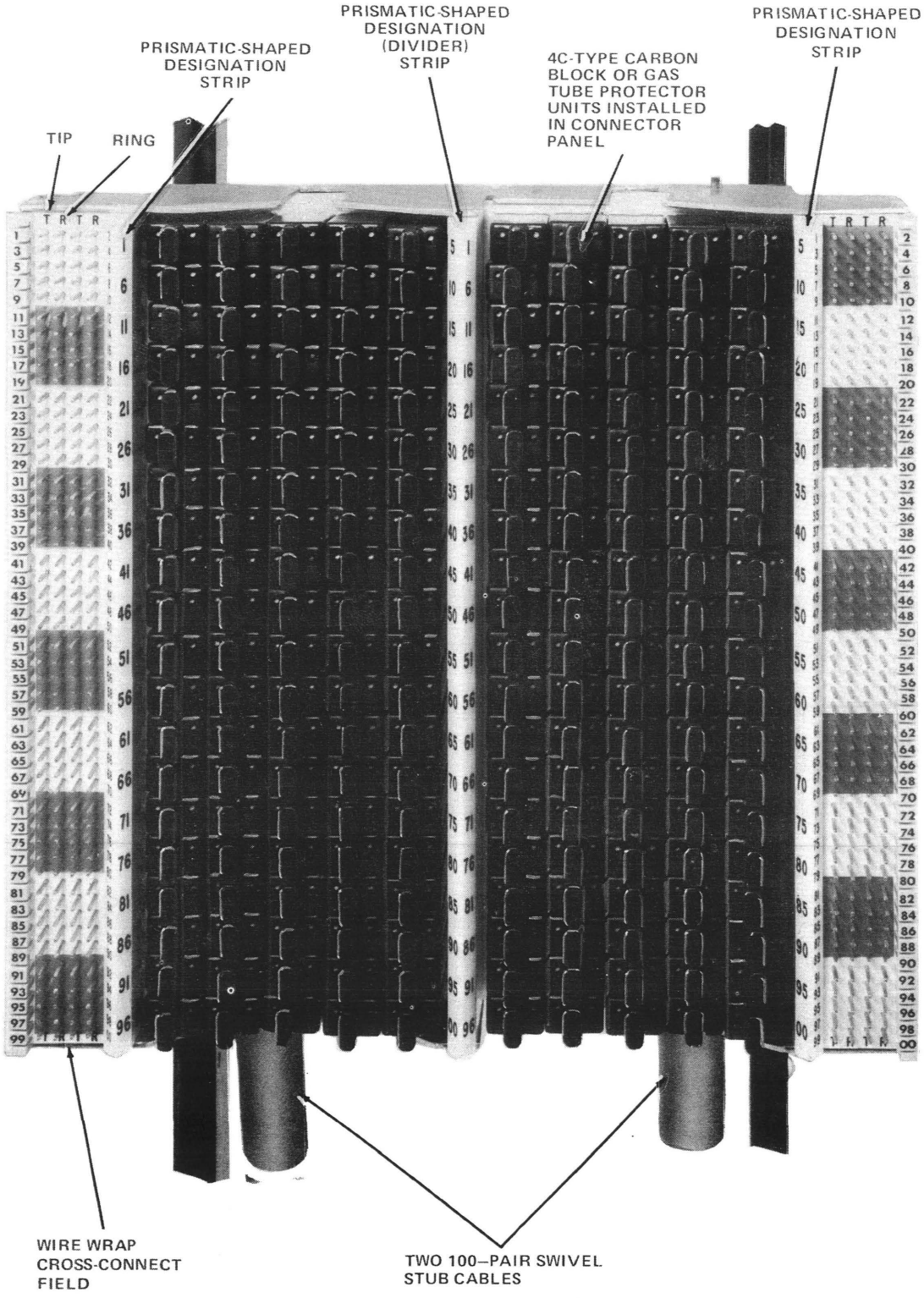
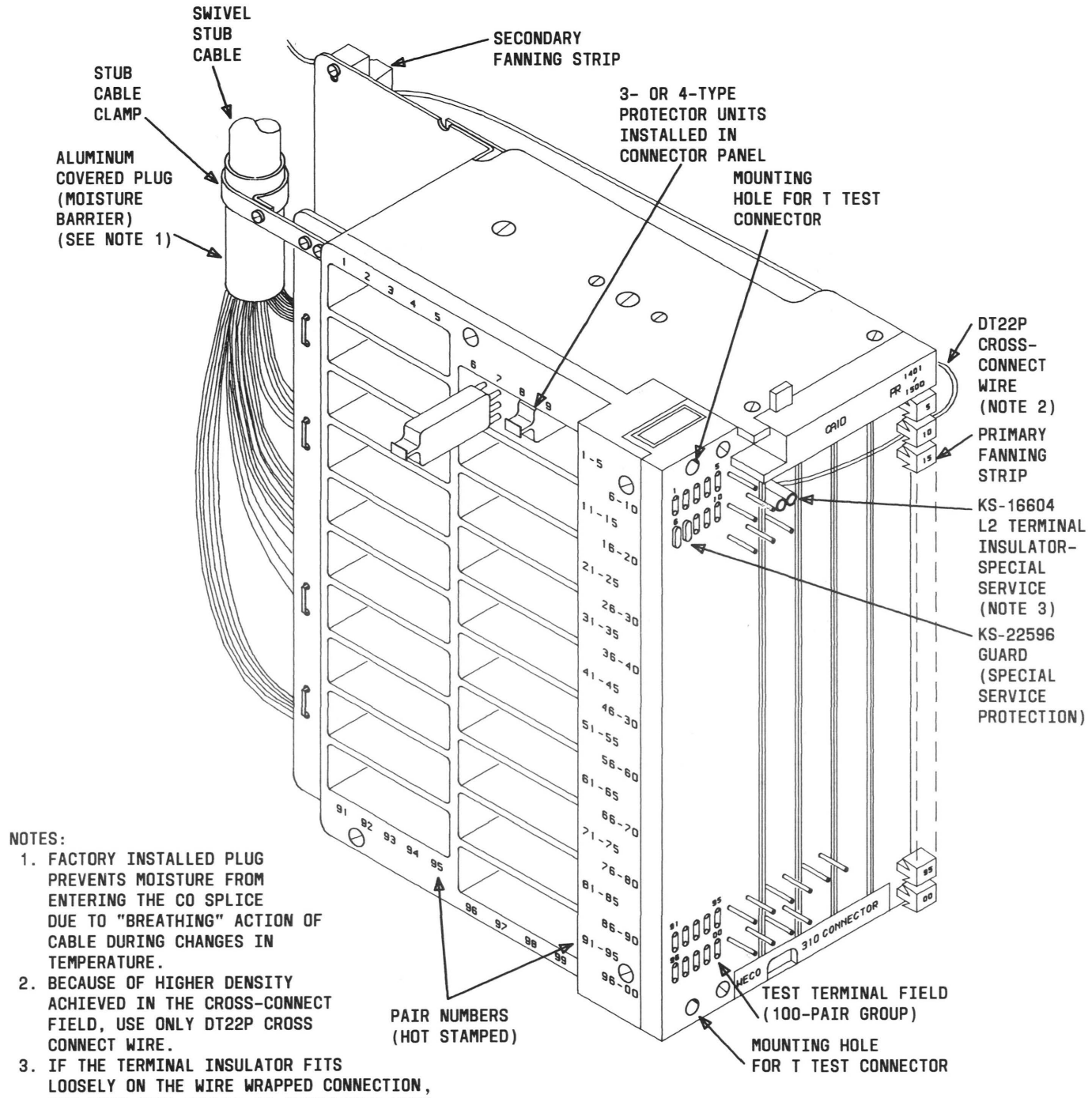


Fig. 5—309-Type Connector Front View



NOTES:

1. FACTORY INSTALLED PLUG PREVENTS MOISTURE FROM ENTERING THE CO SPLICE DUE TO "BREATHING" ACTION OF CABLE DURING CHANGES IN TEMPERATURE.
2. BECAUSE OF HIGHER DENSITY ACHIEVED IN THE CROSS-CONNECT FIELD, USE ONLY DT22P CROSS CONNECT WIRE.
3. IF THE TERMINAL INSULATOR FITS LOOSELY ON THE WIRE WRAPPED CONNECTION, THE INSULATOR SHOULD BE COMPRESSED WITH A PAIR OF PLIERS PRIOR TO INSTALLING IT ON THE TERMINAL.

Fig. 6—310-Type Connector—Left Side View

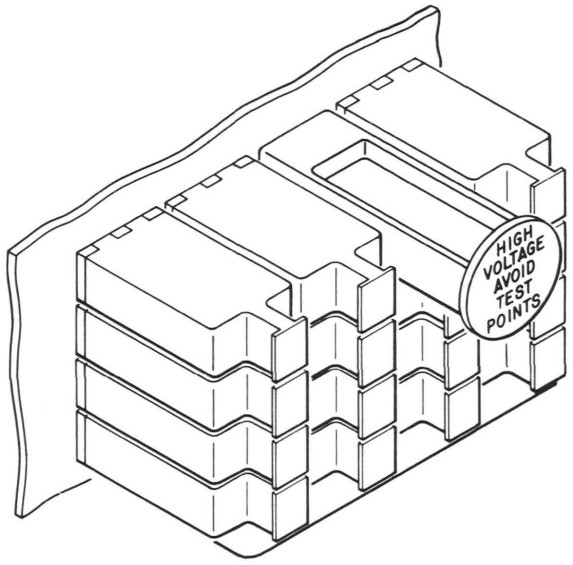
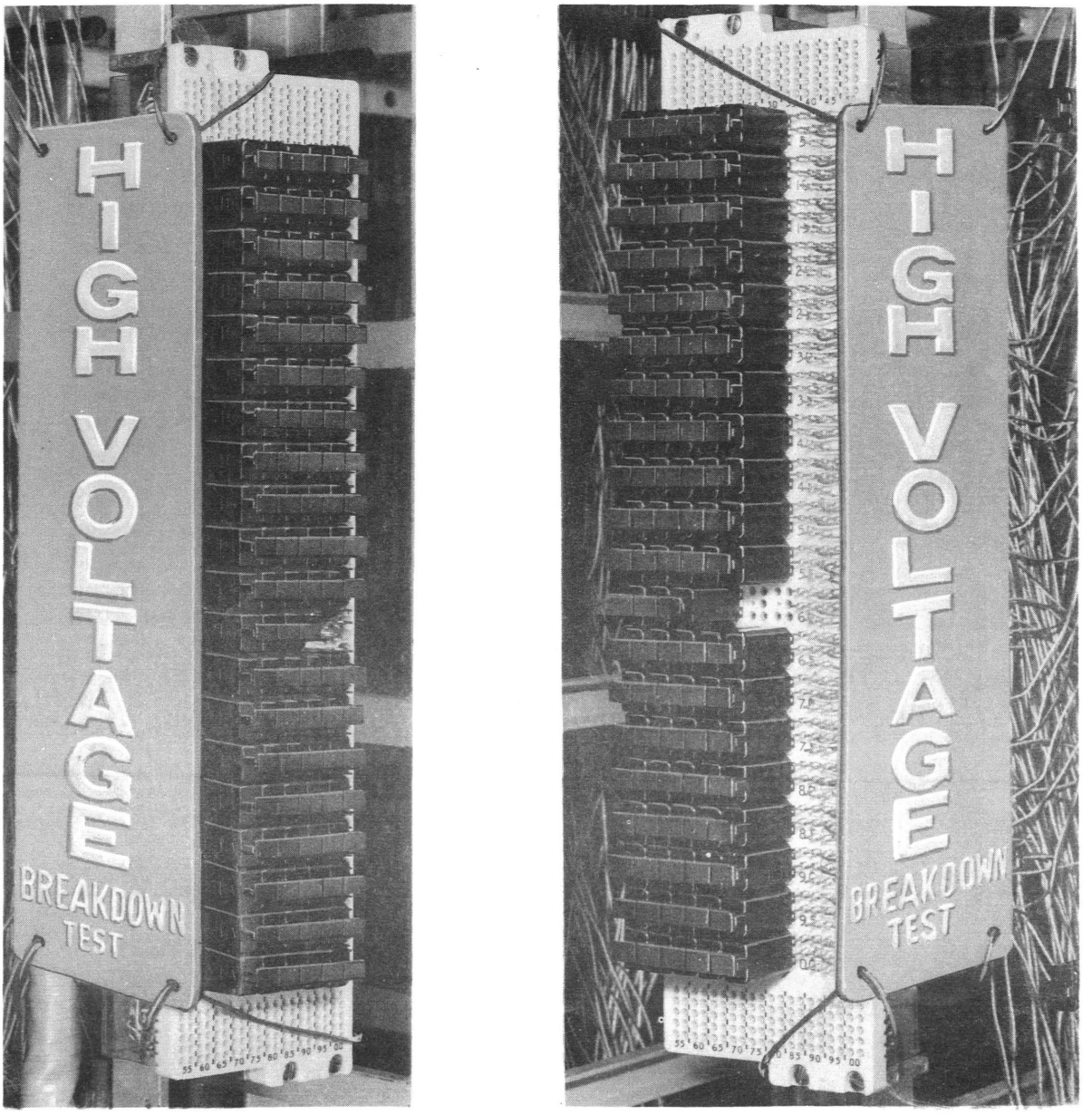


Fig. 7—E Warning Marker Installed on Connector



A B

Fig. 8—E Warning Signs Installed on 303-Type Connector (Similarly Installed on 305-Type and 310-Type Connectors)

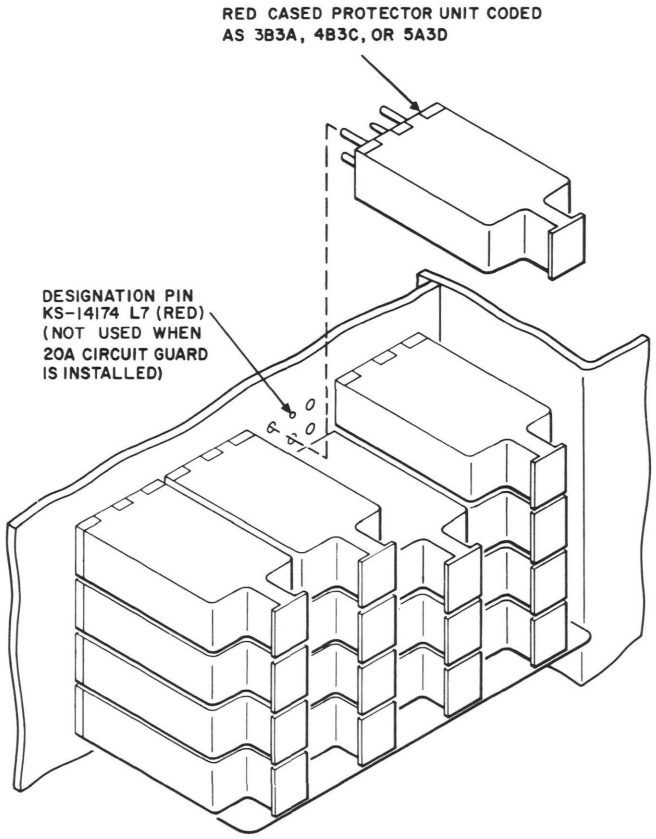


Fig. 9—Use of KS-14174 Designation Pin and Red Cased Protector Unit on 303-Type Connector

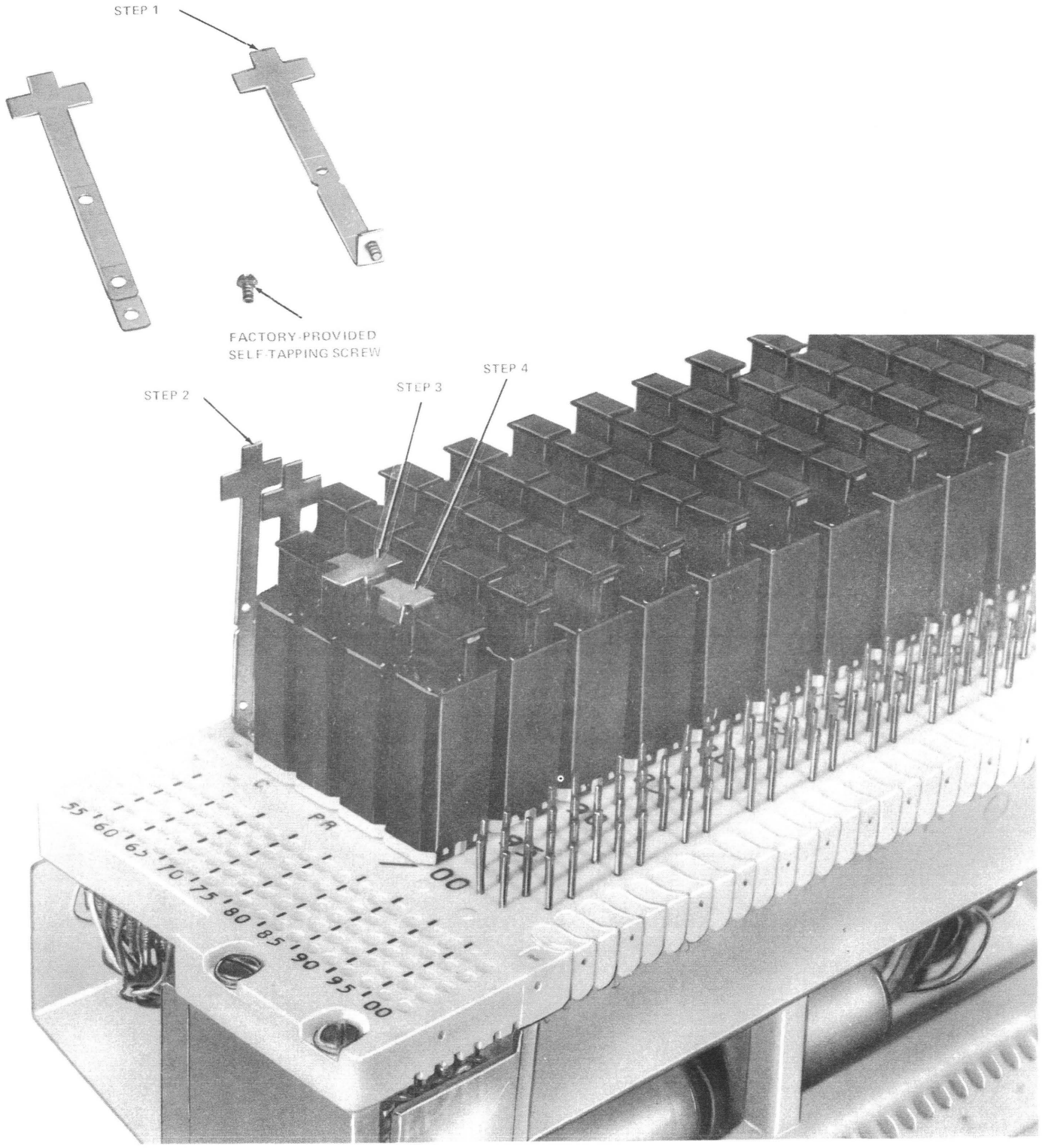


Fig. 10—Installing 20A Circuit Guard

Fig. 11—KS-19478, L1, Guard

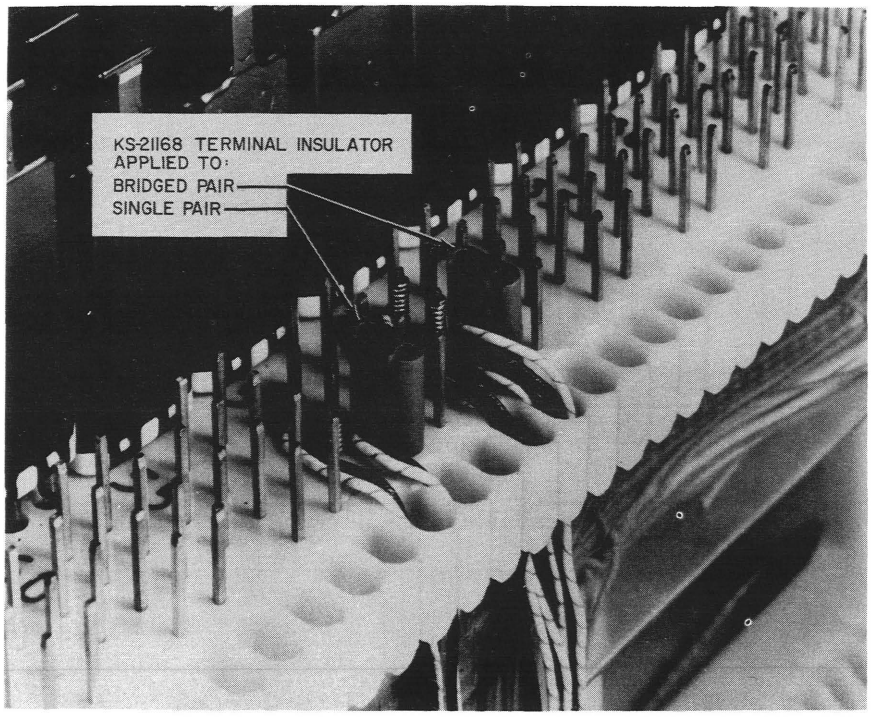


Fig. 12—KS-21168 Terminal Punchings—Special Services Lines—303-Type Connector

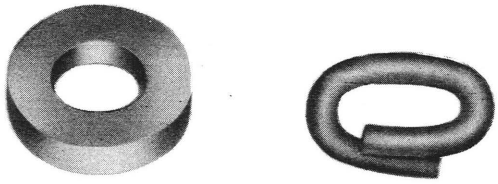


Fig. 13—KS-6660 and KS-16847 Indicators

TABLE A

303-TYPE CONNECTORS

STANDARD CODE (NOTE 1)	MFR DISC. CODE (NOT ORDERABLE)	STUB CABLE SIZE (NOTE 2)	STUB MOUNTING DIRECTION
303A4-100	303A2-100 303A3-100 303C2-100 303C3-100	100-pair, 24-gauge	Up/down
303B3-50	303B2-50	Two 50-pair, 22-gauge	Down
303B4-100	303B2-100 303B3-100 303D2-100 303D3-100	100-pair, 22-gauge	Up/down
303E3-100	303E2-100	None	—

Note 1: The connectors are not supplied with protector units. They must be ordered separately. (See Section 201-208-100.)

Note 2: Stub cables are available in 30-, 50-, 80-, 100-, 150-, and 200-foot lengths.

TABLE B

305-TYPE CONNECTOR CODES (RATED STANDARD)

CODE (NOTE 1)	STUB CABLE SIZE (NOTE 2)	STUB MOUNTING POSITION
305A1-100	24-gauge, 100-pair	Down
305B1-100	22-gauge, 100-pair	Down
305C1-100	24-gauge, 100-pair	Up
305D1-100	22-gauge, 100-pair	Up

Note 1: The 305-type connectors are not supplied with protector units. Required units should be ordered separately and installed by the operating company.

Note 2: Stub cable is available in standard 30-, 50-, 80-, 100-, 150-, or 200-foot lengths.

▶TABLE C◀

309-TYPE CONNECTOR CODES (RATED STANDARD)

CODE (NOTE 1)	STUB CABLE SIZE (NOTE 2)	STUB MOUNTING POSITION
390A1-200	24-Gauge, 100-pair	Up/down
309B1-200	22-Gauge, 100-pair	Up/down
309E1-200	No stub	

Note 1: The connectors are not supplied with protector units. They are ordered and installed by the operating company.

Note 2: Stub cables are available in standard 30-, 50-, 80-, 100-, 150-, and 200-foot lengths.

▶TABLE D◀

310-TYPE CONNECTORS (RATED STANDARD)

STANDARD CODE (NOTE 1)	MFR DISC. CODE (NOT ORDERABLE)	STUB CABLE SIZE (NOTE 2)	STUB MOUNTING DIRECTION
310A2-100	310A1-100 310C1-100	100-pair, 24-gauge	Up/down
310B2-100	310B1-100 310D1-100	100-pair, 24-gauge	Up/down
310B1-50	—	Two 50-pair, 22-gauge	Down
310D1-50	—	Two 50-pair, 22-gauge	Up
310TBA1-100	—	100-pair, 24-gauge	Up/down
310TBB1-100	—	100-pair, 22-gauge	Up/down
310E1-100	—	None	—

Note 1: The connectors are not supplied with protector units. They must be ordered separate. (See Section 201-208-100.)

Note 2: Stub cables are available in standard 30-, 50-, 80-, 100-, 150-, or 200-foot lengths.