

**PLACING, SECURING, AND SUPPORTING CABLE FORMS
INCLUDING UNEQUIPPED FORMS
WIRING AND CABLING
GENERAL EQUIPMENT REQUIREMENTS**



CONTENTS	PAGE
1. GENERAL	1
2. PLACING, SECURING, AND SUPPORTING SEWED FORMS	1
PLACING SEWED FORMS	1
SECURING SEWED FORMS	2
SUPPORTING SEWED FORMS	4
SUPPORTING UNEQUIPPED FORMS	6
A. General	6
B. Specific Requirements	8
TYPES OF TUBES	10
LOOSE WIRES IN RINGS, WIRE RETAINING DEVICES, OR CABLE BRACKETS	10
3. CABLE FORM REINFORCEMENT AND BRACING	12
REASONS FOR REISSUE	14

1. GENERAL

1.01 This practice covers the general equipment requirements for placing, securing, and supporting cable forms (including unequipped forms) and loose wire forms.

1.02 This practice is reissued to make changes that are listed under reasons for reissue at the end of this practice. Since this reissue covers a general revision, the arrows ordinarily used to indicate changes have been omitted.

1.03 The requirements covered in this practice shall be followed except as modified by applicable specifications and drawings.

1.04 The AT&T practices listed below contain wiring and cabling requirements that supplement the requirements of this practice and, where applicable, are referred to in other parts of this practice.

- 800-612-150—Specific Requirements for Electronic-Type Equipment
- 800-612-151—Design of Cable Forms
- 800-612-153—Forming, Fanning, Sewing, and Skinning
- 800-612-157—Protection of Cable Forms and Skinners
- 800-612-163—Specific Requirements for Crossbar-Type Equipment
- 800-614-152—Switchboard, Power and Local Power Cables—Installation

2. PLACING, SECURING, AND SUPPORTING SEWED FORMS

PLACING SEWED FORMS

2.01 **Locate sewed forms** in accordance with the information given on the cable plan drawings.

2.02 **Locate and place forms** so that they interfere as little as possible with access to apparatus requiring adjustment, repair, replacement, or cleaning.

2.03 **There should be no interference of forms** with movable or removable equipment parts such as keyshelf braces, commutator brushes, multiple banks, etc.

AT & T TECHNOLOGIES—PROPRIETARY

This document contains proprietary information of AT&T Technologies, Inc. and is not to be disclosed, reproduced, or published without written consent.

This document must be rendered illegible when being discarded.

2.04 All forms should be located, where possible, at least 2 inches from any wiring carrying outside service current that is not enclosed in armor or conduit.

2.05 Where the physical layout is not controlling, switchboard cable forms will be located on top of the local cable forms in the case of horizontal forms, and to the right of them (facing the rear) in the case of vertical forms.

2.06 Locate sewed arms of cable forms that serve relays, resistors, capacitors, and similar apparatus mounted on mounting plates or panels as follows:

(a) **On channel-type framework, or on uniframes where the mounting plates or panels are mounted on the front of the uprights**, locate the arms so that the inside edge of the form is approximately 3-1/2 inches, not more than 3-3/4 inches maximum, from the mounting plate or panel.

(b) **On uniframes where the mounting plates or panels are mounted on the rear of the uprights, and on ESS-type frameworks**, locate the arms so that the inside edges of the forms are approximately 2-1/8 inches from the mounting plate or panel.

(c) **On bulb-angle or box-type frameworks**, locate the arms so that the inside edge of the form is approximately 2-3/8 inches, not more than 2-5/8 inches maximum, from the mounting plate or panel.

(d) **On duct-type frameworks**, locate the arms in accordance with the equipment information. The arms should be located within the limits of the guardrail.

(e) In general, shop-wired units should be designed with local cable arms located 2-3/8 inches from the mounting plate in order to permit their use universally on channel, bulb-angle, and box-type frameworks. Shop-wired units mounted exclusively on channel-type frameworks may be designed with local cable arms located 3-1/2 inches from the mounting plate or panel.

2.07 Locate sewed arms of forms serving terminal strips approximately 1/2 inch from the rear edge of the fanning strip. Locate the

sewed arms of forms serving terminal strips not equipped with fanning strips approximately 1/2 inch from the rear edge of the terminal strip mounting bars.

SECURING SEWED FORMS

2.08 Secure sewed forms to cable brackets or other framework details by tying with twine in accordance with this practice, unless otherwise specified. Provide protection, if required, in accordance with AT&T Practice 800-612-157.

2.09 Use the Chicago stitch or the Kansas City stitch specified in AT&T Practice 800-612-153 to secure the form in place. The Chicago stitch should always be used when additional rigidity is required.

2.10 Cable forms on power panels should be secured by means of metal clamps per specification AT-6933 or approved equivalents. (See paragraph 2.11.) Protect the cable form from direct contact with the metal cleat or clamp by wrapping 3/4-inch wide friction tape per 995911278 around the cable. Where necessary, several layers of tape may be used to build up the diameter of the cable for a more secure fastening of the cable within the clamp. Sheet fiber 1/64-inch thick per 995831011 may also be used instead of tape to protect or build up the cable.

(a) The drawing number and sizes of the AT-6933 clamps available for securing cable forms on power panels are as follows:

Clamp Size	Cable Diameter (inches)	Size Of Screw Hole (inches)	Part Number
1	0.19 or less	0.203	A-155215
3	0.19 to 0.24 incl	0.203	400120895
4	0.25 to 0.33 incl	0.203	400120903
6	0.34 to 0.43 incl	0.265	400120911
8	0.44 to 0.60 incl	0.280	400120937
10	0.60 to 0.72 incl	0.280	400120952
13	0.73 to 0.93 incl	0.280	400120978
17	0.94 to 1.20 incl	0.280	400120986
21	1.21 to 1.70 incl	0.280	400120994
30	1.71 to 2.00 incl	0.280	400121018
35	2.01 to 2.75 incl	0.280	400121026

(b) The screws, nuts, and washers that should be used to fasten the clamps specified in (a) are as follows:

See proprietary notice on cover page.

Type of Panel	Screw	Nut	Washer
Fiberglass, Insul-Roc, or impregnated asbestos composition, 1 inch thick	RH type B self-tapping (8 by 3/4) P-422007	—	Flat P-284148
Fiberglass, Insul-Roc, or impregnated asbestos composition, 5/8 inch thick	PHST type B (6 by 1/2) P-424816	—	Flat P-284145
Metal 1/8 inch thick	PHM (0.164-32 by 1/2) 840059083	Hex P-206518	Flat P-284148
Metal, 7/32 inch thick	PHM (0.164-32 by 5/8) 840059109	Hex P-206518	Flat P-284148

2.11 As a substitute for the AT-6933 metal clamps specified in paragraph 2.10, the R-4065 nylon clamps, the KS-20986 L8 cable ties, the plastic loop supports specified below, or equivalent plastic supports may be used to secure cable forms as shown in Fig 1. The clamps or plastic loop supports should be secured to power panels with the screws, nuts, and washers specified in paragraph 2.10(b) for metal clamps. The R-4065 clamps or KS-20986 L8 cable ties shall not be used in shop applications for securing cable forms greater than 3/4 inch in diameter.

(a) **R-4065 nylon clamps and KS-20986 L8 cable ties** are strap-type clamps that wrap and permanently lock around the cable form. To secure the cable form, position the clamp or tie around the cable form, thread the end of the clamp or tie through its locking device, and manually tension the clamp or tie to temporarily hold the cable in place. Final tensioning of the clamp or tie and cutting off of the unused end shall be done using the R-4827 cable tie fastening tool set to tension the tie around the cable at approximately 23 pounds. See AT&T Practice 800-612-153.

(b) **Plastic loop supports** (cable clamps) are snap-on type clamps and therefore should be one size smaller than the diameter of the cable to be secured. The following sizes are available:

Size ID	COMCODE
1/8	996248720
3/16	997126321
1/4	996609160
5/16	996609178
3/8	997656582
7/16	400932026
1/2	400932034
9/16	997842257
5/8	900010969
11/16	997842323
3/4	997842265
7/8	997888698
1	996233011
1-1/8	900005927
1-3/16	996233037
1-1/4	996233045
1-3/8	996233052
1-1/2	996233060

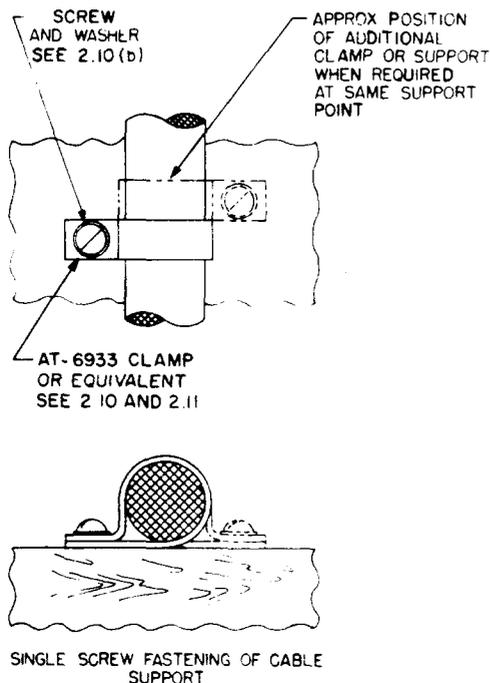


Fig 1—Securing Sewed Cable Forms on Power Panels

See proprietary notice on cover page.

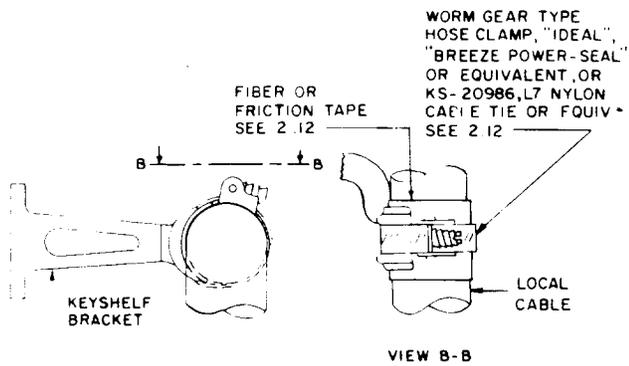


Fig 2—Fastening Keysheaf Local Cables to Keysheaf Cable Brackets

2.12 Keysheaf Local Cable Forms: Where brackets such as those shown in Fig 2 are furnished for securing keysheaf local cable forms, the forms shall be securely fastened to the brackets in accordance with Fig 2.

- (a) Where the metal strap or clamp is used for securing the cable, friction tape per 995911278 or 995831011 1/64-inch sheet fiber shall be placed under the metal strap or clamp to protect the cable from damage.
- (b) Where the nylon cable tie is used for securing the cable, several wrappings of 995911278 friction tape instead of the fiber shall be used under the nylon tie. Application and tensioning of the tie around the keysheaf bracket and local cable shall be in accordance with paragraph 2.11(a). The nylon cable tie shall not be used in shop applications for securing cable forms greater than 3/4 inch in diameter.
- (c) Cables shall be built up sufficiently with wrappings of 995911278 friction tape to ensure that they will be securely fastened to the bracket by the clamp, strap, or tie.
- (d) Where the keysheaf bracket is located on the same side of the keysheaf as the keysheaf brace, the end of the metal strap or clamp or the locking head of the nylon tie shall not protrude so as to result in a hazard when closing the keysheaf.

SUPPORTING SEWED FORMS

2.13 Cable supports, cable brackets, or other supporting details are generally provided for securing and supporting cable forms on equipment framework. Cable forms shall be secured to cable supports, cable brackets, etc, in accordance with the applicable requirements of Fig 3, 4, or 5. Where cable supports, etc, are not provided or where it is impracticable to secure the cable forms to the cable supports, tie the forms directly to the metal framework as shown in Fig 5. When securing cable forms to the cable supports, cable brackets, etc, or to the metal framework, provide protection, where required, in accordance with AT&T Practice 800-612-157.

2.14 Where it is impracticable to secure the cable forms to cable supports, brackets, etc, or to the framework, they may be tied to adjacent forms or other cables that are fastened to the cable supports or framework.

2.15 Installer-run wiring may be secured to L-, U-, or similar-type brackets or to other cable forms, using KS-20986 nylon cable ties instead of twine. The use of the nylon cable ties for this purpose shall be in accordance with Part 6 of AT&T Practice 800-612-153 covering the requirements for tying and banding wire and cable. Securing of the cable forms to the L-, U-, or similar-type brackets with the nylon ties shall be in accordance with paragraph 2.31.

2.16 Where two or more closely adjacent parallel forms or arms of forms serve the same or adjacent apparatus, the forms should be tied or sewed together with twine as necessary to make a compact bundle of forms. This is especially important where the several forms are small, in order to keep them in place. Where applicable, KS-20986 nylon cable ties may be used instead of twine, as specified in Part 6 of AT&T Practice 800-612-153.

2.17 Closely adjacent forms at right angles to each other should be tied together with twine as necessary for mutual support and to present a professional appearance. Nylon cable ties shall not be used for securing together cable forms that are at right angles to each other or for securing forms at right angles to towel bars or similar-type supports.

See proprietary notice on cover page.

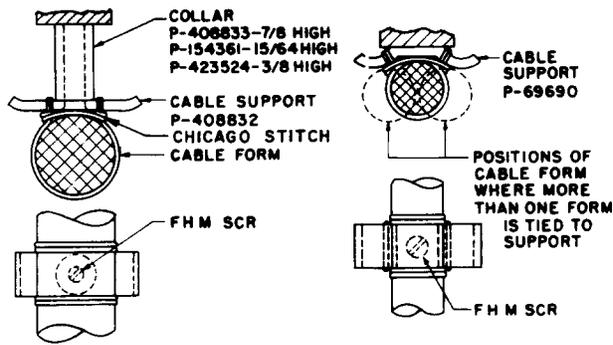
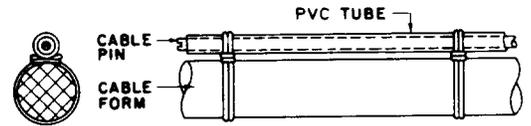
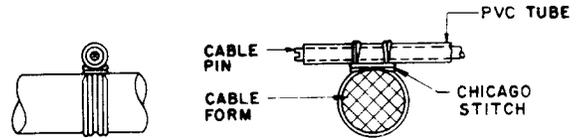


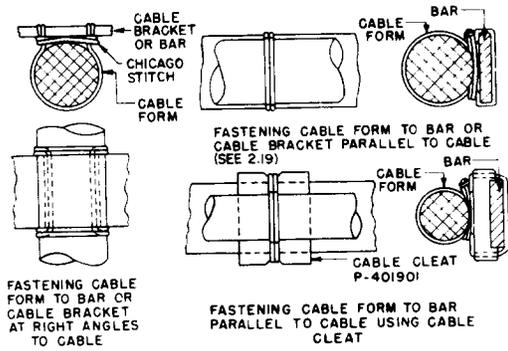
Fig 3—Fastening Cable Forms to Cable Supports



FASTENING CABLE FORM TO CABLE PINS PARALLEL TO CABLE

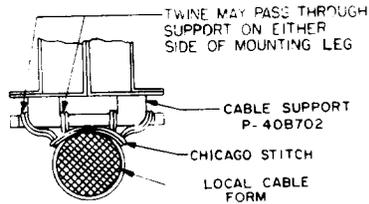


FASTENING CABLE FORM TO CABLE PINS AT RIGHT ANGLES TO CABLE

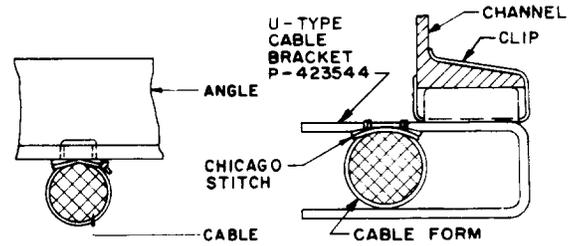


FASTENING CABLE FORM TO BAR OR CABLE BRACKET AT RIGHT ANGLES TO CABLE

FASTENING CABLE FORM TO BAR PARALLEL TO CABLE USING CABLE CLEAT

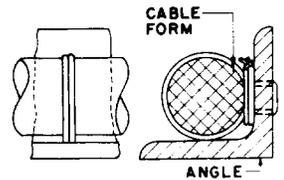


METHOD OF SUPPORTING MAIN CABLE ARM ON DOUBLE BAY FRAMES

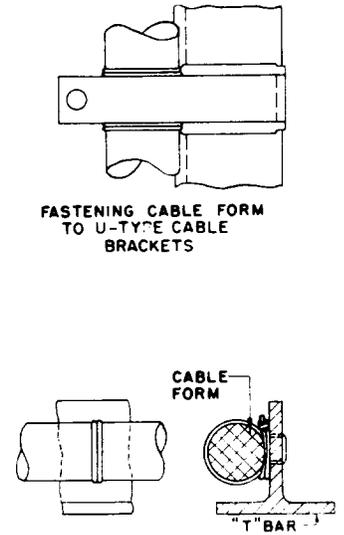


FASTENING CABLE FORM TO ANGLE AT RIGHT ANGLES TO CABLE

FASTENING CABLE FORM TO U-TYPE CABLE BRACKETS



FASTENING CABLE FORM TO ANGLE PARALLEL TO CABLE



FASTENING CABLE FORM TO "T" BARS

Fig 4—Fastening Cable Forms to Cable Brackets or Bars

Fig 5—Fastening Cable Forms to Cable Pins, Angles, Channel Uprights, T Bars, and L-, or U-Type Brackets and Similar Type of Framework Details

See proprietary notice on cover page.

2.18 Where a vertical cable is to be secured to a vertical bar and the weight of the cable is such that the twine may slip and cause the cable to sag, wrap five or six turns of R-3428, R-3359, or KS-14090 gray plastic tape tightly around the bar immediately below the uppermost tie. Tape should not be used if the bar is notched to engage the twine.

2.19 Cable Forms (Local or Switchboard):

The standard spacing of points of support for cable forms is approximately 1 foot 8 inches. This is not a fixed dimension, however, and will vary as the design of the framework structure and the shape and size of the cable forms dictate.

SUPPORTING UNEQUIPPED FORMS

A. General

2.20 Entire Arm Unequipped: Enclose the unequipped arm in a rigid PVC tube (see paragraph 2.29) and secure the tube in place with twine. For installer-run wiring, the tube may be secured, where practicable, with KS-20986 nylon cable ties instead of twine.

(a) **Horizontal Form:** Fasten the horizontal form to the framework or dummy mounting plate as shown in Fig 6 and 7.

(b) **Vertical Form:** Fasten the vertical form to the mounting plate as shown in Fig 8 except where space limitations or other factors make this procedure difficult, in which case the method shown in Fig 10 for supporting unequipped skimmers may be used.

2.21 Arm Partially Unequipped: Unequipped skimmers may be sewed back against the form as specified below, or enclosed in rigid PVC tubes (see paragraph 2.29) that are tied to the mounting plate or to a dummy plate furnished for this purpose as shown in Fig 9 and 10 and specified below.

(a) **Where the last breakout at the tip of the form is unequipped** (last two breakouts where the skimmers break out at closely spaced points, 1/2 inch or less apart) and there are six or fewer skimmers in the breakout (in both breakouts where two are included), the unequipped leads may be doubled back at the last

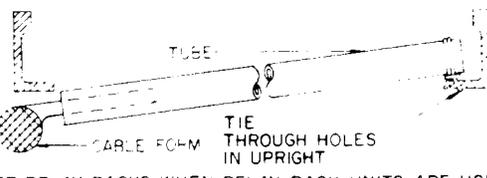
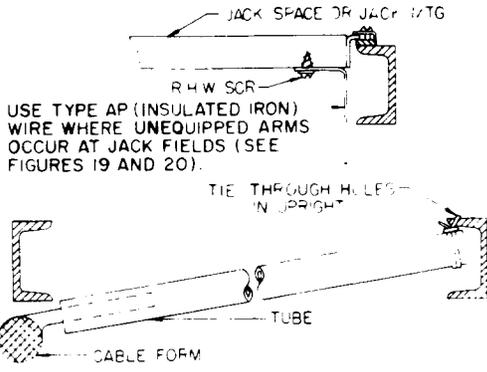
breakout point and sewed to the form with twine. A single strand of twine shall be used for such sewing. The stitches should coincide with the regular sewing on the form wherever practicable, but should be located so as to hold the ends of the skimmers in place. Where the number of skimmers exceeds six, the entire tip of the form shall be enclosed by a tube. This tube is supported by tying to the mounting plate or framework or by means of a tube support as shown in Fig 9 and 10. Where the last two or more breakouts are unequipped, enclose the entire tip of the form in a tube regardless of the number of skimmers involved, except as indicated above.

(b) **Where there is a small number of unequipped skimmers** at each breakout point [six or fewer, except as covered in (a)], as in the case of 18- or 19-type resistors, or where only a portion of the skimmers at any breakout point is left unconnected, as in the case of universal local cables, the unequipped leads may be doubled back and sewed to the form with twine. The skimmers should be as evenly distributed as practicable on the side of the form facing the mounting plate. A single strand of twine may be used for such sewing. The stitches should coincide with the regular sewing on the form, wherever practicable, but should be located so as to hold the ends of the skimmers in place.

(c) If the total number at breakout points is seven or more and the unequipped skimmers break out at closely spaced points (1/2 inch or less apart), enclose skimmers in a single short tube and tie it to the mounting plate. For example, sew three and three skimmers, but enclose three and four skimmers in a tube.

(d) **Where the number of sets of unequipped skimmers is so large** as to make the use of individual tubes for each set of skimmers uneconomical, and the circuits, when equipped, will be added in regular consecutive order, a split rigid PVC tube (see paragraph 2.29) may be used over the unequipped portion of the form as shown in Fig 9. Tie the tube at approximately 12-inch maximum intervals with twine or KS-20986 cable ties to prevent the split in the tube from opening. Where the length of the unequipped portion is considerable, overlap the tubes end to end before applying the ties.

See proprietary notice on cover page.



NOTE: CUT AP WIRE TO APPROX LENGTH BEFORE FORMING. FORM ONE END OF WIRE TO FIT SNUGLY AROUND TUBE. FORM OTHER END TO FIT UNDER HEAD OF MOUNTING SCREW.

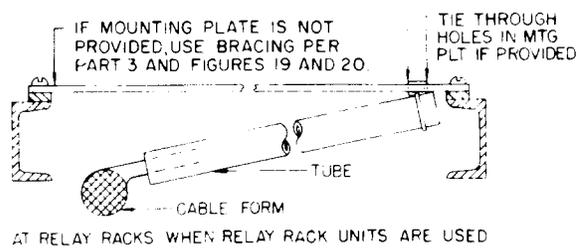


Fig 6—Supporting Completely Unequipped Horizontal Cable Forms (Channel and Bulb-Angle Uprights Shown)

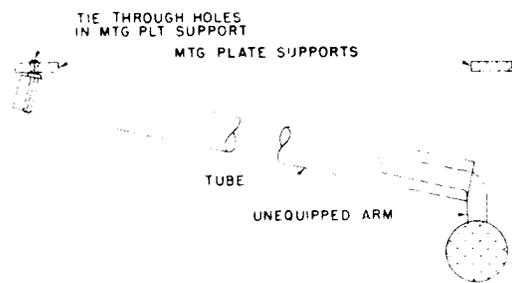


Fig 7—Supporting Unequipped Horizontal Cable Arms in Switchboards and Desks When Mounting Plates Are Omitted

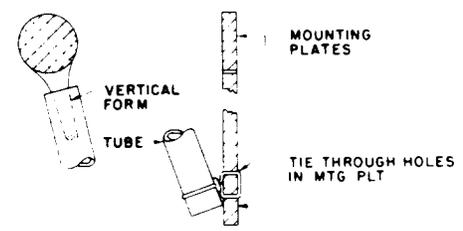
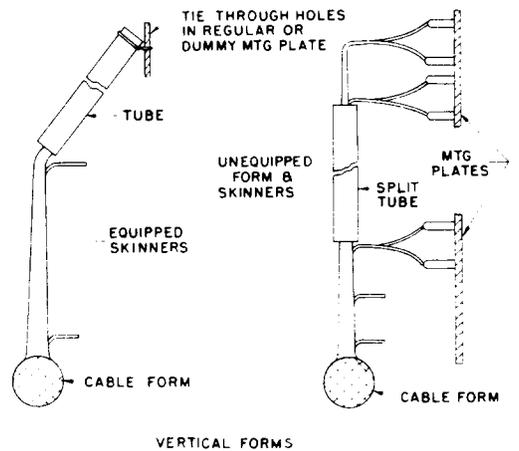
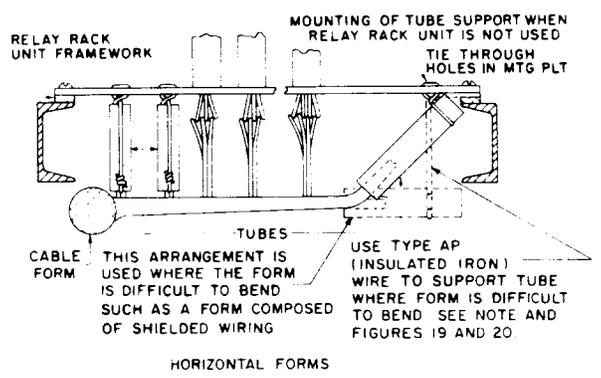


Fig 8—Supporting Completely Unequipped Vertical Forms



NOTE: CUT AP WIRE TO APPROX LENGTH BEFORE FORMING. FORM ONE END OF WIRE TO FIT SNUGLY AROUND TUBE. FORM OTHER END TO FIT UNDER HEAD OF MOUNTING SCREW.

Fig 9—Supporting Partially Unequipped Cable Forms

See proprietary notice on cover page.

2.22 Unequipped arms of ladder-type forms

should be enclosed in split rigid PVC tubes (see paragraph 2.29). Where the diameter of the arm is so large that the use of a split tube is impracticable, use 1/64-inch gray sheet fiber per 995831011 wrapped around the arm in the form of a tube and securely tied with twine. Tie split tubes as specified in paragraph 2.21(d).

2.23 Where it is impracticable to support unequipped forms enclosed in rigid PVC tubes in the regular way, as shown in Fig 6 through 10, the forms shall be held in proper position by tying the tubes to adjacent equipped forms.

B. Specific Requirements

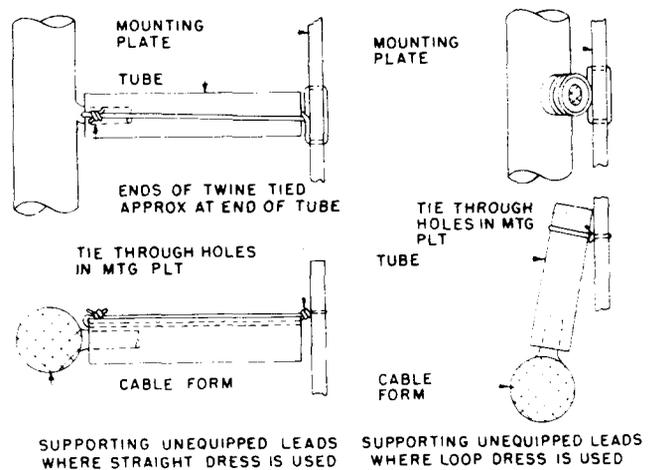
2.24 Bank Cable Forms: Unequipped vertical cable arms attached to 26-, 27-, and similar-type banks should be enclosed in rigid PVC tubes (see paragraph 2.29) and supported as shown in Fig 11.

2.25 Fuse Bay and Fuse Panel Forms: At partially equipped fuse and lamp panels, forms that are so small that they are not self-supporting should be supported as shown in Fig 12. In general, one support placed midway between the butt and tip of the form will be sufficient. An additional support should be furnished where the tip of the form is not equipped.

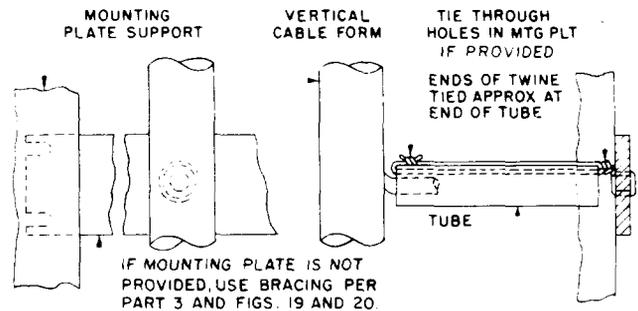
- (a) For circuit breaker panels or fuse panels equipped with 18-, 19-, 20-, 21-, or similar-type fuse blocks or with 22-, 23-, 24-, or similar-type modular fuse blocks, cable form bracing CBF2, as covered in Part 3 and Fig 19, may be provided to support vertical or horizontal forms.

2.26 Keyshelf Local Cable Forms: Enclose unequipped key arms of keyshelf local cables in rigid PVC tubes (see paragraph 2.29) as shown in Fig 6 through 10 (whichever is most applicable) whether the keyshelf is partially or entirely unequipped.

- (a) Where the main arm of the keyshelf also requires support either at unequipped key positions or when fully equipped, provide bracing such as that shown in Fig 19 or 20.
- (b) Where key positions are equipped with 12-, 14-, or similar-type ticket boxes instead of keys, the skimmers normally sewed into key arms for these positions should be sewed back on the main form.



LEADS FROM HORIZONTAL CABLE FORMS



LEADS FROM VERTICAL CABLE FORMS

Fig 10—Supporting Unequipped Skimmers of Cable Forms

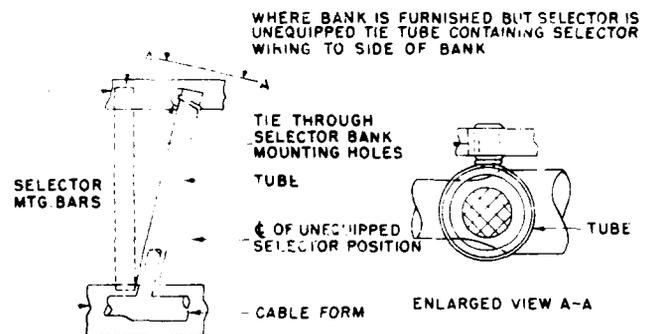


Fig 11—Supporting Unequipped Cable Arms to 26-, 27-, and Similar-Type Banks

See proprietary notice on cover page.

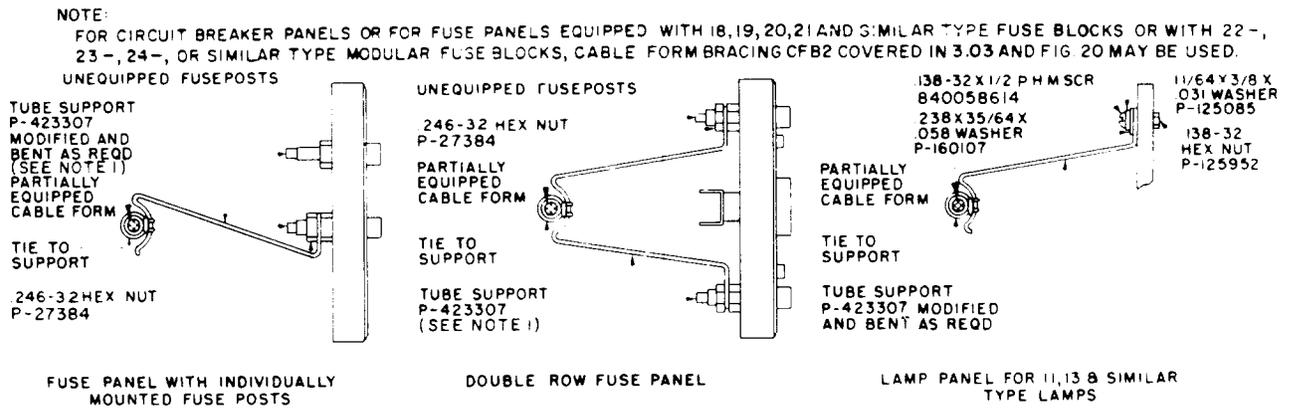


Fig 12—Supporting Cable Forms at Partially Equipped Fuse, Circuit Breaker, and Lamp Panels

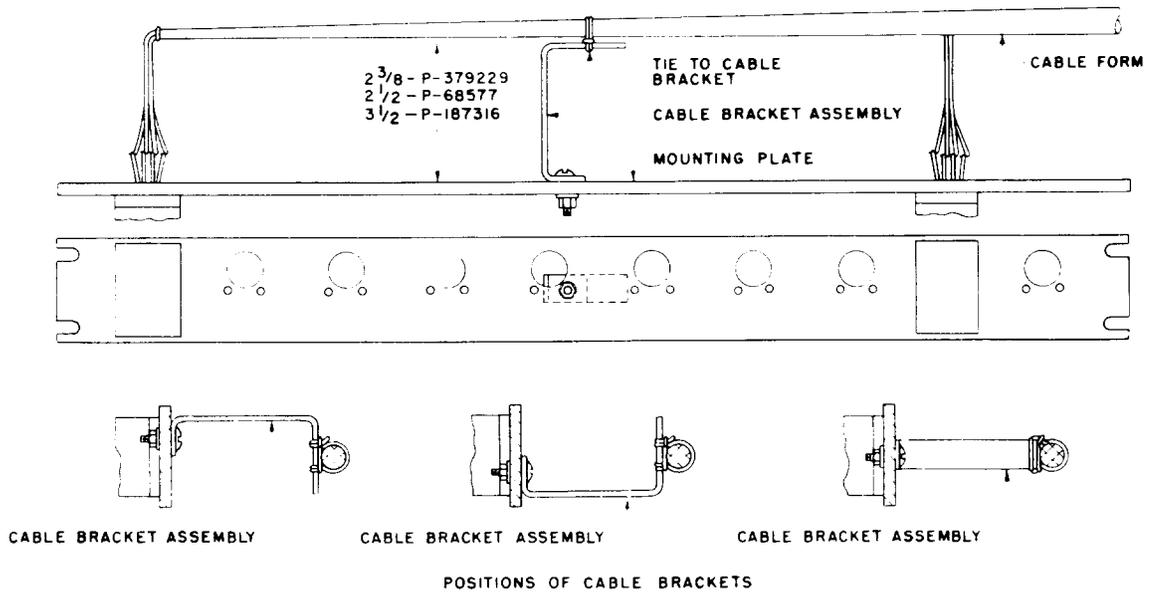


Fig 13—Supporting Cable Forms at Unequipped Apparatus Positions

See proprietary notice on cover page.

2.27 Relay Resistance and Similar Forms:

Cable forms for apparatus on strip-type mounting plates should be supported by brackets where the distance between equipped apparatus positions or between the equipped apparatus and the butt of the form exceeds 1 foot 3 inches. The brackets are fastened to the mounting plate approximately at the middle of the unequipped part of the forms as shown in Fig 13.

2.28 Universal Local Cable Forms: The unequipped wire should be doubled back and sewed to the form unless otherwise specified.

TYPES OF TUBES

2.29 Unless otherwise specified, the following tubes (length as required) shall be used to enclose unequipped wiring. They are also used where moistureproofing is required. Tubing may be cut to the required length with scissors.

RIGID POLYVINYL CHLORIDE TUBES

Inside Diameter (inches)	Length (inches)	COMCODE
1/2	32	995524584
5/8	20	995524360
3/4	33	995524170
1	36	995524485
1-1/8	32	995524501
1-1/4	30	995524550
1-1/2	29	995524527
1-3/4	37	995524543

SPLIT RIGID POLYVINYL CHLORIDE TUBES

3/4	16	801600065
1	29	801600099
1-1/4	30	814023131
1-1/2	30	814034054
1-3/4	23	995841749

LOOSE WIRES IN RINGS, WIRE RETAINING DEVICES, OR CABLE BRACKETS

2.30 At locations where cable brackets are provided, such as L- and U-type and the cable brackets provided on No. 5 crossbar frames, the loose wiring shall be secured to the cable brackets with twine in the same manner as for sewed forms. See Fig 14. Provide protection, when required, in accordance with AT&T Practices 800-612-153 and 800-612-157.

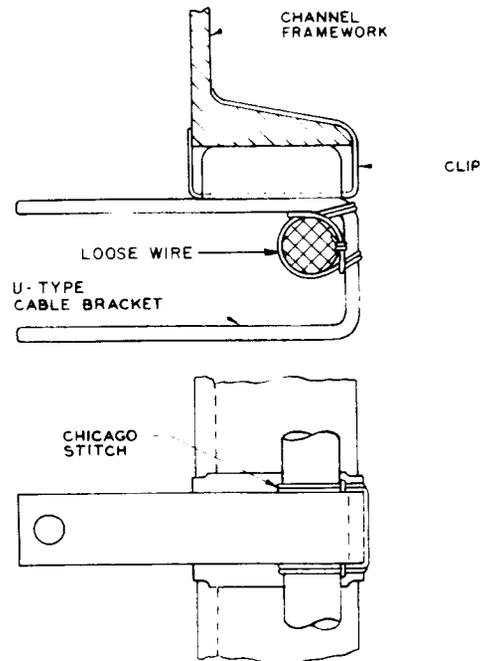


Fig 14—Fastening Loose Wire in U-Type Cable Brackets on Relay Racks

2.31 Installer wiring and cabling run within equipment bays or frames may be secured to L-, U-, or similar-type brackets or wire retaining devices using KS-20986 L1, L2, or L3 cable ties instead of twine. See (b)(4) below. The use of cable ties for this purpose shall be in accordance with the requirements of AT&T Practice 800-612-153 and as indicated below.

- (a) Securing of wires and cables to cable brackets or similar-type wire retaining devices with cable ties shall be in accordance with Fig 15 or 16 whichever is applicable.
- (b) Securing of power wiring to the brackets or wire retaining devices with the cable ties shall be in accordance with Fig 15 and the following requirements:

See proprietary notice on cover page.

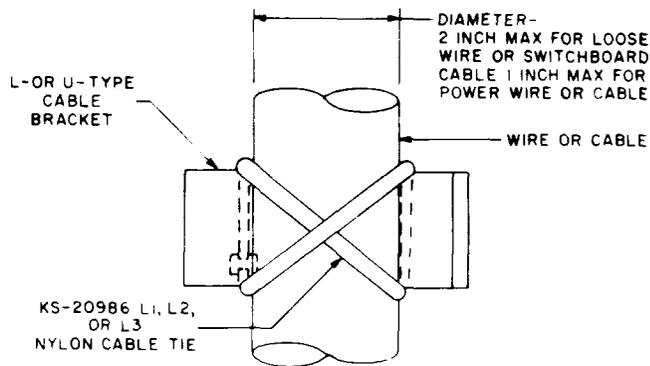


Fig 15—Securing Installer-Run Loose Wire, Switchboard Cable, or Power Wire or Cable to L- or U-Type Cable Brackets With Nylon Cables Ties

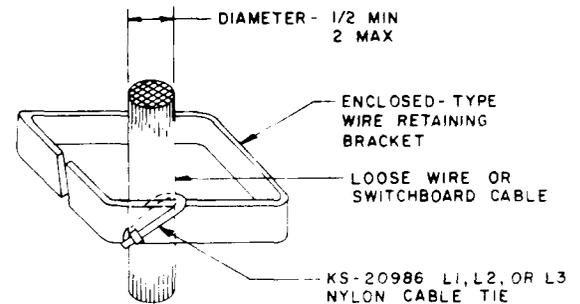


Fig 16—Securing Installer-Run Loose Wire to Enclosed-Type Retaining Brackets With Nylon Cable Ties

(1) Except as indicated in paragraph 2.35, wires and cables shall be secured with twine at the top cable bracket or other wiring support on the equipment bay where they enter the bay from the cable rack.

(2) KS-20986 L1, L2, and L3 cable ties shall be tensioned, and the loose ends shall be cut off using the R-4266 (fixed tension) or R-4827 (adjustable tension) cable tie fastening tool in accordance with AT&T Practice 800-612-153.

(3) Flexible cordage (such as the KS-15141, KS-15143, and KS-20195 types), coaxial cables having soft inner dielectrics (such as the KS-21112 and KS-19689 types), and conductors having foamed polyethylene insulation (such as those in 1244-, 1245-, 1247-, and 1249-type cables) shall be protected from contact with the cable bracket and cable tie (or sewing twine) by wrapping the wires with 1/64-inch sheet fiber per 995831011.

(4) Lightguide cables shall not, generally, be tied to cable brackets or other framework details. Where it is necessary to secure the cables in order to hold them in place or in formation, they may be taped to adjacent cabling or they may be tied with twine to framework details. However, where the cables

are to be tied, they shall be protected from contact with the twine and the metalwork by wrapping the cables with 995831011, 1/64-inch thick sheet fiber. Although protected, the cable shall not be tied so tightly as to cause the fiber protection to deform the cables since deformation may cause damage to the glass fibers. Lightguide cables that are kinked or otherwise damaged shall be replaced.

2.32 Where enclosed-type cable brackets, fanning rings, adjustable wiring supports, or other wire retaining devices are provided, tying is not required except when there is a possibility of the wires pulling out of the ring or wire retaining devices.

2.33 Additional ties should be placed on the forms between the cable brackets or wire retaining devices where necessary to keep the wiring in a reasonably good formation and to prevent the wiring from contacting adjacent framework or apparatus.

2.34 At points where wiring breaks out of the form, such as from the main vertical form, additional ties are not required where a cable bracket or wire retaining device is provided at the breakout point. However, ties should be provided at breakout points when no wire retaining devices are provided on the main vertical form.

(a) As an exception to the above, no ties are required on the main vertical form at breakouts to D-type terminal strips when they are located close to the frame uprights or to units equipped with wire retaining clips mounted adjacent to the frame upright. In these cases, the terminal strip wiring guides and the unit wire retaining clips provide sufficient support for the main vertical form and provide turning point support at the breakouts.

2.35 Switchboard cables or loose wires (such as P-wire) entering the duct of duct-type bays do not require additional support within the duct if they are secured by sewing at the cable rack strap or stringer where they turn off the rack to enter the duct. However, the loose wiring should, where practicable, be secured within the duct with the nylon cable ties and clamps furnished with the bay framework as shown in Fig 17. At breakout points, band the wires with twine or nylon cable ties in accordance with AT&T Practice 800-612-153. At unequipped positions, when the wiring within the duct has a tendency to extend outside the duct, use straight details made with No. 14 gauge bare copper wire and place as shown in Fig 18.

3. CABLE FORM REINFORCEMENT AND BRACING

3.01 In general, the equipment arrangement and design of cable forms make unnecessary the bracing or reinforcement of such forms. In some cases, where forms contain only a few wires or where the skimmers are too few or too long to provide good support for the forms, some supplementary support is required. Also, the location of equipment may be such as to make reinforcement of the forms desirable where the rear of the equipment is on an aisle having heavy maintenance activity. Except on electronic-type switching equipment, reinforcement or bracing of the forms to provide mechanical strength and to resist movement of the forms should be provided only when specified in the design specifications or drawings, or by the telephone company. The requirements and methods for reinforcement or bracing of forms on electronic-type switching equipment are covered in AT&T Practice 800-612-150.

- NOTES:
- 1 THE CABLE FASTENERS SHALL BE INSTALLED IN THE VERTICAL ROW OF HOLES IN THE BAY UPRIGHTS NEAREST THE TERMINAL STRIPS OF THE PANELS AND UNITS IN THE BAY.
 - 2 SHIELDED WIRE OR CABLE SHALL NOT BE SECURED SO TIGHTLY AS TO CAUSE DEFORMATION OF THE WIRE OR CABLE.

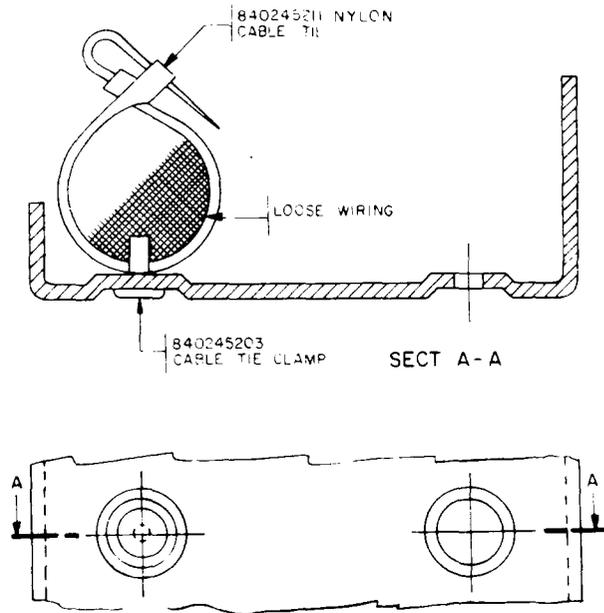


Fig 17—Method of Holding Loose Wiring in Cable Duct

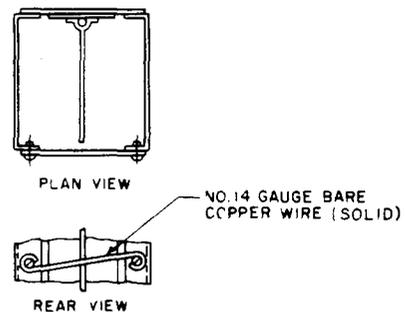


Fig 18—Method of Retaining Cables Within Ducts

See proprietary notice on cover page.

3.02 When supplementary supports are specified for cable forms, use type AP (insulated iron) wire for reinforcing and bracing as indicated in Fig 19, 20, and 21. Locate the reinforcing wire on the side of the forms away from the equipment. Tie the wire to the forms with sewing twine, spacing the ties approximately 3 inches apart. Cut ends of twine close to the knot. Where the cable forms are run parallel to the AP reinforcing wire, KS-20986 nylon cable ties may be used, instead of the twine, in accordance with AT&T Practice 800-612-153.

(a) For convenience in specifying cable form braces in the design specifications or drawings or in job specifications, reference numbers CFB1, CFB2, and CFB3 are assigned to the three types of cable form braces shown in Fig 19, 20, and 21, respectively.

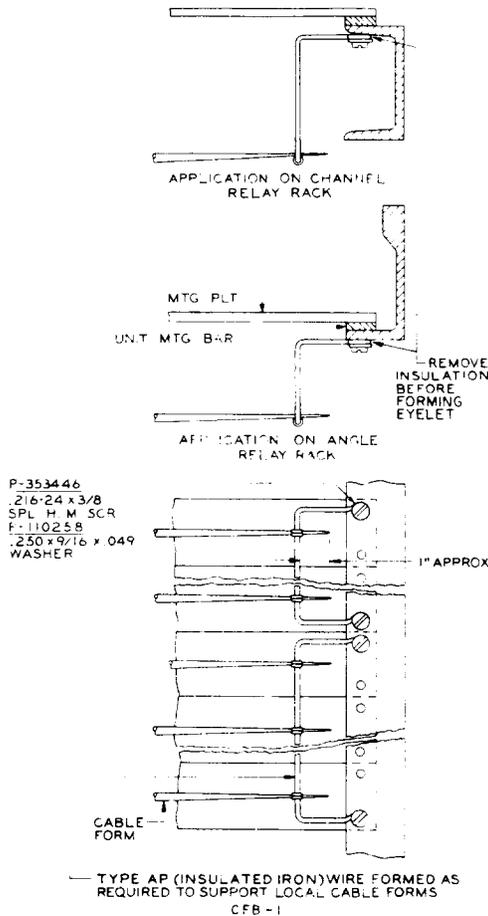


Fig 19—Bracing Horizontal Cable Forms to Frame Uprights (Relay Rack Unit Shown)

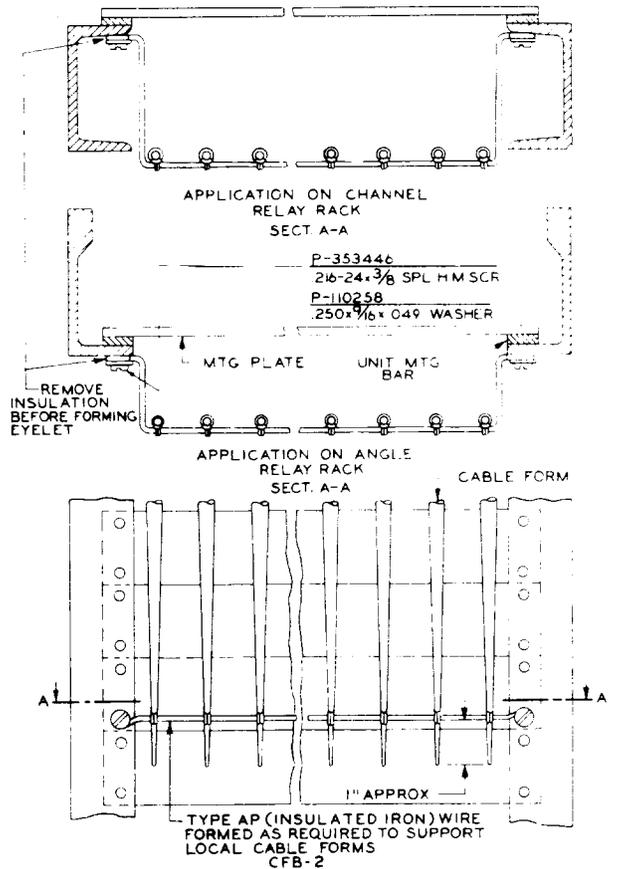


Fig 20—Bracing Vertical Cable Forms to Frame Uprights (Relay Rack Unit Shown)

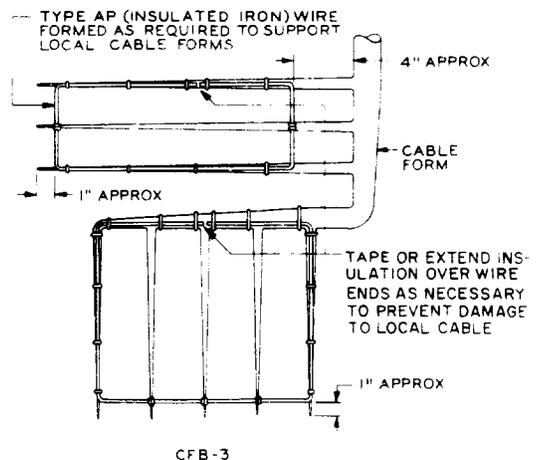


Fig 21—Reinforcement of Cable Forms

See proprietary notice on cover page.

3.03 Brace forms to the framework where the arrangements are such that the end of the brace wires can be conveniently fastened (as in the case of forms at relay rack units), as shown in Fig 19 and 20. Attach the brace wires to the rear of the relay rack uprights with P-353446, 0.216-24 by 3/8-inch special head machine screws in the tapped holes regularly provided in the uprights. By properly locating the brace wire, it should be possible to avoid interference with the screws used to attach the relay rack units to the frame uprights.

- (a) Where the mounting plates are fastened directly to the relay rack uprights (without the use of unit mounting bars), the regular mounting plate screws at the points of fastening of the cable form brace wires should be replaced by screws long enough to permit attaching the brace wire to the end of the screw by means of a nut and washer at the rear of the upright.

3.04 **Where conditions are not suitable for attaching the form braces to the framework**, reinforcement should be provided in a manner similar to the example shown in Fig 21. While a "closed loop" arrangement of reinforcement is shown, the shape of the reinforcement may be varied to suit conditions. The U- and L-shaped reinforcement will also be commonly used for supporting small or weak forms from adjacent rugged forms. In general, this type of cable form brace would be used only for the support of occasional individual weak forms from adjacent rigid forms, although it may sometimes be found more convenient to use this type of reinforcement for reconditioning wiring, instead of the braces described in paragraph 3.03.

- (a) Where the form is located so that the closed loop arrangement cannot be used to support the form, heavier gauge dummy wires may be included as part of the cable form to provide the necessary stiffness. The stiffener (dummy) wires shall consist of two or three 803682533 16-gauge type AM wires, one or two 803682947 14-gauge type AM wires, or one or two 400292215 12-gauge (type AT-7088) wires.

3.05 **Cable-Duct Framework:** When forms extend outside of the frame uprights, attach the form brace wires in a manner similar to that shown in Fig 19 and 20 for the application on angle

relay racks. The brace wire should be mounted under the heads of the mounting plate screws with a P-110258 washer on each side of the brace wire eyelet. Replace the regular mounting screws with longer screws of the same type. Forms between the uprights requiring reinforcement shall be treated per Fig 21.

3.06 **Box-Type Framework:** When forms extend outside of the frame uprights, attach the form brace wires in a manner similar to that shown in Fig 19 and 20 for the application on angle relay racks. Forms between the uprights requiring reinforcement shall be treated per Fig 21.

- (a) Where the self-tapping mounting plate screws are inserted from the front (apparatus side), the screw at the points of fastening of the cable form brace wire should be replaced by a screw of sufficient length to permit the brace wire to be attached to the end of the screw by a nut and washer at the rear of the upright. The screw should be long enough to permit the nut to be fully engaged beyond the tapered portion of the self-tapping screw.

- (b) Where the mounting plate screws are inserted from the rear (wiring side), the cable form brace wire should be mounted under the heads of the screws in the same manner as specified for cable-duct framework in paragraph 3.05.

REASONS FOR REISSUE

1. To change "BSP Section" to "AT&T Practice" throughout the practice.
2. To include in 1.04 reference to AT&T Practice 800-612-151.
3. To delete former 2.10 information for securing cable forms run on woodwork with waxed webbing.
4. To delete from 2.10 (formerly 2.11) reference to varnished cotton cloth per P-122229 for protecting cable forms on power panels.
5. To delete from 2.10(a) [formerly 2.11(a)] references to clamp sizes 7, 9, 11, 25, and 42, which are no longer required.

See proprietary notice on cover page.

6. To change Fig 1, to remove information on 2-hole cable clamps, to change wood panel to plastic panel sectioning, and to replace 996294561 wax-impregnated webbing (strap) reference with AT-6933 clamp or equivalent designation.
7. To delete from 2.11 (formerly 2.12) reference to 996291561 strap.
8. To revise 2.12 (formerly 2.13) and Fig 2 to remove obsolete bracket and clamping information and to provide general information for securing cables to keyshelf brackets.
9. To revise 2.12(a) [formerly 2.13(a)] to indicate that friction tape may also be placed under the metal strap or clamp to protect the cable.
10. To delete from Fig 5 reference to U-type cable bracket part number.
11. To revise Fig 6 to remove reference to wire supports listed in Fig 14 (deleted) and dummy mounting plates, which are no longer available, and to specify bracing per Fig 19 and 20.
12. To revise Fig 9 to remove references to tube supports in Fig 14 (deleted), which are obsolete, and to specify use of type AP wire per Fig 19 and 20.
13. To revise Fig 10 to delete obsolete information on dummy mounting plates and to include reference to bracing information in Part 3 and Fig 19 and 20.
14. To delete 2.32(a), which contained obsolete information on supporting PVC tubes with wooden dowels.
15. To delete 2.26, which contained obsolete information on clutch cable forms.
16. To delete 2.27 and Fig 12, which presented obsolete information on commutator cable forms.
17. To revise 2.26(a) (formerly 2.29) containing reference to Fig 19 and 20, instead of Fig 14 (deleted), for bracing keyshelf local cable forms at unequipped or equipped key positions.
18. To delete 2.32 covering the support of wiring for service observing jacks on line link frames in No. 1 Crossbar Systems.
19. To revise 2.29 (formerly 2.33) to delete all but the longest lengths of PVC tubes for each diameter listed and to indicate that the tubing may be cut to length as required.
20. To change Fig 13 to Fig 12.
21. To delete Fig 14, which contained obsolete information.
22. To change Fig 15 to Fig 13.
23. To revise 2.30 (formerly 2.34) to include references to AT&T Practices where protection is required.
24. To change Fig 16 to Fig 14, Fig 16A to Fig 15, and Fig 16B to Fig 16.
25. To include revised information in Fig 15 (formerly Fig 16A) and 2.30 and 2.31 (formerly 2.34 and 2.35) from Addendum Issue 1 of 800-612-156 covering new and revised cable tie requirements.