SECURING CABLE AND WIRE
CLIPS, REQUIREMENTS FOR USE OF

CONTENTS

1. GENERAL

1.1 Scope of Section

1.1 This section covers the requirements for securing switchboard cable and wire on cable racks with adjustable flat type clips.

1.2 General Information Pertaining to Arrangement, of Tools, Precautions, Verification, Specs and Drawings and Figures

1.21 Refer to Section 1 of this handbook for information pertaining to these items.

2. INSTALLING EQUIPMENT

2.1 The tools and supplies normally required for the operations covered in this section are covered in Section 300 of this handbook.

3. SPACING AND ARRANGEMENT OF CLIPS

3.1 Clipping on Horizontal Resting Runs

3.11 In general, cables are clipped on the straight sections of horizontal resting runs with adjustable clips completely across each third cable rack strap as shown on Figure 1.

3.111 Cables on a cable rack installed at a vertical angle of 45° are to be clipped in the same manner as horizontal resting runs.

3.112 The outer layers of cables of small diameter which have a tendency to bulge or sag, should be clipped at closer itervals, the added clips being installed in a similar manner as covered in Paragraph 3.351.

3.12 Clipping Incomplete Groups

3.121 On the bottom layer, select proper size start or regular clip in order to clip incomplete group in the regular manner.

3.122 On all other layers, sew the incomplete group to the tops of the clips using two strands of approved twine, R-2916.

3.1221 When additional cables fill an incomplete group, clip it in the regular manner. Remove the twine if it interferes with installing clip.

3.2 Clipping on Vertical and Inverted Horizontal Runs

3.21 Vertical cable runs should be clipped as follows:

3.211 Vertical switchboard cable runs shall not exceed an ultimate pile-up of 12".

3.212 If ultimate pile-up is 6" or less; clip at every other strap as shown in Figure 2(A).

3.213 If the ultimate pile-up exceeds 6" but is physically limited to 12" or less, clip the inner layer or layers at every strap and the outer layers at every other strap. The portion of the pile-up clipped at every other strap should not exceed 6" as shown in Figure 2(B).

3.214 Cable clips should be pushed home to a snug fit. Viewed from the side of the rack, there is frequently a tendency for the clip line to slant downward as the pile-up builds outward. Actual sagging, resulting in the edges of the clip pressing sharply into the cable covering is to be avoided

3.22 Inverted horizontal cable runs should be clipped as shown in Figure 3.

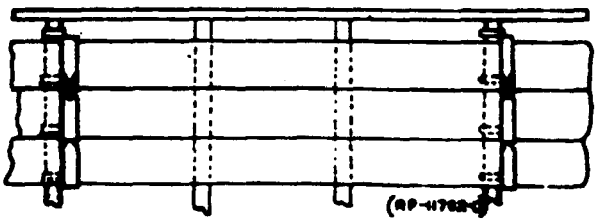


FIG. 1 CLIPPED HORIZONTAL RESTING RUN (PAR. 3.11)

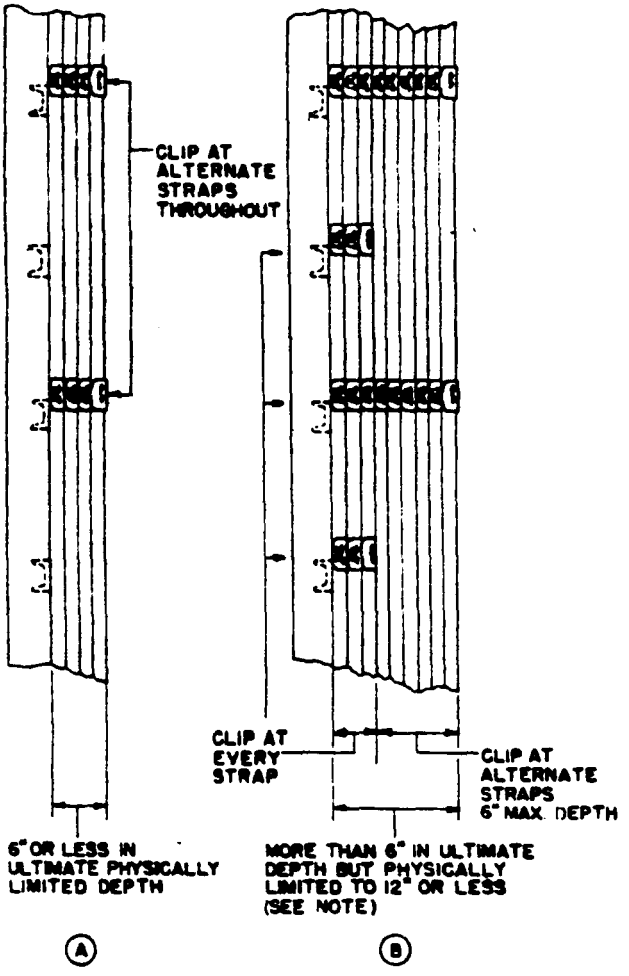


FIG. 2 CLIPPING, VERTICAL CABLE RUNS (PARS. 3.212, 3.213)

3.221 Inverted horizontal cable runs which are three or more clips in depth should be equipped with auxiliary supports as covered in Section 300.

3.23 Securing Incomplete Groups

3.231 Secure incomplete groups, except those in the bottom layer, with approved twine, R-2916 as shown in Figure 3. Clip these groups when sufficient cables are added to fill a clip.

3.232 Secure incomplete groups of the bottom layer with clips in the regular manner, selecting start or regular clips depending on size of the group.

3.3 Clipping at Turning Points

NOTE: For the purpose of clipping, 45° bends are classified as turns.

3.31 Particular care shall be used where the cables turn at or near the point of support to bend the cables so as to prevent the edges of the clips from cutting sharply into the cables.

3.311 At bends where the cable cannot be secured in such a manner as to prevent the clips from pressing into the sheathing protect the cable by wrapping it with 1/64" gray sheet fiber.

3.32 On turns in the same plane, place a full set of clips at the cross strap adjacent to the start of, but so as not to include, the bend in the cables. See Figure 4.

3.321 Secure the cable with twine throughout the turn in accordance with the requirements for sewing. Refer to Section 320 of this handbook.

3.33 On outside turns, from a horizontal to a vertical cable rack, place a full set of clips at the cable rack cross straps adjacent to the turn. See Figure 5.

3.331 Where the depth of the run is such that the clipping locations will become more than 18" apart, (measurement along the cables) place additional sets of clips over the cables as anchors, and continue clipping at the additional locations so the space between the clipping points will not exceed 18" as shown in Figure 5.

3.332 Where special sections of cable rack turns are provided, such as for multiple cables in cable turning sections, place the clips on alternate straps.

3.34 On inside turns from vertical to horizontal cable rack place clips at cross strap just outside the cable bend on each cable rack. See Figure 6.

3.35 Where cables turn off cable racks, and are regularly clipped at every third strap, place additional clips where necessary to provide clips at the last cross strap before the turn.

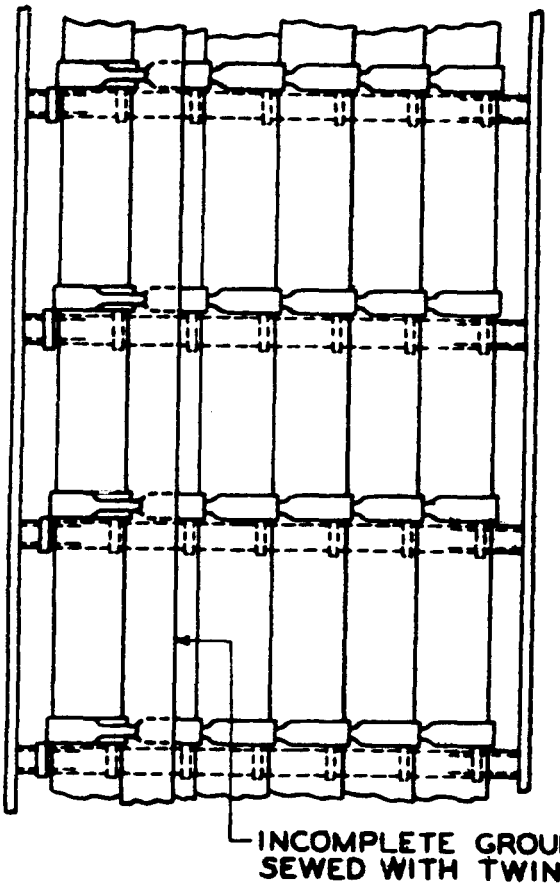


FIG. 3 INVERTED HORIZONTAL CABLE RUN
(PARS. 3.22, 3.231)

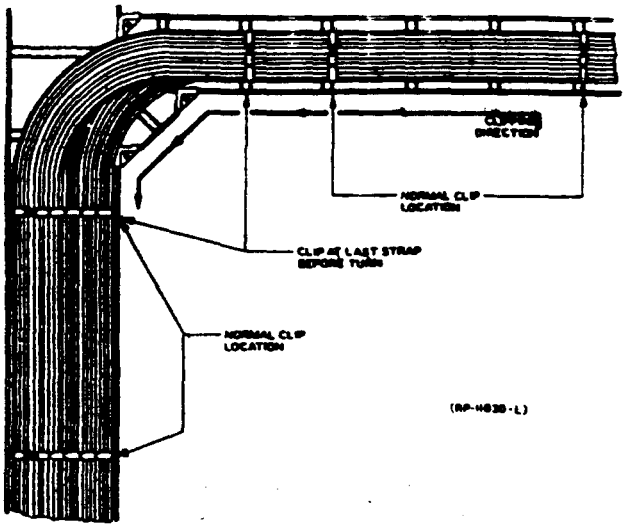


FIG. 4 CLIPS AT TURNS IN SAME PLANE
ON HORIZONTAL RESTING RUN
(PAR. 3.32)

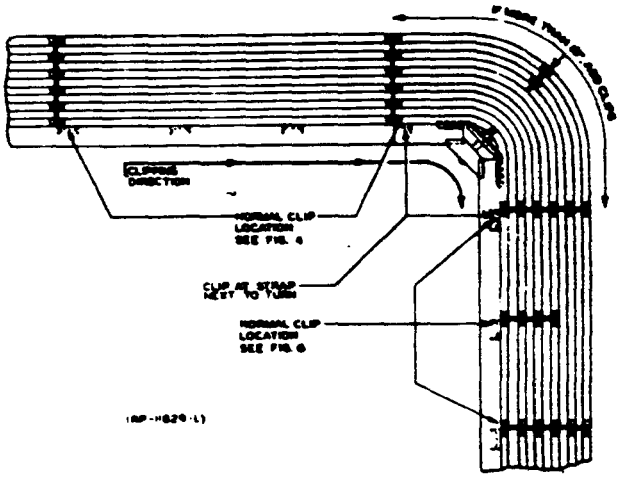


FIG. 5 CLIPS AT OUTSIDE HORIZONTAL
TO VERTICAL TURNS
(PARS. 3.33, 3.331)

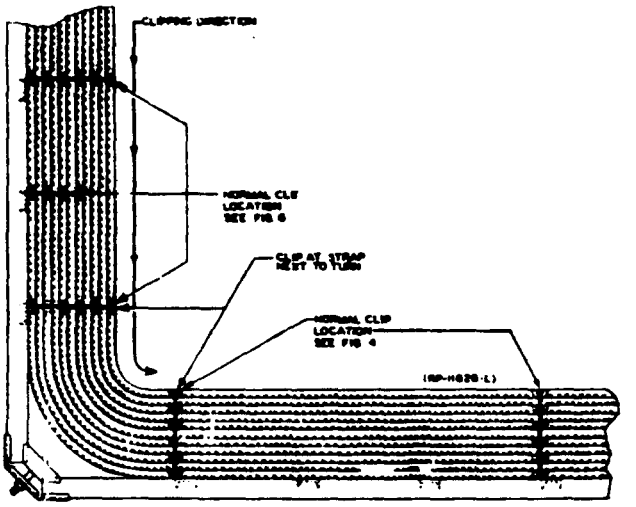


FIG. 6 CLIPS AT INSIDE VERTICAL
TO HORIZONTAL TURNS
(PAR. 3.34)

3.351 Clips placed at these turn off points need not be built from the bottom up, to secure cables in upper layers of runs at turns. Place clips over the cables immediately below the cables which are to be turned. These clips will serve as anchors for the clips that secure the cables which break off.

3.352 Clips need not be continued above the layer where the last cables turn.

3.36 Where cables turn through the rack, they are to be sewed to the last cable rack cross strap, except where this strap is a normal clip location.

3.361 Where cables turn through the rack at a normal clip location, place the anchor clips so that the tooth portion is on the side of the cross strap away from the turn.

3.362 When cables break through the rack on both sides of a cross-strap at a normal clip location, the anchor clip tooth may be on either side of the cross strap. Cables which are in contact with the toothed portion of the anchor clip should be protected from the clip by placing a wrapping of 1/64" gray sheet fibre around the cable or group of cables.

3.363 Clips shall not be used where they are at an angle to the cables which condition may result in the clips cutting into the sheathing. Even pressure along the side or top of the clip without cutting into the sheathing, is satisfactory. Since cutting into the sheathing will occur at spirals and horizontal turns, cables shall always be sewed at these locations.

3.3631 It is permissible to clip cables on tapering runs where the taper of the cables is sufficiently gradual so that the clips will not damage the cable sheathing.

3.4 Clipping Cables on Additions

3.41 On Additions to Flat Clipped Runs

3.411 On additions to existing flat clipped cable runs, clip in the same manner as the existing cable runs.

3.412 On additions, when adding cables to a one layer run of cables which contains an incomplete group, the incomplete group should be completed before adding a new layer of cables. To utilize the full width of the cable rack, replace or respace the start or regular clips of the incomplete group to enable cables to be added to the group.

3.42 On Additions to Runs Previously Sewed

NOTE: Clips should not be applied when the amount of cable to be added, the size, and length of the run or the formation of the present cables would make it uneconomical or result in a poor appearance of the finished run.

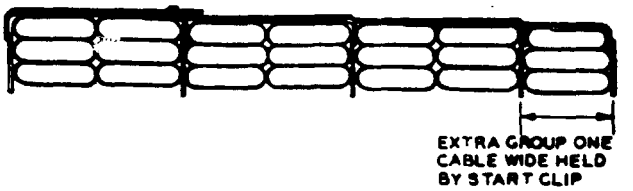
3.421 On horizontal resting runs, place clips on top of the run with approximately the same spacing as would be used on a similar flat clipped run. Cover with a layer of cables and clip the cables to the clips below. Clip subsequent layers in the usual manner. Sewing is not necessary.

3.422 On vertical and horizontal inverted runs place clips on top of the run with approximately the same spacing as would be used on a similar flat clipped run. Cover with a layer of cables and sew this layer to the existing cabling, thereby holding the adjustable clips in place. Clip this and subsequent layers in the usual manner. Place clips on vertical runs above the existing sewing where practicable, to prevent their slipping downward.

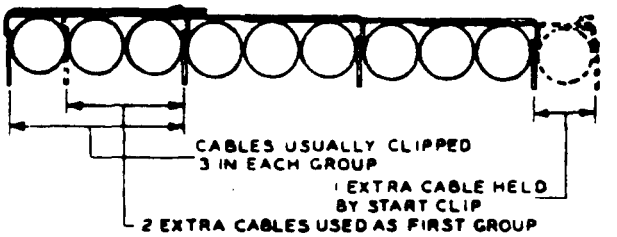
4. CABLE AND WIRE ARRANGEMENTS

4.1 Cable Arrangement

4.11 Where a layer of large cables, such as 243A, is clipped in group of three cables per clip and, due to the width of the cable rack, there are one or two extra cables, arrange the cables as follows and as illustrated in Figure 7.



239A AND SIMILAR CABLES



243A AND SIMILAR CABLES (RP-1130S-L)

FIG. 7 CLIPPING UNEVEN SIZED GROUPS OF LARGE CABLE (PARS. 4.11, 4.113)

4.111 One odd cable may be clipped last with a start clip.

4.112 Two odd cables should be clipped under the start and regular clips as the first group of the layer.

4.113 Where flat type cables, such as the 239A, are clippid flat, two wide under a clip and, due to the cable arrangement, there is an odd part of a group one cable wide, clip the odd group last using a start clip in a manner similar to the clipping of one 243A cable as illustrated in Figure 7.

4.12 Clip oval cables on edge whenever possible. When on flat, clip two layers deep.

4.13 Different size cables can usually be clipped to best advantage by using a clip depth sufficient to take the largest size cables in the layer. Smaller cables may then be built up on the flat edge to equal this depth. If all cables are small (1/2" in diam. or less) clip two or three layers deep whenever possible. Typical arrangements are shown in Figure 8.

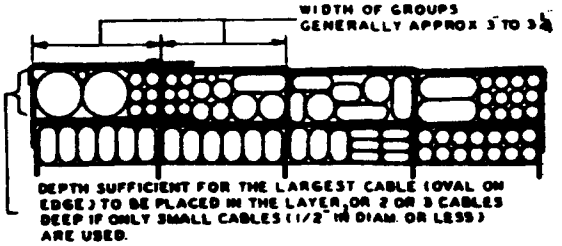


FIG. 8 CLIPPING GROUPS OF VARIED SIZES OF CABLE (PAR. 4.13)

4.2 Wire Arrangement

4.21 Arrange wires run with cable and secured under the same clip so that they are buried between the cables and are not touching the clip. Where it is not practicable to protect wires in this manner, provide protection as covered in Paragraphs 4.211 and 4.2111.

(a) P-type and BK-type shielded wire do not require protection from flat type adjustable clips.

4.211 Wrap one thickness of gray fiber, cut from P-409474 (fiber details furnished as standard equipment) or RM-591862, around each group of wires at all clipping points to insure that the wires are not pulled taut against the clips and the clips do not cut into the wires when the clips are pressed into position.

NOTE: A piece of R-2805 acetate fiber tape may be used to hold the ends of the fiber detail together if it is desired to have both hands free while placing the adjustable flat type clip.

4.2111 Where only a few wires are to be protected, and it would be difficult to form the fiber around so few wires (due to the small diameter), the fiber wrapping may include an adjacent cable.

4.212 Clip groups composed entirely of wire (that is, wire not secured under the same clip with cables) at the same frequency as the cables with which they are run. Protection as covered in Paragraph 3.211 is required.

4.2121 Where groups of wires are not run with cable, they should be clipped at every third strap on horizontal resting runs, and at every strap on vertical and inverted runs.

4.213 Any conspicuous bulge of groups of wires on vertical runs is to be corrected by sewing the wires together midway between the clips using approved twine.

4.214 Where the wires have a tendency to fall off the side of the rack, they shall be banded to adjacent groups with 2 strands of twine made as a starting stitch and ended as a square knot.

4.215 Where wire or groups of wires cannot, for any reason, be included under clips they are to be tied, to the cross-straps or tops of clips using twine and secured with a Kansas City stitch.

4.2151 All wires except rubber covered wires do not require protection from twine at sewing points.

4.2152 Protect all rubber covered wire such as KS-15141 or KS-15143 flexible cordage with fiber as outlined in Paragraph 3.211 at all sewing points.

5. VERIFICATIONS

VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS

	REFERENCE	
	Par.No.	Fig.No.
5.1 Adjustable Flat Type Clips		
5.101 In general, horizontal resting runs clipped at every third strap on straight sections of runs.	3.11	1
5.1011 45° angle runs clipped as horizontal resting runs.	3.111	
5.1012 Outer layers of cables of small diameter with tendency to bulge or sag clipped at closer intervals.	3.112	
5.102 Incomplete groups of miscellaneous cables on horizontal resting runs properly sewed.	3.121	
5.103 When incomplete group is on bottom layer, cable is clipped to cable rack straps with regular or start clips as required according to size of group.	3.122	
5.104 Vertical cable runs clipped as follows.		
5.1041 Ultimate pile-up limited to 12".	3.211	
5.1042 When pile-up is physically limited to 6" cables clipped at every other strap.	3.212	2(A)
5.1043 When pile-up exceeds 6" but is physically limited to 12" or less, inner layer or layers of cables clipped at every strap and outer layers at every other strap. Portion of pile-up clipped at every other strap not greater than 6".	3.213	2(B)
5.105 Clips pushed home to a snug fit. No sagging of clips resulting in edges of clips pressing sharply in cable covering.	3.214	
5.106 Inverted horizontal cable runs clipped as shown in figure.	3.22	3
5.1061 Inverted horizontal cable runs three or more clips in depth equipped with auxiliary supports.	3.221	
5.107 Incomplete groups on vertical and inverted horizontal runs secured with approved twine (except bottom layer).	3.231	3
5.108 Incomplete groups on bottom layer of vertical and inverted horizontal runs secured with clips in regular manner using start or reuglar clips according to size of group.	3.232	
5.109 All incomplete groups clipped when sufficient cables are added to fill a clip.	5.231	3
5.110 At turning points and bends, edges of clips not cutting into cables.	3.31	
5.1101 Bends of 45° are classified at turns.	3.3 (Note)	
5.1102 Where cable cannot be secured so as to prevent the clips from pressing into the sheathing, cable protected by a wrapping of 1/64" gray sheet fiber.	3.311	
5.111 A full set of clips placed on cross straps adjacent to start of bend but not to include bend.	3.32	4
5.112 Cables to turns in same plane secured with twine between clipped straps adjacent to start and completion of turn as required to insure cables retaining their proper position.	3.321	
5.113 Full set of clips used at cable rack cross straps adjacent to outside turn from horizontal to vertical rack.	3.33	5
5.114 Additional set of clips added to turn if depth of run is such that measurement along cable exceeds 18".	3.331	5

5. VERIFICATIONS (Cont'd)

VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS	REFERENCE Par.No.	Fig.No.
5.115 Special sections of cable rack turns, as for multiple cable in cable turning sections, cables clipped at alternate straps.	3.332	
5.116 Inside turn from vertical to horizontal cable rack, clips placed at cross strap just outside of cable bend on each rack.	3.33	5
5.117 Where cables turn off rack additional clips added in order to provide clips at last cross strap before turn.	3.35 to 3.352	
5.118 Cables which turn through the rack secured to the last cable rack cross strap as follows:		
5.1181 Sewed, except where this strap is a normal clip location.	3.36	
5.1182 At a normal clip location, anchor clips places so that tooth is on the side of the cross strap away from the turn.	3.361	
5.1183 When cables break through rack on both sides of cross strap, cable in contact with toothed portion of anchor clip protected with 1/64" fiber.	3.362	
5.119 Clips not used where they are at an angle to cables which condition results in clips cutting into sheathing.	3.363	
5.120 Cables at spirals and horizontal turns always secured by sewing.	3.363	
5.121 Cables on tapering runs clipped only where taper of cables is sufficiently gradual so clips do not damage cable sheathing.	3.3631	
5.122 Additions to flat clipped runs, clipped in same manner as existing runs.	3.411	
5.123 Incomplete groups of cables on a one layer run, completed before adding a new layer of cables.	3.412	
5.124 Additions to horizontal resting runs previously sewed or wire clipped, clipped in general at every third strap as in similar flat clipped runs.	3.11 3.421	1
5.125 Additions to vertical and inverted horizontal runs clipped in general at every cross strap, similar to other flat clipped runs.	3.21 to 3.221 3.422	2B
5.2 Wire Run with Cable		
5.21 Wire protected by fiber at clipping points or placed between cables where practicable.	4.21 4.212	
5.3 Wire Not Run with Cable		
5.31 Clipped at every third strap on horizontal runs and at every strap on vertical or inverted runs.	4.2121	
5.4 Wire on Vertical Cable Runs		
5.41 Groups of wire on vertical runs banded together where there is any conspicuous bulge in wires.	4.213	
5.5 Wire Secured and Protected as Follows:		
5.51 Wire secured under the same clip with cables, and buried between cables so that they do not touch the clip, do not require protection. Where it is not practical to protect wires in this manner, use fiber protection.	4.21 to 4.2111	

5. VERIFICATIONS (Cont'd)

VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS	REFERENCE Par.No.	Fig.No.
5.52 Groups composed entirely of wire clipped at the same frequency as the cables with which they are run and protected at clips with fiber. Groups not run with cable clipped at every third strap on horizontal resting runs and at every strap on vertical and inverted runs.	4.211 to 4.214	
5.53 Wire not included under clips sewed to cross straps or tops of clips. No protection required at sewing points except for rubber covered wire such as KS-15141 and KS-15143 flexible cordage. When wire or cable is added to group and group is enclosed by a clip, protect wire with fiber.	4.215 to 4.2151	
5.54 Protect rubber covered wire such as KS-15141 and KS-15143 flexible cordage with fiber at all sewing points.	4.2152	

→ Arrowed lines indicate new or changed information.

[Vertical lines at side of paragraphs indicates requirements.

Assistant Manager
Common Installation Engineering

Reason for Reissue:
To remove all references to CL type cable and R-2805