

EARTHQUAKE PROTECTION AND DISASTER BRACING
FOR CENTRAL OFFICE AND P.B.X. EQUIPMENT
EXCEPT FOR POWER EQUIPMENT

MODIFICATION OF EXISTING EQUIPMENT
BSP 800-610-155 - FIGURES 24 THROUGH 42

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1.	<u>GENERAL</u>	2.111	Existing floor fastenings need not be replaced, but additional fastenings as called for herein should be furnished.
1.1	<u>Scope of Section</u>	2.112	All clamped splices in pairs of auxiliary framing bars should be replaced by bolted splices called for herein.
1.11	This section covers the specific requirements and methods for installing and adjusting track type rolling ladders and associated parts.	2.113	On older equipments where 1/2" x 2" framing bars instead of 3/8" x 2" bars were used, the clips for the attachment of braces, supplementary bars, hanger rods, etc., must be of the wider P-406174 and P-65333 types instead of the P-420306 and P-420315 clips for 1/2" and 5/8" bolts, respectively.
1.2	<u>General Information Pertaining to Arrangement of Tools, Precautions, Verification, Specifications, Drawings and Figures, and Associated Information</u>	2.114	Existing angle-type braces with slotted brackets should be left in place except that lockwashers should be used between the nut and washer of the bolts in the slots of the brackets.
1.21	Refer to Section 17A for information pertaining to the above subjects.	2.115	The following requirements are for earlier types of auxiliary framing and equipment.
2.	<u>MODIFICATION OF EXISTING EQUIPMENT</u>		
2.1	<u>Preliminary Information</u>		
2.11	When the Telephone Company requests that existing installations be modified to provide protection against earthquake damage, the requirements covered in Sections 17A and 17A1 of Handbook 30 should also be followed insofar as they apply.		

2.2 Double-Sided, 9'0" High Step-by-Step Frames (A.E. Co. Type)

2.21 Floor Fastenings

2.211 Connector, Selector and Repeater Frames: See that there is a floor bolt in each of the holes provided for them in the frame base angles and that all floor fastenings are securely tightened. In addition, on selector frames add floor fastenings at each 2" x 1-1/2" x 3/16" frame vertical at the terminal assembly end, as shown in Figure 24.

2.212 Line Switch Frames: Remove the 1-1/2" bottom trim strip and associated filler from the bottom of the pier covers and replace by a 2-1/2" x 2" x 3/16" angle bolted to the floor and to the piers through the pier covers, as shown in Figure 25. Remove the vertical trim details from between frames and the corner angles, redrill and cut to fit the added floor angle.

2.22 Fastening Top of Frames

2.221 Connector, Selector and Repeater Frames: In general, no additional fastenings will be required at the tops of these frames where two or more frames are joined together transversely by over-aisle cable racks bolted directly to the frame top angles at each end of each frame. Where any of these frames are isolated or where there are no transverse cable racks bolted to the top angles (thus serving to tie the tops of the frames together at each end of each frame), braces to the ceiling should be provided or the top angles tied to adjacent frames, as shown in Figure 26. Either of these methods of providing rigidity may be used as best adapted to job conditions. Where the frame is isolated, a brace should be used at each corner of the frame. The braces should be attached to the ceiling by one of the methods shown in Figure 2 and Figure 20 of Section 17B of Handbook 30 for braces of this type.

2.222 Line Switch Frames: Use 2" x 3/8" bars over aisles at the tops of the frame uprights braced to the cable rack supports as shown in Figure 27.

All rows of frames should be tied together in this manner, locating the bars, one at each end of each line switch bay, using one bar for adjacent uprights of intermediate bays in the lineup. The bars should be fastened to end uprights of the lineup per Figure 29. These bars and their braces should be insulated from the framework as shown in Sections C-C and D-D of Figure 27 and in Figure 29.

2.2221 Where the uprights in adjacent lines of line switch bays are not directly opposite each other, so that bars across the aisle in accordance with Figure 27 would be impracticable, the arrangement of bars and braces shown in Figure 28 should be used.

2.23 Bracing Cable Racks

2.231 Over Connector, Selector and Repeater Frames: Cable racks located over the frames and supported to the frames top angles by 1" x 1/4" bars should be braced to the nearest adjacent top angle at each cable rack support as shown in Figure 30. A brace is required only on one side of each cable rack. Where racks are at right angles to the frames, the brace may be located on either side of the rack.

2.232 Over Line Switch Frames: Cable racks located over the frames and supported from the frame uprights by means of 1-1/2" x 1/4" vertical bar details should be fastened down by means of U bolts per Section B-B of Figure 27. Provide a U bolt over each cable rack stringer at every 1-1/4" x 1/4" notched cross bar except at the junction of two frames where only two bolts are necessary as shown in view A-A. Insulate the stringers by means of 1/32" gray sheet fibre per Section B-B.

2.24 Casing Hinges

2.241 All hinge pins in casing doors (line switch frames and terminal assemblies) should be equipped with cotter pins. Undrilled hinge pins and pins too short for cotter pins should be replaced.

- 2.25 Reinforcement of Framework Structures
- 2.251 Connector and Repeater Frames: Add a 7" wide, 1'-11" x 3/16" steel plate at the top of each frame end, as shown in Figure 31, for the purpose of tying together the two halves of the frame and adding rigidity to the structure itself. On repeater frames, the plate should be mounted in place of the filler panel above the fuse panel. A similar reinforcing plate should be bolted between the T uprights (center-shelf supports) on the inside of the frame, using 3/8"-16 H.H. cap screws and hex. nuts. This plate should be located as high as possible in the frame.
- 2.2511 Earlier repeater frames were equipped with a cross-connecting rack at one end similar in construction to the selector frame terminal assembly. On such frames, the uprights adjacent to the cross-connecting rack should be reinforced by means of an X brace, also shown in Figure 31.
- 2.252 Selector Frames: Add a 4" wide, 1'-11" x 3/16" steel plate at the signal end of the frame, similar to that shown in Figure 31, except located directly under the fuse panel. A similar plate, 7" wide, should be bolted between the T uprights (center-shelf supports) as high as possible on the inside of the frame. The angle uprights (end-shelf supports) at the terminal assembly end should be tied together on the inside of the frame by means of an X brace, as shown in Figure 31. Locate as high as possible, utilizing the present cable bracket drillings and replacing the existing cable bracket bolts by bolts long enough to fasten both the brace and the cable bracket.
- 2.3 Low-Type Auxiliary Framing Using Inverted Channel - Step-by-Step Frames Only
- 2.31 All 3/8" bent-type J bolts used to fasten cable racks to framing bars should be replaced by 1/2"-13 J bolts of the welded type shown in the 11 series of sections in Handbook 30 (BSP 800-614-155).
- 2.32 All 1/2" U bolts used for attaching the inverted channel to the framing bars should be removed and the channels fastened to the framing bars by means of 5/8"-11 Hex Head Cap Screws, clips and nuts as shown in Figure 32.
- 2.33 All splices in the inverted channels should be replaced by positively bolted splices, as shown in Figure 33.
- 2.34 Where frames having top angles are attached to the framing bars by means of V bolts and the space between the framing bars and top angle is maintained by means of the 1-1/2" x 1-1/2" channel spacer (P-420307), the spacer should be removed and replaced by the washer and clamp bar assembly shown in Figure 7 of Section 20A3 of Handbook 30 (BSP 800-614-155).
- 2.35 Where top-angle frames are installed in line with step-by-step frames and are attached to the framing bars with the inverted channel extended from the step-by-step lineup to take up the space between the top angle and the framing bars, the inverted channel should be bolted to the framing bars at each point of attachment to the frames as shown in Figure 34.
- 2.36 Where cable racks are supported from inverted channels by means of clamping supports, these supports should be removed and replaced by J bolts and channel spacers as shown in Figure 35.
- 2.37 Where inverted channels have been installed for future rows of frames, the supplementary stiffening bars referred to in Paragraph 3.3 of Section 17A1, Handbook 30 are not required. Bracing as covered in Paragraph 3.3 of Section 17A1, Handbook 30 should, however, be installed.
- 2.4 High-Type Auxiliary Framing
- 2.401 Primary bars should be made continuous wherever possible. Where the top of the primary bar is below the bottom of the beam and the bars have not been continued because the required 2" clearance between the bars and beam was not available, a splice should be provided to make these bars continuous.

This splice may be made with a single 2" x 5/8" bar between the two sets of primary bars where the gap between ends does not exceed 2'0". Where the gap exceeds 2'0", a pair of 2" x 3/8 bars should be spliced as shown in Figure 8 of Handbook 30, Section 17A1.

2.4011 Where the tops of the primary bars are above the bottom of the beam or girder, the bars should be braced as shown in Figure 37. Framing around the girder in this case is of no advantage.

2.402 All 3/8" bent-type J bolts used to fasten cable racks to framing bars should be replaced by 1/2" J bolts of the welded type as shown in Figure 5 of Section 20A1 of Handbook 30. (BSP 800-614-155)

2.403 Where pairs of secondary bars are fastened to primary bars by means of 5/8"-11 bolts and clips and the secondary bars are used for the support of frames, a P-423640 tooth-type lockwasher should be placed under the nut at each junction.

2.404 Where a single secondary bar is fastened to the primary bars by means of 3/8"-16 U bolts, the U bolts should be removed and replaced by clamp fastenings, using 5/8"-11 bolts as shown in Figure 36.

2.405 Single-level framing bar junctions where the primary and secondary bars are at right angles should be modified by placing a P-423640 tooth-type lockwasher under each nut of the junctions.

2.406 Wall supports for the ends of bars should be eliminated and the ends of the bar cut back as required and supported to the ceiling by means of hanger rods and ceiling inserts or 5/8"-11 Self Drilling Anchors.

2.407 Bracing of Framing Bars: The standard adjustable threaded rod braces used for bracing the primary bars of high-type auxiliary framing are not satisfactory for bracing the bars against end thrust. These braces should be removed and the entire system of primary bars braced by means of flat-bar or angle-type braces, as required, per Figure 37.

2.4071 Spacing: Each line of primary bars should be braced at each end as near the ends as practicable and, in addition, double braces should be located at intermediate points along the bars on approximately column spacing.

2.4072 The braces should be fastened to the primary bars as shown in Figure 37. The upper end of the braces will usually be attached at a ceiling insert equipped with a 5/8"-11 threaded hanger rod. The upper foot of the brace should be placed against the ceiling as shown in Figure 37.

2.408 Framing bar splices should be positively bolted, as shown in Figure 8 of Section 17A1, Handbook 30, for pairs of bars and Figure 38 for single bars. Clamped splices should be removed and replaced by bolted splices.

2.409 11'-6" Relay Racks and Similar Frameworks Supported by High-Type Auxiliary Framing: When the auxiliary framing bars are 8" or less above the frames, provide V bolts in the regular manner (Figures 7B and 7D, of Section 20A3 of Handbook 30). Where the bars are over 8" but not more than 1'-6" above the frames, provide regular double adjustable brace rods (Figure 36, Section 20A of Handbook 30) using tooth-type lockwashers under nuts of friction fastenings. Where the framing bars are more than 1'-6" above the frames, provide angle braces per Figure 39. When frame supports consisting of 5/8" V bolts and adjustable braces are continued without change, see that all fastenings are tight.

2.410 Distributing frames 11'-6" high and higher (MDF, IDF, CDF and LDF only) should be braced in an endwise direction. Provide a brace at each end and at about 40-foot intervals along the frame as shown in Figure 39A.

2.411 The welded-type support details originally installed for supporting dial frames from high-type auxiliary framing should be replaced by supports per Figures 40 and 41 as required.

2.4111 Single-sided frames should have the end upright supports for each frame changed to conform with Figure 40.

(a) The supports for the longer step-by-step frames should be replaced on the following basis:

- (1) Connector frame with supplementary bay: New support for each end upright and one support where supplementary bay joins regular bay, the uprights in this case being bolted together at the top per Figure 42.
- (2) Line finder frame with two intermediate uprights: New supports for each end upright and for one intermediate upright only.
- (3) Selector frames with distributing terminal assembly bay: New supports for each end upright of each of the three bays of this frame.

2.4112 Double-sided frames should be attached to the secondary framing bars by means of frame supports per Figures 40 and 41. Figure 40 should

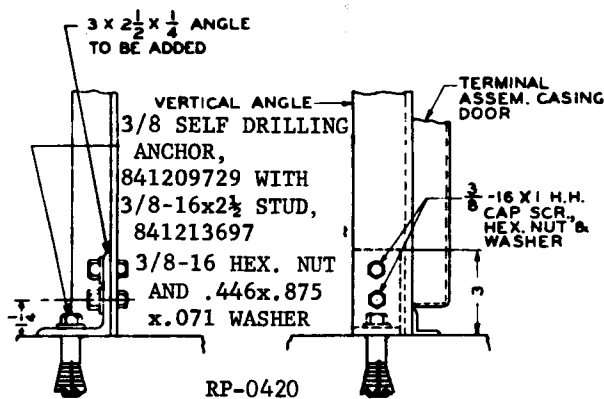


FIG. **24** FLOOR FASTENINGS 9'0" DOUBLE-SIDED SELECTOR FRAMES
(PAR. 2.211)
(BSP 800-610-155, FIG. 24)

be used for the end uprights of the side units. Figure 41 should be used for the channel uprights of the multiple bank bays. A frame support should be provided at each channel upright.

2.5 Crossbar No. 1 & No. 4 Toll

2.51 No. 1 Crossbar Frames - Floor Fastenings: When necessary to modify existing No. 1 Crossbar or No. 4 toll switching installations to provide floor fastenings at the spacing required in Paragraph 4.724, Handbook 30, Section 17A1, the added fastenings should be in accordance with Figure 40A. In such cases a supplementary guard-rail, similar to ED-62628-01, should be provided to prevent interference between these added floor fastenings and the rolling ladder floor wheels.

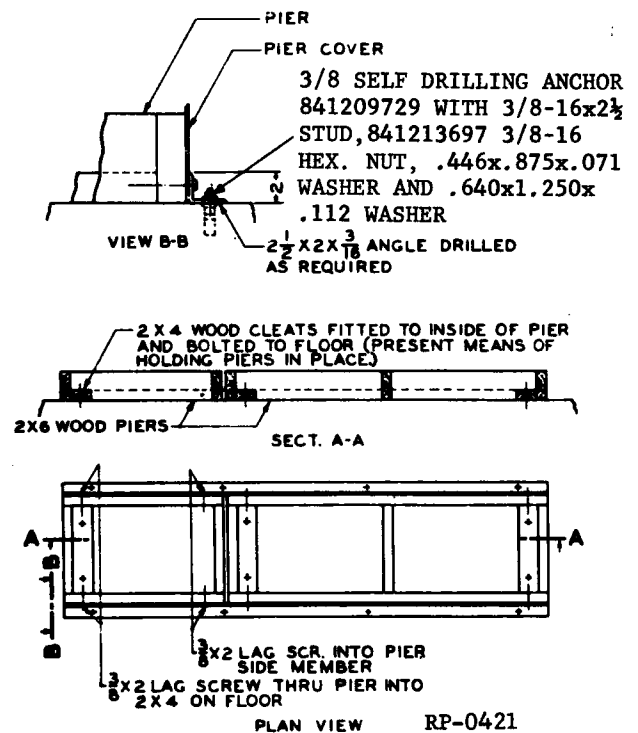
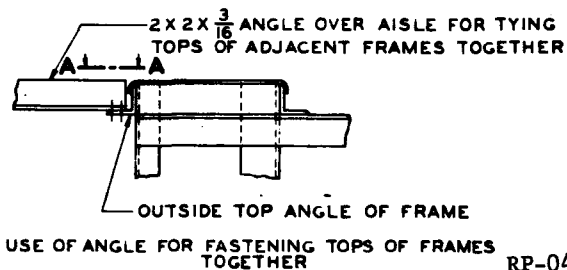
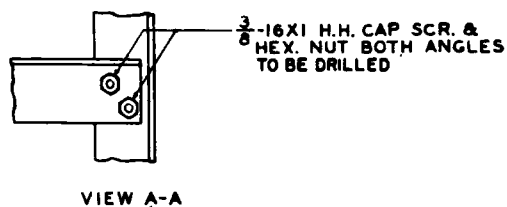
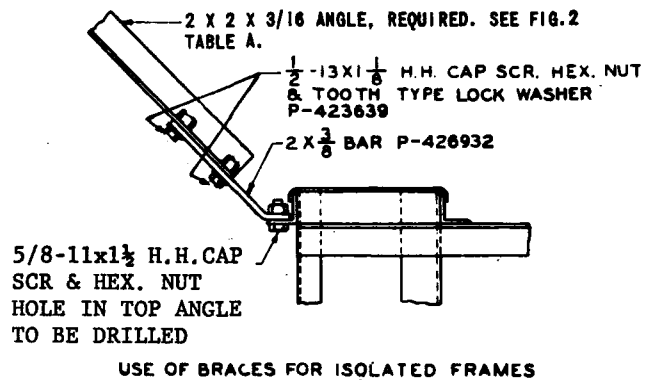


FIG. **25** FLOOR FASTENING FOR PIERS OF LINE SWITCH FRAMES
(PAR. 2.212)
(BSP 800-610-155, FIG. 25)



RP-0422

FIG. **26** TOP OF FRAME FASTENINGS 9'0" DOUBLE-SIDED CONNECTOR, SELECTOR AND REPEATER FRAMES
(PAR. 2.221)
(BSP 800-610-155, FIG. 26)

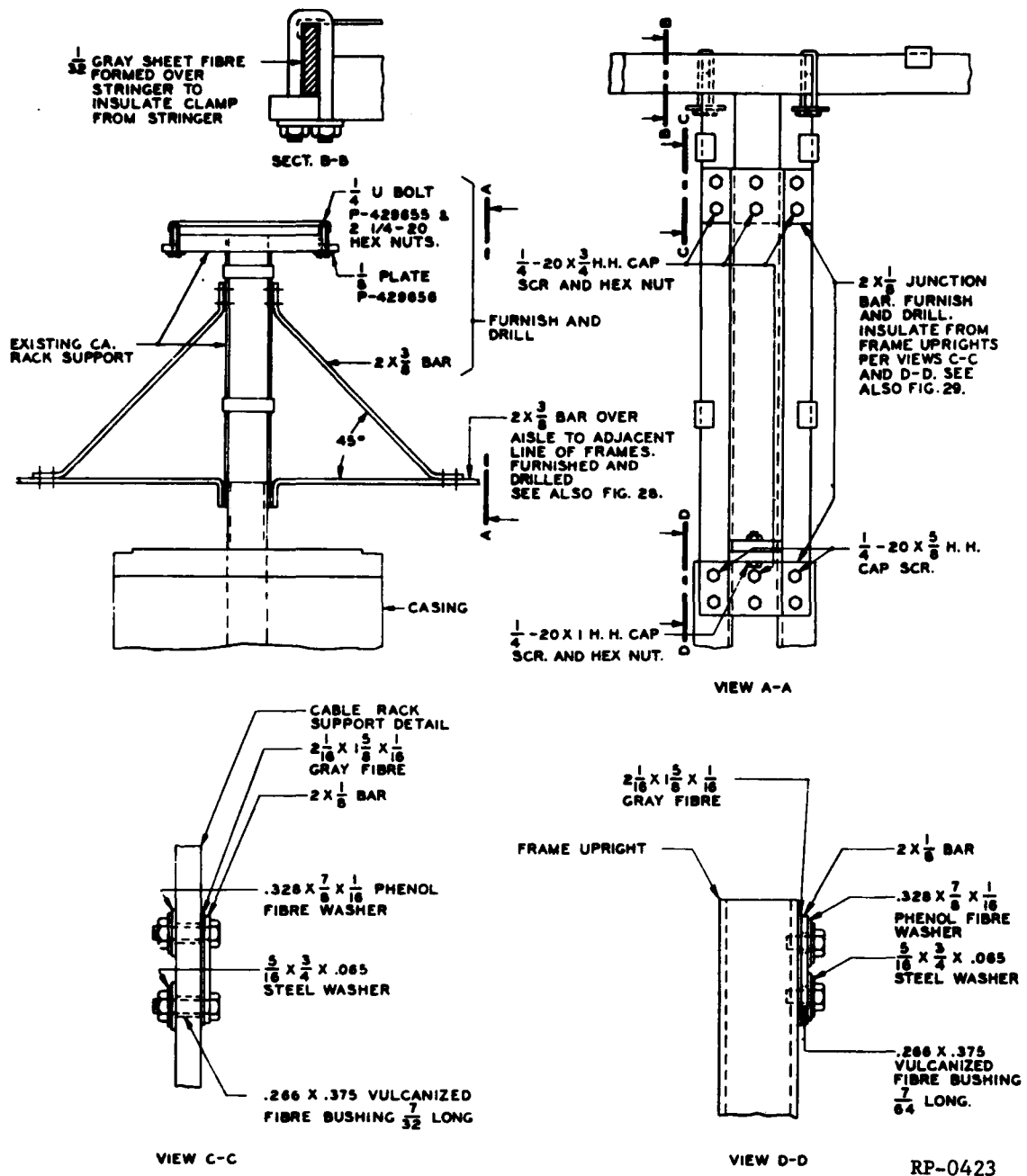


FIG. 27 TOP OF FRAME BRACING FOR LINE SWITCH FRAMES - UPRIGHTS IN ADJACENT LINEUPS DIRECTLY OPPOSITE EACH OTHER (PARS. 2.222, 2.2221, 2.232) (BSP 800-610-155, Fig. 27)

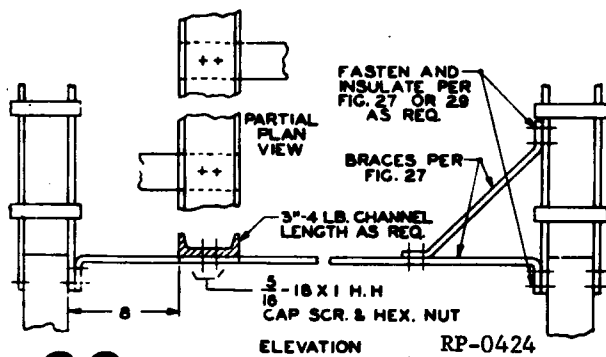


FIG. 28 TOP OF FRAME BRACING FOR LINE SWITCH FRAMES - UPRIGHTS IN ADJACENT LINEUPS NOT DIRECTLY OPPOSITE EACH OTHER
(PAR. 2.221)
(BSP 800-610-155, Fig. 28)

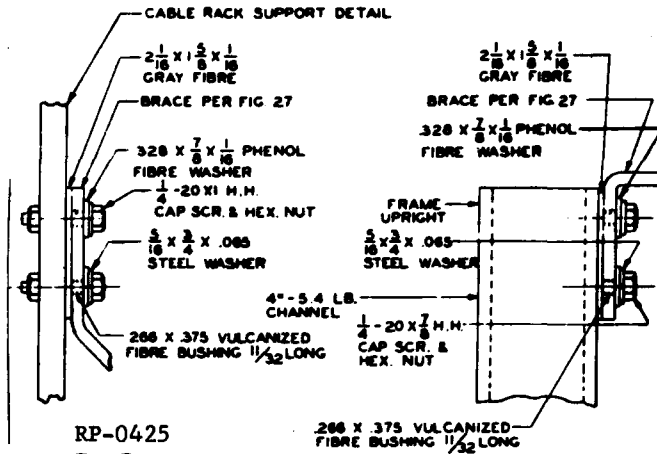
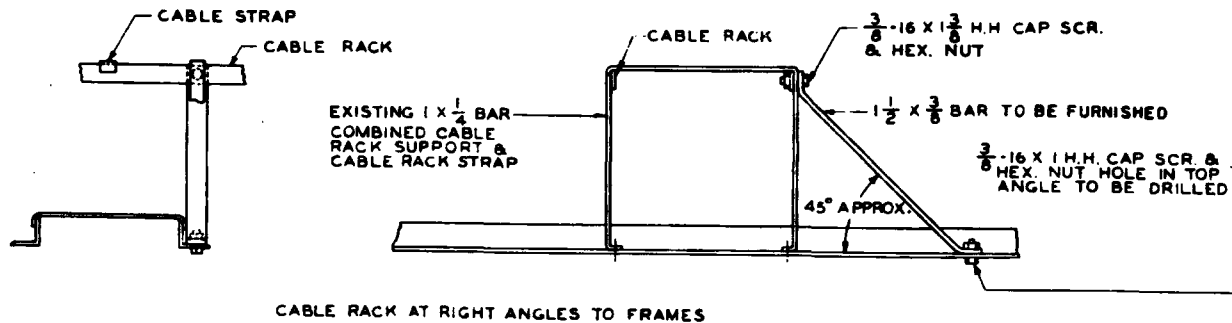
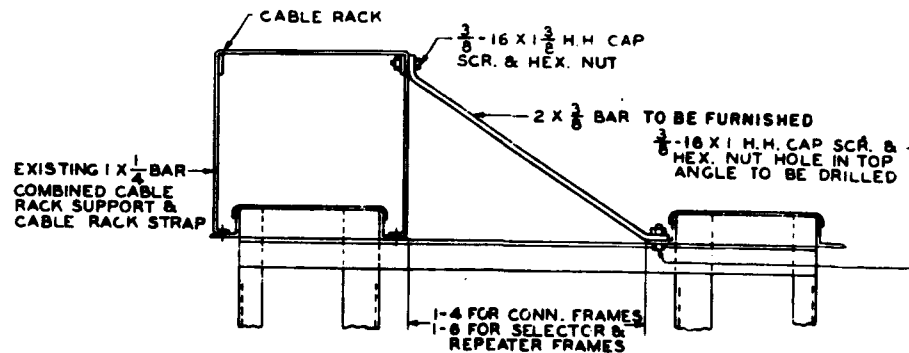


FIG. 29 BRACE FASTENINGS AND INSULATION AT END UPRIGHTS FOR LINE SWITCH FRAMES
(PAR. 2.222)
(BSP 800-610-155, Fig. 29)



CABLE RACK AT RIGHT ANGLES TO FRAMES



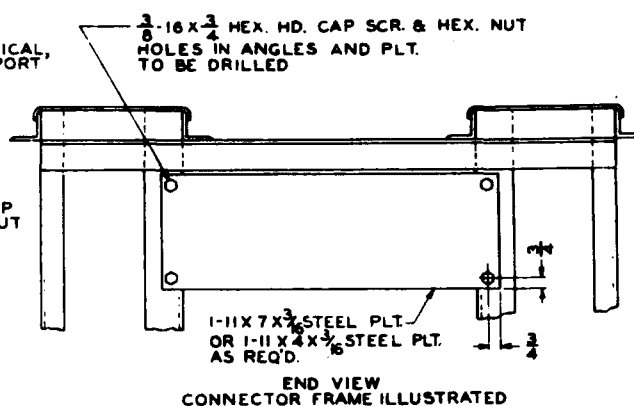
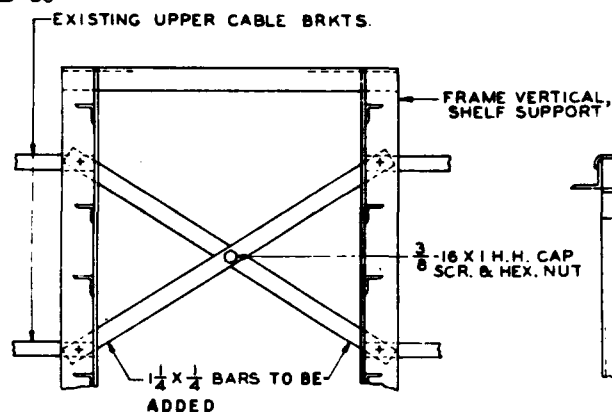
CABLE RACK PARALLEL TO FRAMES

RP-0426.

FIG. 30 BRACING CABLE RACKS OVER 9'0" DOUBLE-SIDED CONNECTOR, SELECTOR AND REPEATER FRAMES
(PAR. 2.231)
(BSP 800-610-155, Fig. 30)

HB 30

9



VIEW INSIDE SELECTOR & REPEATER
FRAMES LOOKING TOWARD
TERMINAL ASSEMBLY END

RP-0427

FIG. 31 FRAMEWORK REINFORCEMENT FOR 9'0" DOUBLE-SIDED
CONNECTOR, SELECTOR AND REPEATER FRAMES
(PARS. 2.251, 2.2511, 2.252)
(BSP 810-610-165, Fig. 31)

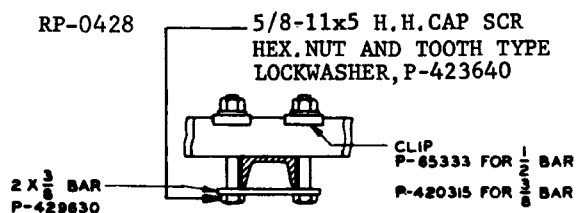


FIG. 32 INVERTED CHANNELS OVER STEP-BY-STEP FRAMES - FASTENING TO AUXILIARY FRAMING BARS
(PAR. 2.32)
(BSP 800-610-155, Fig. 32)

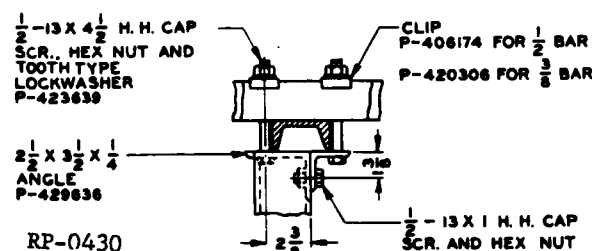
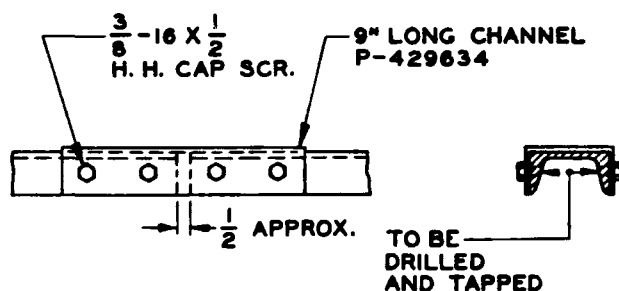


FIG. 34 INVERTED CHANNELS OVER FRAMES HAVING TOP ANGLES - FASTENING TO AUXILIARY FRAMING BARS
(PAR. 2.35)
(BSP 800-610-155, Fig. 34)



RP-0429

FIG. 33 SPLICES IN INVERTED CHANNELS
(PAR. 2.33)
(BSP 800-610-155, Fig. 33)

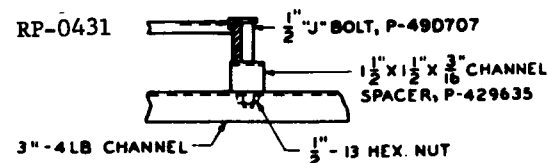


FIG. 35 CABLE RACKS SUPPORTED BY INVERTED CHANNELS - FASTENING OF CHANNEL SPACER
(PAR. 2.36)
(BSP 800-610-155, Fig. 35)

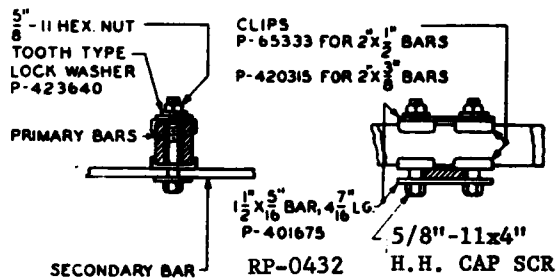
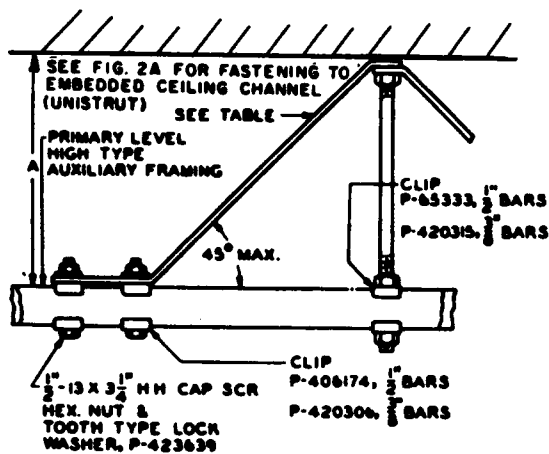


FIG. 36 FASTENING OF SINGLE SECONDARY BAR TO PAIRS OF AUXILIARY FRAMING BARS (PAR. 2.404) (BSP 800-610-155, Fig. 36)



A	TYPE OF BRACE
OVER 5' & LESS THAN 10'	2" x 3/8" BAR, P-429638 TO P-429642 AS REQD
10' TO 1'-6" INCLUSIVE	2" x 3/8" BAR, AS REQUIRED SEE FIG. 39, TABLE A
OVER 1'-6"	2" x 2" x 3/8" ANGLE P-429516 TO P-429523 AS REQD WITH 2" x 3/8" BAR P-426932 AND P-426931 AT TOP & BOT. RESP

FIG. 37 RP-0433 BRACING OF HIGH-TYPE AUXILIARY FRAMING BARS (PARS. 2.4011, 2.407, 2.4072) (BSP 800-610-155, Fig. 37)

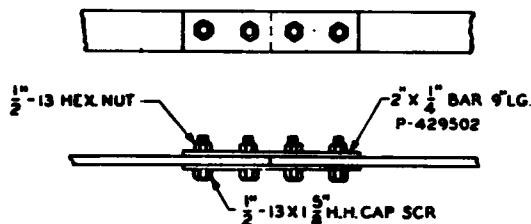


FIG. 38 RP-0434 SPLICES IN SINGLE FRAMING BARS (PAR. 2.408) (BSP 800-610-155, Fig. 38)

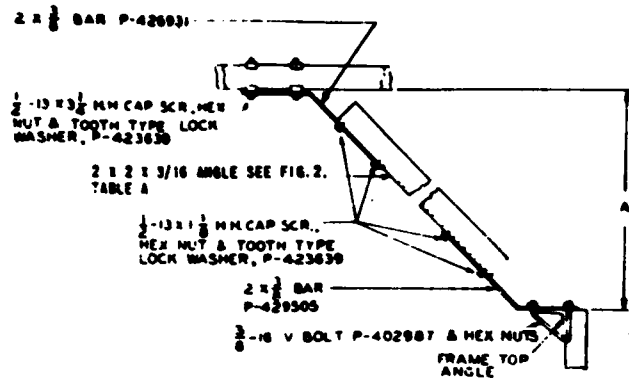
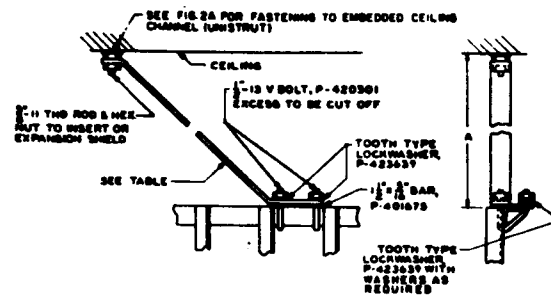


FIG. 39 RP-0435 BRACING OF 11'6" RELAY RACKS, WITH SINGLE TOP ANGLE, AND SIMILAR FRAMEWORKS TO HIGH-TYPE AUXILIARY FRAMING WHERE "A" IS OVER 1'6" (PAR. 2.409) (BSP 800-610-155, Fig. 39)



A	TYPE OF BRACE
OVER 5' & LESS THAN 10'	2" x 3/8" BAR P-429638 TO P-429642 AS REQUIRED
10' TO 1'-6" INCLUSIVE	2" x 3/8" BAR P-429506 TO P-429516 AS REQUIRED
OVER 1'-6"	2" x 2" x 3/8" ANGLE P-429516 TO P-429523 AS REQUIRED WITH 2" x 3/8" BAR P-426932 AND P-426931 AT TOP AND BOTTOM RESPECTIVELY

FIG. 39A RP-0436 ENDWISE BRACING OF DISTRIBUTING FRAMES (PAR. 2.410) (BSP 800-610-155, Fig. 39A)

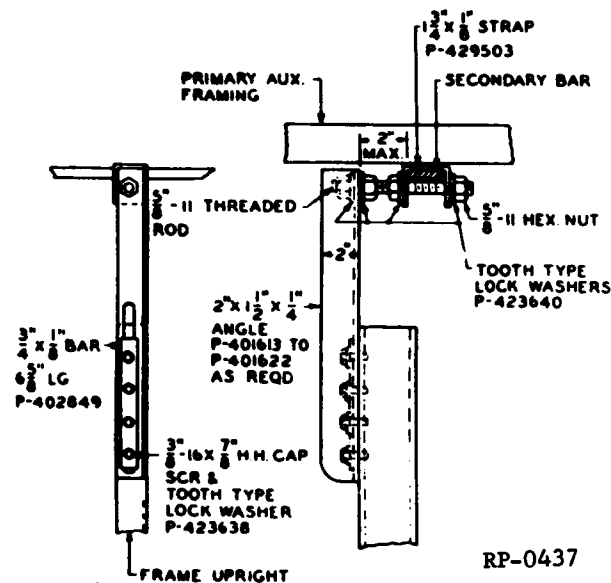


FIG. 40 SINGLE-SIDED FRAMES - SUPPORT TO
HIGH-TYPE AUXILIARY FRAMING
(PARS. 2.411, 2.4111, 2.4112)
(BSP 800-610-155, Fig. 40)

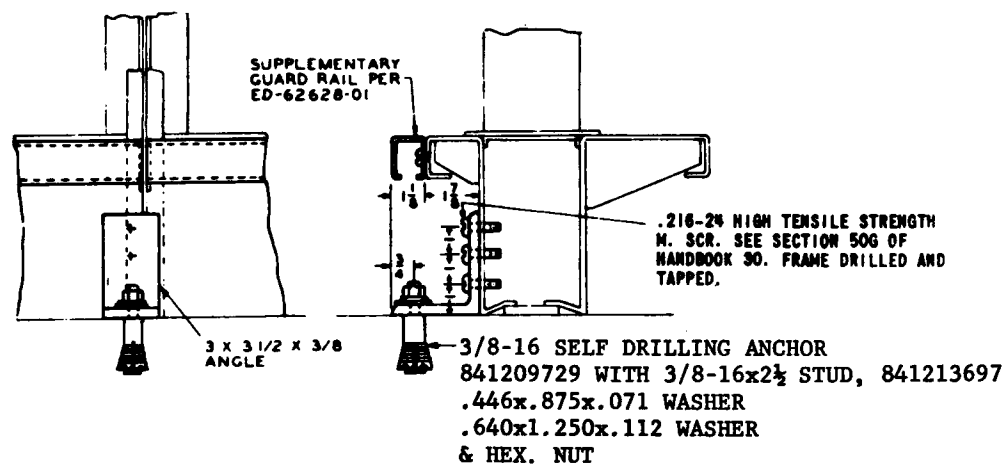


FIG. 40A SUPPLEMENTARY FLOOR FASTENINGS FOR BULB-ANGLE SWITCHING
FRAMES IN EXISTING OFFICES
(PAR. 2.51)
(BSP 800-610-155, Fig. 40A)

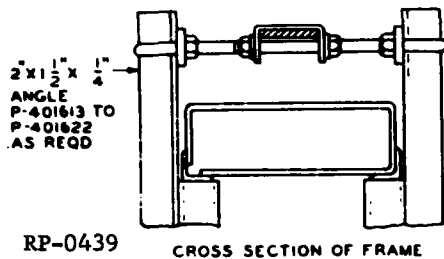
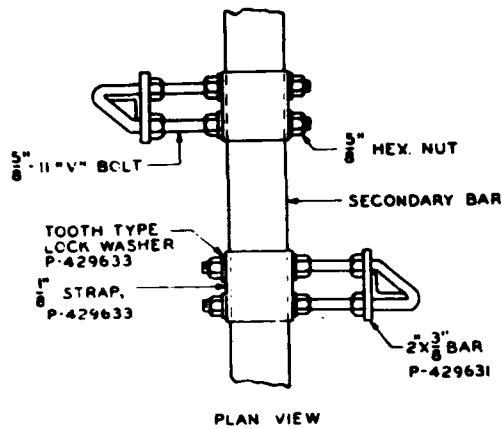


FIG. 41 PANEL DOUBLE-SIDED FRAMES- SUPPORT OF MULTIPLE BANK BAYS TO HIGH-TYPE AUXILIARY FRAMING
(PARS. 2.411, 2.4112)
(BSP 800-610-155, Fig. 41)

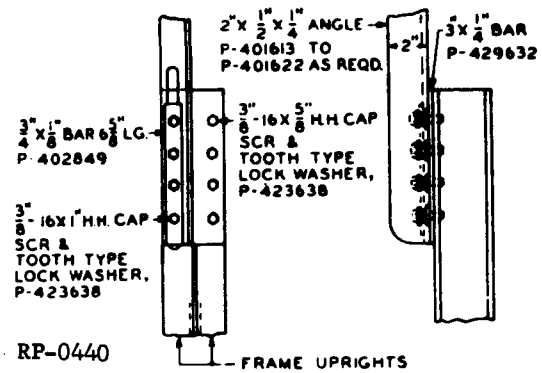


FIG. 42 STEP-BY-STEP CONNECTOR FRAMES - FASTENING BETWEEN REGULAR BAY AND SUPPLEMENTARY BAY
(PARS. 2.4111 (a) (1))
(BSP 800-610-155, Fig. 42)

→ Indicates new or changed information.

Engineering Planning Manager
Common Installation Engineering

Reason for Reissue:

1. To replace all reference to "Expansion Shields with "Self Drilling Anchors" in Figs. 24, 25 and 40A.
2. To replace all reference to "Sq. H.M. Bolts" with "H.H. Cap Screws" in Figs. 26, 32, 36, and 38.