ERECTING, FRAMES, JOB ASSEMBLED STEP-BY-STEP FRAMES

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2. GENERAL

2.1 Scope

2.11 This section covers the specific requirements and installing procedures for erecting, placing, and fastening step-by-step switch frames both with and without frame channel top members.

2.2 Associated Information

2.21 Refer to the Associated Handbook Information Reference Chart for the location of information to which reference may be necessary when performing the operations covered by this section.

2.22 Reference should also be made to job specifications; Floor Plan, Cabling and Cable Rack Plans and Other drawings furnished the job.

3. INSTALLING EQUIPMENT

3.1 In addition to tools supplied in the general kits, the tool listed below may be required for the operations covered in this section.

3.11 Additional Tools

1 R-2510 Truck, Dolly

NOTE: One R-2510 is included in the R-3015 Hoist Set.

4. INSTALLING PROCEDURES

4.1 Chart 1 outlines the installation procedure for step-by-step switch frames with frame channel top members.

4.2 Chart 2 outlines the installation procedure for step-by-step switch frames without frame channel top members.

5. LAYING OUT FLOORS

5.1 Lay out floors in accordance with floor plan drawings furnished in job and instructions contained in Sections 6A and 6D.

6. AUXILIARY FRAMING

6.1 Install auxiliary framing as indicated in job drawings and information contained in the 11 series of sections.

6.11 Install auxiliary framing somewhat higher than the ultimate height to facilitate the installation of the frame uprights. A height of approximately 1/2" over the final height is recommended. Since there may be a certain amount of sagging in the framing bars or channels, the height of the framing supports may have to be greater to maintain a height of 1/2" above the final height.

6.12 When all frame uprights are in place, the auxiliary framing should be lowered to the 11'-8" or 11'-9-1/2" level.

CHART 1 - OUTLINE OF OPERATIONS

SXS SWITCH FRAMES WITH FRAME CHANNEL TOP MEMBERS

(Par. 4.1)

1. Lay out floors. (See Paragraph 5.1 and Sections 6A and 6D.)
2. Install auxiliary framing. (See Paragraph 6 and Section 11B.)
3. Install and align frame channel top members. (See Paragraph 7.)
4. Install and align cable rack. (See Paragraph 8 and 13 series of sections.)
5. Loosely fasten sheet metal base in place. (See Paragraph 9.) Where channel type uprights are provided, install base angles. (See Paragraph 11.11.)
6. Align and level sheet metal base. (See Sections 27A and 27D.)
7. Install frame uprights. (See Paragraph 10 and Sections 27A and 27D.)
8. Install end guards. (See Section 19G.)

CHART 2 - OUTLINE OF OPERATIONS

SXS SWITCH FRAMES WITHOUT FRAME CHANNEL TOP MEMBERS

(Par. 4.2)

A. Install temporary "starting bars" or permanent supports. (See 11 Series.)

B. Erect line-up of frames about 15' away from "starting bars" or permanent supports, proceeding as follows:

1. Install base angle or sheet metal base assemblies as provided. (See Paragraph 11.1.)

2. Erect uprights, commencing at the aisle end with cable rack support "U" brackets fastened to those uprights which are not fastened directly to the auxiliary framing bars or will not be junctioned to an adjacent upright which will be fastened to the cable rack or auxiliary framing. (See Paragraphs 11.31 to 11.5.)

3. Brace uprights temporarily so that they are approximately vertical.

4. Install the pairs of framing bars which extend from the "starting bars" to this line-up and which fasten directly to the frame uprights. Locate them in accordance with the plan, extending the bars with the desired overhang.

5. Lay off on a stock length of frame cable rack the desired overhang or distance the cable rack is to extend beyond the end of the line-up.

6. Place and fasten cable rack in position over the uprights, splicing the cable rack as necessary.

7. Install the pairs of framing bars which fasten to the cable rack and extend to the "starting bars" from this line-up.

C. Plumb the frames, permanently fasten the framing bars and install braces if necessary. (See Sections 27A and 27D.)

D. Erect frames in intermediate line-ups as follows:

1. Install base angle or sheet metal base assembly, as provided.

2. Erect, plumb, and secure uprights which fasten directly to auxiliary framing bars.

3. Place cable rack over the framing bars in the location of an intermediate line-up of frames, splicing the cable rack as necessary and locating the end of the cable rack with the desired overhang at the end of the line-up.

4. Align front edge of cable rack using a plumb bob to a line on the floor 1-1/8" in front of the upright leg of the base angle of the frame line-up.

5. Fasten cable rack support brackets on the top of the verticals where necessary.

6. Erect, plumb, and secure uprights which fasten to the cable rack.

7. Install permanent braces where planned.

E. Continue the installation by erecting a line-up about 15" away from the ends of the framing bars already installed, following the procedures given above.

F. Remove temporary braces and "starting bars" when they are no longer required.

NOTE: Where the term "bars" is referred to it may be interpreted to mean either rectangular bars or channels.

6.2 In step-by-step offices, the auxiliary framing should be fastened at right angles to the tops of 2" framing channels that tie the tops of the bulb-angle or channel-type uprights of switch frames together. This will result in the auxiliary framing being located approximately 11'-8" or 11'-9-1/2" from the floor to the bottom of the framing. (See Paragraph 6.4 for 11'-9-1/2" framing ceiling height requirements are met.)

6.3 Where additional step-by-step frames are installed in offices with auxiliary framing 11'-6" above the floor, the added frames should be supported in a manner similar to that used for existing frames. If the frames are grouped together in the last building bay in the direction of the frame line-ups, 11'-6" auxiliary framing should be retained. Where two or more building bays of frames are added either in the direction parallel with, or at right angles to the frame line-ups, or one bay only with more to follow at a later date and integrated fluorescent lighting is to be furnished, then 11'-8" auxiliary framing should be furnished.

6.4 In new step-by-step offices or in additions of two or more building bays of frames to existing offices where there is a minimum clearance of 13'-0" under all obstructions, the auxiliary framing should be installed 11'-9-1/2" above the floor.

7. FRAME CHANNEL TOP MEMBERS

7.1 Loosely fasten the channel top members to the auxiliary framing and then align them following instructions outlined in Section 27D. The channel top members should be accurately located with respect to the lines previously laid out on the floor to insure the proper alignment of the frame uprights.

7.2 Bulb-angle or channel-type uprights of switch frames in step-by-step offices having 11'-8" or 11'-9-1/2" framing should be tied together at the top with 2" framing channels in stock lengths wherever practicable. Where the length of the line-up exceeds 20', splices per Figure 9A should be used. Splices should be staggered with respect to others in adjacent parallel rows of frames, as shown in Figure 1 of Section 11B. Where a frame has been omitted from inside a line-up of frames, the channels should be run continuously across the space of the future frame. If the frame omitted is an end frame, the channels should end at the last upright and should be fastened as shown in Figure 11D. Where a switch frame is added at the end of an existing line-up at a later date, the channel top members should be junctioned as shown in Figure 11C.

7.3 Auxiliary framing (11'-8" high) over step-by-step bulb-angle or channel-type switch frames should be fastened at right angles to the tops of the pairs of framing channels that tie together the tops of the uprights of a line of frames, see Figures 11B, 11C, 11D, and 11H. Where the fastening occurs over the uprights, it should be done as shown in Figures 11E and 11F. Where fastening is between uprights, it should be made as shown in Figure 11J. Where a line-up of bulb-angle or channel-type step-by-step frames extends more than 2'-6" beyond the last pair of regular auxiliary framing bars or channels, the end of the line-up should be attached to the overhead cable rack by means of a pair of short bars or channels with "J" bolts at each stringer, as shown in Figure 5 and to channel top members, as shown in Figure 15B (11'-8") or Figure 15C (11'-9-1/2" framing).

7.31 Auxiliary framing (11'-9-1/2" high) over step-by-step bulb-angle or channel type switch frames should be fastened at right angles to the tops of the pairs of framing channels that tie together the tops of the uprights of a line of frames (see Figures 11B, 11C, 11D, and 11H) using a P-428409 Channel spacer between the auxiliary framing and channel frame top members. Where fastening occurs over the uprights, it should be made as shown in Figures 11K or 11L. Where fastening is between uprights, it should be made as shown in Figure 11M.

7.32 Where frame channel top members are fastened between the auxiliary framing and an upright as shown in Figures 11E and 11F, provide temporary fastening as shown in Figure 11N until frame uprights are installed. As the frame uprights are being installed, remove the 5/8"-11 hex. nut and fasten uprights as shown in Figures 11E or 11F.

7.4 Channels may become bent during installation causing them to become wavy in a sidewise direction. If this condition should occur, additional clips should be used as necessary to hold the channels parallel.

8. CABLE RACK

8.1 Install cable racks. See 13 Series of Sections for requirements and fabrication.

9. SHEET METAL BASE ASSEMBLIES

→9.1 Drill holes in the floor using self-drilling anchor at locations marked on the floor.

→9.2 Set self-drilling anchor. Do not insert studs until sheet metal base assembly is to be set in place so as not to create an accident hazard.

9.3 Set sheet metal base assemblies in place on the floor and loosely assemble fastening arrangement as shown in Figure 4D. A hold-down bolt should be placed in each hole provided in the base.

9.31 The sheet metal base assemblies shall be placed directly on the floor or placed directly on the floor covering when the floor covering has been laid prior to the installation of equipment.

9.4 Align sheet metal base assemblies per instructions contained in Section 27D.

10. FRAME UPRIGHTS

10.1 Loosely fasten frame uprights in place to channel top members and to the base. Also, loosely assemble junction bolts on adjacent uprights.

10.11 Adjacent bulb-angle or bulb-angle and channel-type uprights shall be fastened together in two places on 11'-6" and 9'-0" uprights and in one place on 7'-0" uprights with spacers between the uprights, in all cases, as shown in Figure 4D.

10.111 Methods of joining uprights to different types of frames are shown on ED-91839-70.

10.12 Frame uprights are to be fastened to the framing channels as shown in Figures 11B, 11C, 11D, and 11H.

10.13 Where an upright is located directly under the auxiliary framing, it should be fastened as shown in Figures 11E or 11F.

10.2 After all uprights are loosely fastened in place, lower auxiliary framing so that channel top members come to rest on the uprights.

10.3 Align and plumb uprights following the information contained in Sections 27A and 27D. Tighten all fastenings.

11. INSTALLING STEP-BY-STEP FRAMES - WITHOUT FRAME CHANNEL TOP MEMBERS - A&M ONLY

11.1 Install base angles or sheet metal base assemblies, as specified, before the various groups of frames are erected. Paragraph 9 of this section outlines a method of installing sheet metal base assemblies.

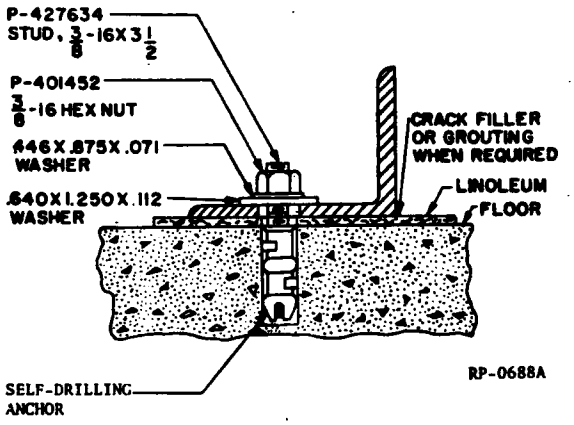
11.11 Angle or sheet metal base members should, unless otherwise specified, be fastened to the floor. A hold down bolt should be placed at each hole provided in the base unless otherwise specified on the framework assembly drawings. See Figures 3 and 4D.

11.12 Base members shall be placed directly on the floor or placed directly on the floor covering when the floor covering has been laid prior to the installation of equipment.

11.2 Install the frame uprights in conjunction with the installation of auxiliary framing and over-frame cable racks.

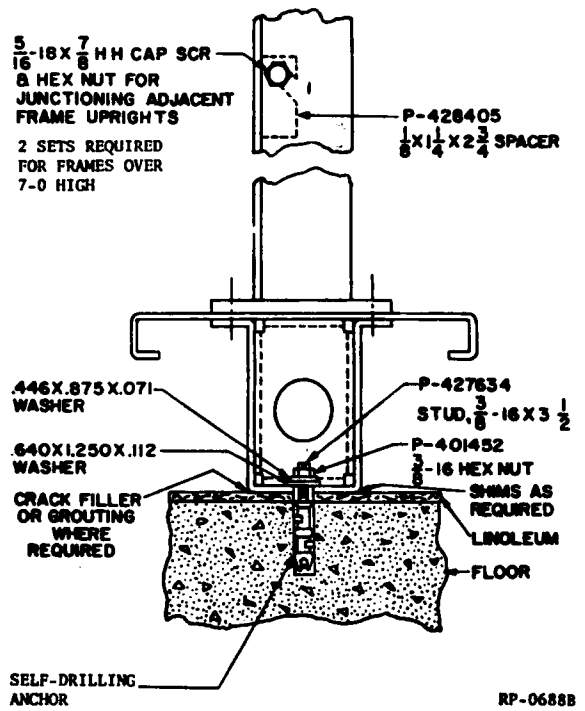
11.3 The auxiliary framing (11'-6" high) over step-by-step frames should be fastened to the underside of the cable racks over the frames by means of J-bolts, as shown in Figure 5. The cable racks, in turn, are fastened to the frame uprights by means of U-shaped brackets as shown in Figure 63. Where convenient, the auxiliary framing bars or channels are fastened directly to the frame uprights, as shown in Figures 11 and 12, and the U-bracket cable rack supports are omitted at such points. This requirement is now rated "A&M ONLY" and is superseded by the following:

11.31 Where a bulb-angle switch frame upright is installed adjacent to a channel switch frame upright in an 11'-6" auxiliary framing area of a step-by-step office, the junction should be made as shown in Figure 11. Where two adjacent bulb-angle switch frame uprights are installed in an 11'-6" auxiliary framing area of a step-by-step office, the junction should be made as shown in Figure 11G.



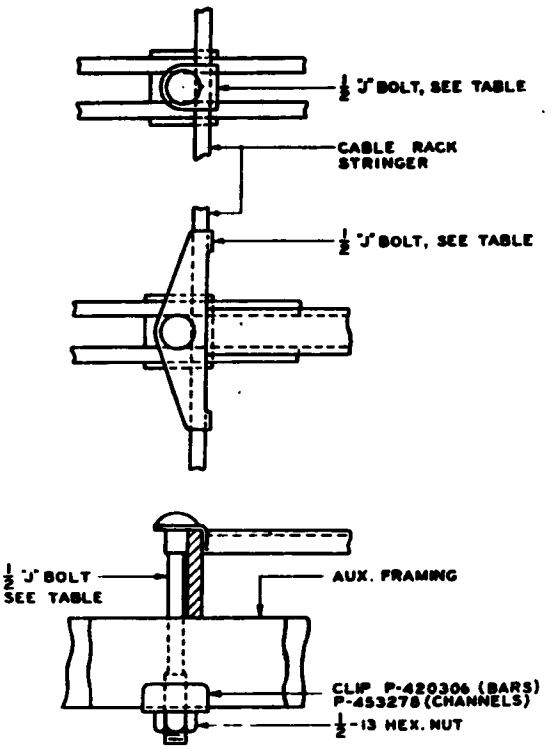
NOTE 1. WHEN THE EQUIPMENT IS TO BE FASTENED TO WOODEN FLOORS, SUBSTITUTE APPROPRIATE WOOD OR LAG SCREWS FOR THE SCREW AND SELF-DRILLING ANCHOR.

FIG. 3 FASTENING FRAMES AND RACKS TO FLOORS (PAR. 11.11)
(BSP 800-614-154, Fig. 3)



NOTE 1. WHEN THE EQUIPMENT IS TO BE FASTENED TO WOODEN FLOORS, SUBSTITUTE APPROPRIATE WOOD OR LAG SCREWS FOR THE SCREW AND SELF-DRILLING ANCHOR.

FIG. 4D FASTENING SHEET METAL BASE ASSEMBLY TO FLOOR - BULB ANGLE STEP-BY-STEP FRAMES (PARS. 9.3, 10.11, 11.11)
(BSP 800-614-154, Fig. 4D)



CABLE RACK STRINGER SIZE	J BOLT	
	PLAIN	SPANNER
1 1/2	P-49D706	P-420915
2	P-49D707	P-420916

RP-0688C

FIG. 5 AUXILIARY FRAMING FASTENED TO UNDERSIDE OF CABLE RACK
(PARS. 7.3, 11.3)
(BSP 800-614-155, Fig. 5)

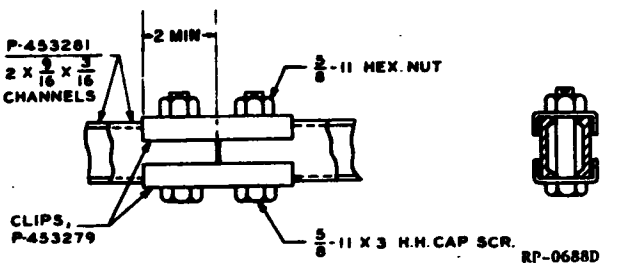


FIG. 9A SPLICING FRAME CHANNEL TOP MEMBERS (PAR. 7.2)
(BSP 800-614-155, Fig. 9A)

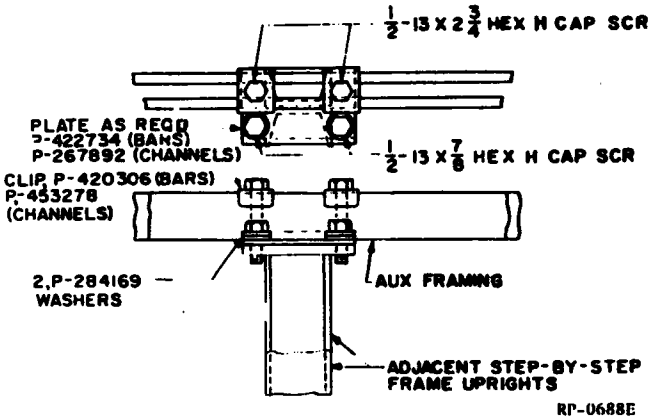


FIG. 11 AUXILIARY FRAMING ATTACHED WITH PLATE TO TWO ADJACENT STEP-BY-STEP UPRIGHTS - CHANNEL TO CHANNEL OR CHANNEL TO BULB ANGLE (CHANNEL TO CHANNEL SHOWN) - 11-FT 6-IN. FRAMING - "A&M ONLY" - SUPERSEDED BY FIG. 11E (PARS. 11.3, 11.31 (BSP 800-614-155, Fig. 11)

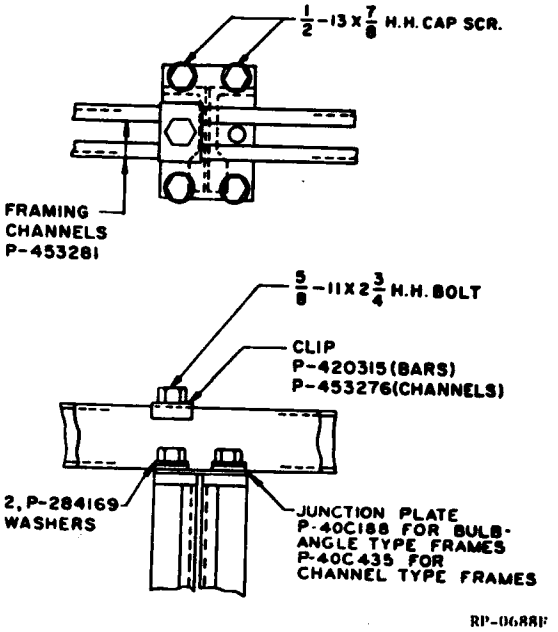


FIG. 11B JUNCTIONING ADJACENT FRAME UPRIGHTS WITH CHANNEL TOP MEMBERS - BULB-ANGLE OR CHANNEL-TYPE STEP-BY-STEP SWITCH FRAMES - BULB-ANGLE TYPE SHOWN (PARS. 7.3, 10.12) (BSP 800-614-155, Fig. 11B)

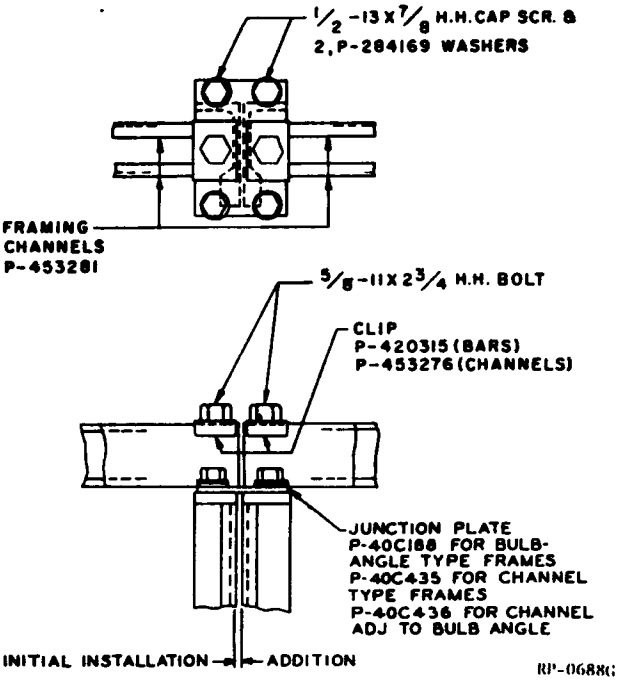


FIG. 11C JUNCTIONING ADJACENT FRAME UPRIGHTS WITH CHANNEL TOP MEMBERS WHERE A FRAME HAS BEEN ADDED TO AN EXISTING LINE-UP - BULB-ANGLE OR CHANNEL-TYPE STEP-BY-STEP SWITCH FRAMES - BULB-ANGLE TYPE SHOWN (PARS. 7.2. 10.12) (BSP 800-614-155, Fig. 11C)

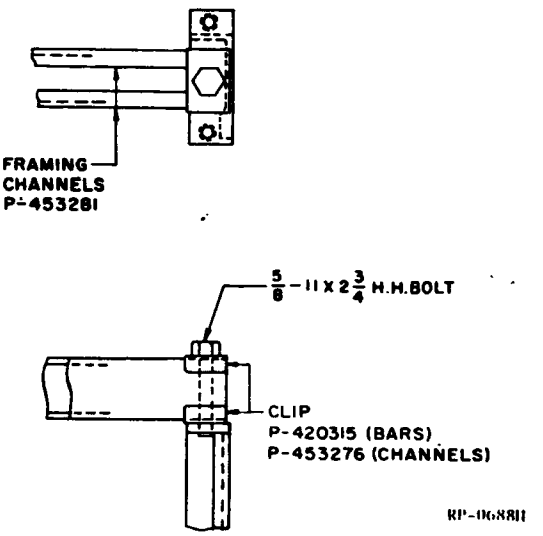


FIG. 11D FASTENING 2-IN. CHANNEL TOP MEMBERS TO UPRIGHT AT END OF LINE-UP - BULB-ANGLE OR CHANNEL-TYPE STEP-BY-STEP SWITCH FRAMES - BULB-ANGLE TYPE SHOWN (PARS. 7.2, 10.12) (BSP 800-614-155, Fig. 11D)

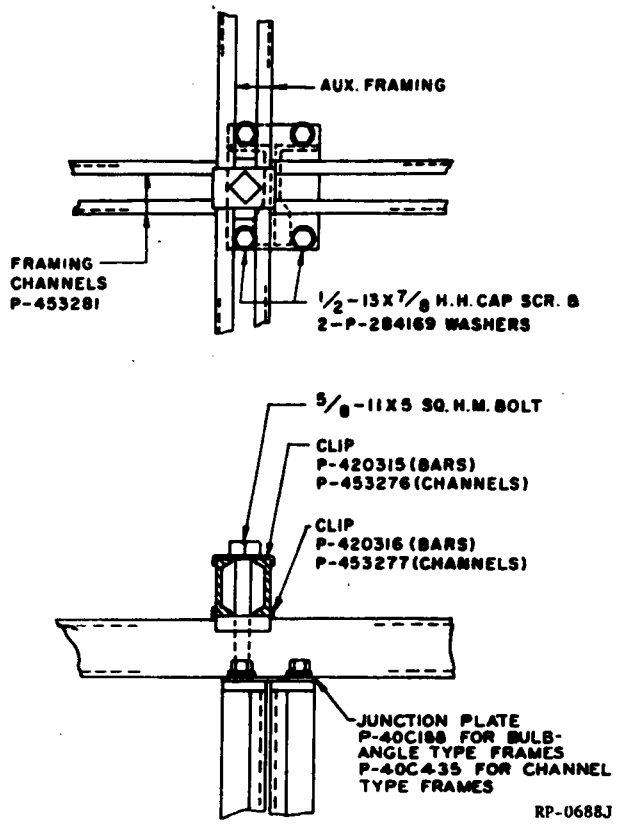


FIG. 11E JUNCTIONING ADJACENT FRAME UPRIGHTS HAVING 2-IN. CHANNEL TOP MEMBERS WITH AUXILIARY FRAMING OVER ONE OF THE UPRIGHTS - BULB-ANGLE OR CHANNEL-TYPE STEP-BY-STEP SWITCH FRAMES - BULB-ANGLE TYPE SHOWN (PARS. 7.3,7.31,10.13) (BSP 800-614-155, Fig. 11E)

11.4 Where adjacent step-by-step bulb-angle or channel type frame uprights are junctioned together at the top, erect plumb and secure one of the uprights before erecting the other. If this procedure is not followed, difficulty may be encountered in using the R-2642 Plumbing Fixtures.

11.5 Where one or more uprights are bolted directly to a run of auxiliary framing, make certain that the entire length of the bars or channels is correctly located before plumbing the uprights.

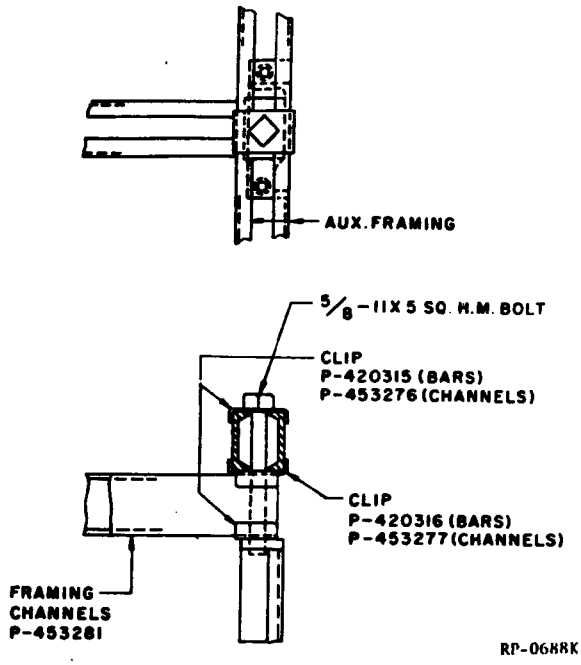


FIG. 11F FASTENING 2-IN. CHANNEL TOP MEMBERS TO UPRIGHT AT END OF LINE-UP WITH AUXILIARY FRAMING OVER THE UPRIGHT - BULB-ANGLE OR CHANNEL-TYPE STEP-BY-STEP SWITCH FRAMES - BULB-ANGLE TYPE SHOWN (PARS. 7.3, 7.31, 10.13) (BSP 800-614-155, Fig. 11F)

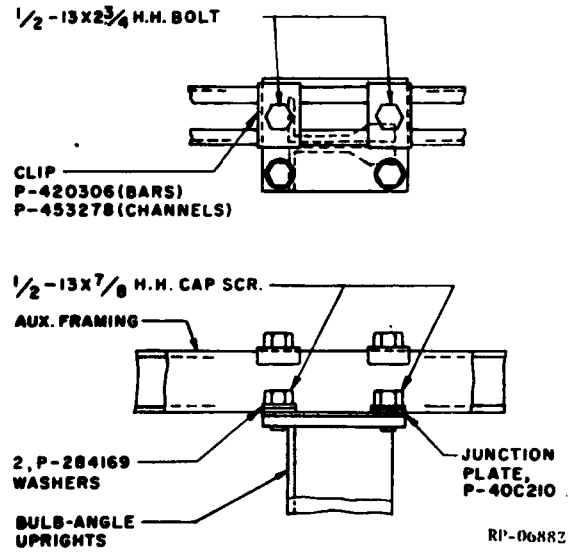


FIG. 11G AUXILIARY FRAMING ATTACHED WITH JUNCTION PLATE TO TWO ADJACENT BULB-ANGLE UPRIGHTS IN 11-FT 6-IN. FRAMING AREA - STEP-BY-STEP OFFICES (PAR. 11.31) (BSP 800-614-155, Fig. 11G)

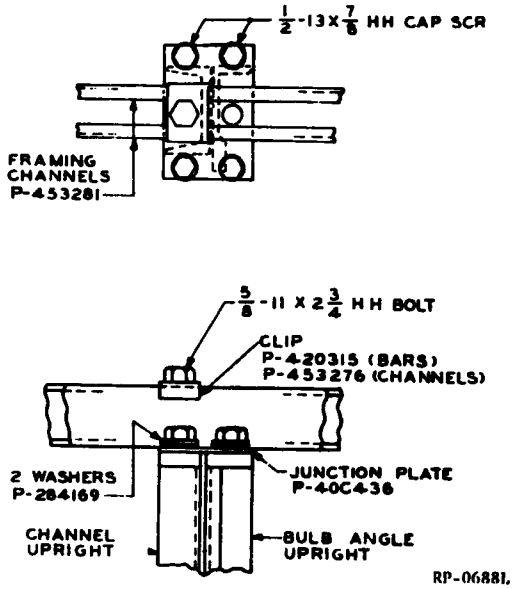


FIG. 11H JUNCTIONING ADJACENT FRAME UPRIGHTS WITH CHANNEL TOP MEMBERS - BULB-ANGLE TO CHANNEL-TYPE STEP-BY-STEP SWITCH FRAMES (PARS. 7.3, 10.12) (BSP 800-614-155, Fig. 11H)

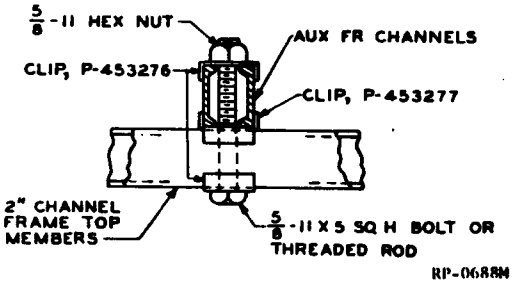


FIG. 11J FRAME CHANNEL TOP MEMBERS FASTENED TO AUXILIARY FRAMING (PAR. 7.3) (BSP 800-614-155, Fig. 11J)

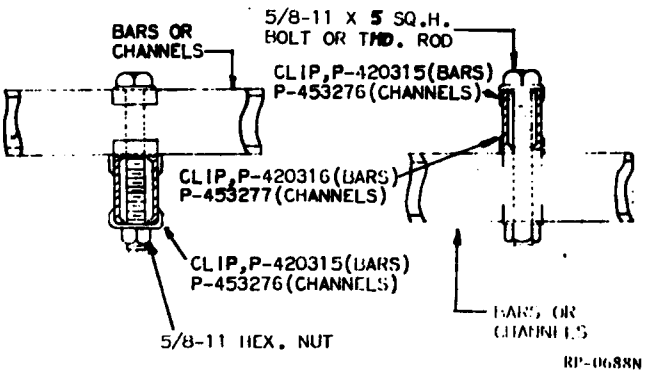


FIG. 11K TEMPORARY FASTENING - AUXILIARY FRAMING OVER FRAME CHANNEL TOP MEMBERS OVER FRAME UPRIGHTS (PAR. 7.31)

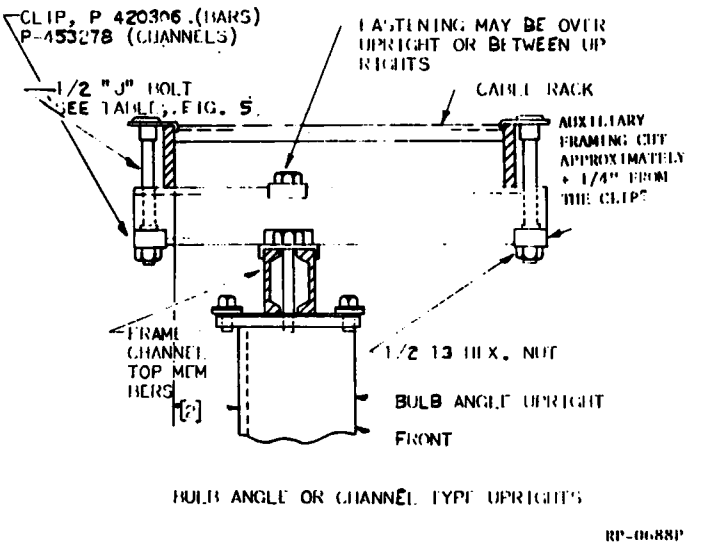


FIG. 15B ISOLATED STEP-BY-STEP FRAMES SUPPORTED FROM ONE CABLE RACK 11'-8" FRAMING (PAR. 7.3) (BSP 800-614-155, Fig. 15B)

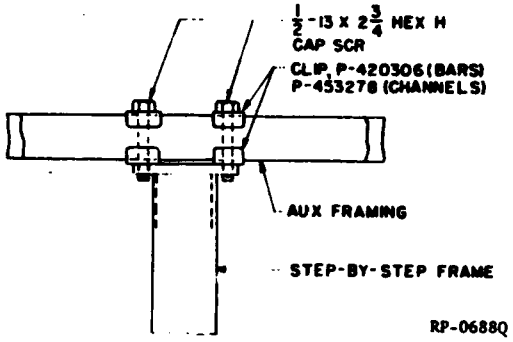


FIG. 12 AUXILIARY FRAMING ATTACHED TO UPRIGHT OF STEP-BY-STEP FRAME - CHANNEL OR BULB-ANGLE (CHANNEL SHOWN) - 11-FT 6-IN. FRAMING - "A&M ONLY" - SUPERSEDED BY FIGURE 11F (PAR. 11.3)
(BSP 800-614-155, Fig. 12)

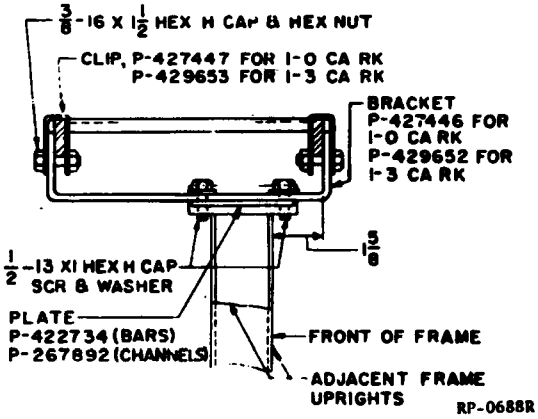


FIG. 63 1-FT 0-IN. CABLE RACK FASTENED TO STEP-BY-STEP FRAMES WITH U-BRACKETS - "A&M ONLY"
(PAR. 11.3)
(BSP 800-614-157, Fig. 63)

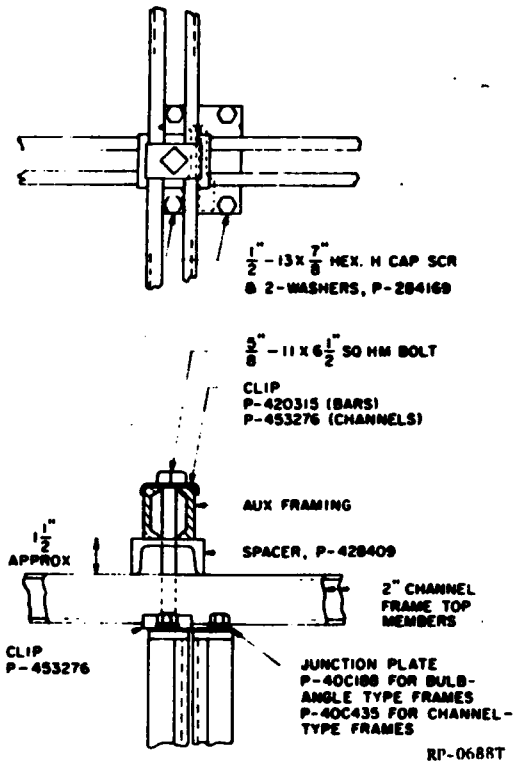


FIG. 11K JUNCTIONING ADJACENT FRAME UPRIGHTS HAVING 2-in. CHANNEL TOP MEMBERS WITH AUXILIARY FRAMING OVER ONE OF THE UPRIGHTS - BULB-ANGLE OR CHANNEL-TYPE STEP-BY-STEP SWITCH FRAMES - BULB-ANGLE TYPE SHOWN 11'-9-1/2" FRAMING. (PAR. 7.31)
(BSP 800-614-155, Fig. 11K)

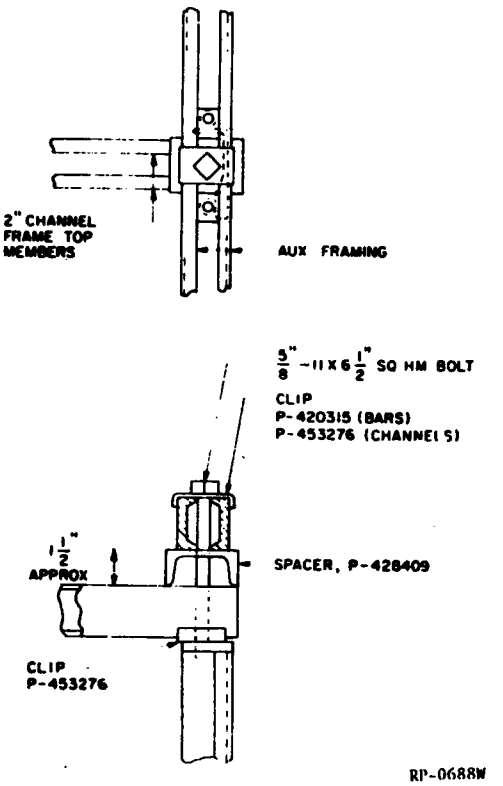


FIG. 11L FASTENING 2-in. CHANNEL TOP MEMBERS TO UPRIGHT AT END OF LINE-UP WITH AUXILIARY FRAMING OVER THE UPRIGHT - BULB-ANGLE OR CHANNEL-TYPE STEP-BY-STEP SWITCH FRAMES - BULB-ANGLE TYPE SHOWN 11'-9-1/2" FRAMING
(PAR. 7.31)
(BSP 800-614-155, Fig. 11L)

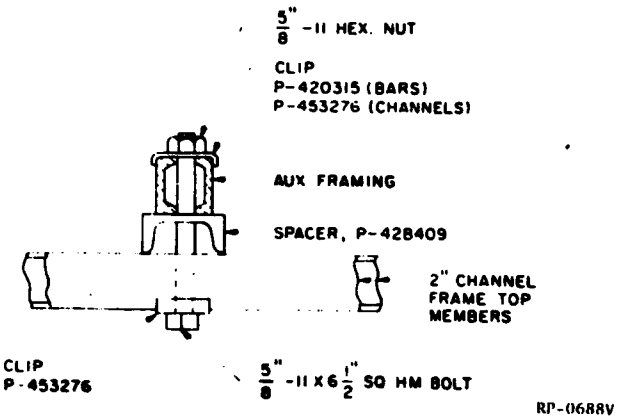


FIG. 11M AUXILIARY FRAMING ATTACHED TO 2-in. CHANNEL TOP MEMBERS OF STEP-BY-STEP SWITCH FRAMES FASTENING BETWEEN FRAME UPRIGHT 11'-9-1/2" FRAMING
(PAR. 7.31)
(BSP 800-614-155, Fig. 11M)

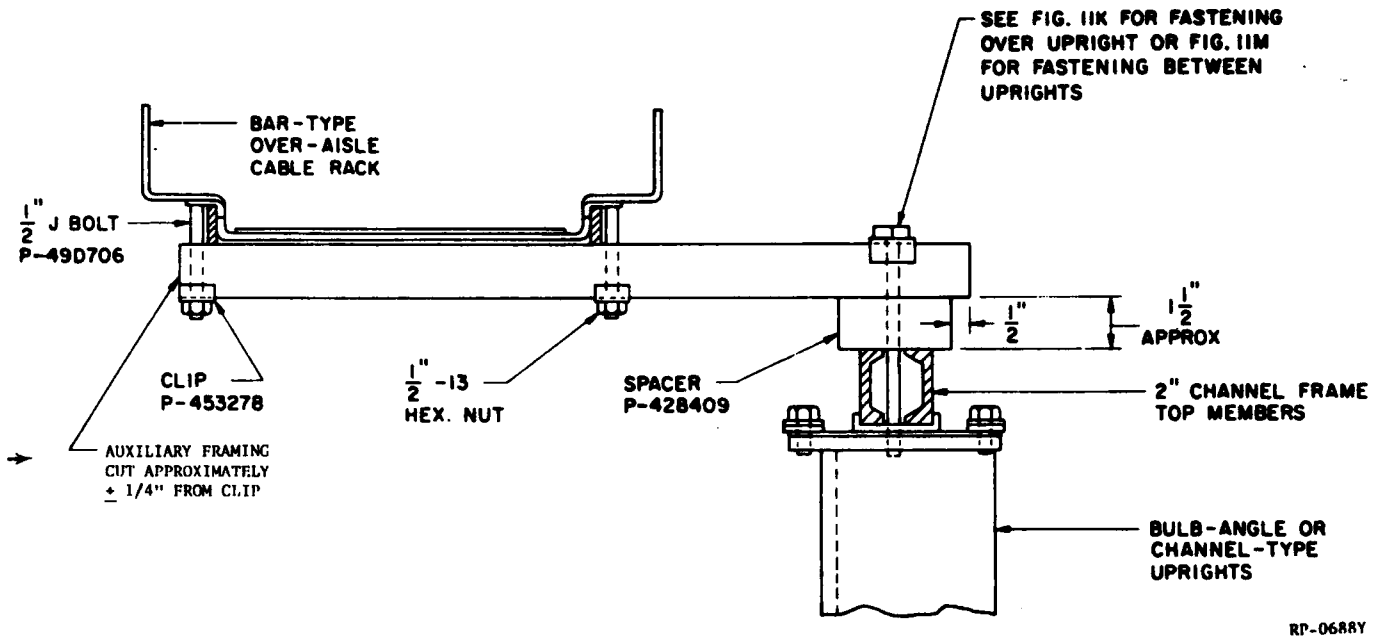


FIG. 15C ISOLATED STEP-BY-STEP FRAMES SUPPORTED FROM ONE CABLE RACK 11'-9-1/2" FRAMING (PAR. 7.3) (BSP 800-614-155, Fig. 15C)

← Indicates new or changed information.

[Vertical line at side of paragraphs indicates requirements.

Engineering Planning Manager
(Installation)

Reason for Reissue:
(1) Remove R-7200.
(2) Update BSP's references.
(3) Remove expansion shield, and replace with self-drilling anchor.