

FASTENING FRAMES
GENERAL INFORMATION

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1. GENERAL

NOTE: The use of the word "frame" in the requirements is intended to include relay racks and fuse bays.

1.1 Scope

1.1.1 This section covers general requirements and information applying to the fastening of all types of frames, except ESS and Toll frames associated with ESS.

1.2 Piece Part Information

1.2.1 The list shown in Figure 1 will facilitate the identification of piece parts frequently used to fasten frames. While it is intended that the list include all parts which otherwise might be difficult to identify, it will be impracticable to keep the list up-to-date at all times.

1.2.2 The R-2901 Piece Part Chart is a large reproduction, similar to Figure 1 which may be located near piece part bins on the job for ready identification of some of the more common piece parts.

1.3 Verification

1.3.1 Items for verification of equipment installed by the operations covered in the 20 series are listed at the end of each section.

2. INSTALLING EQUIPMENT

2.1 Tools and materials required for the operations and procedures covered in the 20 series are included in the general tool kits, and are normally available on the job.

3. PRECAUTIONS

3.1 Precautions Against Personal Injury and Equipment Damage

3.1.1 The precautions to be taken against personal injury and to prevent damage to equipment and service interruptions are covered in this section or in other sections of this series with the associated operations. General precautions are covered in the general sections of this handbook and in Handbook 0. These precautions should be observed at all times as they apply to the particular operation being performed.

4. FRAMES, RACKS, FUSEBOARDS, CABINETS, ETC. (GENERAL DESCRIPTIONS)

4.1 Bolted-Type Frames and Racks

4.1.1 Floor members of distributing frames, step-by-step frames with floor angles or sheet metal bases, and other frame structures of these general types in which the uprights are flexibly attached to long horizontal members shall be laid directly on the floor covering prior to installation. Where a conspicuous space (approximately 3/16" or more) occurs between the bottom of the floor angles and the floor, the entire space should, as far as practicable, be filled with crack filler.

4.2 Welded-Type Frames and Racks

4.2.1 Frames such as the bulb angle crossbar frames, bulb angle relay racks, crossbar office interrupter frames, cable duct-type carrier frames, and channel relay racks, fuse bays, message register racks, etc., are provided with leveling screws. These frameworks should be installed directly on the floor covering, and leveled by means of the leveling screws, care being taken to

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Insure that these screws cut through the floor covering to the concrete when the screws are turned down, in order to prevent shifting of the frames. Spaces between the frame bases and the floor, 3/16" or more, should be filled with crack filler. An exception to the above is made in carrier auxiliary stations where such spaces are not filled.

4.3 Sheet Metal Box-Type Frames

4.3.1 These frames (No. 5 crossbar) are not provided with leveling screws. It will be necessary to shim the frames in extreme cases of unevenness of the floor in order to maintain a satisfactory mutual alignment of the frames. No caulking between the base of the frame and the floor is necessary. The moulding strip at the base of the frame on the front should be adjusted to fit as snugly as practicable.

4.4 Floor-Mounted-Type Cabinets And Casings

4.4.1 A cabinet is a sheet metal structure which supports the equipment encloses, while a casing is a sheet metal structure placed around a completely installed unit of equipment. All cabinets and casings are usually perforated for hold-down bolts but only those having channel base members have leveling screws.

5. FASTENING EQUIPMENT TO FLOORS, WALLS, ETC.

5.1 Methods of Fastening

5.1.1 Equipment is fastened to floors, walls, etc., as follows:

5.1.1.1 Concrete, brick, etc., - with self-drilling anchor, Ackerman-Johnson anchors or approved equivalents, as specified in the job specifications or drawings.

5.1.1.2 Wooden or joist constructed walls, - lag or wood screws, as specified.

5.1.1.3 Terra cotta, hollow tile, concrete block or cinder block walls - with toggle bolts (Figure 2).

5.1.2 Supports to walls and partitions should in general be avoided. Where necessary, fasten frames supports to concrete walls or partitions with self-drilling anchor or other equally secure devices. Provide wooden strips finished smooth and of sufficient thickness between the support and the wall as shown in Figure 45. On wooden or wood stud constructed walls, fasten wood strip to wall and fasten support to wood strip or through to the stud with lag screws as shown in Figure 46.

5.1.2.1 To prevent paint splashes on finished ceilings and walls, either paint the wooden strips before they are installed and then do whatever touching up is required later, or place a clean piece of paper between the wooden strip and wall protruding approximately 6" from all sides of the strip. The latter procedure has the added advantages of

preventing finger marks on the wall or ceiling. After the paint has dried, trim the paper close to the edges of the wood.

5.1.3 When determining the size and type of bolts or screws not otherwise specified, consider the size, weight, and construction of the equipment to be fastened.

5.2 Lag Screws and Wood Screws

5.2.1 Drill sizes for wood screw lead holes are listed in the following table:

Wood Screw Number	Drills	
	Soft Wood	Hard Wood
4, 5, 6	No. 52 (R-1466)	No. 45 (R-2777)
8, 10	No. 39 (R-2979)	No. 31 (R-2308)
12, 14	No. 31 (R-2308)	No. 13 (R-1471)
18	No. 19 (R-1940)	No. 13 (R-1471)

5.2.2 To facilitate the installation of wood screws, threads of the screws may be lubricated with soap, paraffin, or similar cake wax.

5.2.3 When installing screws in inaccessible locations, use the R-2226 Screwdriver equipped with a screw holding device or press a small amount of wax on the head of the screw and use an ordinary screwdriver.

5.2.4 The R-2819, Det. 15 Socket, contained in the R-2792 Wrench Set, should be used for tightening 3/8" lag screws.

6. JUNCTIONING FRAMES

6.1 Common Information

6.1.1 All frames in a continuous lineup should be bolted together, where practicable. Information for such frame junctions is, in general shown on the framework assembly drawings.

6.1.2 Where the amount of offset between the uprights is slight (as in the case of the 1-3/4" and 2" front guard rail frames) the uprights may be bolted together by enlarging the hole normally used for this purpose, as shown in Figure 6. Where the amount of offset makes it impossible to use the standard top-angle junction clips, an additional hole should be drilled in each of the adjacent uprights at a point approximately 10' 0" above the floor and the uprights bolted together at this point as well as at the hole just above the frame base.

6.1.3 Where the amount of offset between uprights is so great that it would be impossible to bolt adjacent uprights together (as in the case of message register racks in line with No. 1 Crossbar frames), the adjacent frames should be bolted together at the base through the holes in the guard rail gusset plates, 3/8" -16 x 1" RHM screws, hexagonal nuts, and washers should be used for this

purpose. Since the uprights cannot be bolted together, additional auxiliary framing supports will be required at the tops of these frames, as covered in other sections of this handbook.

6.1.4 In certain cases, frame base fillers are furnished in the base of bulb angle sheet metal base frames in order to provide space between the uprights of adjacent bays for cabling or maintenance reasons. This space varies from the 1" provided between crossbar interrupter bays for bearing adjustments to the 3-1/2" provided for heavy cabling at fuse bays. In any case, the frame base filler makes it impossible to bolt adjacent uprights directly together. The frame bases will be joined together, however, by bolting the guard rail gusset plates of the frames involved to the frame base filler. Bent bracket details are usually furnished for junctioning the uprights. Where such details are not furnished, as for example between adjacent crossbar interrupter bays, additional auxiliary framing supports will be required at the tops of the frames as covered in this and other sections of the 19 series in this handbook.

6.1.5 Adjacent units of LDF should be bolted together through the holes in the guard rail gusset plates, using 3/8"-16 x 1" RHM screws, hexagonal nuts, and washers, as required.

6.1.6 In cases where cable duct-type frames are junctioned to channel or bulb angle relay racks, additional details are provided for junctioning guard rails, uprights, etc., as shown on framework drawings, such as ED-92466-70.

7. BRACING AND SUPPORTING - GENERAL INFORMATION

7.1 Diagonal bracing is generally used to secure the tops of frames to auxiliary framing and to the ceiling where a bay or lineup extends more than 2'-6" beyond the last pair of framing bars or channels, or where a full bay extends beyond the frame having the last pair of framing bars or channels fastened to it. The method of securing diagonal braces to the tops of frames is illustrated in Figures 35, 36, 36A 38A and 44 of this section.

7.2 Support frames in offices having high-type auxiliary framing to double bar or channel auxiliary framing as shown in Figures 37 to 38 inclusive.

7.3 Use V-Bolts for support of frames in offices having high-type auxiliary framing where the distance between the framing and the frame top angle is 8" or less as in Figures 32 to 34 inclusive.

7.4 In offices having high-type auxiliary framing, use single adjustable braces for support where the distance between the framing and the frame top angle exceeds 8" but does not exceed 1'-6". Install adjacent brace supports on opposite sides as shown in Figure 35.

7.4.1 If frames are not rigid or the angle of braces greatly exceeds 45 degrees with the horizontal, use double braces as shown in Figure 36.

7.5 Use double adjustable braces for supports where the distance between the framing and the frame top angle exceeds 1'-6" (the maximum is approximately 4'-0").

7.5.1 The angle of adjustable brace supports attached to framing bars or channels parallel with the frame top angle should be not less than 15 degrees nor more than 60 degrees from the vertical.

7.6 Support each separate line of frames or racks at least at two points.

7.7 Provide end brace for individual frames standing alone. Use single adjustable brace in line with top angle and at approximately 45 degrees from the vertical.

7.8 Attach adjustable braces to hanger rods as shown in Figure 37 and to a junction of primary and secondary framing bars or channels as shown in Figure 38. Figure 37 shows optional method of assembling the brackets associated with the adjustable rod braces. The same optional methods may be used in any of the brace rod assemblies shown herein.

7.9 Angle-type frames arranged for low-type framing in building bay areas with high-type framing which may ultimately be changed to low-type framing areas should be supported as shown in Figure 38A.

7.10 High-type auxiliary framing should not be installed for the support of frames in mill-constructed buildings. Where low-type auxiliary framing is not specified, use adjustable brace supports fastened with lag screws at the ceiling, wooden beams, or girders as shown in Figures 35 and 36, or use V-bar frame supports as shown in Figures 44 and 44A. Avoid fastenings to hollow tile arch, to furring, or to suspended ceilings. In such cases, provide suitable supporting framework attached to nearest beams or girders.

7.11 Where the ceiling construction consists of substantial exposed timbers, beams, or planking, as in mill constructed buildings, the wooden strips shown in Figures 35, 35, 44, and 44A may be omitted and the supports attached directly to the ceiling.

8. VERIFICATION ITEMS

		<u>REFERENCE</u>	
	<u>BRIEF STATEMENT OF REQUIREMENTS</u>	<u>PAR. NO.</u>	<u>FIG. NO.</u>
8.1	<u>Frame Junctions</u>		
8.1.1	Junctions made as shown on equipment drawing	6.11	
8.2	<u>Miscellaneous</u>		
8.21	Space between base of frame and floor filled where required.	4.1 to 4.3	

No arrows shown due to extensive changes.

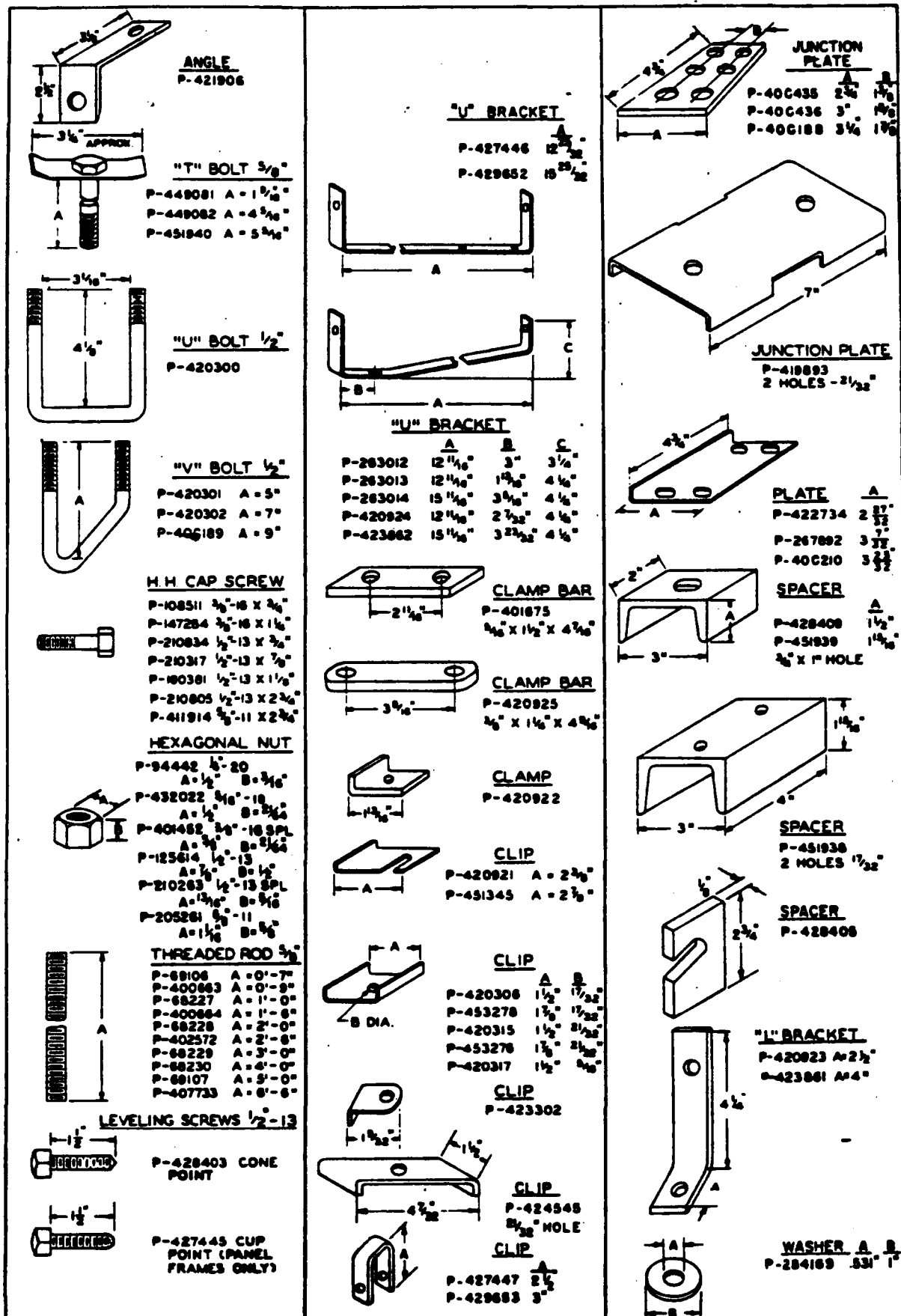
[Vertical line at side of paragraphs
Indicates requirements.

Engineering Planning Manager
(Installation)

Attachments:
Figures

Reason for Reissue:

- (1) Update BSP References.
- (2) Update Figs. 6, 45, on self-drilling anchor.
- (3) Delete power driven frames (panel system frames).



R-2901 PIECE PART CHART ISSUE 4

FIG. 1 CHART OF PIECE PARTS FREQUENTLY USED FOR FASTENING FRAMES
(PARS. 1.2.1 and 1.2.2)

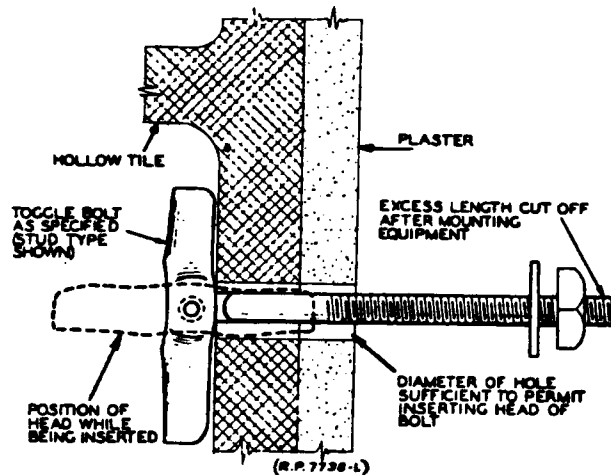
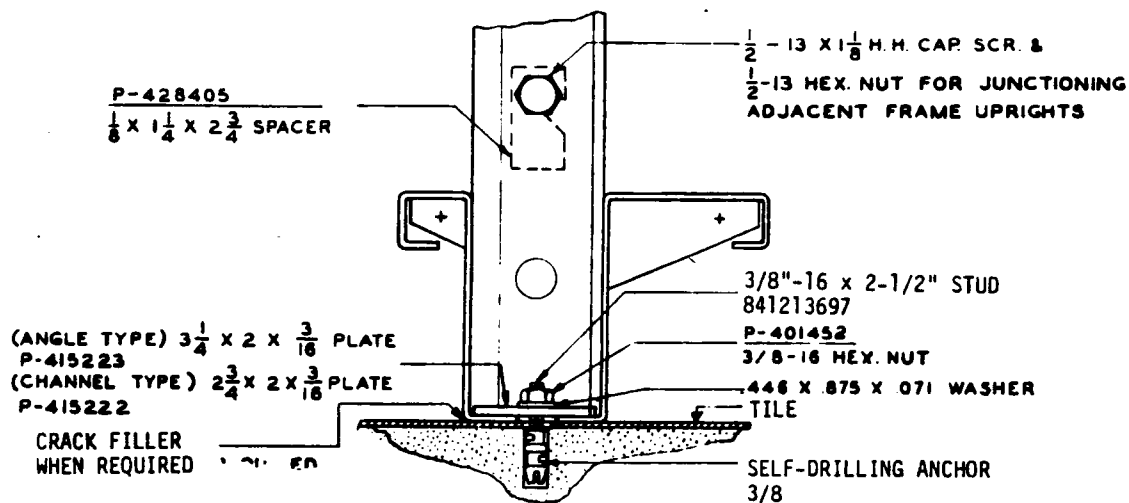


FIG. 2 TYPICAL TOGGLE BOLT
INSTALLATION (PAR. 5.1.1.3)



RP-0689-A

FIG. 6 FASTENING CHANNEL AND ANGLE-TYPE RELAY RACK OR CROSSBAR
FRAMES, HAVING SHEET METAL BASE CONSTRUCTION, TO FLOORS
(ANGLE-TYPE UPRIGHT SHOWN) (PAR. 6.1.2) (BSP 800-614-154
FIG. 6)

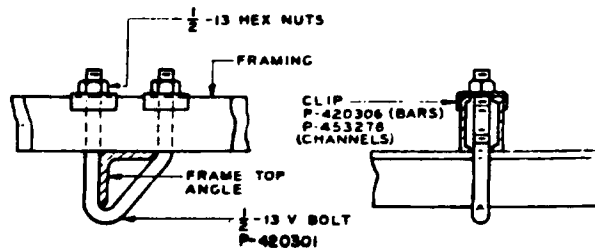


FIG. 32 V-BOLT FRAME SUPPORT - TOP ANGLE ATTACHED DIRECTLY TO FRAMING (PARS. 7.2 and 7.3) (BSP 800-614-156, FIG. 32)

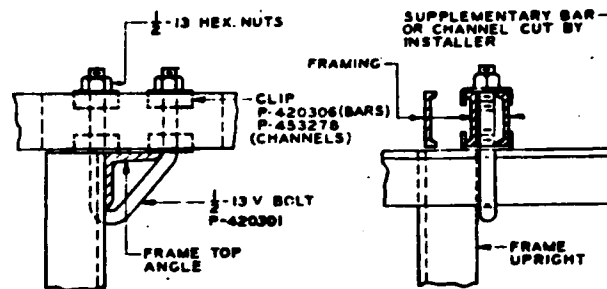


FIG. 3 V-BOLT FRAME SUPPORT - V-BOLT OFFSET TO CLEAR FRAME UPRIGHT (PARS. 7.2 and 7.3) (BSP 800-614-156, FIG. 33)

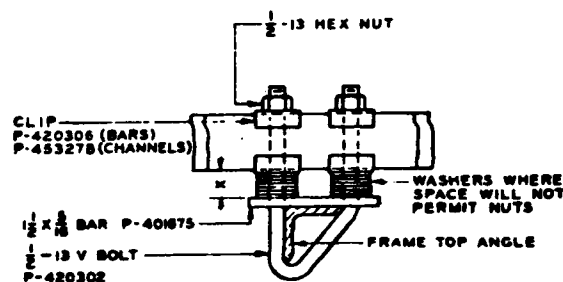
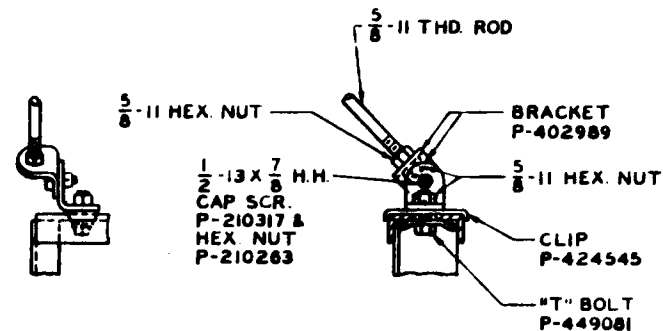
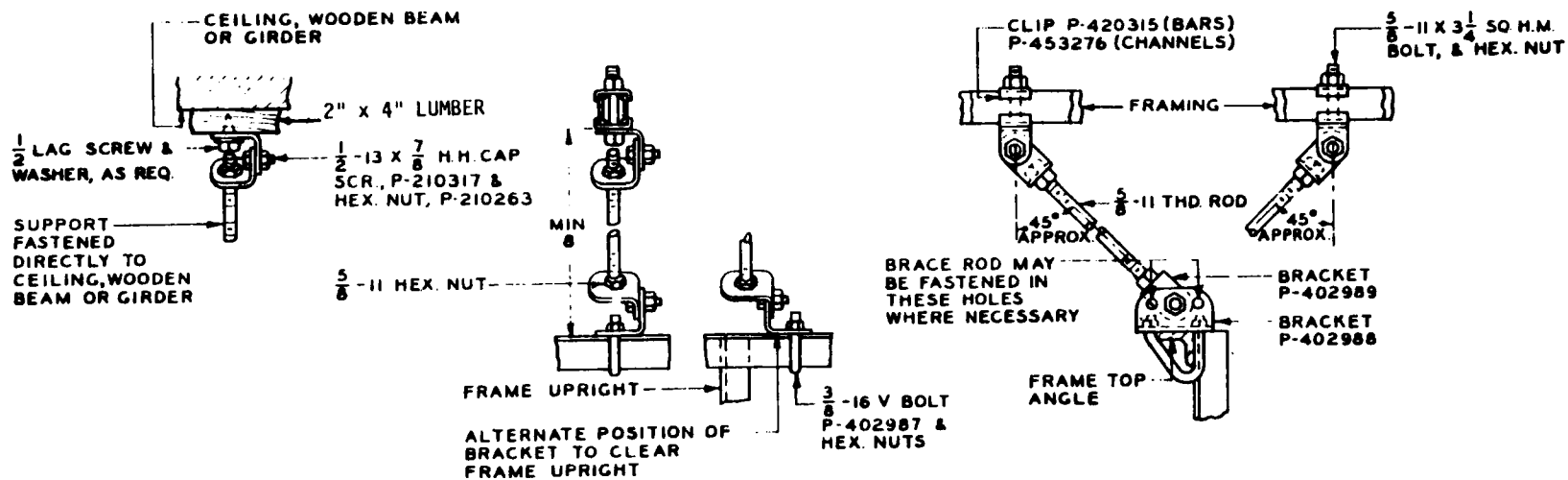


FIG. 34 V-BOLT FRAME SUPPORT ASSEMBLY WHERE DIMENSION "X" IS LESS THAN 1-1/16" (PARS. 7.2 and 7.3) (BSP 800-614-156, FIG. 34)



BRACE RODS FOR FRAMES HAVING TWO TOP ANGLES



BRACE RODS FOR FRAMES HAVING SINGLE TOP ANGLES

FIG. 35 SINGLE BRACE FRAME SUPPORT (PARS. 7.1, 7.2, 7.4, 7.10 and 7.11)
(BSP 800-614-156, FIG. 35)

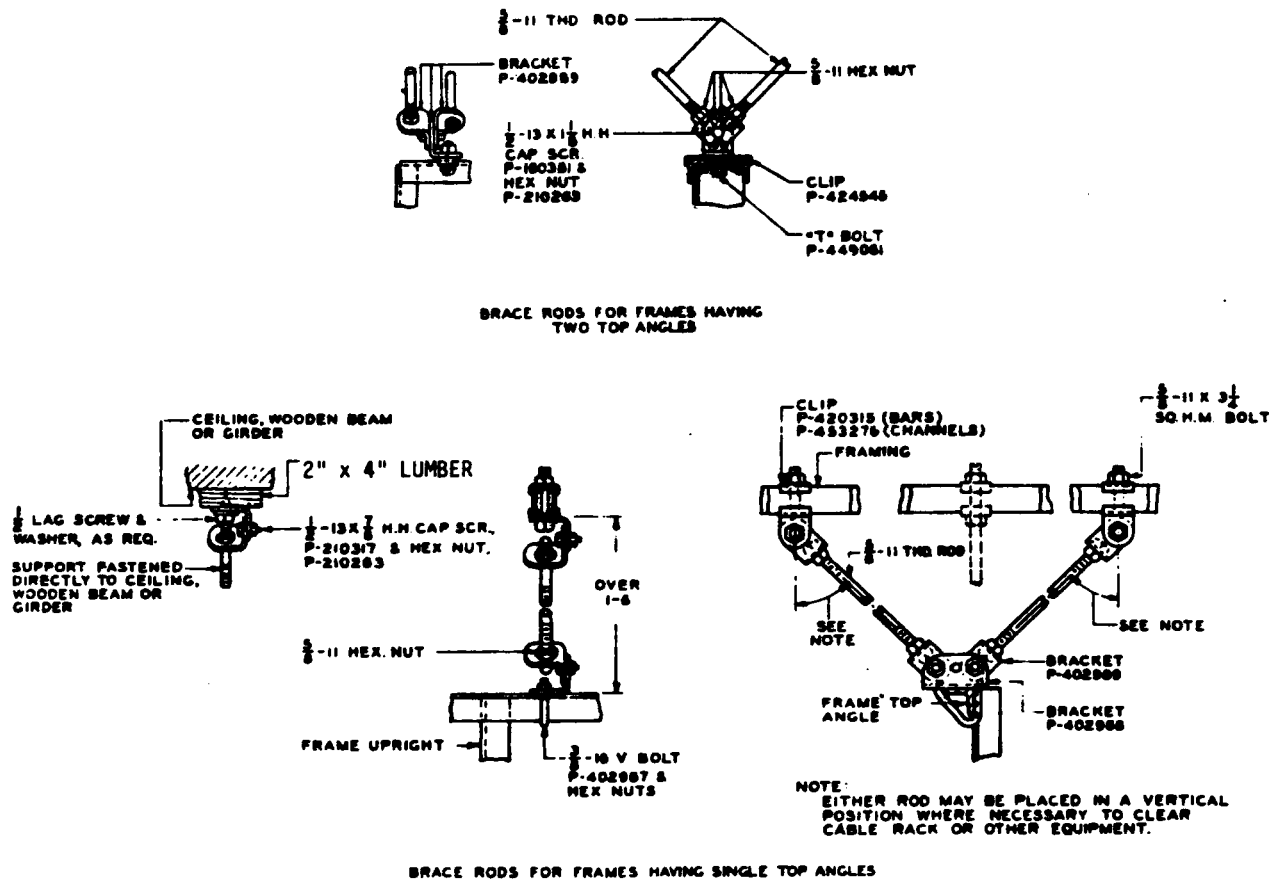


FIG. 36 DOUBLE BRACE FRAME SUPPORT USING THREADED ROD BRACES (PARS. 7.1, 7.2, 7.4.1 and 7.11) (BSP 800-614-156, FIG. 36)

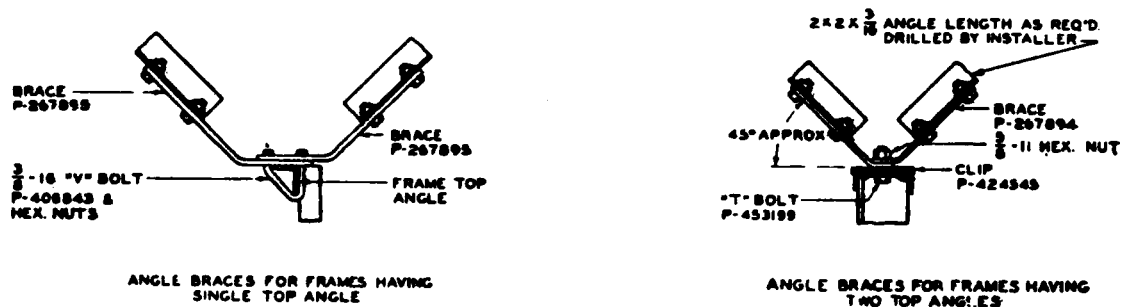
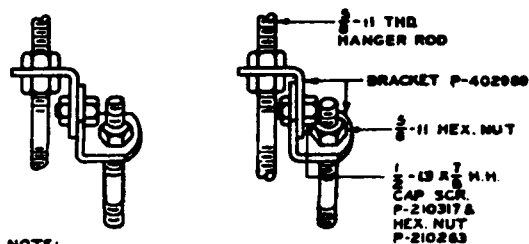


FIG. 36A DOUBLE BRACE FRAME SUPPORT USING ANGLE-TYPE BRACES (PARS. 7.1 and 7.2) (BSP 800-614-156, FIG. 36A)



NOTE:
EITHER ASSEMBLY MAY BE USED.

FIG. 37 BRACE AT HANGER ROD
(PARS. 7.2 and 7.8)
(BSP 800-614-156,
FIG. 37)

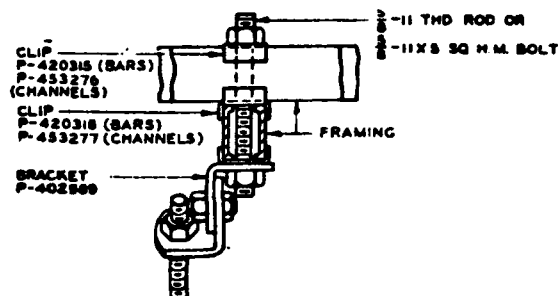


FIG. 38 BRACE ATTACHED AT JUNCTION OF
FRAMING (PARS. 7.2 and 7.8)
(BSP 800-614-156, FIG. 38)

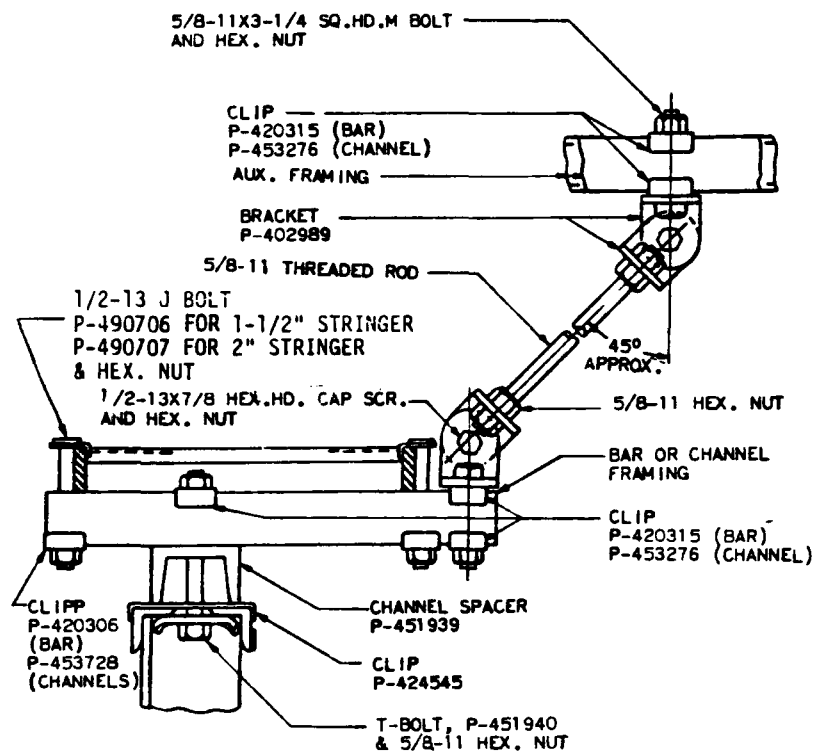
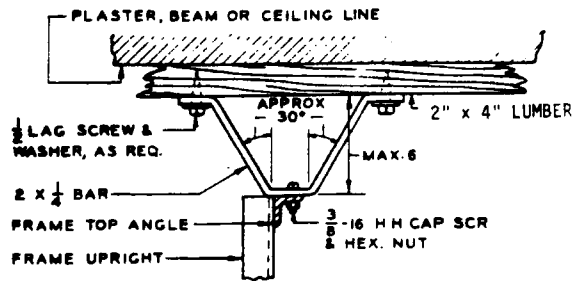
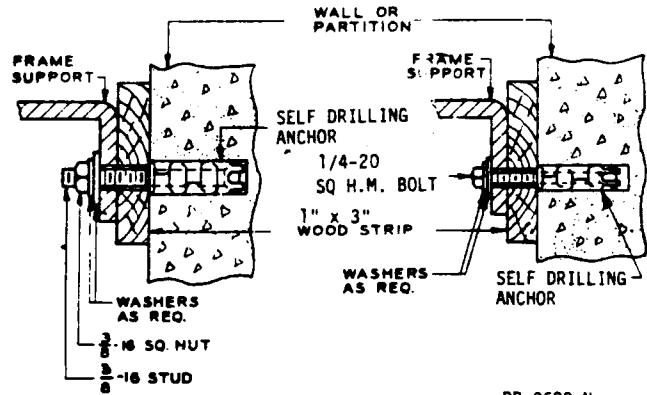


FIG. 38A SUPPORTING ANGLE-TYPE FRAMES ARRANGED FOR LOW-TYPE
FRAMING IN A BUILDING BAY AREA WITH HIGH-TYPE FRAMING
WHICH MAY ULTIMATELY BE CHANGED TO A LOW-TYPE AREA
(PARS. 7.1 and 7.9) (BSP 800-614-156, FIG. 38A)



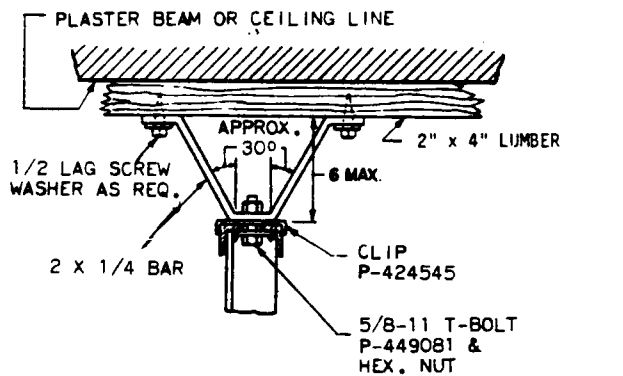
RP-0689-L

FIG. 44 V-BAR FRAME SUPPORT
(PARS. 7.1, 7.10 and
7.11)
(BSP 800-614-156, FIG. 44)



RP-0689-N

FIG. 45 FRAME SUPPORT ATTACHED
TO CEMENT WALL OR PARTI-
TION (PAR. 5.1.2)
(BSP 800-614-156,
FIG. 45)



RP-0689-M

FIG. 44A V-BAR FRAME SUPPORT FOR
BULB-ANGLE-TYPE FRAMES
(PARS. 7.1 and 7.11)
(BSP 800-614-156, FIG. 44A)

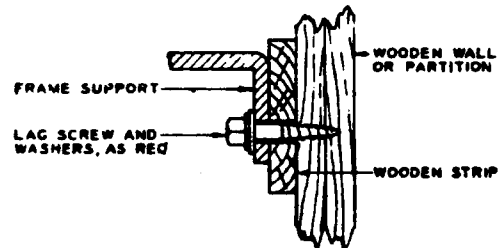


FIG. 46 FRAME SUPPORT ATTACHED
TO WOOD WALL OR PARTI-
TION (PAR. 5.1.2)
(BSP 800-614-156, FIG. 46)