AUXILIARY FRAMING - HIGH TYPE

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1. GENERAL

1.1 Scope of Section

1.11 This section covers the general equipment requirements and procedures applying to the installation of high type framing.

1.2 Associated Information

1.21 General information pertaining to workmanship, definition of terms, general requirements for the assembly and location of equipment, and other information of a general nature pertaining to the installation of equipment will be found in the "General" sections of this handbook.

1.22 Sections of Handbook 3 covering Scaffolding, Ladders, and Stools.

1.23 The Floor, Cabling, Cable Rack, and Auxiliary Framing Plan drawings furnished on the job.

1.24 Sections of Handbook 30 which covers low type auxiliary framing.

1.3 Arrangement and use of BSP figures

1.31 The figures in BSP 800-614-156 are frequently referred to in job specifications and drawings. For this reason, where figures from BSP 800-614-156 are reproduced in this section on High Type Auxiliary Framing, they are numbered to agree with the corresponding figures in the BSP as far as possible. (Where a duplication of figure numbers would result from this procedure, the numbers are followed by a letter for the purpose of differentiation.) Such figures are identified in the sections by a note beneath each figure title.

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1.4 Piece Part Information

1.41 The R-2904 Piece Part Chart is a large reproduction similar to Figure 1A, which may be located near piece part bins on the job for ready identification of some of the more common piece parts. While it is intended that the list as shown in Figure 1A include all parts which otherwise might be difficult to identify, it will be impracticable to keep the list up-to-date at all times.

1.5 Precautions

1.51 General safety precautions against personal injury and equipment damage are outlined in the "General" sections of this handbook. Precautions applying to specific operations are listed with the associated paragraphs in this section.

1.6 Requirements

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

1.7 Verification

1.71 Items for the verification of the equipment installed by the operations covered in each section are listed at the end of that particular section.

1.72 Where practicable, the essentials of the requirement are included in the verification item. Where this is not practicable, a brief statement of the requirement appears as one or more subparagraphs of the verification item. In each case, a reference is made to the complete requirement.

1.8 Ceiling Heights

1.81 The location and arrangement of the auxiliary framing will, in most cases, be controlled by the ceiling heights. The usual difference of 6 inches between the girder heights and the beam or slab height is sufficient to accommodate the two levels of framing above the girder line.

1.82 Ceiling heights were formerly measured to the main girders, ceiling slabs, beams, or projections. Because the most economical types of structural floor systems differ in various areas and because there are numerous variations in the size and arrangement of ventilating ducts, ceiling heights are now measured in terms of minimum clearances under all obstructions that are needed to insure a straightforward and economical cabling job.

1.83 To provide a quick reference, Table A lists the various types of equipment rooms and the associated minimum clearances under all obstructions.

TABLE A

Type of Equipment Room	Minimum Clearance Under All Obstructions
No. 1 and No. 5 Crossbar, Crossbar Tandem, and Step-by-Step	13 Feet 0 Inch
Protector MDF	
12-Foot 5-Inch Frame	13 Feet 0 Inch
14-Foot 5-Inch Frame	15 Feet 0 Inch
Double-Sided 14-Foot 5-Inch Frame	15 Feet 6 Inches
Toll Terminal (Broadband Carrier)	13 Feet 6 Inches
Combined Local Dial and Toll Terminal	13 Feet 6 Inches
No. 4A Toll Crossbar	13 Feet 6 Inches

1.9 Types of Framing

1.91 Standard low type auxiliary framing consist of pairs of 2" x 3/8" bars, or 2" x 9/16" x 3/16" channels. Some of the fastening details are common to both framing bars and channels. The details used in either case are shown on the figures of this section.

1.92 If hardened steel bars or channels are furnished on a job, they will have their ends painted red for identification purposes. When hardened steel auxiliary framing is encountered, it should either be cut with the R-2557 Power Hack Saw or when cut by hand, an R-2767 Flexible Hand Hack Saw Blade should be used.

2. TOOLS REQUIRED

2.1 In addition to the tools supplied in the general kits, the tools listed below may be required for the operations.

2.11 Tools

R-2557	Saw, Hack, Power, Portable
R-2923	Scaffold, Mobile Aluminum (See Section 11A)
R-3472	Scaffold, Wide Mobile
R-2767	Flexible Hand Hack Saw Blade
R-2469	5/8" - 11 Tap

3. ARRANGEMENT OF CEILING INSERTS AND OTHER CEILING FASTENINGS

3.1 Equipment areas are usually provided with beam clamps, ceiling inserts, embedded ceiling channel (Unistrut), or other devices arranged for fastening auxiliary framing to the ceiling.

3.11 A commonly used beam clamp manufactured by the Grinnell Company is shown in Figure 1. The usual size clamp may be attached to beam flanges 2-3/8 inches to 7 inches in width. Larger clamps are available for beam flanges up to 15 inches in width. The sockets of the spindles of these clamps are tapped for 5/8-11 thread.

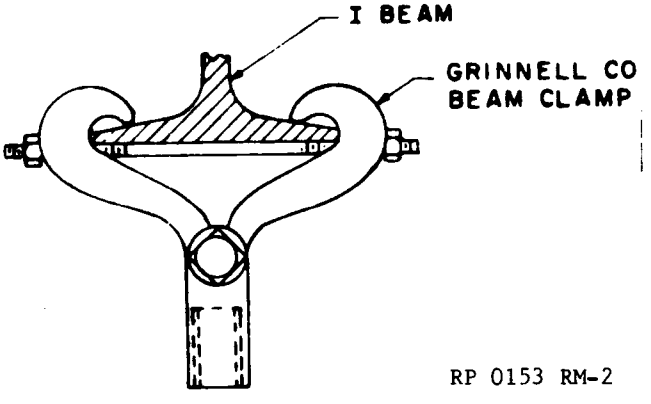


FIG. 1 TYPICAL BEAM CLAMP INSTALLED BY TELEPHONE COMPANY-GRINNELL COMPANY TYPE CLAMP SHOWN (PAR. 3.1) (BSP 800-614-156 FIG. 1)

3.2 Ceiling Inserts

3.21 An example of the ceiling inserts furnished is shown in Figure 2. They are embedded in the ceiling slabs on the desired insert centers during the building construction.

A 5/8-11 brass marker bolt to fit the 5/8-11 tap in the insert is also furnished with ceiling inserts.

3.211 The R-4221 Ceiling Insert Testing Tool shall be used to test all "questionable" concrete embedded ceiling inserts.

3.212 To test a "questionable" ceiling insert, screw the threaded rod (Figure 6E) into the insert approximately seven turns, and then tighten the hex nut until the Spring Bearing Plate comes in contact with the Support Tubing.

3.213 This test imparts a 1,000 lb. load to the insert. All concrete embedded inserts should be able to withstand a safe load of 1,200 lbs. Therefore, the 1,000 lb. test will not (if the insert is properly installed) cause any damage whatsoever to the insert or the concrete.

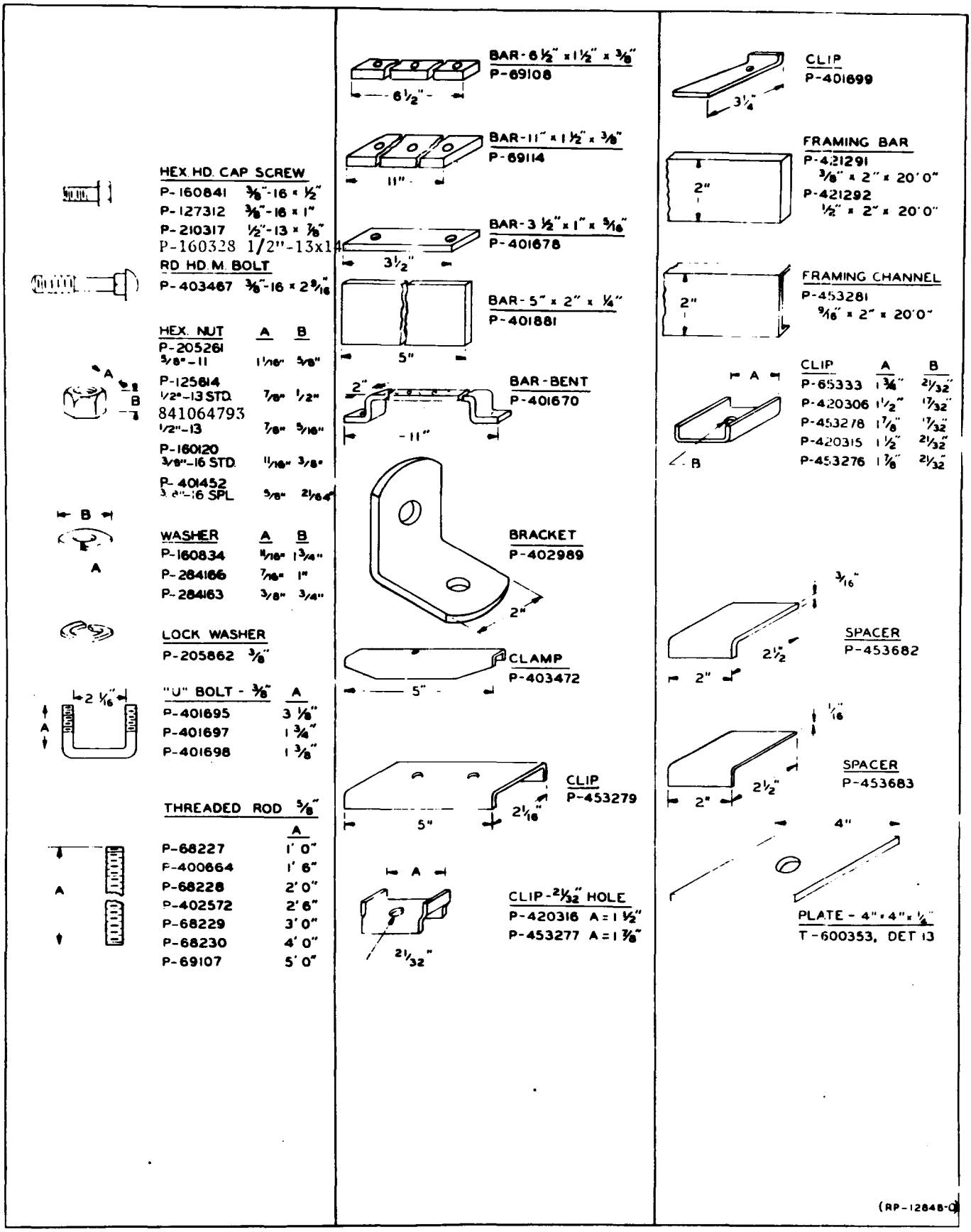
3.22 Continuous channel inserts are embedded in the concrete ceiling in parallel rows which are normal to the equipment bay lineups and extend over all the equipment area. 5/8-11 spring nuts, as required, are furnished for fastening threaded hanger rods or ceiling braces as shown in Figure 6B or 6C, respectively. Rows are spaced 5 feet 0 inch to 6 feet 0 inch apart.

3.3 Self-Drill Anchors

3.31 Self-Drill Anchors for supporting threaded rods from ceilings are to be installed only when their use and type are specified by the telephone company.

3.32 Self-Drill Anchors are used for braces, and similar occasional ceiling attachments in areas not supplied with ceiling inserts, such as may occur in power rooms. 5/8"-11 Self-Drill Anchors as shown in Figure 3, or an approved equivalent, should be used assuming that the ceiling is of good grade of stone concrete and provided such ceiling attachments are not to be used for the direct support of loads in excess of 500 pounds per support.

3.4 Hanger bolts, as shown in Figure 4, are occasionally used for the support of heavy loads in parts of the building where other attachments have not been provided.



R-2904 PIECE PART CHART ISSUE 1

FIG. 1A PIECE PARTS FREQUENTLY USED IN THE INSTALLATION OF HIGH TYPE AUXILIARY FRAMING (PAR. 1.41)

3.5 Ceiling inserts or beam clamps will be located over the entire area of the floor space assigned for telephone equipment as shown in Figure 5.

3.6 Use 5/8"-11 threaded rods to support the auxiliary framing or other equipment from ceiling inserts, beam clamps or expansion shields, as shown in Figures 3 and 6. These rods should be threaded their entire length. A 5/8"-11 hex. nut and 1-3/4" washer should be used at the ceiling on all hanger rods and bolts regardless of the type of finish on the ceiling or the kind of support, as shown in Figures 3, 4 and 6. Where false or suspended ceilings are encountered, use an additional 1-3/4" washer and two 5/8"-11 nuts on each rod, placing the washer below the ceiling with one nut to hold it in place against the ceiling and the other to serve as a locknut as shown in Figure 6A.

3.61 When used with beam clamps, threaded rods should be screwed into the clamp socket as far as possible, then backed away approximately one full turn to prevent binding, after which the locknut is tightened.

3.611 Maximum strength will be insured by screwing the threaded rods into the beam clamps, sockets or ceiling inserts at least seven full turns. However, a greater number of turns is desirable.

NOTE: The construction of Kneas sockets having a loose nut permits the threaded rod to hang vertically even though the socket may be slightly out of square with the ceiling. Certain types of ceiling inserts similar to that shown in Figure 6B are sometimes encountered. With this construction the inserts must be square with the ceiling to insure a vertical hanger rod. Where they are not installed squarely, the rods should be bent into alignment after installing.

3.612 Ceiling inserts and beam clamps sometimes become rusty or filled with concrete. When these conditions are encountered, the inserts or beam clamps should be cleaned out with the R-2469 5/8" - 11 Tap.

3.62 The installing of hanger rods through ventilating ducts is not a standard practice. However, there are some occasions when this arrangement is necessary and is called for in the job specifications or drawings. When a hanger rod is so located, an additional 1-3/4" washer and two 5/8" -11 nuts are to be used on the bottom side of the duct. The nuts and washer should be assembled as indicated in Paragraph 3.6.

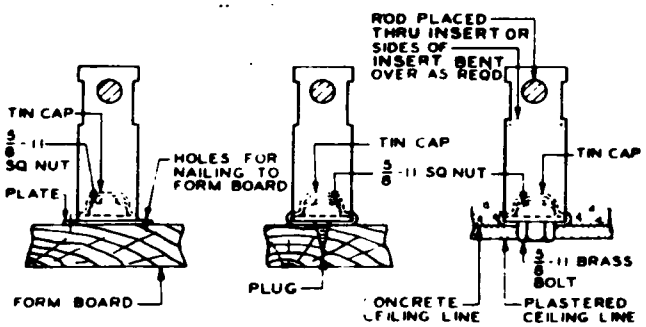


FIG. 2 CEILING INSERT AS INSTALLED BY TELEPHONE COMPANY (PAR. 3.1) (BSP 800-614-156 FIG. 2)

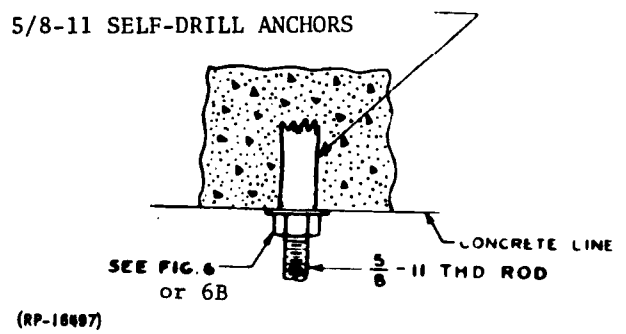


FIG. 3 SELF-DRILL ANCHOR FOR HANGER ROD (PARS. 3.31, 3.6) (BSP 800-614-156 FIG. 3)

3.63 In general, hanger rods or threaded rods used for braces should not be spliced. However, where splicing cannot be avoided, splices should be made in accordance with Figure 75 of Section 13.1 covering the installation of cable racks. In no case should the hanger rods used for the support of mezzanine platforms be spliced.

3.64 Threaded rod 5/8" in diameter, used for the support of auxiliary framing, for braces, for supporting mezzanine platforms, etc., is available under the following piece parts.

Piece Part	Length of Rod
P-420303	0'-4-1/2"
P-69106	0'-7"
P-400663	0'-9"
P-68227	1'-0"
P-400664	1'-6"
P-68228	2'-0"
P-402572	2'-6"
P-68229	3'-0"
P-68230	4'-0"
P-69107	5'-0"
P-407733	6'-6"

4. ARRANGEMENT OF AUXILIARY FRAMING

4.1 Planning

4.11 An arrangement for the approximate location of the framing bars or channels for any particular office is shown on the cabling, cable rack and auxiliary framing plan drawings furnished the job. These drawings should be checked for conditions mentioned below. Deviation from the arrangements shown may be made by the installer where desirable.

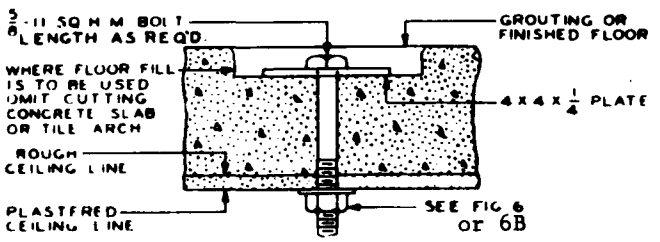


FIG. 4 HANGER BOLTS USED WHERE BEAM CLAMPS OR CEILING INSERTS ARE NOT PROVIDED (PARS. 3.4, 3.6) (BSP 800-614-156 FIG. 4)

4.111 Primary framing located under ceiling inserts.

4.112 Primary framing located so as to permit the secondary framing being installed at right angles to the frames they support.

4.113 Auxiliary framing which supports frames and racks located so as to support associated, ladder track, cable rack and conduit.

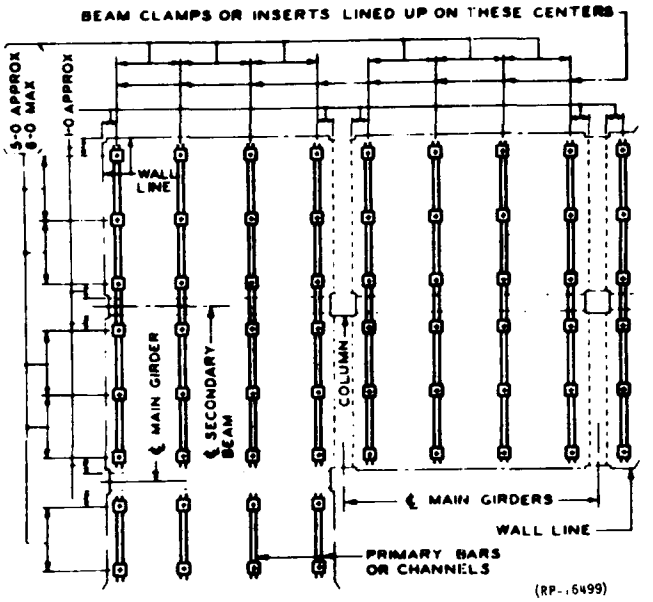


FIG. 5 LAYOUT OF BEAM CLAMP OR INSERTS AND PRIMARY BARS OR CHANNELS (PARS. 3.5, 4.21) (BSP 800-614-156 FIG. 5)

4.2 Levels of Framing

4.21 "Double level" auxiliary framing is the most commonly used type in areas where high framing is specified. Upper level or "primary" bars or channels should be spaced 5'-0" to 6'-0" apart directly under the ceiling inserts, beam clamps or other ceiling attachments, as shown in Figure 5. "Secondary" bars or channels are usually fastened at right angles to the underside of the primary framing as shown in Figure 7, although in cases where additional headroom is required the secondary framing may be placed above the primary bars or channels.

4.211 In a "3-bar" framing system, as formerly used over panel and step-by-step frames, the secondary bars are placed on flat above or below the primary bars or channels as shown in Figure 8.

4.22 "Single-level" auxiliary framing, as shown in Figures 9 and 10, is used where additional headroom is required, but its use should be restricted because of the excessive amount of cutting and fitting required for the secondary bars or channels.

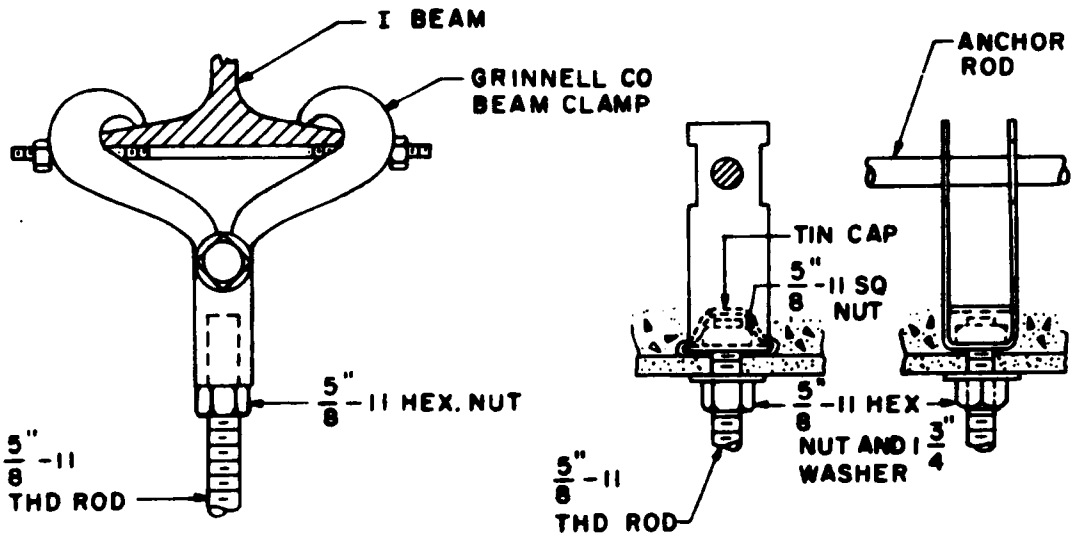


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FIG. 6 HANGER ROD ATTACHED TO BEAM CLAMP OR CEILING INSERT (PAR. 3.6) (BSP 800-614-156 FIG. 6)

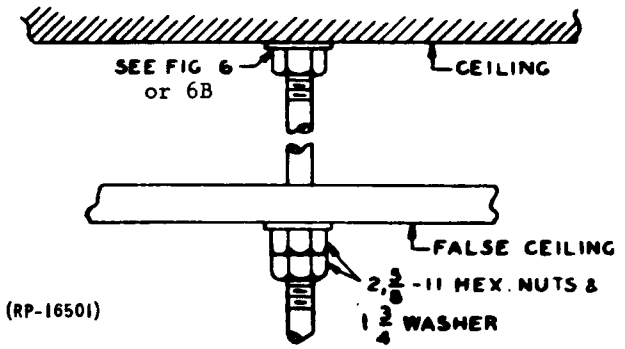


FIG. 6A HANGER ROD PASSING THROUGH FALSE CEILINGS (PAR. 3.6) (BSP 800-614-156 FIG. 6A)

4.23 Height adjustment of bars or channels can be easily obtained by the use of a tool made locally, as illustrated by Figure 19A.

4.3 Length of Bars and Channels

4.31 In order to obtain maximum rigidity, framing bars or channels should be installed in stock lengths (approximately 20') wherever possible.

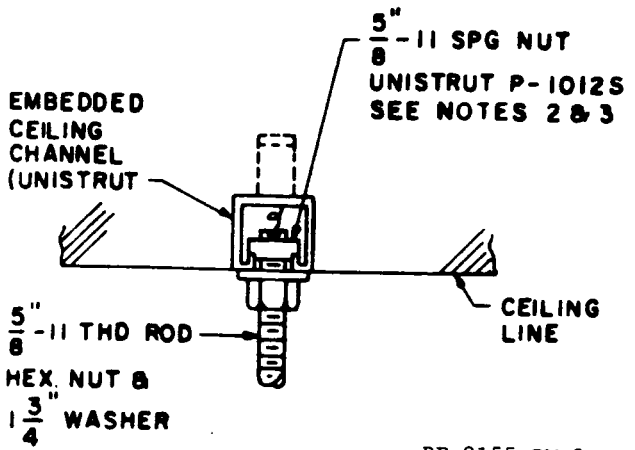
4.32 Channels are not as rigid as bars and may become bent during installation causing them to become wavy in a side-wise direction. If this condition should occur additional clips, P-258449, bolts, P-403467, and nuts, P-401452, should be used as necessary to hold the channels parallel.

4.4 Location and Spacing of Bars or Channels

4.41 All auxiliary framing (both primary and secondary levels) should be supported on approximately 5'-0" to a maximum of 6'-0" centers.

4.411 The 2" x 9/16" x 3/16" channel auxiliary framing should be paired with the backs of the channels to the outside as shown in Figure 7.

4.42 Locate rows of primary bars or channels directly under the ceiling inserts, as shown in Figure 11, throughout the area required for the support of the equipment.



NOTES:

1. The threaded rod shall be turned into the Unistrut nut so that at least three threads protrude beyond the end of the nut.

2. Where P-3300 Unistrut channel is provided, 5/8-11 spring nut, Unistrut, P-4012S shall be used.

3. Where Kendorf channel is provided, 5/8-11 hard steel nut, Steel City Electric Co. B-914 shall be used.

FIG. **6B** FASTENING CEILING HANGER ROD TO EMBEDDED CEILING CHANNEL (UNISTRUT) (PAR. 3.22) (BSP 800-614-156 FIG. 6B)

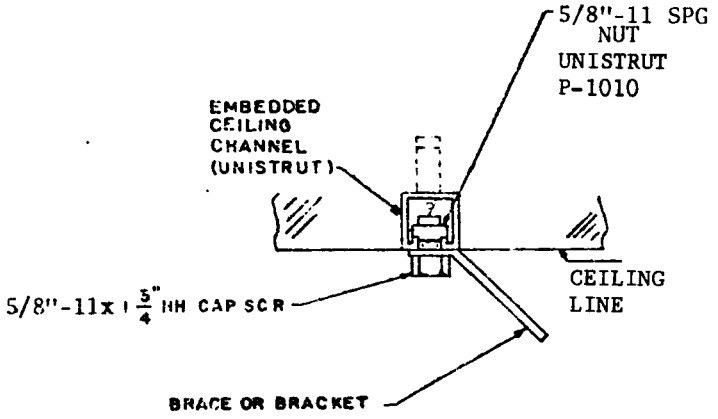


FIG. **6C** FASTENING AUXILIARY FRAMING - BRACE TO EMBEDDED CEILING CHANNED (UNISTRUT) (PAR. 3.22) (BSP 800-614-156 FIG. 6C)

4.421 To insure that each length of bar has two supports, it is necessary at times to cut and install in one run two sets of bars of less than stock length.

4.43 Locate rows of secondary bars or channels at right angles to the primary framing, spaced as required to support the particular frameworks or equipments properly in their assigned locations.

4.44 The framing bars or channels for an area covered by continuous rows of framing should be at approximately the same level. Bars or channels at different levels may be used where they are not in continuous rows.

4.45 Locate the lower level of framing so that the underside of the bars or channels are not lower than the underside of the main girders. Where headroom permits, the primary framing may be dropped to clear the main girders.

4.46 Place secondary framing above primary framing where additional headroom is required and space above the primary bars or channels is available.

4.47 Provide only primary framing where frame or rack supports are such that framing bars or channels located under inserts can be fastened to frames at right angles to the lengths of the frame or racks.

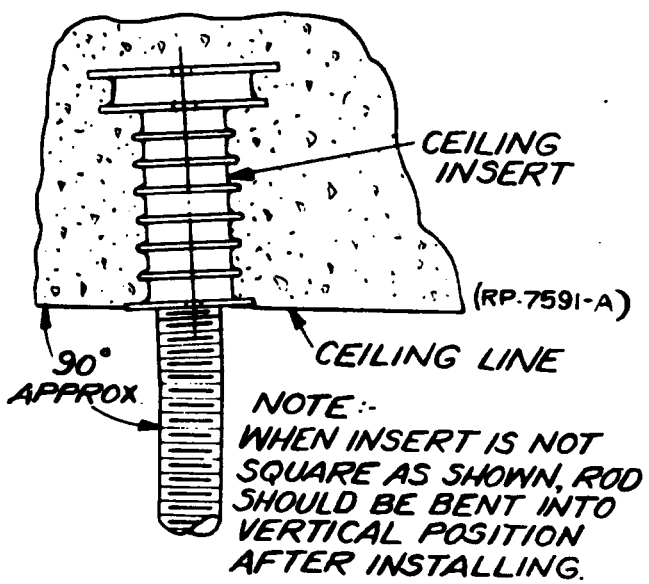


FIG. **6D** CAST TYPE CEILING INSERT (PAR. 3.611 NOTE) (BSP 800-614-156 FIG. 6D)

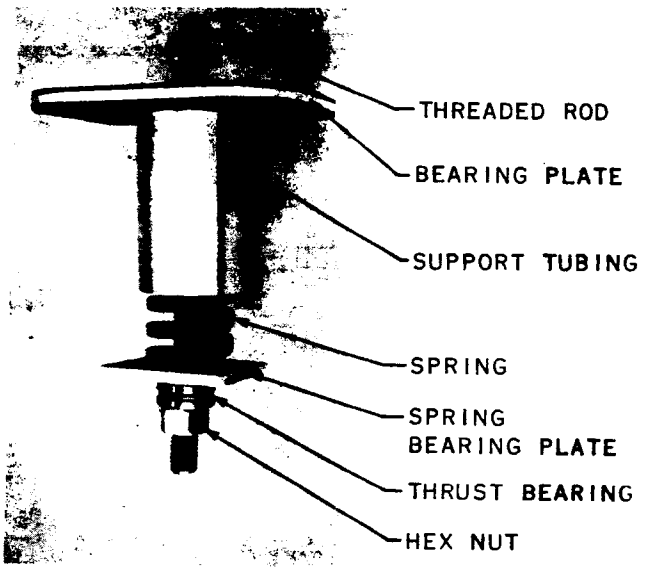


FIG. 6E R-4221 CEILING INSERT TESTING TOOL (PAR. 3.212)

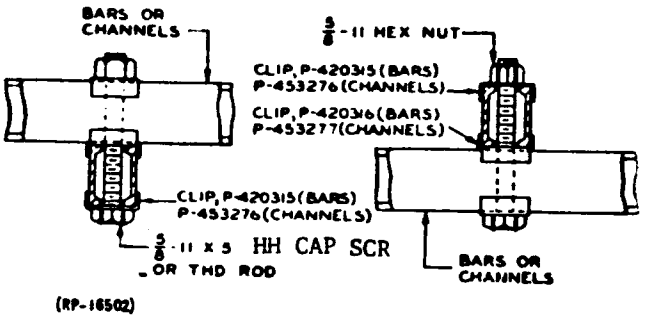


FIG. 7 DOUBLE-LEVEL AUXILIARY FRAMING DOUBLE BARS OR CHANNELS ATTACHED TO DOUBLE BARS OR CHANNELS (PARS. 4.21, 4.411) (BSP 800-614-156 FIG. 7)

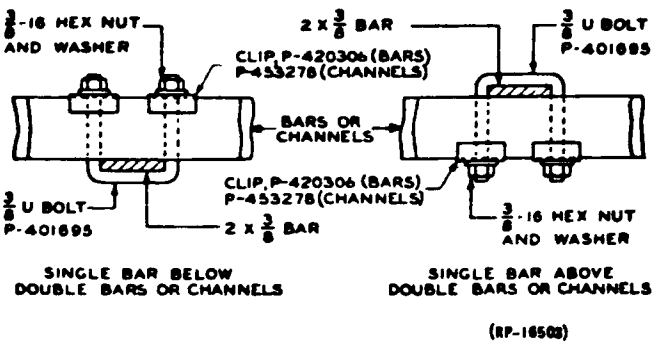


FIG. 8 DOUBLE-LEVEL AUXILIARY FRAMING-SINGLE BARS ATTACHED TO DOUBLE BARS OR CHANNELS (PAR. 4.211) (BSP 800-614-156 FIG. 8)

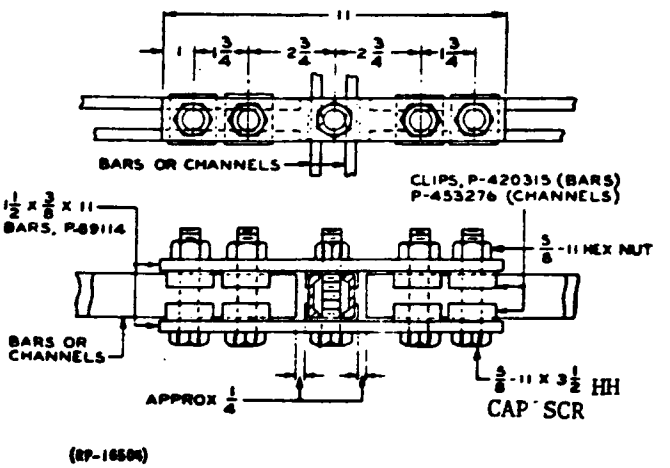


FIG. 9 SINGLE-LEVEL AUXILIARY FRAMING - INTERSECTION OF PRIMARY AND SECONDARY BARS OR CHANNELS (PAR. 4.22) (BSP 800-614-156 FIG. 9)

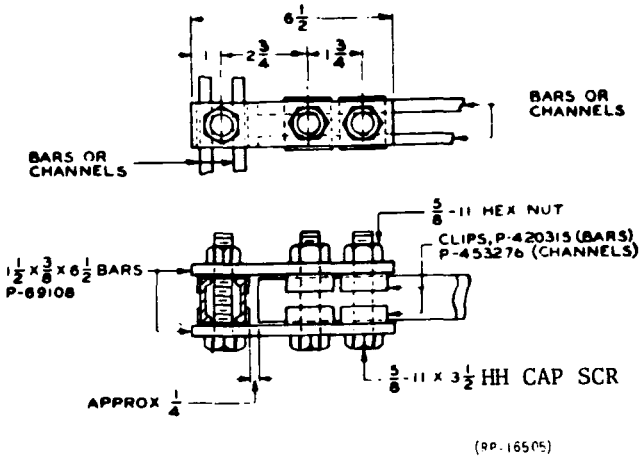


FIG. **10** SINGLE-LEVEL AUXILIARY FRAMING - JUNCTION OF PRIMARY AND SECONDARY BARS OR CHANNELS (PAR. 4.22) (BSP 800-614-156 FIG. 10)

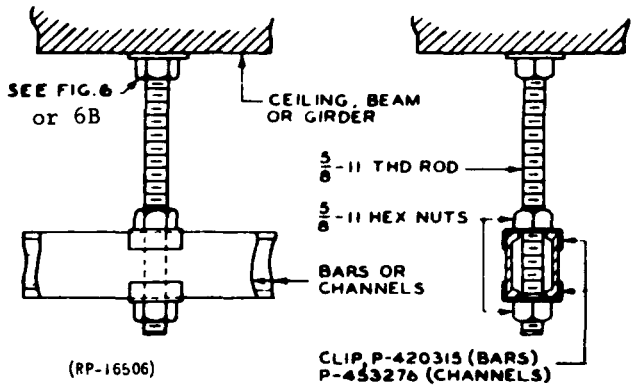


FIG. **11** DOUBLE BARS OR CHANNELS ATTACHED TO HANGER RODS (PAR. 4.42) (BSP 800-614-156 FIG. 11)

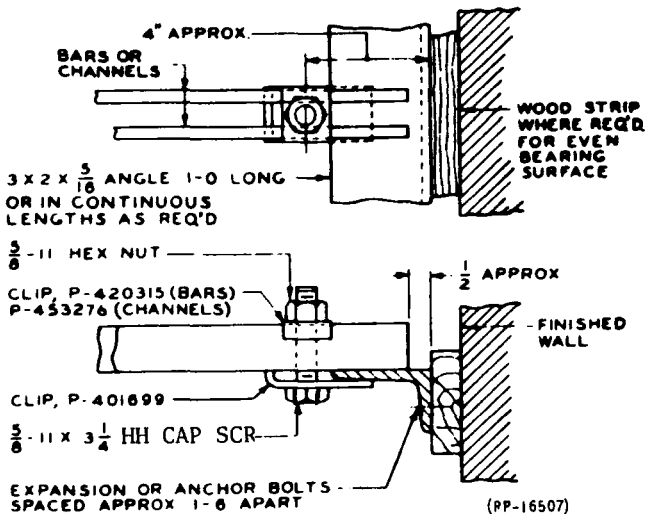


FIG. **12** DOUBLE FRAMING ATTACHED TO WALLS (PARS. 5.313, 5.51) (BSP 800-614-156 FIG. 12)

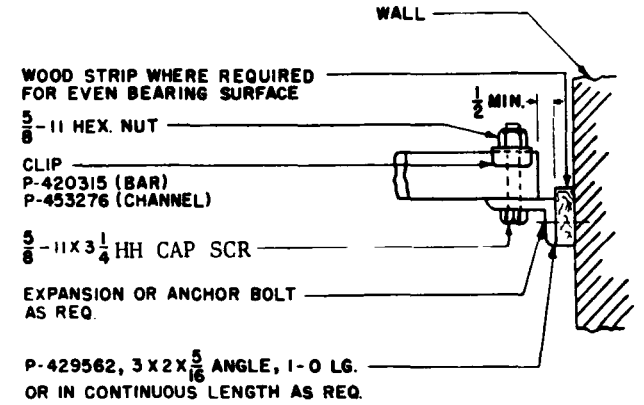


FIG. **12A** DOUBLE FRAMING ATTACHED TO WALLS WHERE ANGLE IS DRILLED (PARS. 5.313, 5.51) (BSP 800-614-156 FIG. 12A)

4.5 Arrangement Over Mezzanine Platforms and Distributing Frames

4.51 At mezzanine platforms provide secondary bars or channels located lengthwise directly above the platform supports at approximately 14'-6" to 15'-0" high to provide headroom and cabling clearance without the use of excessively long platform hanger rods.

4.52 Splices in framing bars or channels supporting distributing frames and associated mezzanine platforms should be avoided wherever possible. Where necessary, they shall be located within 1'-0" of a support.

4.53 Locate framing as high as practicable above distributing frames to provide cabling clearance and headroom.

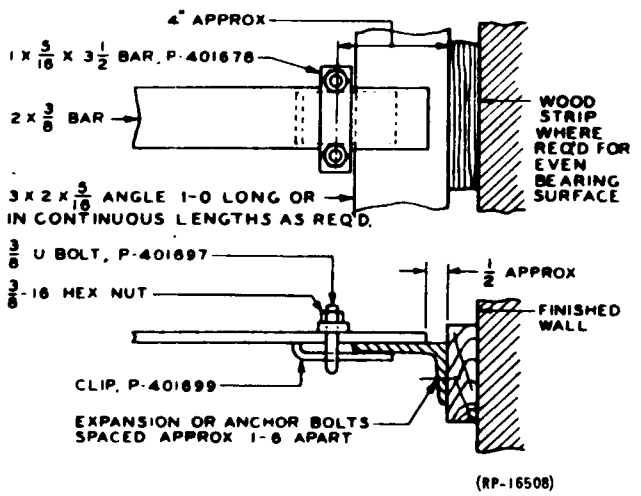


FIG. 13 SINGLE FRAMING ATTACHED TO WALLS
(PARS. 5.313, 5.51)
(BSP 800-614-156 FIG. 13)

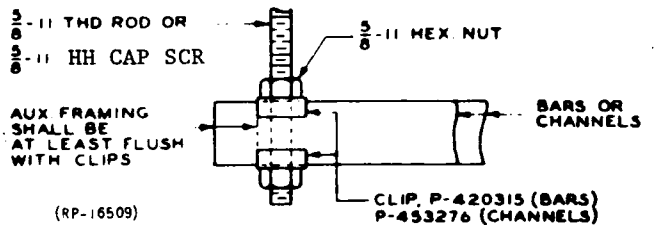


FIG. 14 HANGER RODS OR BOLTS ATTACHED AT ENDS OF DOUBLE BARS OR CHANNELS
(PAR. 5.313)
(BSP 800-614-156 FIG. 14)

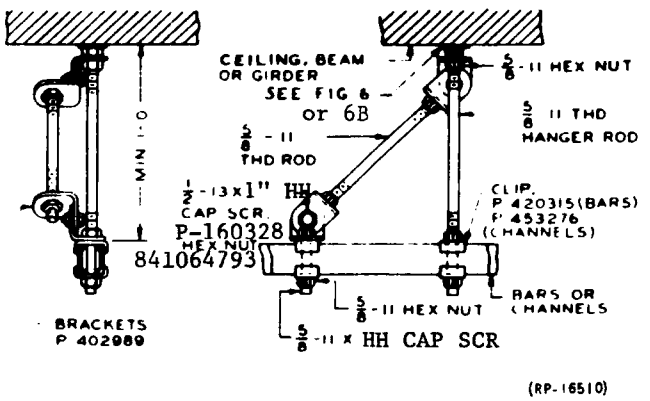


FIG. 15 BRACING UPPER LEVEL FRAMING
(PAR. 5.321)
(BSP 800-614-156 FIG. 15)

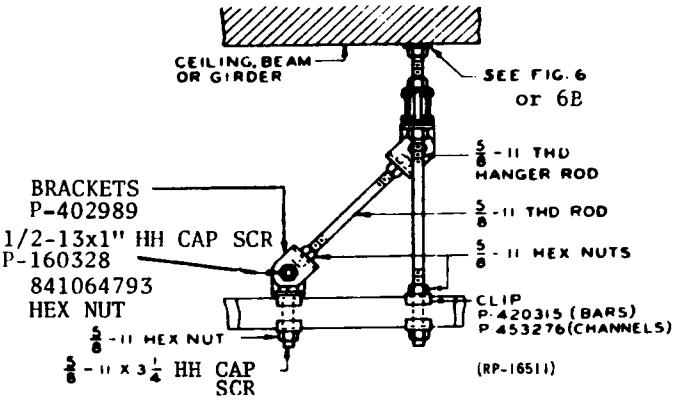


FIG. 16 BRACING LOWER LEVEL FRAMING
(PAR. 5.321)
(BSP 800-614-156 FIG. 16)

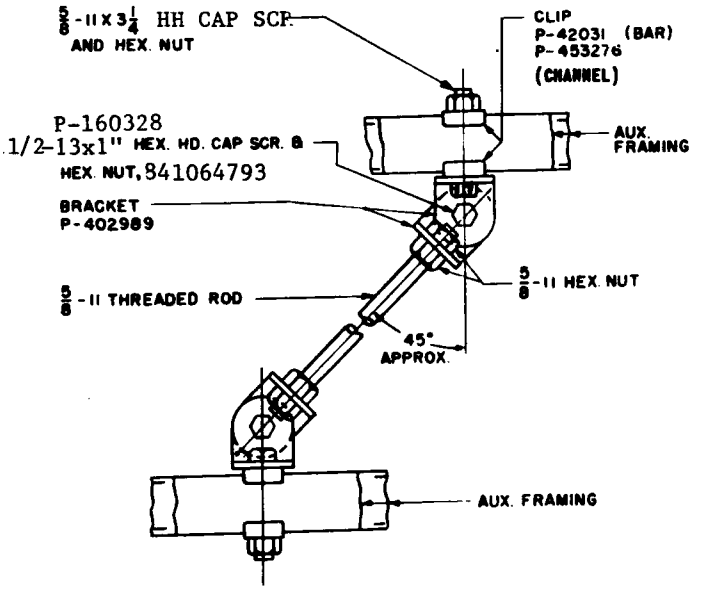


FIG. 16A BRACING LOWER LEVEL FRAMING PARALLEL TO HIGHER LEVEL FRAMING (PAR. 5.321)
(BSP 800-614-156 FIG. 16A)

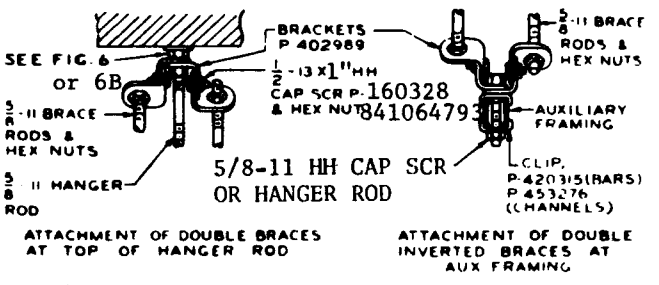


FIG. 17 ATTACHING DOUBLE BRACES
(PARS. 5.321, 5.321(b))
(BSP 800-614-156 FIG. 17)

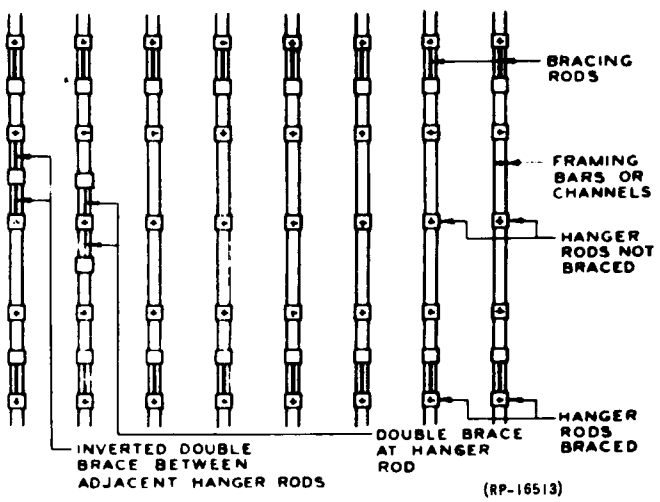


FIG. 18 TYPICAL LAYOUT OF BRACING DETAIL (PARS. 5.321(a), 5.321(b)) (BSP 800-614-156 FIG. 18)

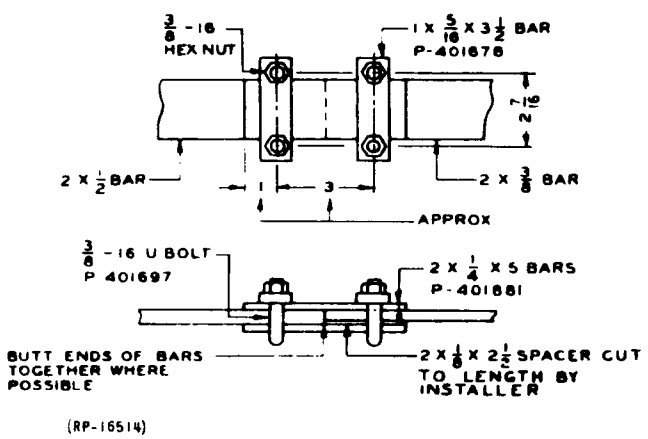


FIG. 19 SPLICING SINGLE 2" X 3/8" BAR TO 2" X 1/2" BARS (PAR. 5.211) (BSP 800-614-156 FIG. 19)

4.6 Arrangement Under Beams and Girders

4.61 Provide auxiliary framing under beams or girders only where required for the support of frames, racks or other equipment. Figures 22 to 25, inclusive, cover various arrangements of framing under beams or girders.

4.7 Arrangement Under False Ceilings

4.71 Place auxiliary framing below false ceilings, ventilating ducts or other obstructions at the ceiling. The framing should be hung from the main ceiling beams or girders.

4.8 Arrangement at Cable Holes

4.81 Provide auxiliary framing at cable holes and other openings in floors or walls as required to support the cable racks. Care should be taken that the framing will not interfere with the cabling at these openings.

5. INSTALLING AUXILIARY FRAMING

5.1 General Installation Procedure

5.11 The most satisfactory sequence, with respect to the installation of auxiliary framing, cable rack and frames, has been found to be as follows:

(a) Install primary framing and secondary framing first, supporting it by means of threaded rods from ceiling inserts.

(b) Install cable rack.

(c) Erect frames.

NOTE: The installation of cable racks and the erection of frames are covered in other sections of this handbook.

5.2 Splicing of Bars and Channels

5.21 Where splicing of auxiliary framing is necessary, splices should be made as follows:

5.211 Splice 2" x 3/8" bars to 2" x 1/2" bars, in the case of extensions of old high type framing installations, as shown in Figure 19 and 20. Clamp splices, as shown in Figure 21, should be used where 2" x 3/8" bars are spliced together either in pairs or singly.

5.212 Splice 2" x 3/8" bars or 2" x 1/2" bars to channels as shown in Figure 20A. Splice channels together as shown in Figure 21A.

5.213 The P-390391 3-Hole Splice Plate may be used if the need for such a splice plate would occur. Refer to low type auxiliary framing section in this handbook.

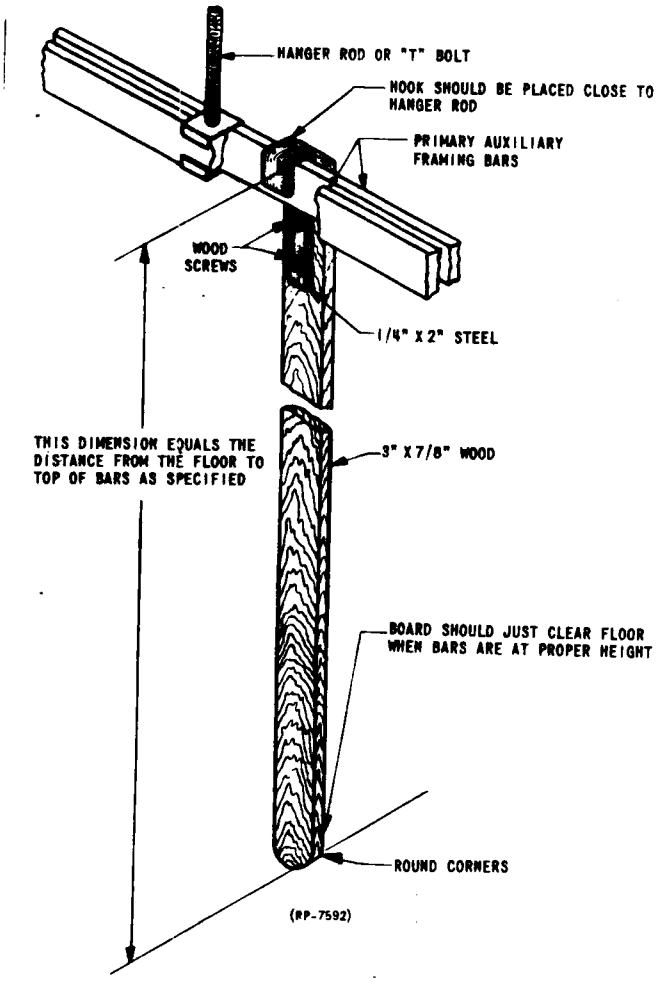


FIG. 19A TOOL FOR DETERMINING HEIGHT OF FRAMING BARS (PAR. 4.23)

5.3 Supporting and Bracing of Bars and Channels

5.31 Supporting

5.311 No pairs of bars or channels used for the direct support of vertical loads, such as cable racks or ladder tracks, should have fewer than two points of support. A splice at the end of a pair of bars or channels is not considered as a point of support. Refer to Section 17A1 for earthquake areas.

5.312 Where the horizontal distance from the regular framing support (hanger rod or fastening to other supporting bars or channels) to the furthermost point of support for a frame, cable rack or other equipment load does not exceed 3'-0", the double bar or channel-type auxiliary framing will require no additional support to the ceiling or wall beyond the load.

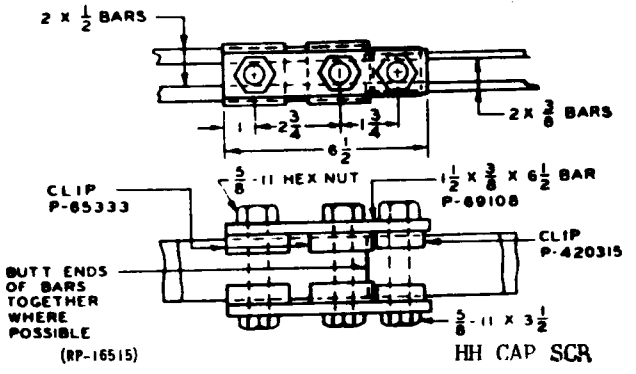


FIG. 20 SPLICING PAIRS OF 2" X 3/8" BARS TO 2" X 1/2" BARS (PAR. 5.211) (BSP 800-614-156 FIG. 20)

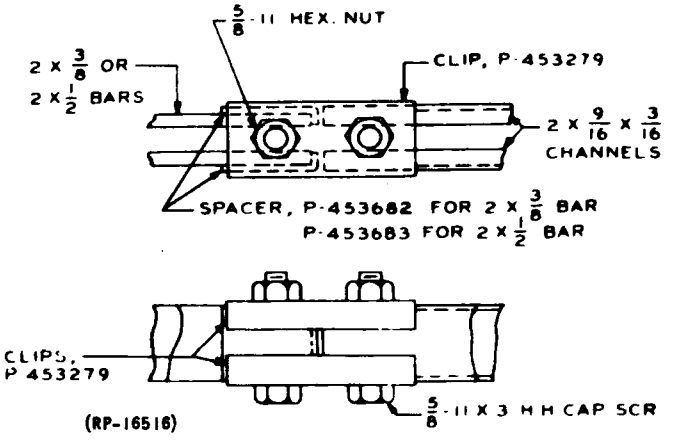


FIG. 20A SPLICING PAIRS OF 2" X 3/8" OR 2" X 1/2" BARS TO CHANNELS (PAR. 5.212) (BSP 800-614-156 FIG. 20A)

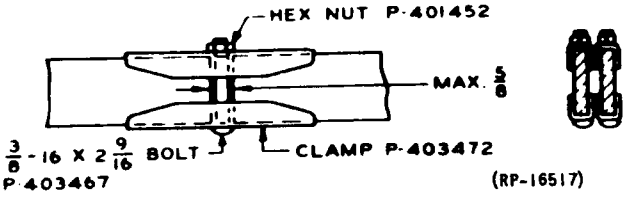


FIG. 21 SPLICING PAIRS OF 2" X 3/8" BARS (PAR. 5.211) (BSP 800-614-156 FIG. 21)

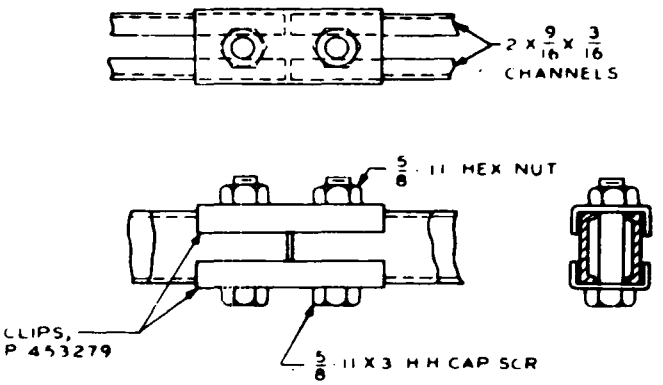


FIG. **21A** SPLICING PAIRS OF 2" X 9/16" X 3/16" CHANNELS (PAR. 5.212) (BSP 800-614-156 FIG. 21A)

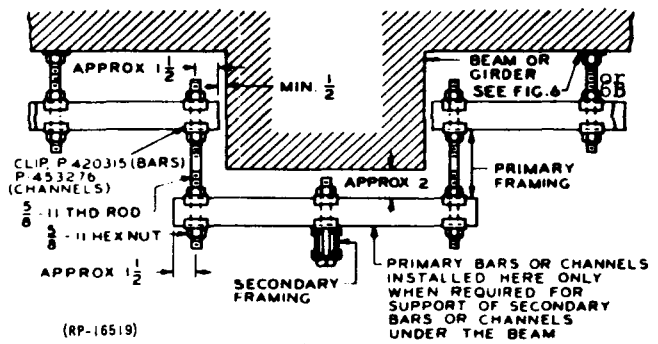


FIG. **22** DOUBLE FRAMING UNDER BEAMS OR GIRDERS - PRIMARY BARS OR CHANNELS AT RIGHT ANGLES TO BEAMS OR GIRDERS (PARS. 4.61, 5.51) (BSP 800-614-156 FIG. 22)

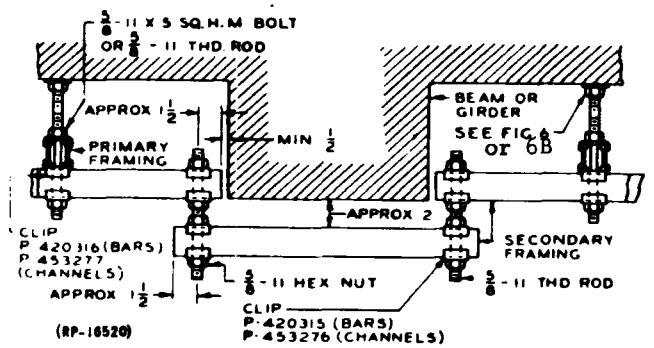


FIG. **23** DOUBLE FRAMING UNDER BEAMS OR GIRDERS - PRIMARY BARS OR CHANNELS PARALLEL TO BEAMS OR GIRDERS (PARS. 4.61, 5.51) (BSP 800-614-156 FIG. 23)

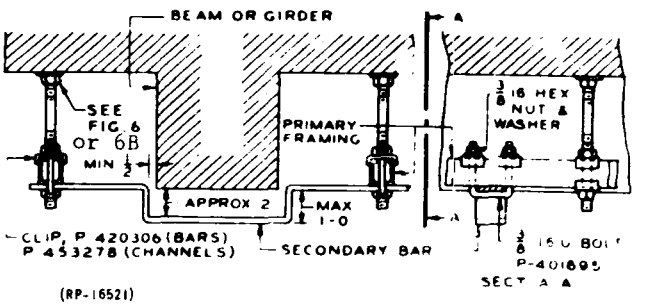


FIG. **24** SINGLE FRAMING UNDER BEAMS OR GIRDERS - PRIMARY BARS OR CHANNELS PARALLEL TO BEAMS OR GIRDERS (PARS. 4.61, 5.51) (BSP 800-614-156 FIG. 24)

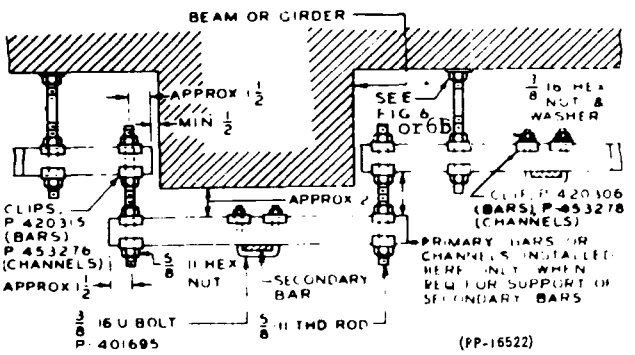


FIG. **25** SINGLE FRAMING UNDER BEAMS OR GIRDERS PRIMARY BARS OR CHANNELS AT RIGHT ANGLES TO BEAMS OR GIRDERS (PARS. 4.61, 5.51) (BSP 800-614-156 FIG. 25)

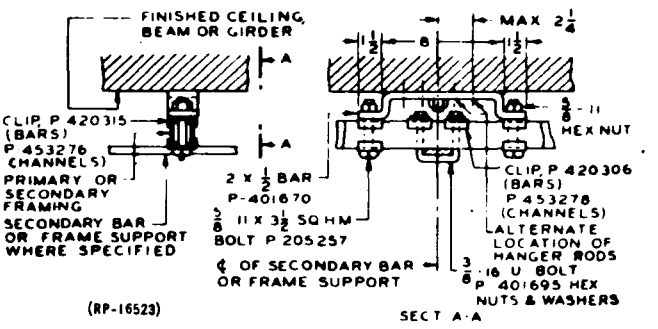


FIG. **26** SUPPORTING FRAMING WHERE HANGER RODS INTERFERE WITH OTHER ATTACHMENTS (PAR. 5.314) (BSP 800-614-156 FIG. 26)

(a) Where this distance exceeds 3'-0", extend the framing to the next row of primary bars or channels, hanger rod, or to the wall, except for framing supporting mezzanine platforms which should be extended to the next support if the horizontal distance exceeds 1'-0".

(b) Where the secondary bars are of the single-bar type and the horizontal distance referred to above exceeds 1'-0", extend the secondary bar to the next row of primary bars or channels or to the wall.

5.313 Where bars or channels are extended to the wall, they should be supported as shown in Figures 12, 12A and 13. Where they terminate at a hanger rod, support them as shown in Figure 14.

5.314 Where a hanger rod supporting auxiliary framing interferes with the attachment of other framing or frame supports, provide "U" shaped details as shown in Figures 26 and 27 for making the attachments.

5.315 When hanger rods or hanger bolts normally fall at the ends of double bars or channels, the bars or channels should be at least flush with the clips. It is not necessary to install hanger rods or bolts at the ends of each length of auxiliary framing bars or channels except where required for support of frames or other equipment.

5.316 Placing of bars between clips will be facilitated by use of a short piece of wire bent hairpin shape and placed around the hanger rod and under the upper clip to prevent the clip from dropping, or by using a P-404159 Cable Pack Alignment Clip in a similar manner.

5.32 Bracing

5.321 Brace framing bars or channels, as shown in Figures 15 to 17, (or use column bracing as specified in sections covering low type auxiliary framing) where upper level bars or channels are 1'-0" or more below ceiling, where lower level bars or channels are 1'-0" or more below upper level framing, and where necessary to provide rigidity for framing that supports only cable rack.

(a) Use single brace at each end hanger rod, as shown in Figure 18, where distance to ceiling or distance between levels is 1'-0" or more.

(b) Provide double braces, as shown in Figure 17 and 18, at intervening hanger rods as necessary to secure rigidity where hanger rods exceed 2'-6" in length.

(c) On rows of primary framing bars or channels adjacent to columns, the framing may be braced to the columns, as described in Sections 11A to 11G covering low type framing, and the diagonal braces omitted for these rows.

(d) Where the framing bars or channels are used only for the support of cable racks, bracing should be furnished only as required for rigidity of the cable racks.

5.322 On frames that stand singly or in groups of two bays, place a diagonal hanger rod end brace where necessary to obtain a rigid installation and to maintain the plumbing of the frames.

5.323 An M.D.F. may be supported directly from ceiling inserts where no high type auxiliary framing bars or channels are otherwise required for the support of mezzanine platforms, ladder tracks or cable rack. Brace rods should not exceed 4' in length and should be evenly distributed on both sides of the frame.

5.4 Support of Rolling Ladder Tracks, Cable Racks and Conduit

5.41 Auxiliary framing supporting frames and racks should be arranged, as far as practicable, so that it will also support the associated ladder tracks, cable racks, and conduit. Additional framing required for these purposes should be arranged so that track and cable racks can be supported on the centers specified in the sections covering the requirements for their installation.

5.42 Where additional auxiliary framing is required for the support of cable racks and conduit, install in accordance with Figures 28 and 29.

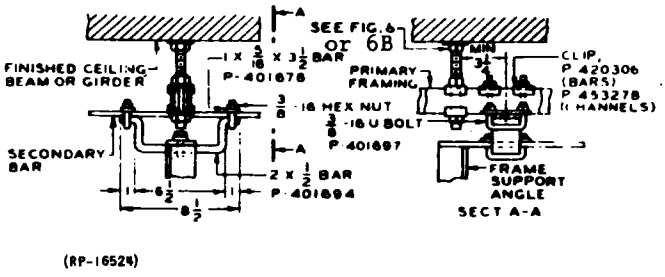


FIG. **27** FRAMING BARS OR CHANNELS ATTACHED AT FRAME SUPPORTS - MAIN HANGER ROD AT POINT OF SUPPORT (PAR. 5.314) (BSP 800-614-156 FIG. 27)

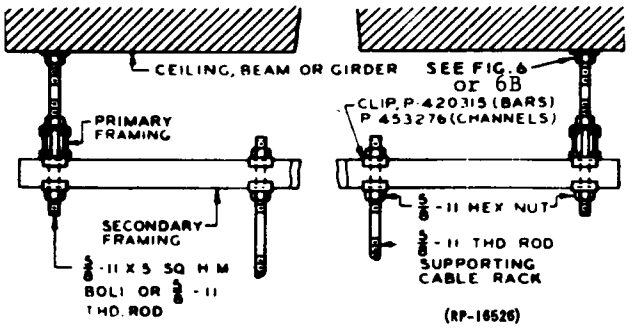


FIG. **29** CABLE RACK OR CONDUIT HANGER RODS ATTACHED TO FRAMING - CABLE RACH OR CONDUIT RUN PARALLEL TO PRIMARY BARS OR CHANNELS (PAR. 5.42) (BSP 800-614-156 FIG. 29)

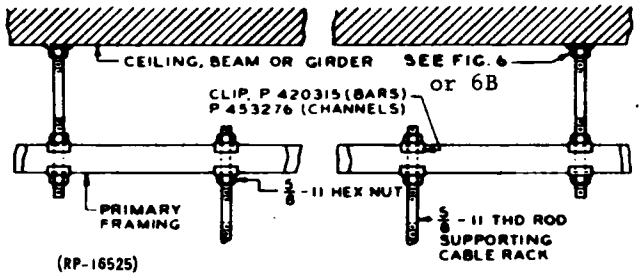


FIG. **28** CABLE RACK OR CONDUIT HANGER RODS ATTACHED TO FRAMING - CABLE RACK OR CONDUIT RUN AT RIGHT ANGLES TO PRIMARY BARS OR CHANNEL (PAR. 5.42) (BSP 800-614-156 FIG. 28)

5.43 Where frames, racks, auxiliary framing and similar items are supported from primary auxiliary framing bars or channels, it is not necessary to cut off the threaded ends of bolts, screws or rods that do not extend more than approximately 2-1/2" above the primary bars or channels.

5.5 Minimum Clearance at Ends of Framing

5.51 In placing of auxiliary framing, regardless of the means of support, a minimum clearance of 1/2" shall be maintained between the ends of the framing bars or channels and any building obstruction as shown in Figures 12, 12A, 13, 22, 23, 24 and 25.

6. VERIFICATION

	VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS	REFERENCE	
		Par. No.	Fig. No.
6.1	Threaded Parts		
6.11	The threaded rods shall be turned into the Unistrut nut so that at lease three threads protrude beyond the end of the nut.	3.211	6B, Note 1
6.12	Expansion shields in ceiling, type specified by telephone company.	3.31, 3.32	
6.13	Additional nuts and washers used at false or suspended ceilings.	3.6	6A
6.14	Threaded rods properly secured to ceilings.	3.6, 3.61 3.611	3,6,6D
6.15	Splicing of Hanger rods.	3.63	
6.2	Framing		
6.201	Primary framing located under ceiling inserts.	4.21,4.42	7, 11
6.202	Bar or channels spaced 5'-0" to 6'-0" centers.	4.21,4.41	5
6.203	Secondary framing at right angles to primary framing.	4.21,4.43	
6.204	Secondary bars on 3- bar framing installed on flat.	4.211	8
6.205	Single level framing used only where additional headroom is required.	4.22	9, 10
6.206	Stock lengths used where practical.	4.31	
6.207	Channels not wavy.	4.32	
6.208	Channels paired with backs to the outside.	4.411	7
6.209	Continuous rows of framing at same level.	4.44	
6.210	Lower level of framing not lower than underside of main girder except as indicated.	4.45	
6.211	Secondary framing above primary framing where headroom is required.	4.46	
6.212	Provide only primary bars where conditions permit.	4.47	
6.213	Secondary bars or channels located lengthwise directly over mezzanine platforms.	4.51	
6.214	Framing over mezzanine platforms, at 14'-6" to 15'-0".	4.51	
6.215	Framing over distributing frames as high as practicable.	4.53	
6.216	Framing under beams or girders only where required for the support of equipment.	4.61	

	VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS	REFERENCE	
		Par. No.	Fig. No.
6.2	Framing (Cont'd.)		
6.217	Framing located below false ceilings, ventilating ducts and other obstructions at the ceiling.	4.71	
6.218	Framing located at cable holes and other openings in floors or walls where required.	4.81	
6.219	Framing does not interfere with cable holes, etc.	4.81	
6.220	A minimum of 1/2" clearance between ends of auxiliary framing and any building obstruction.	5.51	12,12A,13, 22,23,24,25
6.221	Auxiliary framing arranged for best support of frames, racks and associated ladder track, cable rack and conduit.	5.41,5.42	
6.3	Splices		
6.31	Type of splices, correct.	5.21,5.212	21A
6.32	Splices in framing above mezzanine platform to be avoided where possible.	4.52	
6.33	Where splicing is necessary above mezzanine, platform, it is within 1'-0" of the support.	4.52	
6.4	Supporting		
6.41	Bars or channels used for direct support of vertical loads have at least two supports.	5.311	
6.42	The distance from double bar or channel framing support to the furthermost point of load does not exceed 3'-0".	5.312	
6.43	Framing extended to next point of support when point of load exceeds 3'-0".	5.312(a)	
6.44	Where furthermost point of support for mezzanine platform exceeds 1'-0", the framing is extended to next point of support.	5.312(a)	
6.45	The distance from three-bar framing support to the furthermost point of load does not exceed 1'-0".	5.312(b)	
6.46	Where furthermost point of load to the three-bar framing support exceeds 1'-0", the bar is extended to the next point of support.	5.312(b)	
6.47	Auxiliary framing properly supported from hanger rods on wall.	5.313	12,12A, 13,14
6.48	"U"-shaped details used where hanger rod support interfere with other auxiliary framing or frames.	5.314	26.27

VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS		REFERENCE	
		Par. No.	Fig. No.
6.5	Bracing		
6.51	Braces used where upper level of bars or channels are 1'-0" or more below the ceiling.	5.321	15,17
6.52	Braces used where lower level of auxiliary framing is 1'-0" or more below the upper level framing and rigidity is required for support of cable rack.	5.321	
6.53	Braces at main distributing frames do not exceed 4' in length and are evenly distributed.	5.323	
6.54	Frames that stand singly or in groups of twos properly braced.	5.322	
6.6	Bolts, Nuts and Screws		
6.61	Meet following requirements. (See General Section)		
	(a) Kind and size as specified and properly tightened.		
	(b) Free from stripped threads and not burred or bent.		
	(c) Engagement of threads.		
	(d) Installed in all places requiring them.		

→ Indicated new or changed information.

[Vertical line at side of paragraphs indicate requirements.

Engineering Planning Manager
(Installation)

Reason for Reissue:
General revision to update
the entire section