

EARTHQUAKE PROTECTION AND DISASTER BRACING
FOR CENTRAL OFFICE AND PBX POWER EQUIPMENT

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ASSOCIATED HANDBOOK INFORMATION REFERENCE CHART

Subject	Handbook	Section
Location, Erection and Assembly		
General Safety Precautions	30	1A
General Requirements and Information	30	1B
Drilling Holes in Masonry and Setting Expansion Shields and Anchors	30	9
Auxiliary Framing - High Type	30	10
Auxiliary Framing - Low Type	30	11A to 11C incl.
Cable Rack - Requirements and Fabrication	30	13A to 13D incl.
Earthquake Protection for Central Office and PBX Equipment	30	17A to 17A2 incl.
Hardening of Central Office and Main Station Equipment	30	18
Erecting, Placing and Fastening Frames, Racks and Associated Parts.	30	20A to 20C incl.

1. GENERAL

1.1 Scope

1.11 This section contains the requirements and recommended supplementary measures to be followed in the supporting and fastening of telephone equipment in critical target areas, offices serving important military or atomic installations, and areas subject to earthquake shocks.

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

1.2 Associated Information

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

1.22 Reference should also be made to the specifications and drawings furnished the job.

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1.23 Earthquake and disaster protection information in this section supplements information contained in the other sections of this handbook and Handbooks 18 and 19. The equipment used in earthquake and disaster protection areas is usually the same as that installed in any other area. The method of installing equipment is also fundamentally the same as that employed in other areas. Earthquake and disaster protection areas differ from other areas in that equipment requires additional floor fastenings, overhead fastenings, bracing for auxiliary framing, cable rack, frames, etc. No effort will be made in this section to repeat methods which are covered in other sections of this handbook or in Handbooks 18 and 19.

1.3 Precautions Against Personal Injury and Equipment Damage

1.31 The precautions to be taken against personal injury and to prevent damage to equipment and service interruptions are covered in this section with the associated operations. General precautions are covered in Handbook 0 and are to be observed at all times as they apply to the particular operation being performed

1.4 Arrangement of Tools

1.41 Prior to starting operations covered by this section the tools and other items required should be arranged at the work location so as to minimize fatigue and inconvenience when handling.

1.5 Arrangement of Figures

1.51 The figures in BSP 800-610-155 are frequently referred to in job specifications and drawings. For this reason where figures from BSP 800-610-155 are reproduced in this section, 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 purposes of differentiation.) Such figures are identified by a note beneath each figure title.

1.6 Piece Part Information

1.61 The list of parts shown in Figure 1A of Section 17A of Handbook 30 will facilitate the identification of piece parts frequently used on earthquake and disaster protection jobs. While it is intended that the list include all parts which otherwise might be difficult to identify, it will be impractical to keep the list up to date at all times.

1.7 Building Construction

1.71 The special bracing requirements covered herein are based on standard central office ceiling heights and building conditions. It is assumed that floors and columns will be of a good grade of concrete, preferably with no plaster on the columns and ceilings, since the method of support called for herein relies upon bracing to columns and the ceiling. For unusual building construction, ceiling heights, and framing conditions, it will be necessary to work out the manner of special bracing locally or on a job basis.

1.8 Basic Principles

1.81 Equipment framework structures are rigidly secured at both bottom and top, so as to lessen the chances of damage from blast pressures and so that in the event of movement the building and equipment will sway in unison.

1.811 Power boards with box-type frameworks having an overall minimum depth of 23 inches at the floor require no bracing at the top. Other floor-supported power boards, more than 7 feet 0 inches high, shall be braced as required.

(a) The 250-volt battery and power board bays, such as are used in 425A plants, shall be braced in a sidewise direction. Bar-or angle-type bracing shall be fastened near the J bolt fastenings at the ends of the cable rack stringers that run the length of the line at the top of the bays.

1.82 Where the number of holddown bolts normally provided is not considered adequate, additional bolts are provided. Power equipment which cannot be bolted down is provided with bumpers or rails to prevent horizontal movement.

1.83 Large floor-mounted batteries are provided with a crate-like structure to prevent sliding and to increase resistance to tipping over. Old type wooden tank batteries are provided with timbers to prevent cells from dropping to the floor if shaken off their pedestals. Supplementary supports are used for heavy power room bus bars, effective if insulators break.

2. INSTALLATION EQUIPMENT

2.1 The tools required for the operations in this section are the same as those listed in the specific sections covering the type equipment being installed.

3. FASTENING EQUIPMENT

3.1 Self-Drilling Anchors

3.11 The following piece parts for self-drilling anchors in the lengths shown shall be used unless otherwise specified:

Size	Length in Inches	COMCODE NO.
1/4-20	1-1/8	841209703
3/8-16	1-1/2	841209729
1/2-13	2	841209737
5/8-11	2-1/2	841209745

3.2 Location of Self-Drilling Anchors

3.21 The locations of self-drilling anchors for anchoring some frames to the floor in earthquake protection areas are shown on the following drawings:

H-249-139 Common Systems and Toll
H-582-211 No. 1 Crossbar and Panel
H-582-226 Common Systems and
Step-by-Step

3.22 When laying out the floor, the location of the self-drilling anchors can be spotted by means of a template or by making direct measurements from the end of the frames.

3.3 Setting Self-Drilling Anchors

3.31 The self-drilling anchors are placed in the floor and expanded before the frames are erected. The installing operation is covered in Section 9A of this handbook.

3.4 Bolt Assemblies

3.41 Drawing H-555-120 lists the groups of fastenings required in earthquake detection areas. Some of the more common self-drilling anchor bolt assemblies and the piece parts are shown in Figure 1B. The table in this figure affords a cross-reference between the various assemblies and the associated figure and paragraph number.

3.5 Auxiliary Framing & Cable Rack

3.51 Standard low-type auxiliary framing installed in accordance with the 11 series of Sections (BSP 800-614-155) shall be used for the support of equipment, except that the special features outlines in Sections 17A and 17A1 of Handbook 30 shall be incorporated.

3.52 Cable rack shall be supported as covered in Sections 17A and 17A1 of Handbook 30.

3.6 Power Equipment

3.601 Power equipment, in general, shall be fastened to the floor with 3/8"-16 Self Drill Anchors and studs. The Telephone Company should arrange to rewaterproof any parts of the floor impaired by these drillings.

3.602 Power Boards: Install a Self Drill Anchor and stud at every hole provided for floor bolts in the frame base. Box-type frameworks having an overall minimum depth of 23" at the floor require no bracing at the top. Other floor supported power boards more than 7'-0" high shall be braced as required.

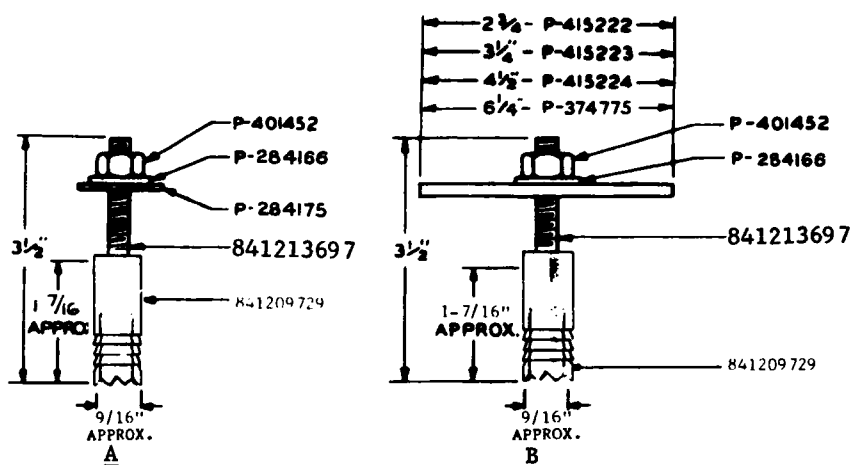


FIG. 1B ANCHOR BOLT ASSEMBLIES FOR FASTENING POWER EQUIPMENT TO FLOOR
(PAR. 3.41)

3.6021 The 250-volt battery and power board bays, such as are used in 425A plants, shall be braced in a sidewise direction. Bar-or angle-type bracing shall be fastened near the J-bolt fastenings at the ends of the cable rack stringers that run the length of the line at the top of the bays.

3.603 Floor-mounted cabinet-type rectifiers, such as J86239, J86249, KS-19210 through KS-19216, and KS-19356 shall be anchored to the floor with a 3/8-16 Self Drill Anchor and stud in each of the holes in the base as shown in Figure 12P. In addition, four P-40A408 3/16-inch steel plates shall be used at the corner holes to re-enforce the corner weld joints in the base.

3.6031 When the rectifier cabinets occur adjacently, P-40A409 intercabinet junction plates shall be used along the tops of the cabinets to tie them together as shown in Figure 12P.

3.6032 Spacers furnished with the KS-19214 Rectifier shall be installed under each hole in the base before fastening to the floor.

3.6033 The 2017B Transformer furnished with the J86295 and J86296 rectifiers shall be fastened to the floor inside the rectifier cabinet with four 3/8-16 Self Drill Anchors and studs located in the mounting holes of the two base angles.

3.604 Machine tables should be fastened to the floor as shown in Figure 13.

3.605 Machines on tables or shelves are normally mounted directly on the surface or on rubber vibration dampeners as shown in Figure 14.

2.6051 When Barry-modified type 262 vibration dampeners and straps are used, they shall be fastened as shown in Figure 14A.

3.6052 For block rubber vibration dampeners which are not bolted to the subbase or table, use retaining details per ED-80730-01, Figures 12, 13 and 14.

3.6053 Machines mounted directly on the surface shall be bolted to the surface or, if there are not bolt holes in the subbase use retaining angles per ED-80730-01, Figures 15 and 16. Conduit nipples extending through the surface close to the sides or ends of the subbase may be relied upon instead of some of the angles.

3.606 KS-5715 Alternators when mounted on tables per ED-81461-70 shall be held in place with angle details as shown in Figure 15D.

3.607 Engine-gernator sets and separate radiator units, located on the floor, with or without rubber isolation pads, should be held in place by Floor Angles P-417992, as shown in Figure 15C. Engine alternators with spring isolators such as KS-15777 or KS-15899 and KS-15884, KS-15890 or KS-15929 shall be fastened to the floor as shown in Figure 15E and Figure 15F respectively.

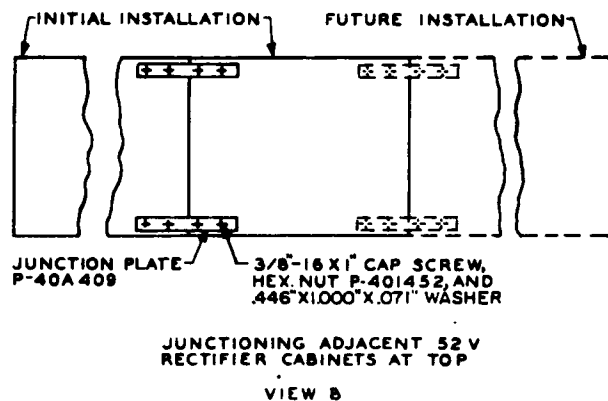
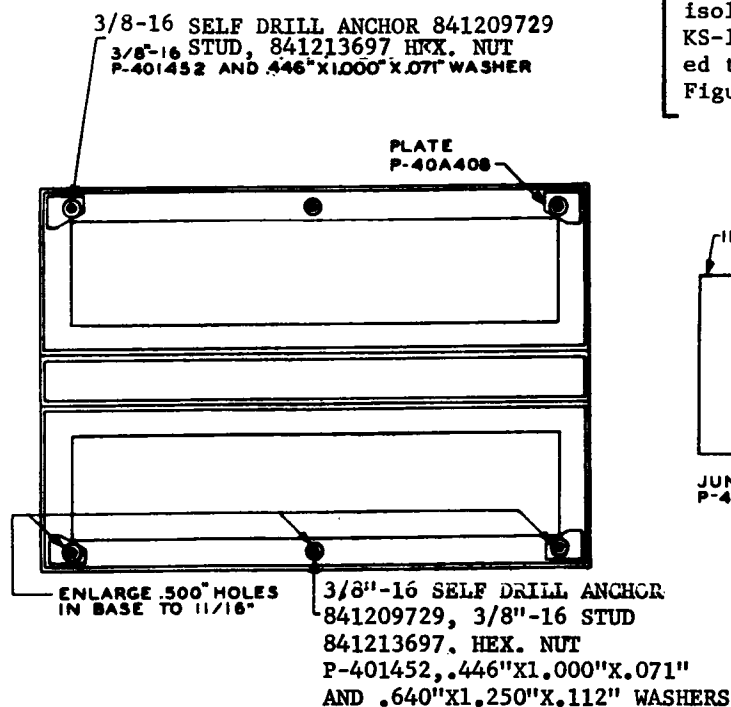


FIG. 12P FLOOR-SUPPORTED RECTIFIER CABINETS, FLOOR AND TOP FASTENINGS
(PARS. 3.603, 3.6031, 3.6073)
(BSP 800-610-155 FIG. 12P)

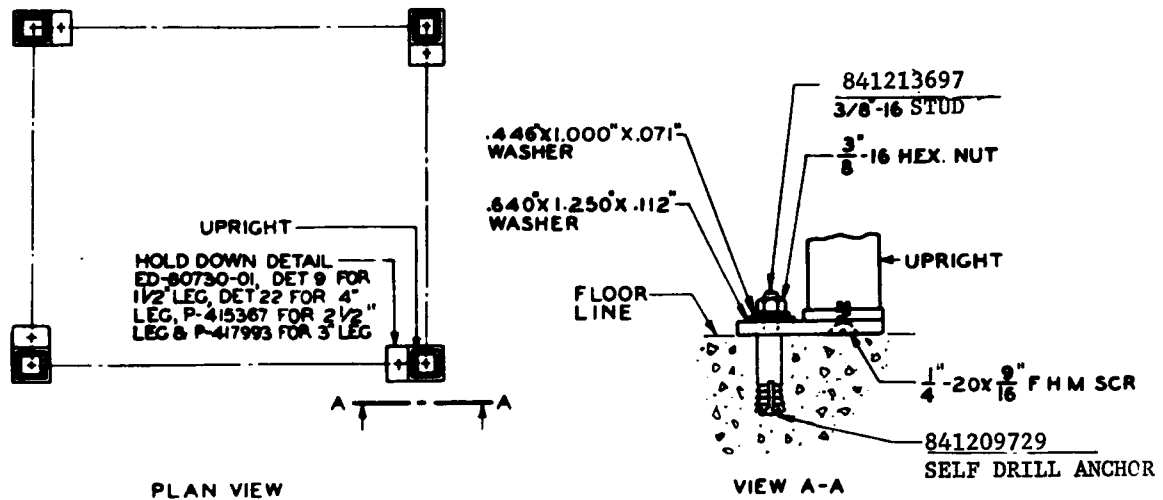


FIG. 13 FLOOR FASTENINGS FOR MACHINE TABLES WITH WELDED BEARING PLATES
(PAR. 3.604) (BSP 800-610-155, Fig. 13)

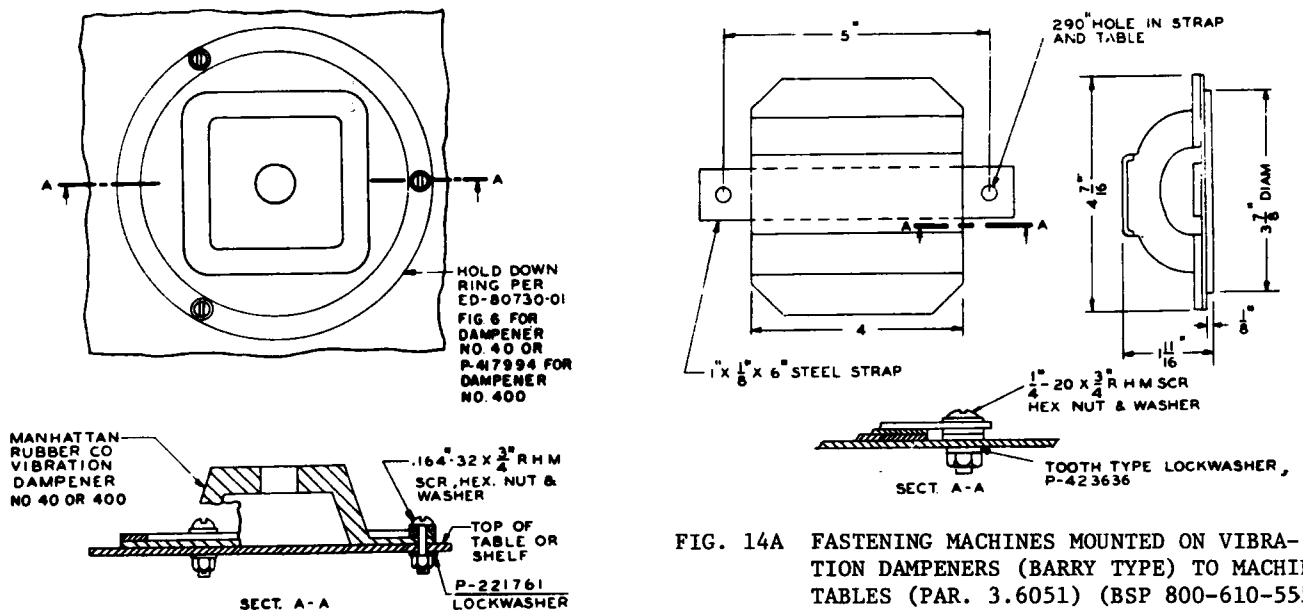


FIG. 14A FASTENING MACHINES MOUNTED ON VIBRATION DAMPENERS (BARRY TYPE) TO MACHINE TABLES (PAR. 3.6051) (BSP 800-610-555, FIG. 14A)

FIG. 14 FASTENING MACHINES MOUNTED ON VIBRATION DAMPENERS (MANHATTAN RUBBER CO. TYPE) TO MACHINE TABLES (PARS. 3.605, 4.221) (BSP 800-610-155, Fig. 14)

3.6071 Engine mounted on piers shall have the pier secured in place by Angles P-417992 bolted to the floor with the vertical surface against the pier. In addition, the engine should be held in place at each end with an Angle P-417992 or with a detail shown on ED-80730-01, Figure 19 or 21 (use Figure 19 or 21 if there is not sufficient space for Angle P-417992). The engine should also be held with one detail, shown on ED-80730-01, Figure 21, near each isolation pad at the sides. Angles and details should be located with the vertical surface 1/4 inch from the engine subbase. Use 3/8"-16 Self Drill Anchors and studs to secure the details.

3.6072 No additional bracing for engine exhaust piping is necessary other than the standard bracing required for auxiliary framing bars or channels that support the silencers.

3.6073 Floor supported control cabinets provided as part of the KS-15777, KS-15929, and KS-15954 Engine-Alternators shall be fastened to the floor in a manner similar to rectifier cabinets as shown in Figure 12P.

NOTE: Spacers furnished with the KS-15929 Cabinets shall be installed under each hole in the base before fastening to the floor.

3.6074 The static exciter of the KS-15929 Engine-Alternator shall be fastened to the floor with four 3/8"-16 Self Drill Anchors and studs located in the mounting holes of the two base angles.

3.608 KS-5400-02 Water Tanks used with reserve power plants are usually suspended from auxiliary framing or ceiling by hanger rods and straps. They shall be braced both endwise and sidewise as shown in Figure 15A to prevent sway. The associated piping requires no additional bracing.

3.6081 KS-5400-02 Fuel Oil Tanks: Inside floor-mounted diesel engine fuel oil tanks shall be securely anchored with steel straps to concrete saddles that are cast integrally with or securely anchored to the floor as shown in Figure 15B.

3.609 Small floor-mounted batteries such as KS-15578 L5W or L6W and KS-15577 L5 shall be held in place by floor angles as shown in Figure 16A and Figure 16B respectively.

3.610 ED-82088-70 metal battery stands shall be fastened to the floor with 1/2"-13 Self Drill Anchors and studs, one bolt at each end up-right foot and two bolts at each intermediate up-right foot as shown in Figure 17D. The stand is self-supporting and does not require any auxiliary framing or bracing from the ceiling or walls. This stand replaces all previous designs and will accommodate all sizes of KS-15544 and KS-5553 Batteries.

3.611 Counter EMF cells shall be installed on the bottom self of relay rack supported shelves, as shown in Figure 21D.

3.612 Flexible-type connectors, as shown in Figure 19E, shall be used when connecting emergency cells on stands to bus bars and making intercell connections.

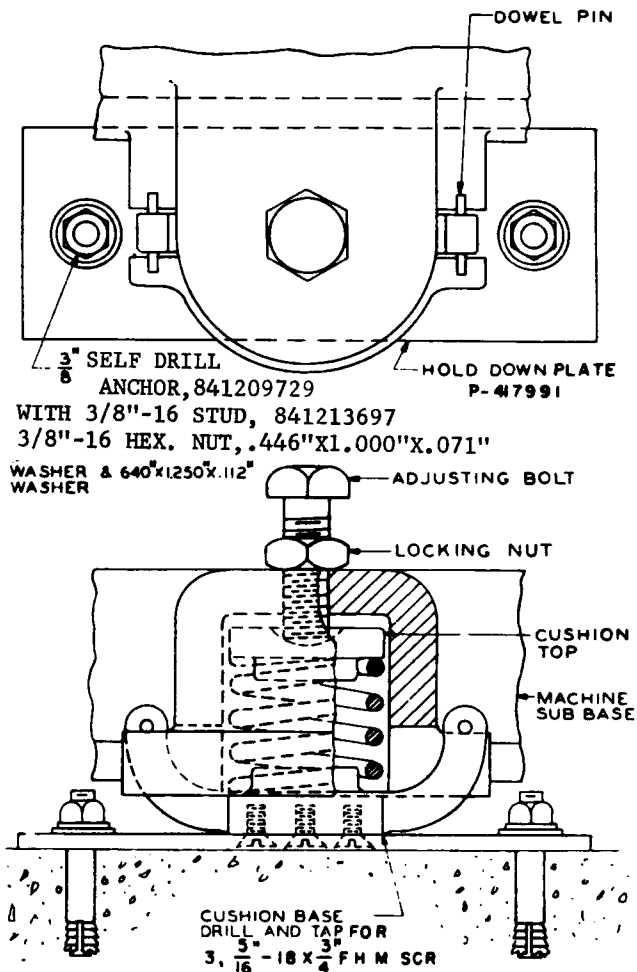


FIG. 15 FASTENING CHARGING MACHINES WITH SPRING CUSHIONS TO THE FLOOR
(PAR. 4.26) (BSP 800-610-155, Fig. 15)

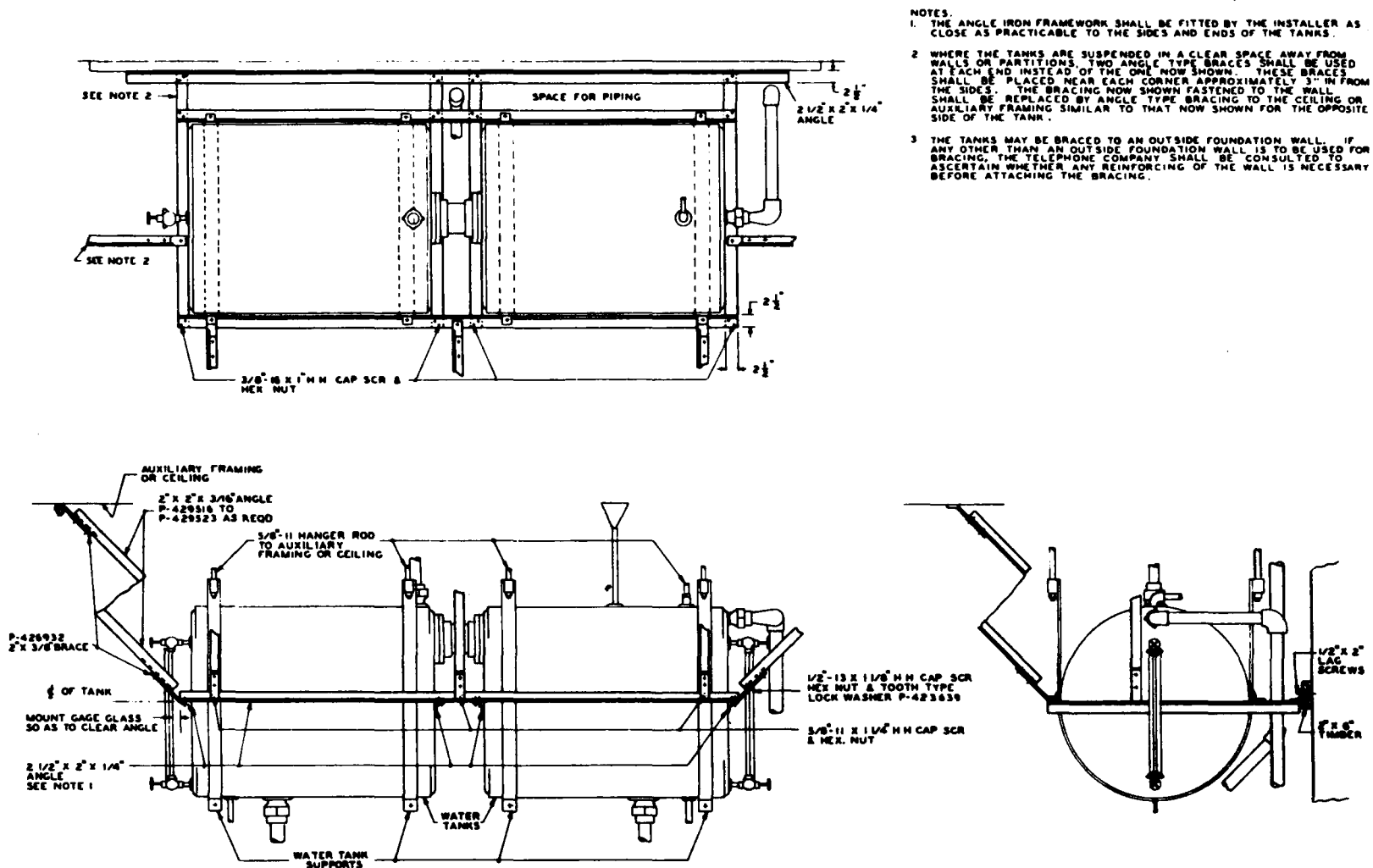


FIG. 15A BRACING FOR KS-5400-02 WATER TANKS USED WITH RESERVE POWER PLATNS
(PAR. 3.608) (BSP 800-610-155, FIG. 15A)

NOTES:

1. THE CONCRETE SADDLE UNDER EACH END OF THE TANK SHALL IN THE CASE OF NEW CONSTRUCTION, BE ADEQUATELY ANCHORED TO THE FLOOR, CASTING IT INTERGRAL WITH THE FLOOR WHERE PRACTICABLE USING REINFORCING BARS AS REQUIRED. IN EXISTING BUILDINGS THE CONCRETE SADDLE SHALL BE ANCHORED TO THE FLOOR WITH AT LEAST THREE 1/2"-13 SELF DRILL ANCHORS STUDS, LARGE WASHERS AND NUTS CAST INTERGRAL WITH THE CONCRETE SADDLES.

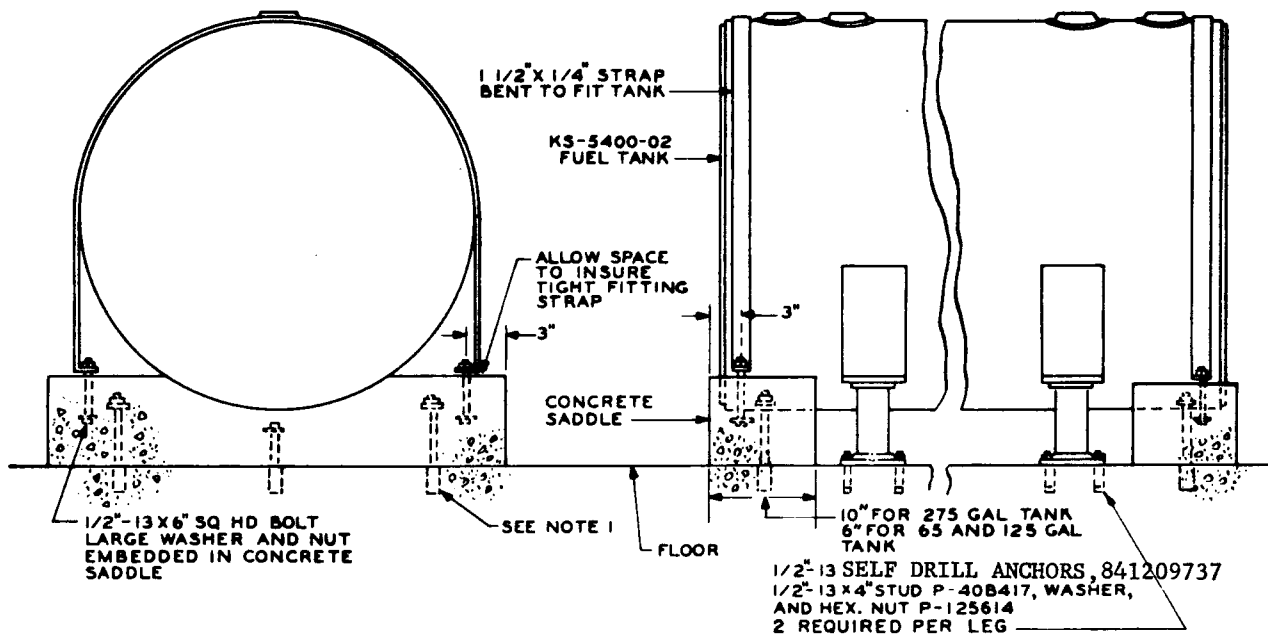
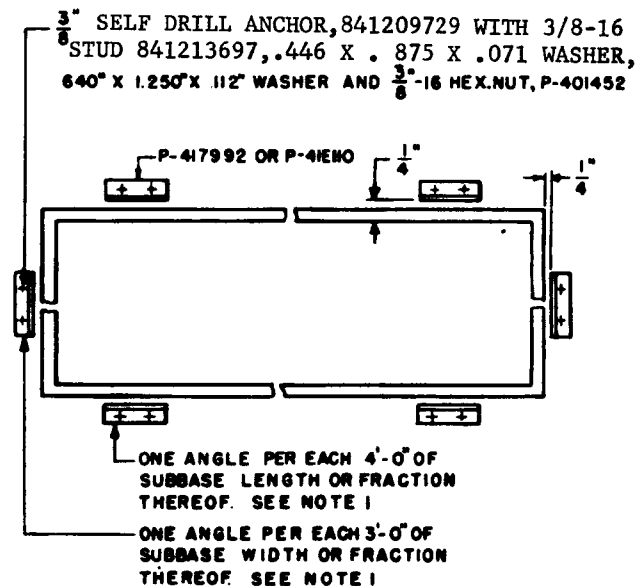


FIG. 15B FASTENING DIESEL ENGINE FUEL OIL TANK TO FLOOR
(PAR. 3.6081) (BSP 800-610-155, FIG. 15B)



NOTES:

- 1 ANGLES ON THE SIDES SHALL BE SPACED SO AS NOT TO INTERFERE WITH ISOLATION PADS THAT EXTEND BEYOND THE SUBBASE.

FIG. 15C FASTENING ENGINE-GENERATOR SETS, MOTOR-GENERATOR SETS, OR SEPARATE RADIATOR UNITS TO FLOOR (PAR. 3.607, 4.231, 4.27)
(BSP 800-610-155, FIG. 15C)

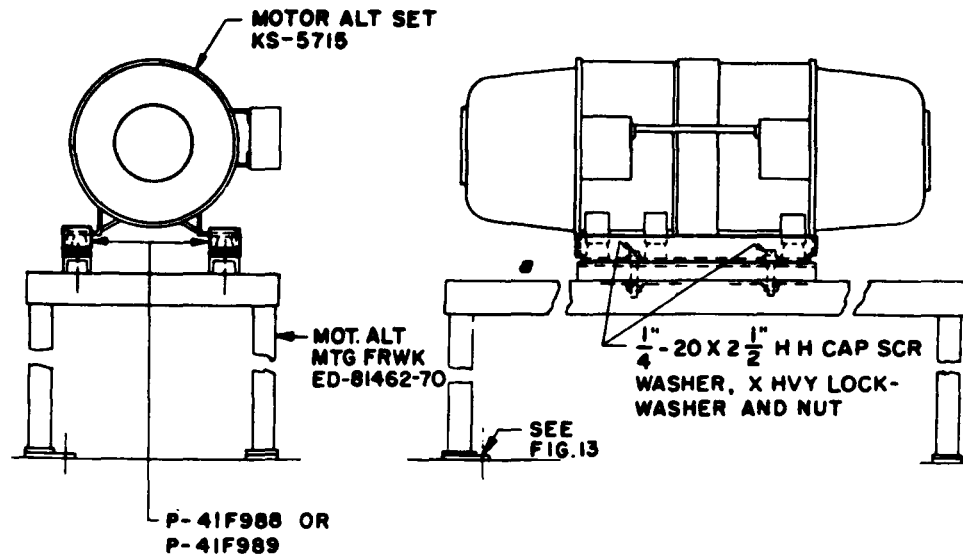


FIG. 15D KS-5715 ALTERNATORS FASTENED TO TABLES
(PAR. 3.606) (BSP 800-610-155, Fig. 15D)

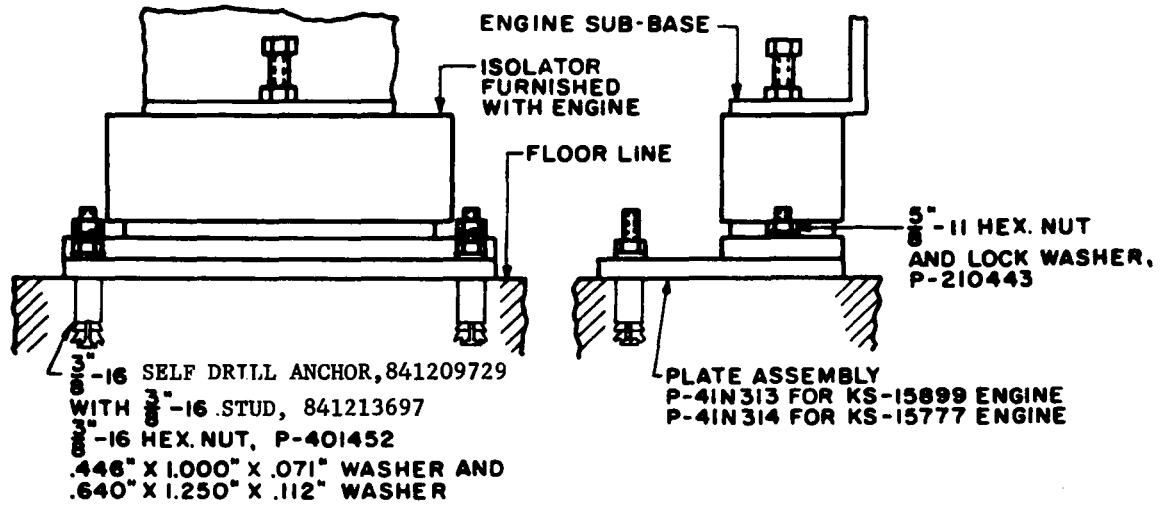


FIG. 15E FLOOR FASTENINGS FOR KS-15777 OR KS-15899 ENGINE-ALTERNATORS
MOUNTED ON SPRING ISOLATORS
(PAR. 3.607) (BSP 800-610-155, Fig. 15E)

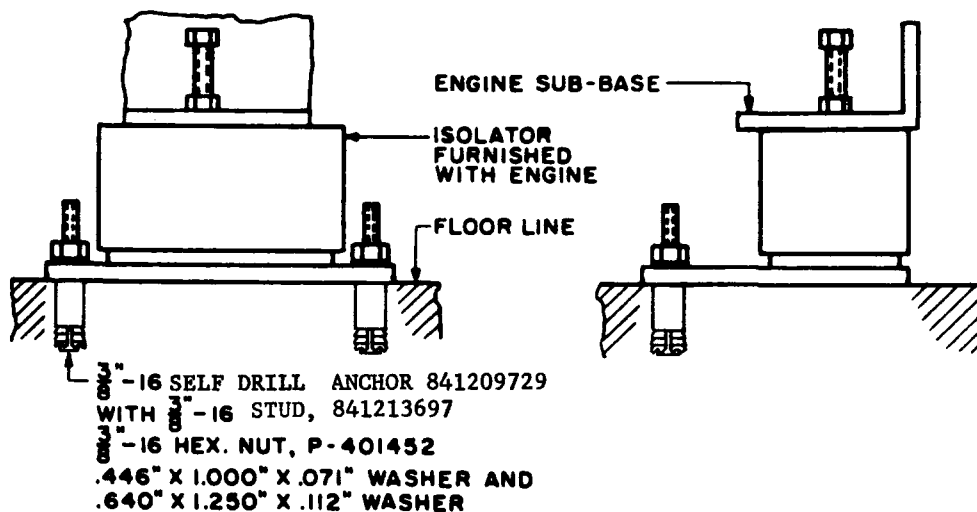


FIG. 15F FLOOR FASTENINGS FOR KS-15884, KS-15890 OR KS-15929 ENGINE-ALTERNATORS MOUNTED ON SPRING ISOLATORS (PAR. 3.607) (BSP 800-610-155, Fig. 15F)

3/8\" SELF DRILL ANCHOR 841209725 WITH 3/8\"-16 STUD 841213697, .446\"X 1.000\"X .071\" WASHER .640\"X 1.250\"X .112\" WASHER AND 3/8\"-16 HEX. NUT, P-401452.

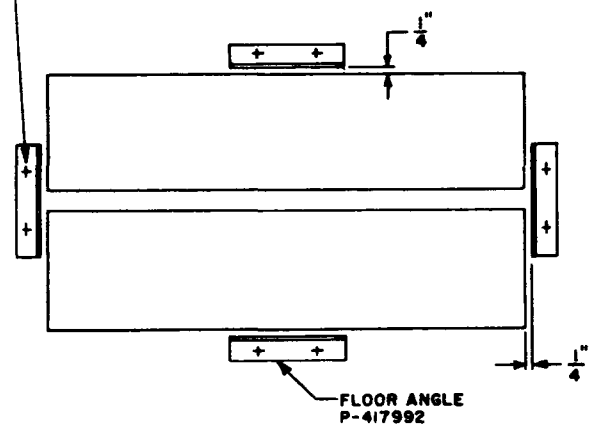


FIG. 16A SECURING ENGINE START KS-15578 L5W OR L6W BATTERIES MOUNTED ON FLOOR (PAR 3.609) (BSP 800-610-155, Fig. 16A)

3/8\" SELF DRILL ANCHOR 841209729 WITH 3/8\"-16 STUD, 841213697, .446\"X 1.000\"X .071\" WASHER .640\"X 1.250\"X .112\" WASHER AND 3/8\"-16 HEX. NUT, P-401452.

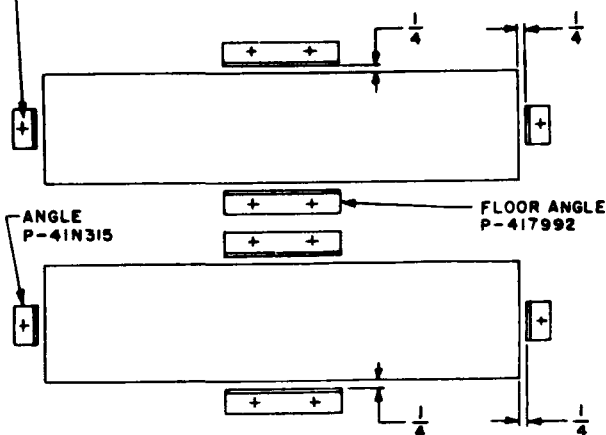
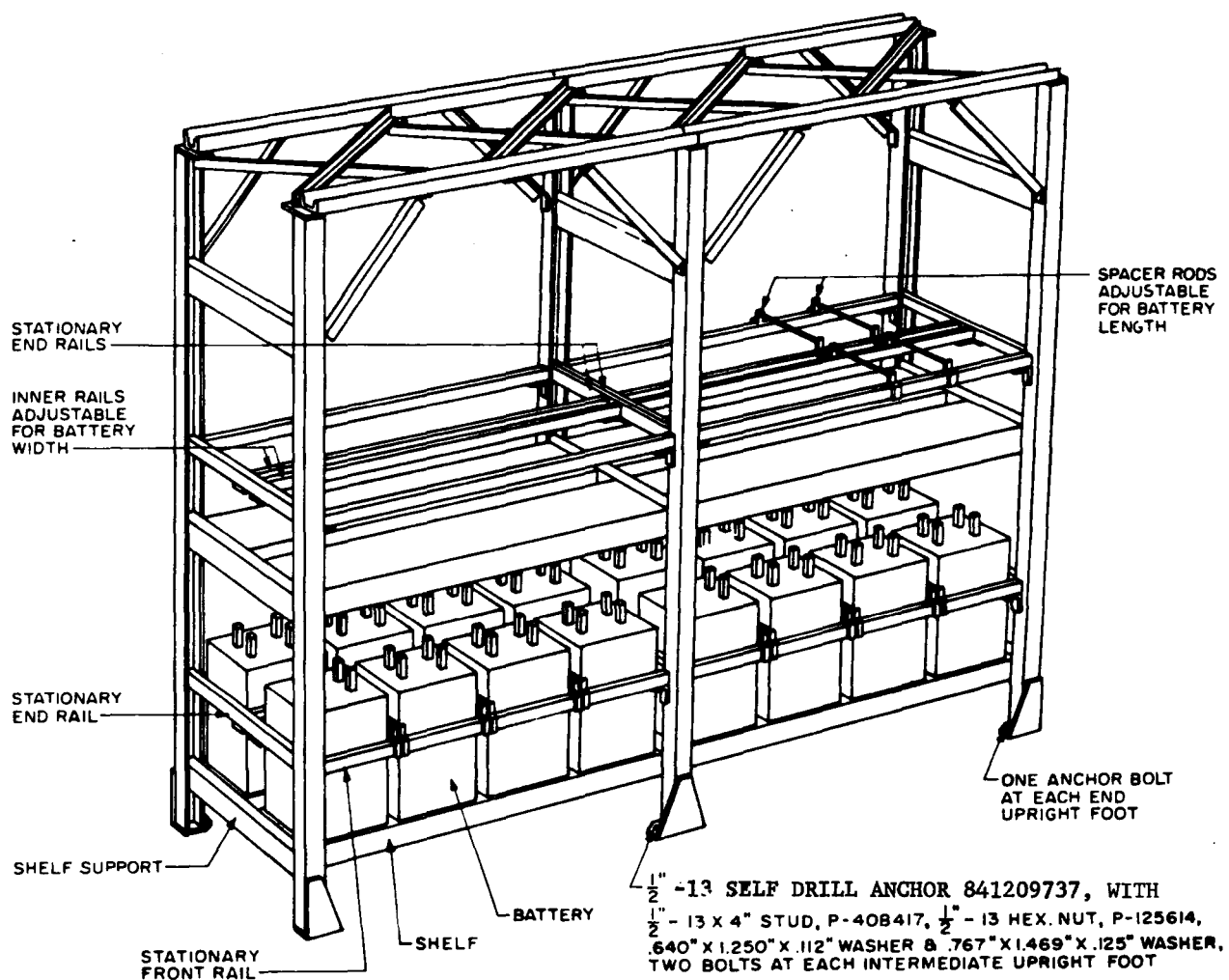


FIG. 16B SECURING ENGINE START KS-15577 L5 BATTERIES MOUNTED ON FLOOR (PAR. 3.609) (BSP 800-610-155, Fig. 16B)



NOTE:

1. FOR EARTHQUAKE PROTECTION DETAILS FOR ANY PARTICULAR KS-LIST NO. OF BATTERY SEE ED-82088-70.

FIG. 17D FLOOR FASTENINGS FOR ED-82088-70 METAL BATTERY STAND
 (PAR. 3.610) (BSP 800-610-155, Fig. 17D)

3.613 Floor-mounted battery cabinets shall be anchored to the floor with a 3/8"-16 Self Drill Anchor and stud, in each corner, as shown in Figure 21C. Where placed against a column or outside wall, the cabinets shall also be fastened at the top with 3/8"-16 Self Drill Anchors and studs, as shown in Figure 21C.

3.614 Batteries in 250-volt battery cabinets associated with TD-2 radio shall be braced with standoff insulators and battery hold-down details and equipped with individual plastic trays as shown in Figure 21F.

3.615 Batteries on relay-rack-type shelves shall be blocked with wooden strips and polystyrene sheets around and between the cells as shown in Figure 21D to prevent movement of more than 1/4" inch. The polystyrene sheets shall be at least 1/4 higher than the battery jars.

3.616 The superimposing batteries in 803C power plants shall be braced, as shown in Figure 21E with wooden strips around and between cells as required to prevent movement of more than 1/4 inch.

3.617 Cable-rack-mounted battery filters, such as J96226, shall have tooth-type lockwashers at all cable rack fastenings.

3.618 Large batteries located on the floor and composed of single or double rows of a maximum of twelve calls per row shall be supported by a closefitting enclosure 3'-0" high, fastened to the floor with 1/2"-13 Self Drill Anchors and studs as shown in Figure 21B. The enclosure is to fit the particular line-up of cells with the cells held in place with wooden block and metal brackets. Intermediate

braces between cells are provided at 2- or 3-cell intervals, as shown in Figure 21B. Where it is necessary to have more than twelve cells in a line, a minimum space of 12" shall be provided between the two halves (lengthwise) of the lineup, thus making it possible to support each set of cells independently. The 12" space is also necessary between a line-up of 12 regular cells and the emergency cells if in the same line-up.

3.6181 Where the free space between the sides of a cell and the side rails of the enclosure for a single line of cells or the side rail and the wooden spacer between a double row of cells totals more than 1/2 inch, wood blocking should be used. Such blocking, when required, should be fastened to the vertical face of the top enclosing angles and to the spacer between double row of cells with wood screws. Wood blocking should also be used at the floor.

3.619 Choke coils resting on H beams which are on the floor shall be securely bolted to the H beams and the H beams bolted to the floor. Choke coils resting on the floor shall be bolted to the floor.

3.620 The bus-bars run between power boards, machines, and batteries, shall, if they are supported by vertical hanger rods from the ceiling or auxiliary framing, be provided with sidewise and lengthwise bracing as covered in Paragraph 4.2 of Section 17A1 of Handbook 30 to prevent swaying and "whipping," except where the bus-bar run is heavy it may be necessary to provide more than one set of lengthwise brace rods. The braces shall run to the hanger rods supporting each line of insulator supports.

3.6201 On large bus-bar runs (4000 amperes or larger) where the bus runs are supported by insulators from auxiliary framing, supplementary supports as shown in Figure 22A shall be placed at approximately 6- to 10-foot centers under the concentrated portions of the run.

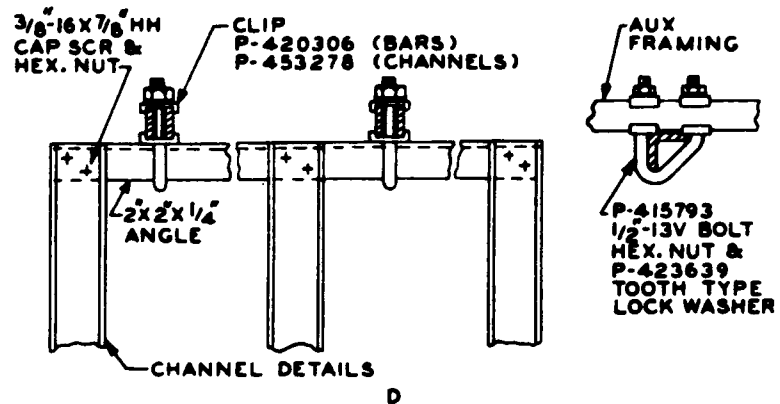
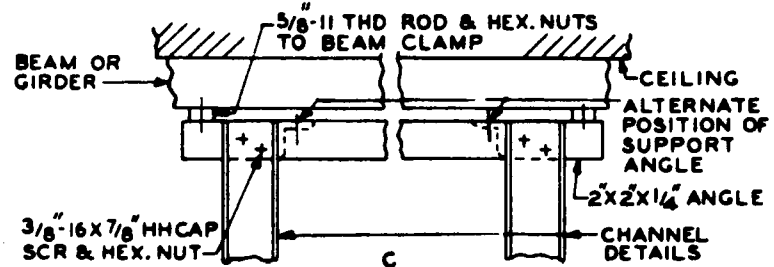
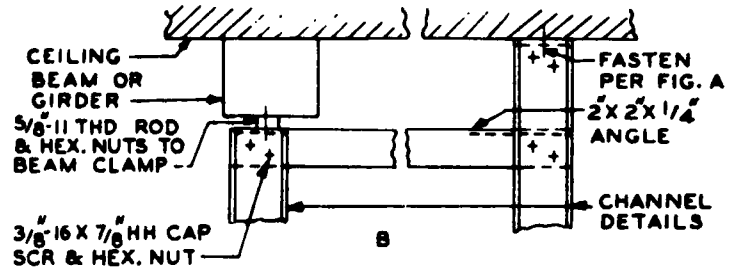
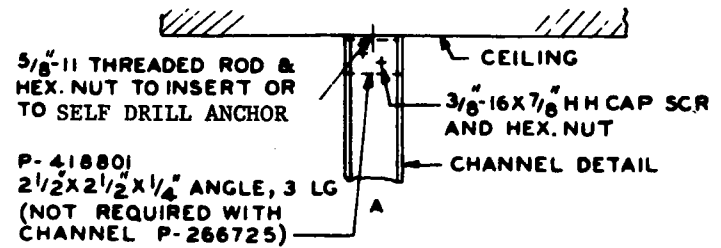


FIG. 19 CEILING FASTENING FOR ISOLATED BATTERY RACKS
(PAR. 4.323) (BSP 800-610-155, Fig. 19)

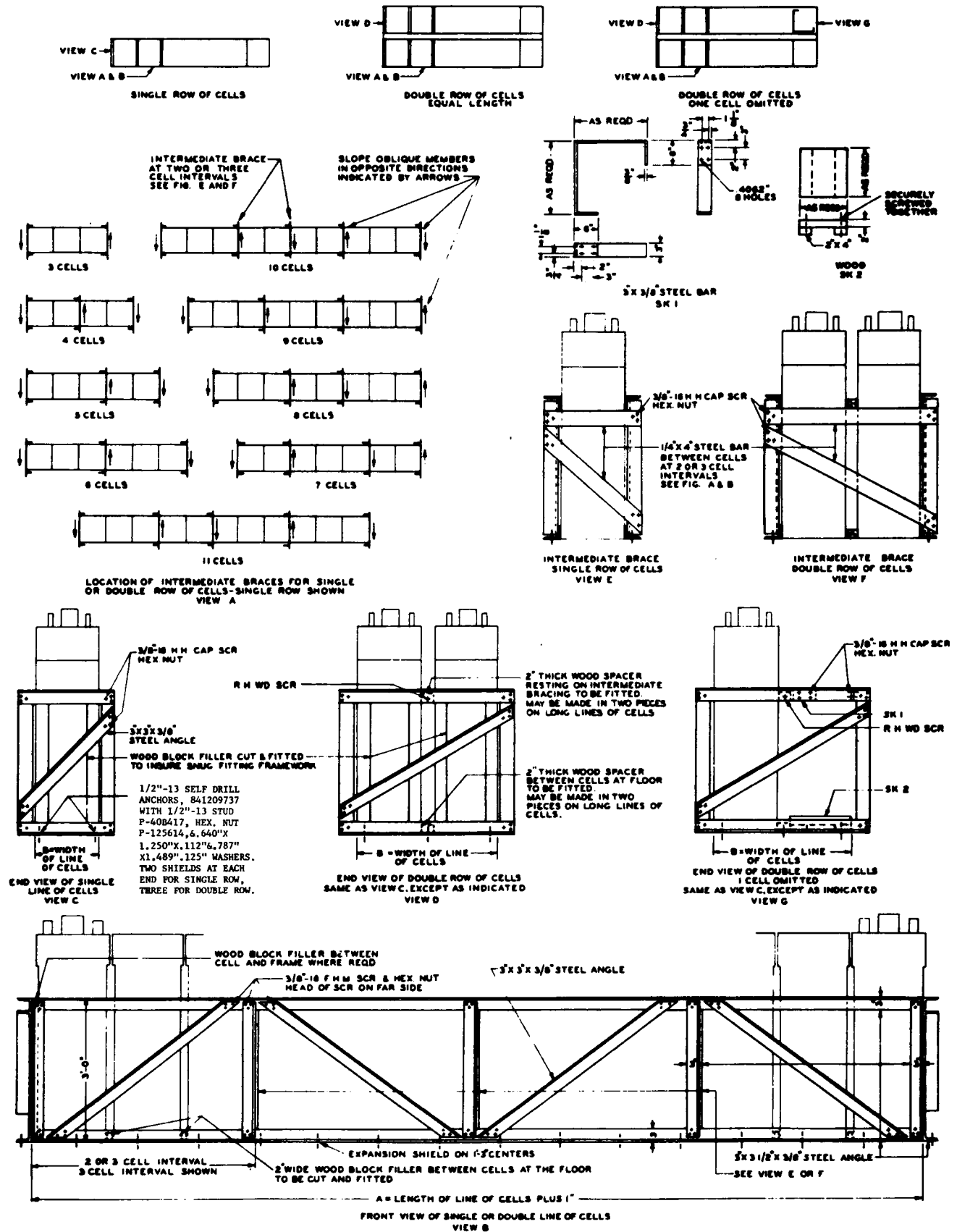


FIG 21B SUPPLEMENTARY SUPPORTS FOR LARGE ENCLOSED CELLS
(PARS. 3.618, 4.33) (BSP 800-610-155, Fig. 21B)

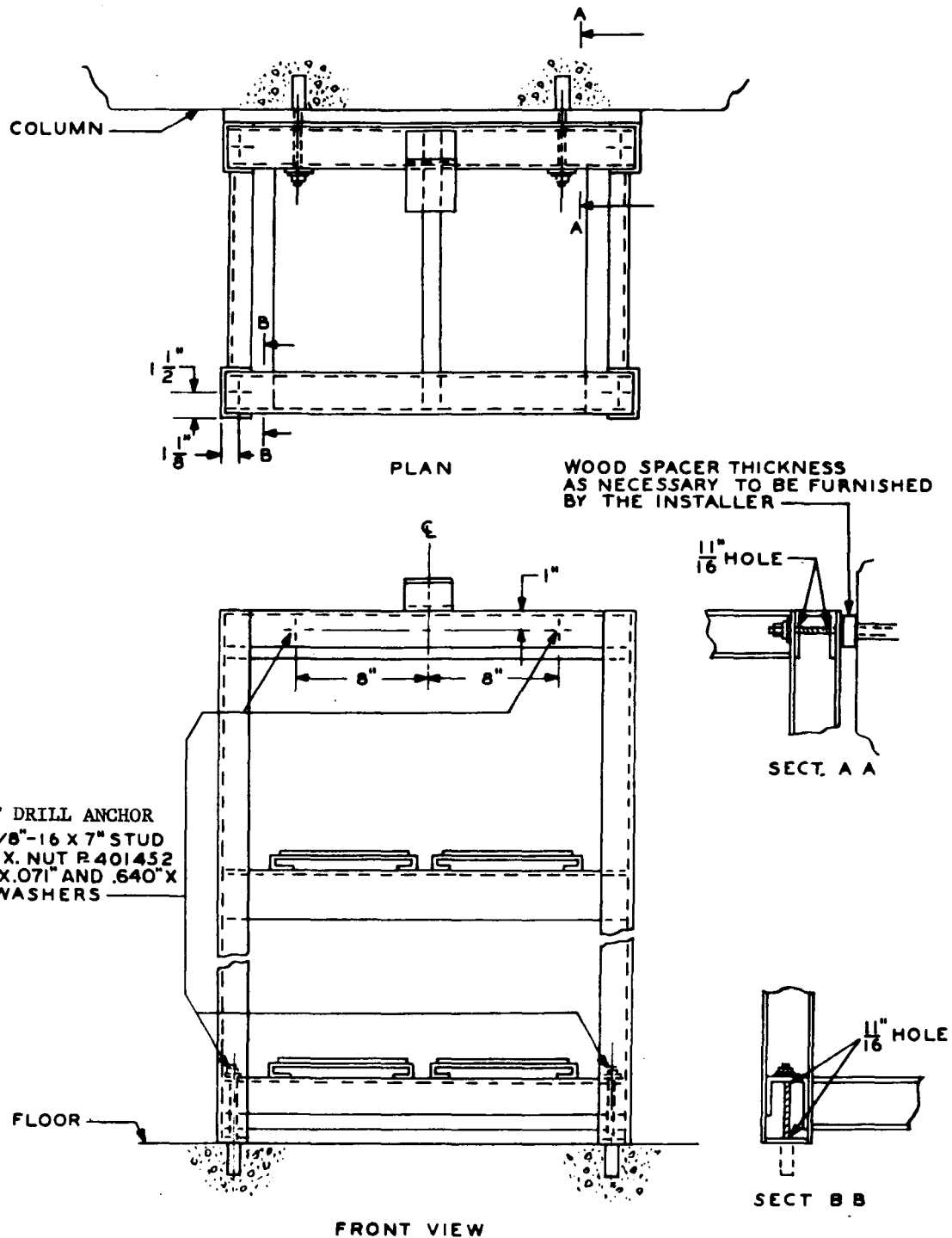


FIG. 21C FLOOR SUPPORTED BATTERY CABINETS-FLOOR AND TOP FASTENINGS
(PAR. 3.613) (BSP 800-610-155, Fig 21C)

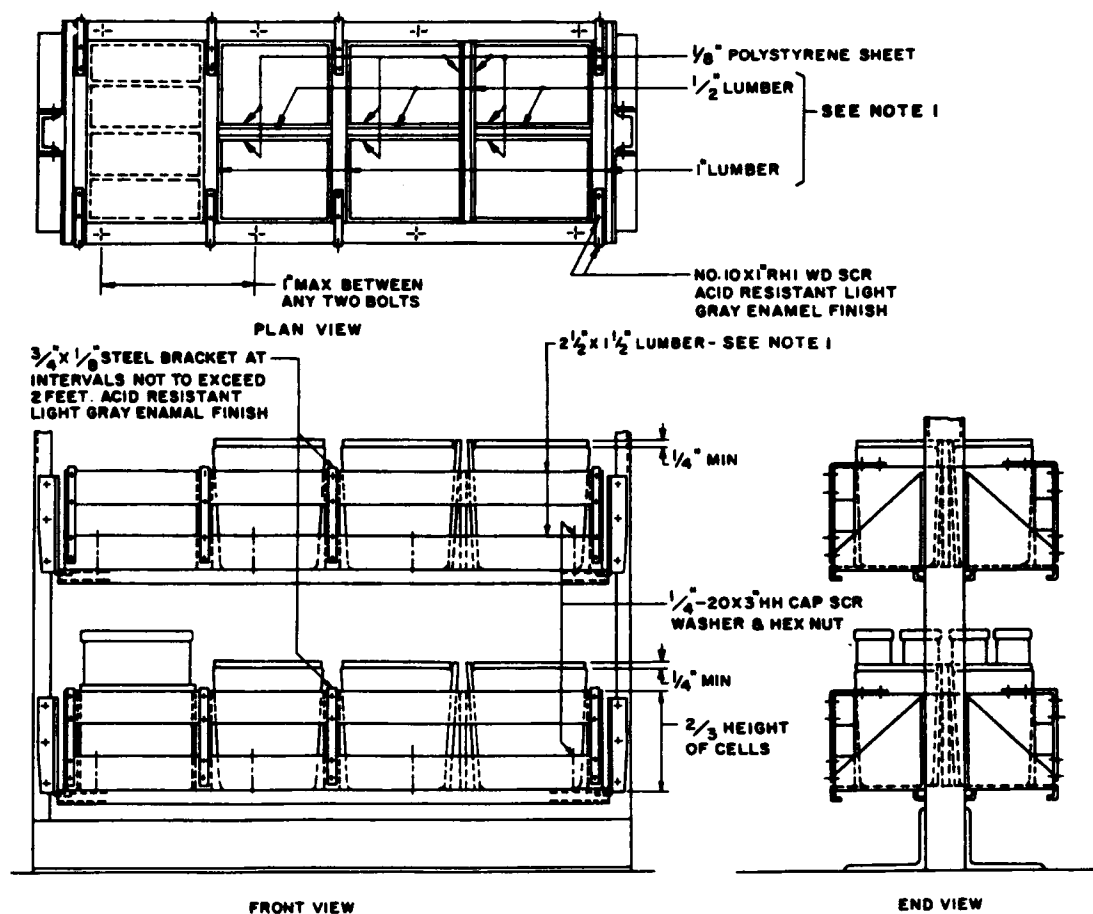
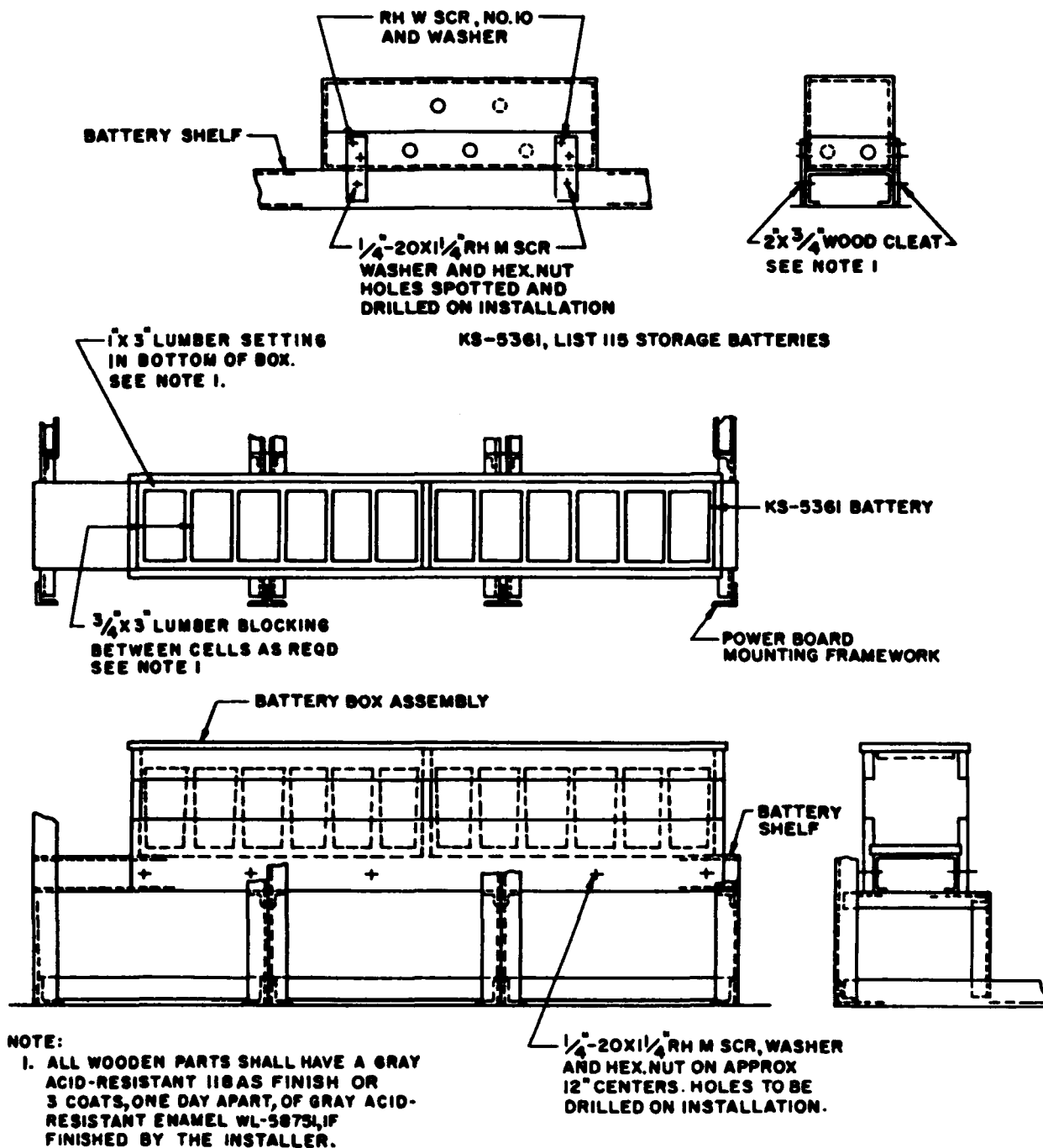


FIG. 21D SUPPORTS FOR BATTERIES ON RELAY RACK-TYPE BATTERY SHELVES
(PARS. 3.611, 3.615) (BSP 800-610-155, Fig. 21D)



KS - 5361, LIST 120C STORAGE BATTERIES

FIG. 21E BRACING OF SUPERIMPOSING BATTERY IN 803C POWER PLANTS
(PAR. 3.616) (BSP 800-610-155, Fig. 21E)

NOTES:

1. BAR ASSEMBLY P-41V031 FURNISHED WITH ED-81789-71 FRAMEWORK SHALL REST LIGHTLY ON TERMINALS OR POSTS OF BATTERY SO THERE IS NO PRESSURE OR CLAMPING ACTION. CAP NUT P-41U530 FURNISHED WITH ED-81789-71 FRAMEWORK SHALL BE FASTENED FINGER TIGHT ONLY.
2. FOR EARTHQUAKE BRACING DETAILS FOR ANY PARTICULAR KS LIST NO. OF BATTERY SEE J86438C-3.

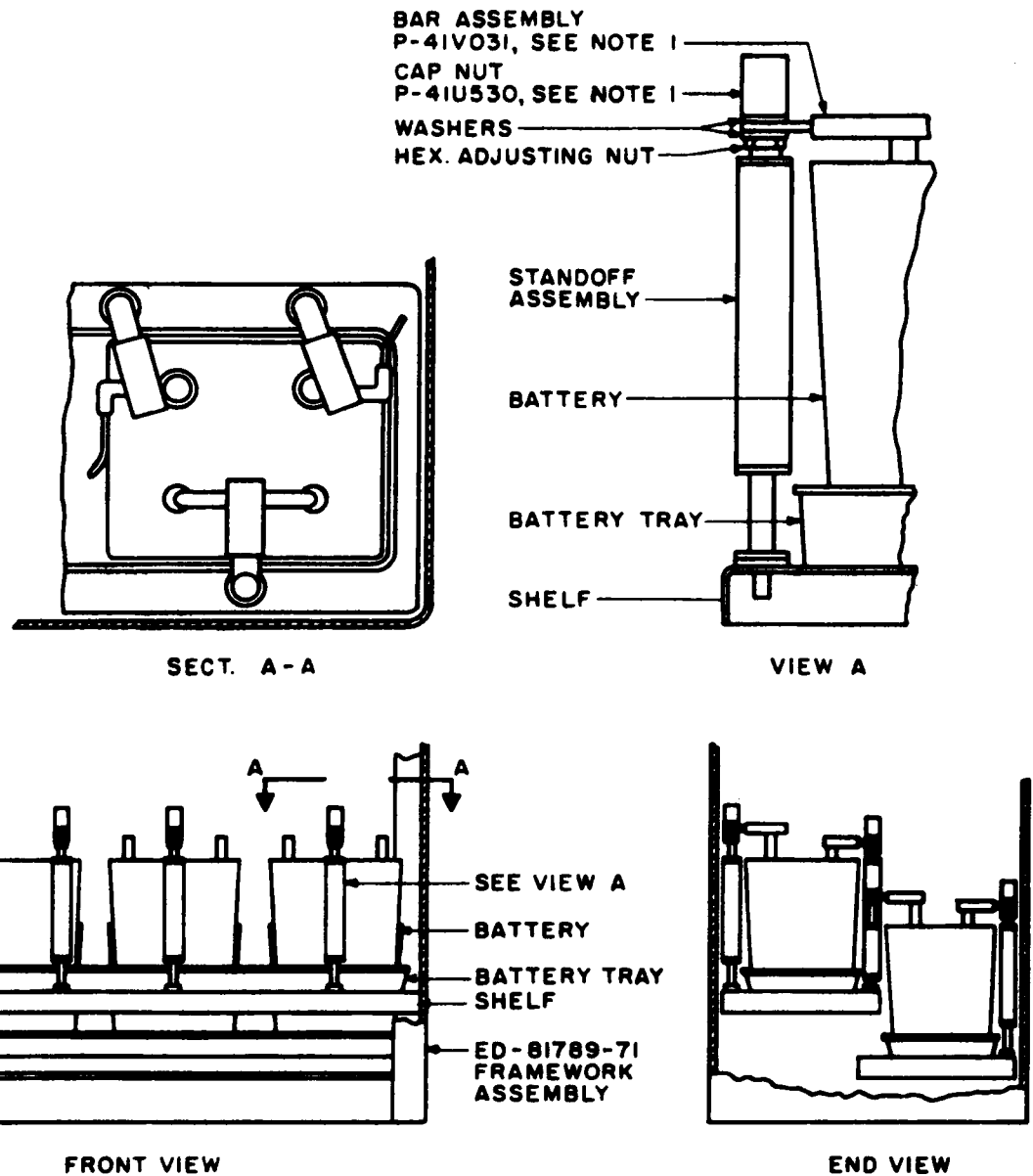


FIG. 21F BRACING OF BATTERIES IN 250-BOLT BATTERY CABINETS ASSOCIATED WITH TD-2 RADIO
(PAR. 3.614) (BSP 800-610-155, Fig. 21F)

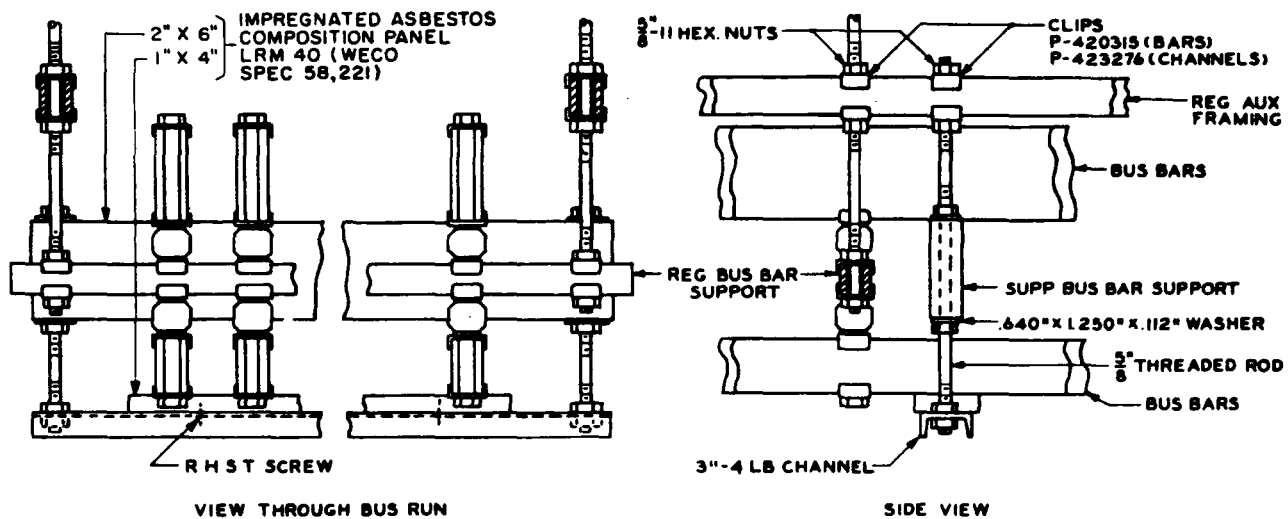


FIG. 22A SUPPLEMENTARY SUPPORTS FOR BUS BAR RUNS
(PAR. 3.6201) (BSP 800-610-155, Fig. 22A)

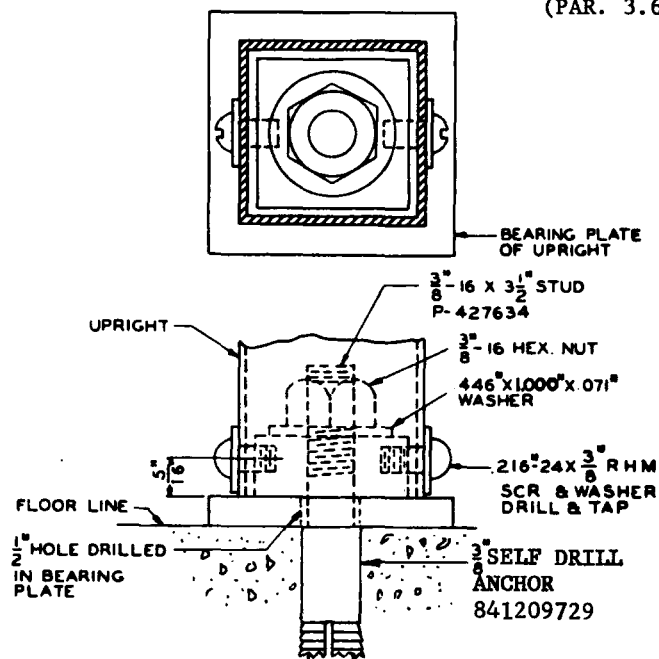


FIG. 43 FLOOR FASTENINGS FOR MACHINE TABLES
AND METAL BATTERY STANDS WITH DE-
TACHABLE BEARING PLATES
(PAR. 4.22) (BSP 800-610-155, Fig. 43)

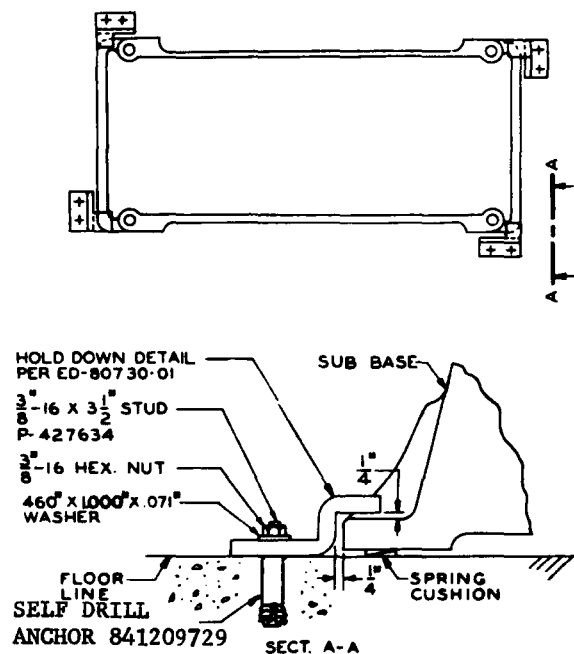
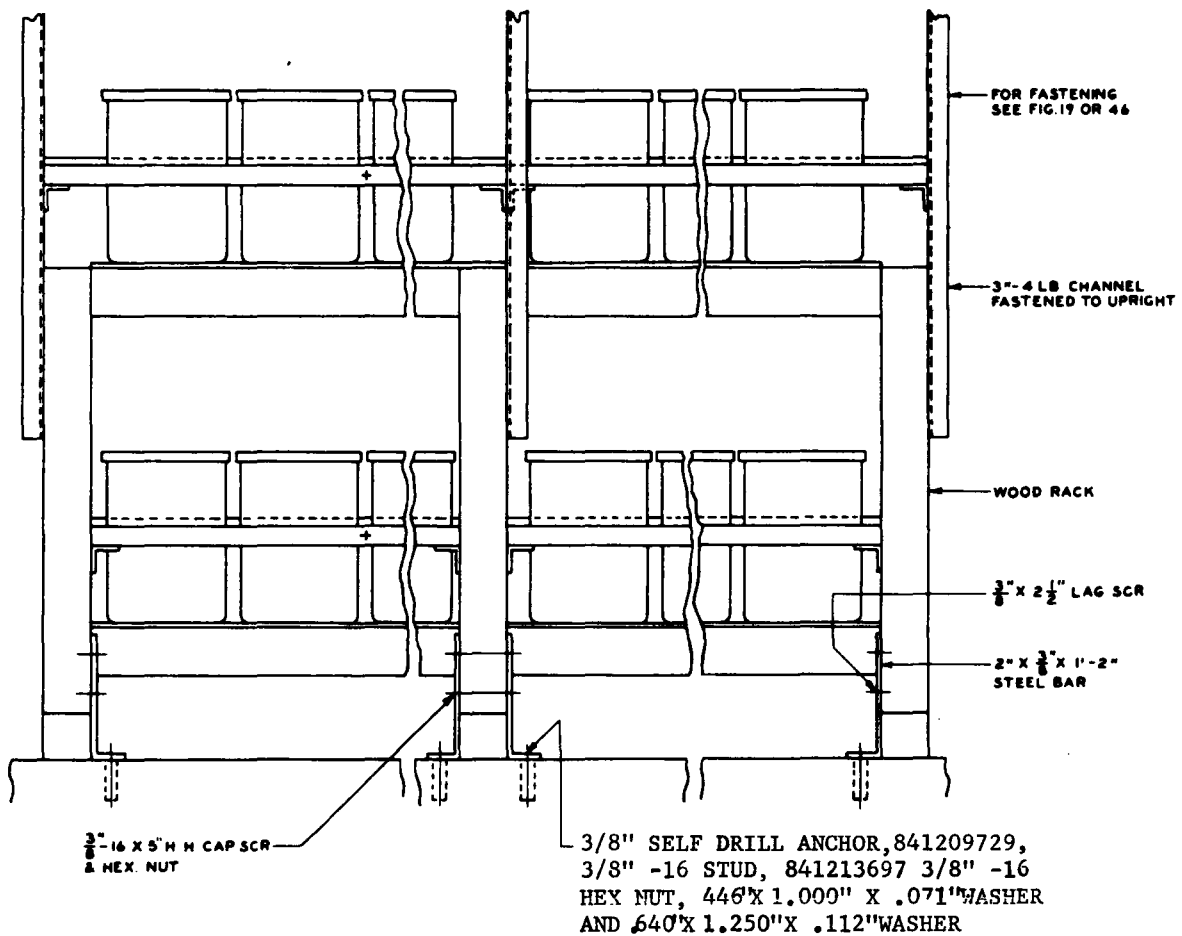
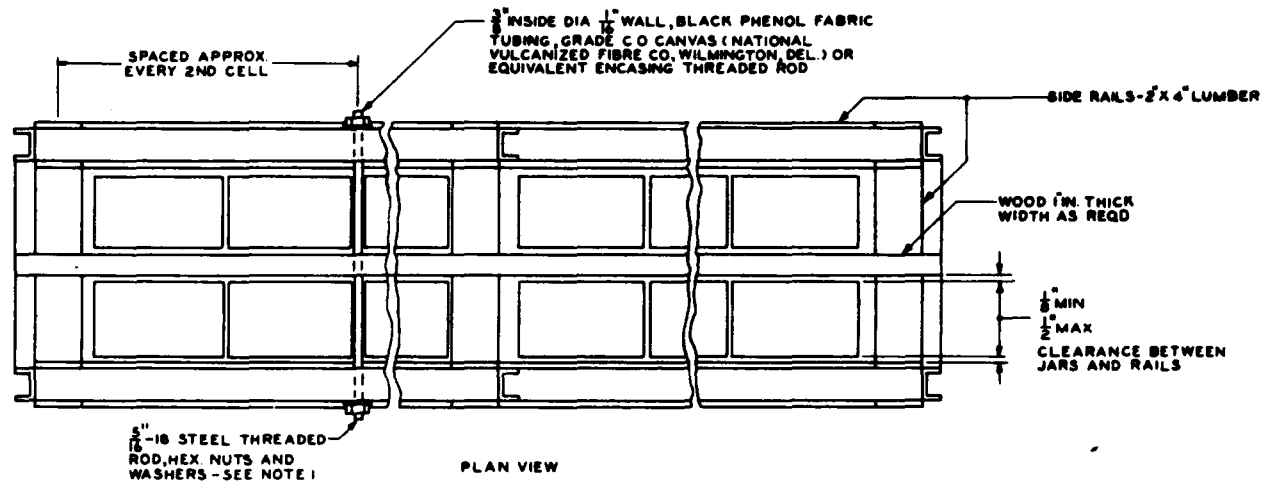


FIG. 44 FLOOR FASTENINGS FOR GASOLINE ENGINES
HAVING SPRINGS AT CORNERS OF SUBBASE
ONLY
(PAR. 4.23) (BSP 800-610-155, Fig. 44)



NOTES

1. USE THREADED ROD WHERE SPACE BETWEEN ROD AND CELL DOES NOT EXCEED 1/2 INCH. WHERE GREATER SPACE EXISTS, USE 1 INCH WOODEN SPACERS WIDE ENOUGH TO LEAVE 1/8 TO 1/2 INCH BETWEEN CELL AND SPACER. FASTEN SPACER TO UNDERSIDE OF RAILS WITH 14 X 2" R H WOOD SCREWS

FIG. 45 SIDE RAILS AND FLOOR FASTENINGS FOR WOODEN BATTERY RACKS
(PARS. 4.321 to 4.323 incl.) (BSP 800-610-155, Fig. 45)

4. MODIFICATION OF EXISTING POWER EQUIPMENT

4.1 Preliminary Information

4.11 When the Telephone Company requests that existing installations of power equipment be modified to provide protection against earthquake damage, the requirements covered in Paragraph 4 of this section and in Sections 17A to 17A2 of Handbook 30 shall be followed insofar as they apply.

4.111 Existing floor fastenings need not be replaced but additional fastenings as called for herein shall be furnished.

4.112 The following requirements are for earlier types of power equipment and supplement the requirements in Paragraph 4.

4.2 Power Equipment

4.21 Power boards of the box- or floor-supported type shall be braced in accordance with Paragraph 3.602. Other power boards more than 4'6" high if not braced to an outside wall should have the uprights extended to the auxiliary framing or ceiling either by a complete replacement of the uprights or by bolting an angle or joining a pipe to the regular angle or pipe upright. The uprights shall be braced as required for rigidity.

4.22 Machine tables shall be bolted to the floor, either directly or as shown in Figure 43.

4.221 When Manhattan Rubber Company type 40, 400, 700, etc., vibration dampeners are used, they should be fastened as shown in Figure 14. Where a hole in the hold-down ring for the dampener is located above a reinforcing channel of a metal top table, a 3/4" hole should be drilled in the bottom of the reinforcing member directly below the mounting bolt so that a No. 102 tool, or equivalent, may be used to tighten the nut. Only two hold-down screws need be used if the third is not sufficiently accessible for installation.

4.23 Engines having bases with springs at the corners only shall be secured as in Figure 44.

4.231 Engines bolted to piers having rubber isolation pads under the pier shall be held in place by having angles per P-417992 located with the vertical surface 1/4" from the pier and fastened to the floor with 3/8" Self Drill Anchors and studs as shown in Figure 15C.

4.24 Where two or more generator control boards 1'3" or more in depth and 7'0" high are fastened together in a transverse direction at the top with auxiliary framing, cable rack, and bus bars, so as to make a rigid self-supporting structure, no additional bracing will be required.

4.25 Ringing machines having a wooden subbase may be secured with wood screws through the table top from below.

4.26 Secure charging machines having spring cushions (car spring isolators) to the floor as shown in Figure 15.

4.27 Engine-alternators furnished with double isolation pads such as KS-5750, KS-5574-01 and KS-15622 shall be held in place with angles P-41E110 as shown in Figure 15C.

4.28 Motor-generator sets not mounted on chassis, such as KS-5668-01, KS-5668-02 and KS-15834 should be anchored to the floor with 3/8-16 Self Drill Anchor 841209729, 3/8-16 stud 841213697, 0.446- by 0.875- by 0.071-inch washer, 0.640- by 1.250- by 0.112-inch washer, and 3/8-16 hex. nut P-401452 in each of the 11/16-inch holes provided in the isolation pads.

4.29 Pipe auxiliary framing in battery room shall be braced in both directions following the same general principles as for flat-bar framing. U bolts may be used for attaching the brace to the pipe. If braces are attached to pipes supported by hanger tees of hanger crosses of the slip-fit type, these tees or crosses shall be prevented from slipping by drilling for, and installing, a 1/4" -20 machine screw through the fitting and pipe.

4.30 Conduit Runs: Heavy conduit runs suspended from threaded rods shall be braced against side sway as covered in Paragraph 4.2 of Section 17A1 of Handbook 30.

4.31 Cable racks resting directly on power board framework should be fastened to the framework every 5'0" or 6'0" by means of 1/2"-13 J bolts. A 1-1/2" angle should be bolted to the power board framework angle for these J bolts when the cable rack is located at the bottom of the power board.

4.32 Batteries and Battery Racks

4.321 Wooden battery racks should be equipped with retaining rails and spacers as shown in Figure 45.

4.322 Fasten the rack to the floor as shown in Figure 45.

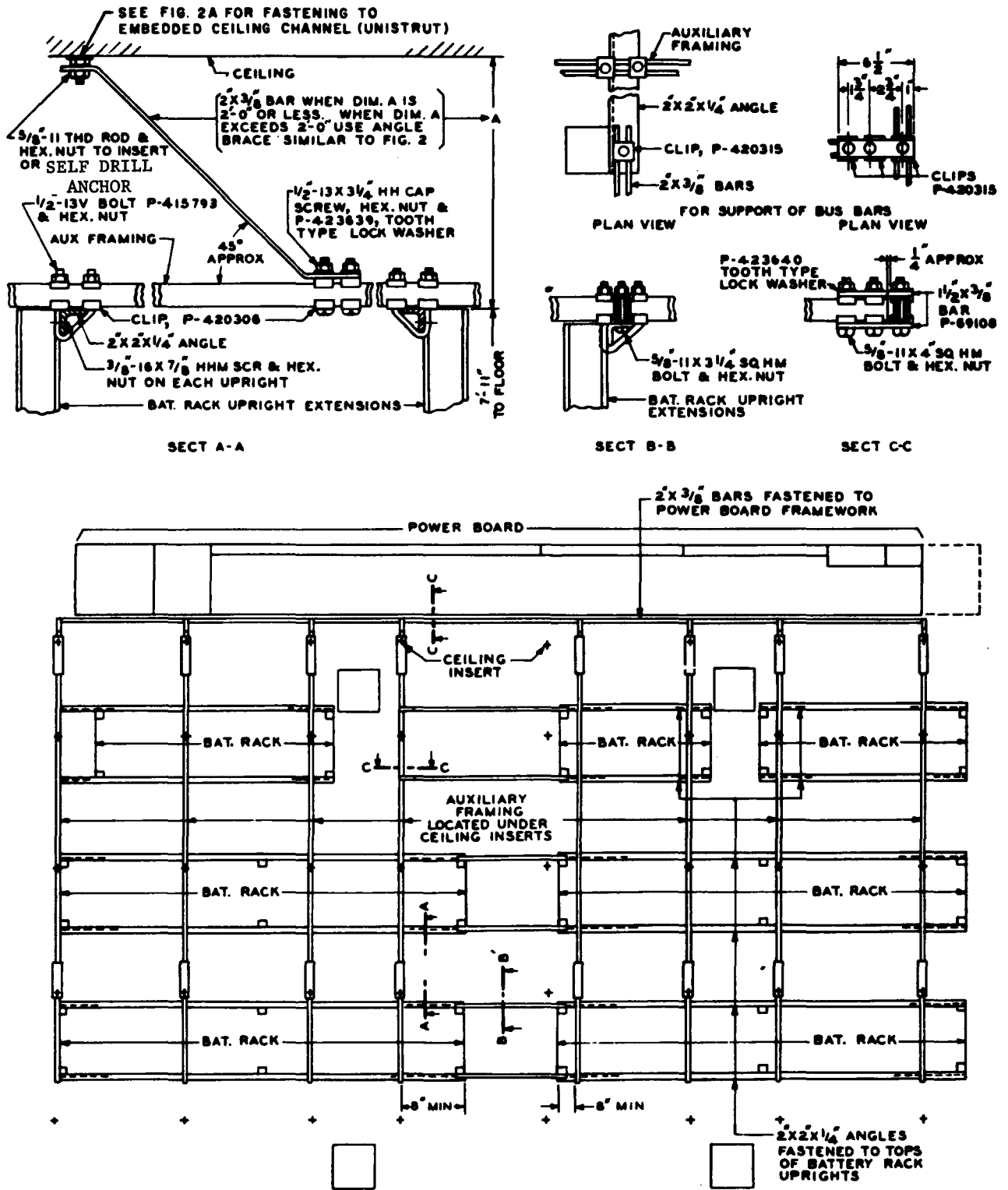


FIG. 46 CEILING FASTENINGS FOR WOODEN BATTERY RACKS ARRANGED IN PARALLEL ROWS
(PAR. 4.324) (BSP 800-610-155, Fig. 46)

- 4.323 Racks isolated from other racks should be fastened to the ceiling with channel upright extensions as shown in Figures 45 and 19 except that racks 3'0" or less in height need not be extended to the ceiling.
- 4.324 Racks arranged in parallel rows should have the uprights extended with metal channels as shown in Figure 45. The tops of these extensions should then be fastened together and braced as shown in Figure 46.
- 4.33 Large Enclosed Cells: In existing offices where the telephone company wishes to provide more adequate protection for large batteries located on the floor

the protection shown in Figure 21B should be used. In such cases, the present protection, that is the 4" x 6" curbing angles, should be removed. Also, for existing continuous lines in excess of twelve cells, the two gates which would be required for one side of a line-up should be bolted together using intermediate brace construction, as shown in Figure 21B, at the junction.

5. VERIFICATION ITEMS

5.1 General

- 5.11 The following contains the verification items for the equipment installed by operations covered in this section.

VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS		REFERENCE	
		PAR. NO.	FIG. NO.
5.2	Verification Items - Auxiliary Framing and Cable Rack		
5.21	Support per BSP 800-614-155. Handbook Sections 17A and 17A1 of Handbook 30	3.51,3.52	
5.3	Power Equipment		
5.31	Fastening to floor with 3/8-16 Self Drill Anchors	3.601,3.602	
5.32	250V battery and power board braced in sidewise direction	3.6021	
5.33	Cabinet type rectifiers fastened with anchors	3.603,3.6033	12P
5.34	Adjacent cabinets junctioned at tops	3.6031	
5.35	Spacers installed in base of rectifier and control cabinets	3.6032	
5.36	Machine tables fastened to floor	3.604	13
5.37	Rubber vibration dampeners fastened to floor	3.605	12,13,14,14A
5.38	Retaining angles for surface mounted machines	3.6053	15,16
5.39	Retaining angles for alternators	3.606	15D
5.4	Engine alternators and generators fastened with floor angles	3.607 3.6074	15C,15E 15F
5.41	Exhaust pipe bracing	3.6072	
5.42	Reserve power plants water tank suspension	3.608	15A
5.43	Fuel oil tank anchoring to saddles	3.6081	15B
5.44	Floor mounted batteries held by floor angles	3.609	16A,16B
5.45	Battery stand floor fastening	3.610,3.613	17D,21C
5.46	Bracing of batteries in cabinets, shelves	3.614 to 3.616	21E,21F

VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS		REFERENCE	
		PAR. NO.	FIG. NO.
<u>Verification Items</u> - continued			
5.47	Cable rack supported filters fastened with tooth-type lockwashers	3.617	
5.48	Battery enclosures fastened to floor with Self Drill Anchors	3.618	21B
5.49	Bus Bar Run Supports - braces run to hanger rod supports	3.620	22A
5.5	Batteries and battery racks - fastening and bracing.	4.32	45,46

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

No arrowed lines due to extensive changes.

[Vertical lines at side of paragraph indicate requirements.

Engineering Planning Manager
Common Installation and Services

Reason for Reissue:
General revisions to update format and add verification items.