Installation Engineering, Handbook 30
Western Electric Company, Incorporated
Kearny Works

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PLACING, FASTENING AND ALIGNING SWITCHBOARD SECTIONS, DESKS AND ASSOCIATED PARTS COMMON REQUIREMENTS AND INFORMATION

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2. GENERAL

2.1 Scope

2.11 This section covers the general requirements and installation procedure for placing fastening and aligning switchboard sections, desks and associated parts, except as modified by applicable specifications and drawings.

2.12 The terms "universal type lower or upper units" and "universal type sections" as used in this section, apply to switchboards having separate one position lower units and either one, two or three position upper units such as the Nos. 1D, 3C, 3CF 3CL, 5, 11, DSA-(No. 15), 605 PBX, 606 PBX, 607A PBX, 702 PBX etc. switchboards. The usual practice is to ship the upper and lower units of these sections separately. An exception to this practice is the 3CF sections which are shipped with the upper units assembled on the lower units.

2.2 Associated Information

2.21 Floor plan and switchboard assembly drawings furnished the job.

2.22 Drawing H-299-201 showing location of floor bolt holes for switchboards and desks.

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

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

3. PRECAUTIONS

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

3.2 Temporary guard rails around an open cable hole at the end of a switchboard should be provided as a safety measure. Information on temporary guard rails for cable holes is contained in Section 2B of Handbook 8.

4. INSTALLING EQUIPMENT

4.1 Tools and material required for the operations covered in this section except as listed below, are generally available on all jobs.

4.11 Tools

R-3051 - Level and Straightedge Set.

Obtain Locally — Saw, Keyhole or Compass. (See Par. 18.3)

4.12 Material

Obtain Locally — Fiber, Sheet, Black, 1/64" (See Par. 16.03)
Shims, Floor, Wood (See Par. 9.3211)

RM-591862 — Fiber, Sheet, Gray, 1/64" (See Par. 15.1)

5. LOCATION OF EQUIPMENT

5.1 The location of switchboard sections, desks and cabinets should conform to the particular plans for each installation.

5.2 Where limiting dimensions or tolerances are not specified the equipment should be located to within such limits of the specified dimensions as will insure satisfactory functioning and workmanlike appearance of the equipment.

6. LAYING OUT FLOORS

6.1 Determine from the floor plan drawings the location of the desks, and switchboard line-ups. Mark lines on the floor following instructions outlined in Section 6A and 6E.

6.2 In the case of universal type sections it may be found desirable to draw lines indicating the front surface of the front angle uprights with respect to the "face-of-jack" line. This will eliminate the need for using a scale when locating the sections in a line-up.

6.3 Mark locations of steel leveling plates and holes for expansion shields. Drawing H-299-201 shows location of floor bolt holes for switchboards and desks;

7. NUMBER, LOCATION AND TYPE OF FLOOR FASTENINGS

7.1 General

7.11 Unless otherwise specified on the drawings or in the job specifications, the type, number and locations of fastenings for switchboard sections desks and cabinets shall be as indicated below.

7.2 Switchboard Sections, Desks and Cabinets Having Angle or Channel Base Members

7.21 Universal Type Switchbaords - (All switchboards having removeable lower units.

7.211 The hold down bolts shall be centrally located on the floor angles or channel, either to the front or rear of the center uprights, as indicated below.

7.2111 Sections Adjacent to the Cable Turning Section and the End Panel - One hold-down bolt on each floor angle or channel as shown in Figure 4A.

7.2112 Adjacent Intermediate Sections - One hold-down bolt between the adjacent floor angles or channels of each pair of intermediate sections as shown in Figures 2 or 4.

7.2113 Angle Sections - One hold-down bolt on each end floor angle or channel as shown in Figure 4B.

7.22 No. 1 Toll, Trunk or Subscriber's Sections (both high and low type) and All Switchboards Not Having Removable Lower Units.

7.221 Four hold-down bolts per section shall be used as shown in Figure 3.

7.23 No. 3 Cable Test Desks and No. 4 Local Test Desks

7.231 Two hold-down bolts shall be used for each section as shown in Figure 3.

7.3 Wooden Frame Switchboards, Wooden or Metal Desks, Cabinets and Similar Equipment not Provided with Angle or Channel Base Members.

7.31 The above equipment should be securely fastened to the floor with suitable angle brackets or other devices, as may be provided as shown in Figure 1. The number and locations of the brackets for the different type of equipment is as indicated below. Where definite locations are not specified below or on the framework assembly drawings suitable location shall be determined by the installer.

7.311 Cordless "B" Board, No. 4 Toll, No. 7 Information Desk and Other Small Sections or Desks with Wooden Floors.

7.3111 Two hold-down bolts through the wood floor centrally located front and rear will ordinarily be sufficient.

7.312 Call Distributing "B" Sections, Nos. 2, 4, 6A and 6B Information Desks and No. 2 Repair Service Desk.

7.3121 All legs shall be fastened to the floor with machine bolts and expansion shields or flat head wood screws.

7.313 No. 3 Information Desks.

7.3131 All six legs of the main sections are fastened to the floor. The end supports do not require fastening.

7.314 Chief Operator's and Similar Type Desks.

7.3141 Not less than two or more than four fastenings per desks.

7.315 Dry Cell Battery Cabinets, Tables Having Legs with Rubber Desks Cups or Glider Bottoms.

7.3151 The above and similar types of equipment do not require fastenings to the floor.

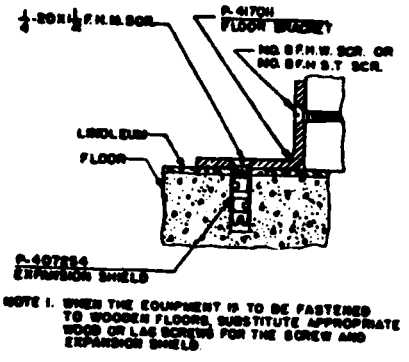
7.316 Small Cabinets, Clocks, Bells, Etc.

7.3161 This equipment should be fastened by means of expansions shields, expansive anchors, wood screws or toggle bolts. Small equipment such as alarm bells, when mounted on walls or partitions, should, unless otherwise specified, be fastened by means of wood screws or bolts to wood strips which are in turn fastened to the walls or partitions with expansion shields, expansive anchors, wood screws or toggle bolts depending upon the type of construction encountered. Toggle bolts should be used in terra cotta or hollow tile walls or partitions.

8. HIGH AND LOW SPOTS IN FLOORS

8.1 To insure that the level alignment requirements in the ultimate switchboard line-up can be met, it will be necessary to determine the high and low spots in the floor before placing the sections in position, particularly when starting a new line-up. The high and low spots can be determined by following instructions outlined in Section 4 of this handbook.

NOTE: If necessary, due to excessive variations in floor levels the high points in the floor shall be channeled out to insure that the space under the sections at low points will not exceed 3/4". Where excessive channeling would be required to maintain a level, the line-up, as a whole, shall be set with the minimum slope practicable. See Paragraph 11.311.



NOTE 1. WHEN THE EQUIPMENT IS TO BE FASTENED TO WOODEN FLOORS, SUBSTITUTE APPROPRIATE WOOD OR LAG SCREWS FOR THE SCREW AND EXPANSION SHIELD.

FIG. 1 - FASTENING DESKS, CABINETS OR LIGHT FRAMEWORKS TO FLOORS (Pars. 7.31, 9.3213(b)) (Agrees with Fig. 1 of BSP AA614.004)

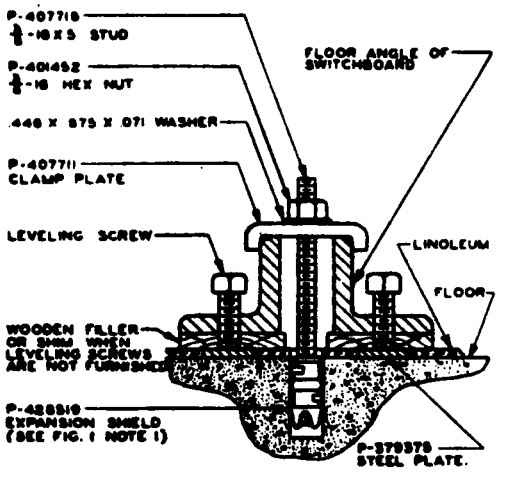


FIG. 2 - FASTENING SWITCHBOARDS WITH REMOVABLE LOWER UNITS HAVING ANGLE BASE CONSTRUCTION FOR FLOORS (Pars. 7.2112) (Agrees with Fig. 2 of BSP AA614.004)

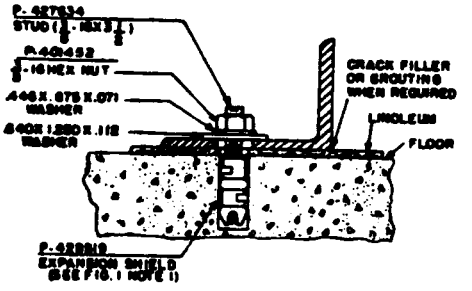


FIG. 3 - FASTENING SWITCHBOARDS WITH NON-REMOVABLE LOWER UNITS TO FLOORS (Pars. 7.221, 7.241) (Agrees with Fig. 3 of BSP AA614.004)

9. USE OF LEVELING SCREWS AND SHIMS

9.1 General

9.11 All switchboards and desks, either with or without leveling screws, may be installed on top of the linoleum or other floor covering, where the linoleum or other floor covering has been laid prior to the installation of the equipment.

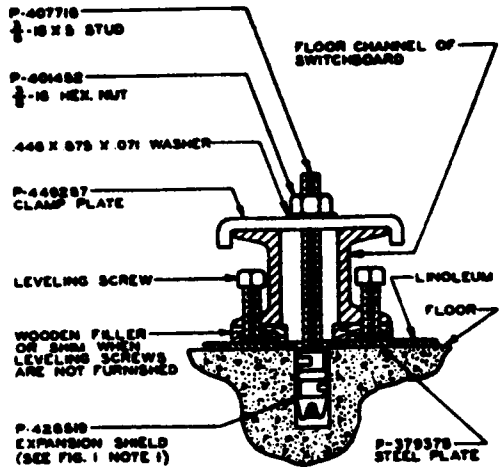


FIG. 4 FASTENING SWITCHBOARDS WITH REMOVABLE LOWER UNITS HAVING CHANNEL BASE CONSTRUCTION TO FLOORS (Pars. 7.2112) (Agrees with Fig. 4 of BSP AA614.004)

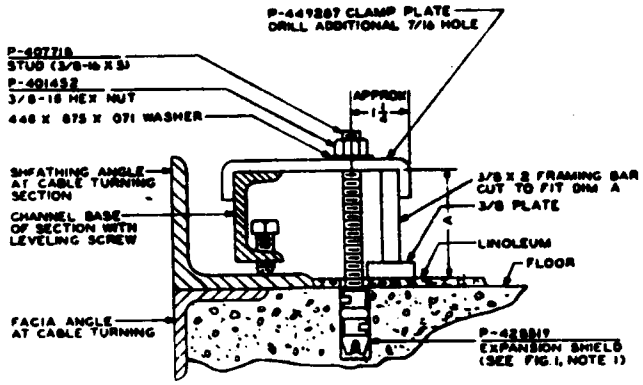


FIG. 4A - FASTENING SWITCHBOARDS WITH REMOVABLE LOWER UNITS AT CTS AND AT END SECTIONS TO FLOORS (Pars. 7.2111, 11.23) (Agrees with Fig. 4A of BSP AA614.004)

9.2 Frameworks Equipped with Leveling Screws

9.21 On Concrete, Terazza and Other Hard Surfaced Floors.

9.211 Where the frameworks are provided with leveling screws, the linoleum or other floor covering should be cut out a sufficient amount at the points where the screws are located to allow the screws to rest directly on the concrete or

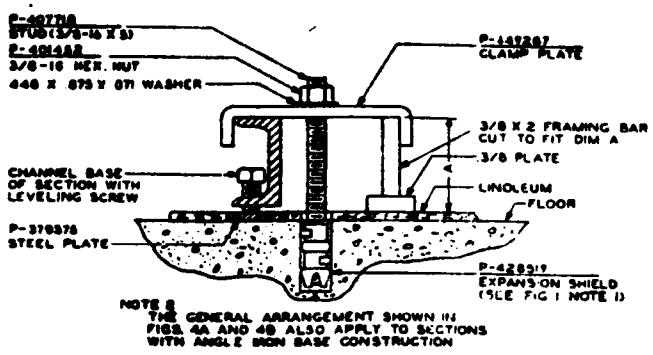


FIG. 4B - FASTENING SWITCHBOARDS WITH REMOVABLE LOWER UNITS AT ANGLE SECTION TO FLOOR (Pars. 7.2113) (Agrees with Fig. 4B of BSP AA614.004)

on steel plates resting directly on the concrete to permit shifting the section as necessary for proper alignment. The framework may be allowed to rest permanently on these screws and no shims grouting or other crack fillers will be required under the base members.

9.212 Mark the locations of leveling screws when laying out the floor. The locations of the leveling screws may be determined from the framework assembly or by checking the base angles, or channels of the framworks being installed. Use a cold chisel for cutting out the linoleum or other floor covering at the leveling screw locations.

NOTE: 1-3/8" x 1-3/8" x 1/8" steel plates, P-379375, are now being furnished as equipment for use under the leveling screws. Where not provided, suitable plates may be made locally or the P-379375 plates may be obtained upon requisition to Hawthorne.

9.22 On Wood and Other Than Hard Surfaced Floors.

9.221 On wood floors and on floors of other than concrete, terazza or equally substantial construction and where steel plates are not used, shims should be used and the weight of the section should not be allowed to rest permanently on the leveling screws.

9.3 Frameworks Not Equipped with Leveling Screws

9.31 General

9.311 Metal frameworks, wooden frame switchboards, wooden or metal desks, either with or without legs, cabinets and similar equipment not provided with angle or channel base construction and leveling screws should have suitable shims installed under the base members or legs as necessary to obtain the proper level and alignment and to offset uneveness in the floor.

9.32 Type, Size and Location of Shims

9.321 Either wood or metal shims may be used as found most convenient. The length and width of the shims should be such as will adequately support the weight of the equipment being shimmed. The following information should be used as guide in determining the type, size and location of the shims.

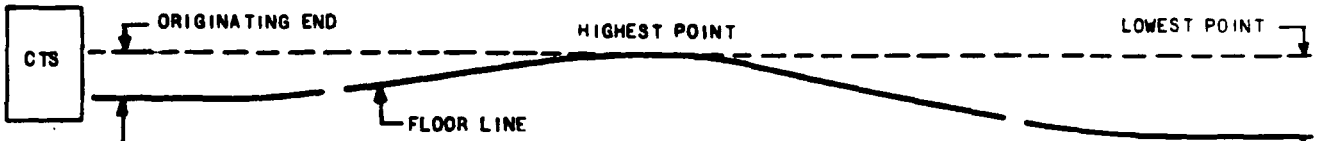
9.3211 Sections and Desks with Angle or Channel Base Construction.

(a) Use wood shims of approximately the same length and width as the individual angle or channel base members.

(b) Plane shims to proper thickness. Purchasing several thicknesses of stock from which the shims are to be made will minimize planing.

(c) The thickness of the shims for the originating section (Section adjacent to the cable turning section in the case of switchboard line-ups) can be determined from Figure 5.

(d) Where the floor is practically level use shims approximately 1/2" thick.



VARIATION IN FLOOR LEVEL BETWEEN ORIGINATING END AND HIGHEST POINT	SHIM THICKNESS AT ORIGINATING SECTION												
	VARIATION IN FLOOR LEVEL BETWEEN HIGHEST AND LOWEST POINTS THRUOUT ULTIMATE LINEUP												
	0	1/16"	1/8"	3/16"	1/4"	5/16"	3/8"	7/16"	1/2"	9/16"	5/8"	11/16"	3/4"
0	1/2"	1/2"	1/2"	3/8"	3/8"	1/4"	1/4"	3/16"	3/16"	3/16"	3/16"	3/16"	3/16"
1/16"		1/2"	1/2"	1/2"	3/8"	3/8"	1/4"	3/16"	3/16"	3/16"	3/16"	3/16"	3/16"
1/8"			1/2"	1/2"	1/2"	3/8"	3/8"	1/4"	1/4"	1/4"	1/4"	3/16"	3/16"
3/16"				1/2"	1/2"	1/2"	3/8"	3/8"	1/4"	1/4"	1/4"	1/4"	3/16"
1/4"					5/8"	1/2"	1/2"	3/8"	3/8"	3/8"	3/8"	1/4"	1/4"
5/16"						5/8"	1/2"	1/2"	3/8"	3/8"	3/8"	3/8"	5/16"
3/8"							5/8"	1/2"	1/2"	1/2"	1/2"	3/8"	3/8"
7/16"								5/8"	1/2"	1/2"	1/2"	1/2"	7/16"
1/2"									5/8"	5/8"	5/8"	1/2"	1/2"
9/16"										5/8"	5/8"	5/8"	9/16"
5/8"											3/4"	5/8"	5/8"
11/16"												3/4"	11/16"
3/4"													3/4"

(RP-12960)

NOTES:

1. DIMENSION IN SQUARE WHERE VERTICAL AND HORIZONTAL COLUMNS MEET IS THE CORRECT THICKNESS FOR SHIM AT THE ORIGINATING END OF LINEUP.
2. 3/16" MINIMUM THICKNESS OF SHIMS AT ORIGINATING END IS TO INSURE THAT CTS. WILL NOT HAVE TO BE CUT OFF WHERE IT SETS ON CABLE HOLE SHEATHING ANGLE.
3. REFER TO SECTION 4 FOR DETERMING HIGH AND LOW POINTS IN FLOOR.

FIG. 5 TABLE FOR DETERMINING THICKNESS OF WOOD SHIMS FOR ORIGINATING SECTIONS (Pars. 9.3211(c)

9.3212 Sections and Desks with Wood Floors.

(a) Use wood shims approximately 2" wide. The shims should be located on two sides, either the front and rear or the two lateral sides. The shims should be fastened in place with suitable brads through the wood floor.

NOTE: By placing the shims lengthwise under the front and rear of the sections, no floor moulding will be required provided the shims are neatly fitted to the contour of the floor and finished to match the section woodwork. The arrangement followed should, however, be the same throughout a switchboard line-up.

9.3213 Sections and Desks with Legs.

(a) Switchboard sections and desks with legs require shims only under the legs that do not touch the floor.

(b) Shape the shims to correspond with the bottom of the legs or ferrules, where provided, and hold in place by the floor fastening through the ferrule or angle brackets. See Figure 1.

10. PRELIMINARY CHECK AND REPOSITIONING OF KEYSHELVES - UNIVERSAL TYPE SECTIONS

NOTE: Figure 6 shows the dimensions governing the correct location of the keyshelf with respect to the front and outer side faces of the front angle uprights of the lower unit framework. The dimensions listed in the figure and the information regarding the screws to be loosened when repositioning the keyshelf and the upper unit framework, if involved, apply to all universal type sections. Unless the parts are accurately located as shown, trouble will be encountered later in obtaining the proper mutual relation between the keyshelves and the rear edges of the plug shelf ("face-of-jack" line) of adjacent sections. (See Paragraph 11.11.

10.1 Sections Having Upper Units Mounted In the Shop

10.11 A preliminary check of each section should be made before it is placed in the line-up to determine that the dimensions shown in Figure 6 are met. Where a dimension shown is not met, the part or parts affected should be repositioned as outlined in the Table of Figure 6 after loosening or removing the screws indicated.

10.111 When checking dimensions from the reference planes (front and side surfaces of the angle uprights) use a straightedge as follows:

(a) For checking front to rear dimensions hold the straight edge vertically against the rear surface of the front palister (See Section AA in Figure 7).

(b) For checking lateral dimensions - hold or clamp a flat bar or strip of wood, approximately 3/8" or greater in thickness against the side surface of the front angle upright and then hold a straight edge against the flat bar. The surfaces of the bar or wood strip must be both parallel and smooth. (The purpose of the bar is to block out the straight edge beyond interfering ironwork above the angle and thus allow the straight edge to be held high enough for making the desired measurements.

In each case (a) or (b), measure from the straight edge to the part being checked. When checking lateral dimensions the thickness of the bar must be added or subtracted, as the case may require, from the scale reading.

10.12 If the wood screws securing the plugshelf to the upper unit were installed in the shop, it may be necessary to plug the screw holes in the plugshelf, to prevent screws from drifting back into their old positions where relocating the plugshelves in the field. See Figure 6.

10.2 Sections Having Upper Units Mounted in the Field

10.21 A preliminary check of the keyshelf and the plugshelf of each lower unit for correct location should be made before the unit is placed in the line-up. The procedure followed should be the same as that outlined for 3CF sections in Paragraphs 10.11 and 10.111 insofar as it applies.

11. PLACING AND ALIGNING - COMMON INFORMATION

NOTE: The operations referred to under this heading.

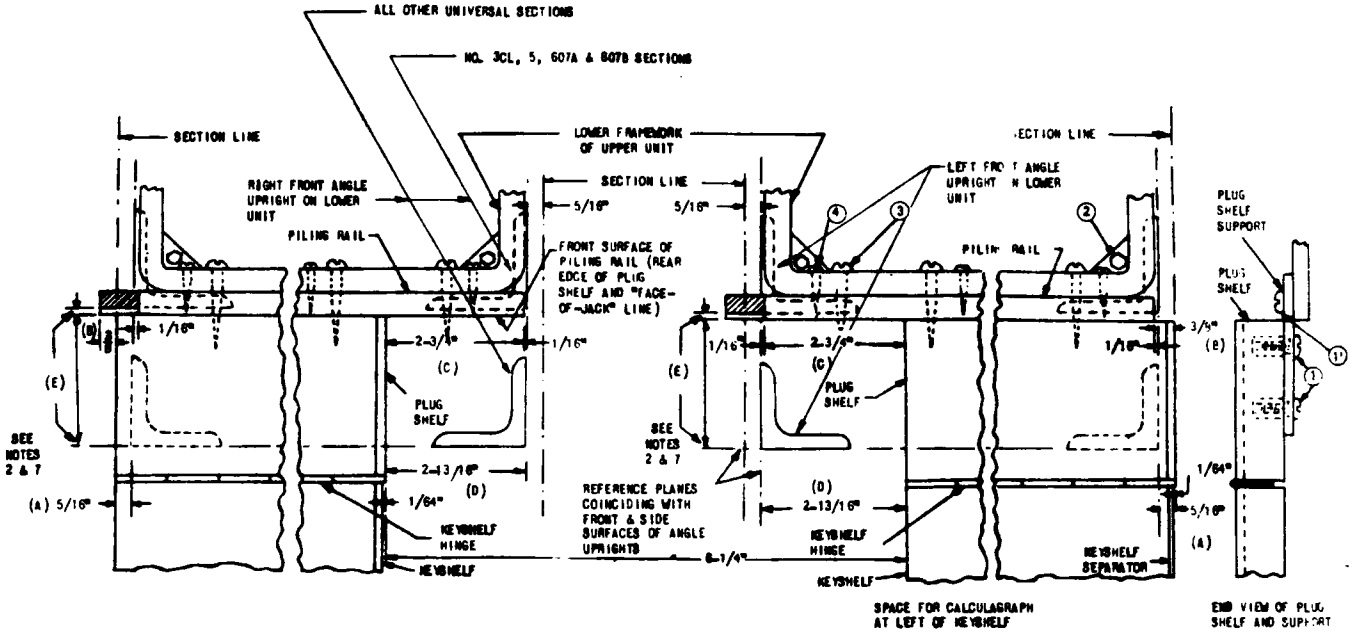
(a) Apply to all types of switchboards, including the No. 1 and similar types, except where specific reference is made to a particular type of section.

(b) Should be preceded by the operations outlined in Paragraph 10, in the case of the universal type sections.

(c) Are supplementary, as applied to universal type sections, to the operations outlined in Paragraphs 13 and 14 and Section 30B.

11.1 General

11.11 The basic line for locating the "front-to-rear" position of a line-up of switchboards is the "face-of-jack" line shown on the floor plan drawings. The basic requirement governing the overall "front-to-rear" alignment of a line-up of switchboards is that applying to the "front-to-rear" alignment of the front surfaces of the piling rail blocks. This is the same as the "face-of-jack" line. (See Paragraph 11.326).



DIMENSION TO BE MET	SCREWS TO BE LOOSENED OR REMOVED	PARTS TO BE SHIFTED
(A)-5/16"	LOOSEN TWO SCREWS (1) UNDERNEATH EACH PLUG SHELF SUPPORT AND IF THE UPPER UNITS ARE NOT MOUNTED ALSO LOOSEN THE SCREWS (1) SECURING THE SUPPORTS TO THE LOWER UNITS. REMOVE WOOD SCREWS (3) THROUGH PILING RAIL INTO PLUG SHELF IN EACH PANEL. SEE NOTE 6.	KEYSHELF, - SHIFT TO RIGHT OR LEFT AS REQUIRED. UPPER UNIT STILL SECURED TO LOWER UNIT.
(B)-3/8"	LOOSEN FOUR CAP SCREWS (2) SECURING UPPER UNIT TO LOWER UNIT. REMOVE WOOD SCREWS (3) THROUGH EACH PILING RAIL INTO PLUG SHELF. SEE NOTE 6.	UPPER UNIT ONLY. - KEYSHELF SHOULD BE SECURELY FASTENED TO LOWER UNIT.
(C)-2-3/4"	SAME AS FOR (B).	SAME AS FOR (B).
(D)-2-13/16"	SAME AS FOR (A).	SAME AS FOR (A).
(E)-SEE NOTE 7	LOOSEN TWO SCREWS (1) UNDER EACH PLUG SHELF SUPPORT. REMOVE FOUR CAP SCREWS (2) SECURING UPPER UNIT TO LOWER UNIT.	KEYSHELF AND COMPLETE UPPER UNIT, - SHIFT FORWARD OR BACKWARD AS REQUIRED.

NOTES:

(1) DIMENSIONS SHOWN IN BRACKETS ABOVE SHOULD BE CHECKED FIRST ON ONE SIDE AND THEN ON THE OTHER SIDE OF THE KEYSHELF.

(2) TO AVOID ACCUMULATION OF PERMISSIBLE MANUFACTURING VARIATIONS IN WIDTHS OF KEYSHELVES OCCURRING AT JUNCTIONS OF SECTIONS, ALWAYS LOCATE THE PARTS (LEFT TO RIGHT) WITH RESPECT TO DIMENSIONS AT LEFT-HAND SIDE OF SECTIONS. THE (E) DIMENSIONS SHOULD BE MET AT BOTH SIDES.

(3) ANY VARIATION IN EXCESS OF 1/32" AT THE RIGHT-HAND SIDE AFTER POSITIONING THE PARTS TO MEET THE DIMENSIONS AT THE LEFT-HAND SIDE MAY REQUIRE SHIMMING OR PLANNING TO OBTAIN SATISFACTORY MUTUAL ALIGNMENT BETWEEN ADJACENT SECTIONS.

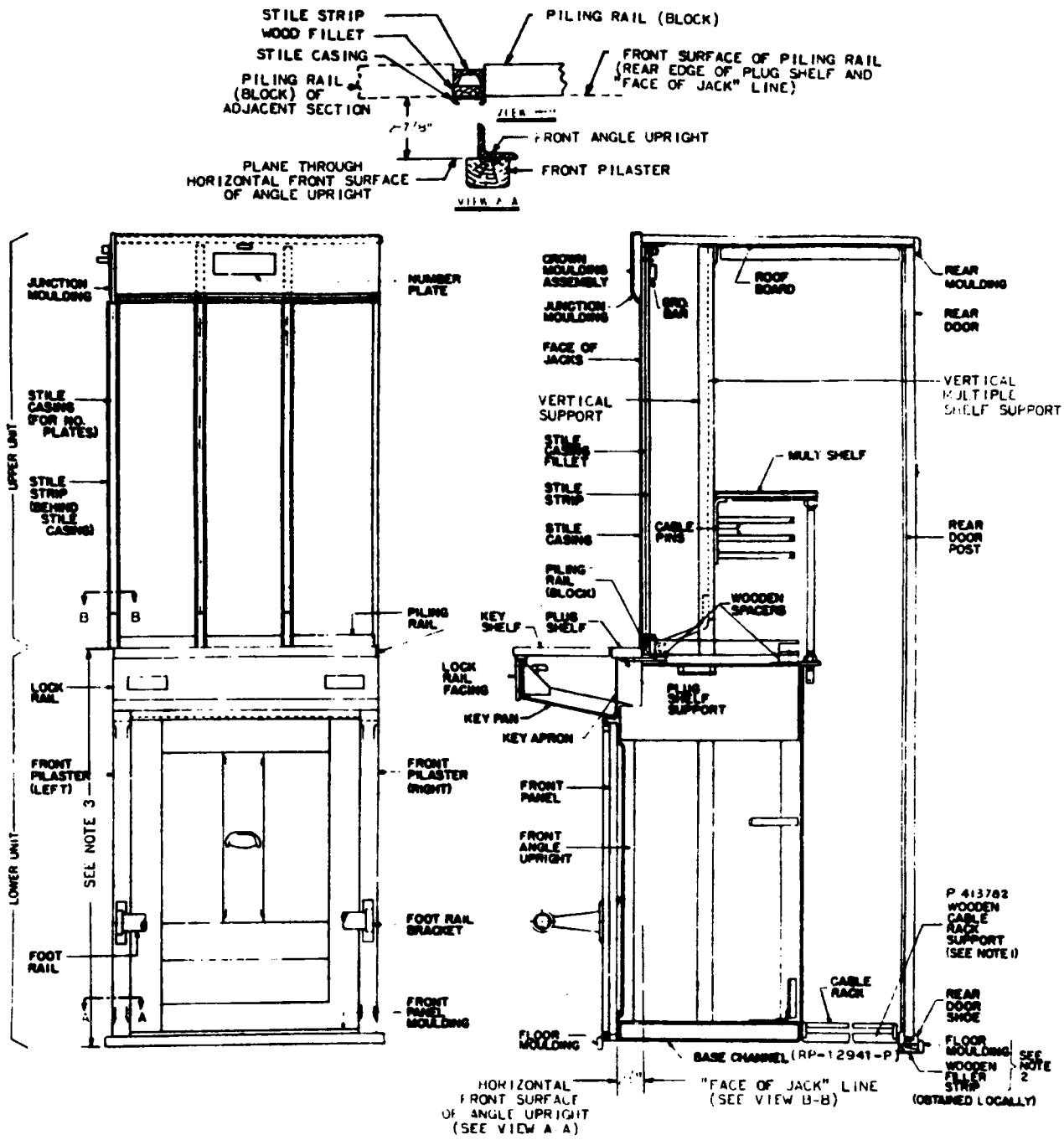
(4) THE SHORTER WOOD SCREWS (4) SHOWN ARE USED FOR SECURING THE PILING RAIL TO THE UPPER UNIT FRAMEWORK DURING SHIPMENT. THE INSTALLER WILL NOT ORDINARILY HAVE ANY REASON TO LOOSEN OR REMOVE THESE SCREWS.

(5) EITHER 1, 2 OR 3 POSITION UPPER UNITS MAY BE FURNISHED. THE 1 POSITION UPPER UNIT IS ILLUSTRATED IN THIS FIGURE AND THE QUANTITIES OF CAP SCREWS (2) TO BE LOOSENED APPLY ONLY TO THE 1 POSITION UPPER UNITS.

(6) TWO WOOD SCREWS (3) ARE USED THROUGH THE PILING RAIL IN EACH PANEL. THE SHOP WILL INSTALL ONLY ONE OF THE TWO SCREWS. AFTER DETERMINING THAT THE KEYSHELF IS CORRECTLY LOCATED, THE INSTALLER SHOULD FIRST INSTALL THE SCREW IN THE HOLE NOT USED BY THE SHOP AND THEN REPLACE THE OTHER SCREW, PLUGGING THE OLD SCREWHOLE IN THE PLUG RAIL TO PREVENT KEYSHELF BEING PULLED BACK INTO ITS OLD POSITION.

(7) THE (E) DIMENSION IS 1/4" (MEASURED FROM FRONT VERTICAL FACE OF FRONT ANGLES AT BOTTOM OF SECTION) FOR NO. 5, 3CL, 607A AND 607B SECTIONS AND 2-7/8" FOR ALL OTHER UNIVERSAL TYPE SECTIONS. NOTE THAT THE REAR EDGE OF THE PLUGSHELF (FACE-OF-JACK LINE) IS IN FRONT OF A PLANE THROUGH THE FRONT SURFACE OF THE ANGLE UPRIGHTS FOR THE NO. 5, 3CL, 607A AND 607B SECTIONS AND TO THE REAR FOR ALL OTHER UNIVERSAL TYPE SECTIONS.

FIG. 6 - LOCATING DIMENSIONS AND INSTRUCTIONS FOR RELOCATING PARTS WHICH CAN BE SHIFTED BY INSTALLER TO OBTAIN PROPER RELATION BETWEEN UPPER AND LOWER UNITS, AND KEYSHELVES OF UNIVERSAL TYPE SWITCHBOARD SECTIONS (Pars. 10(Note), 10.11, 10.12)



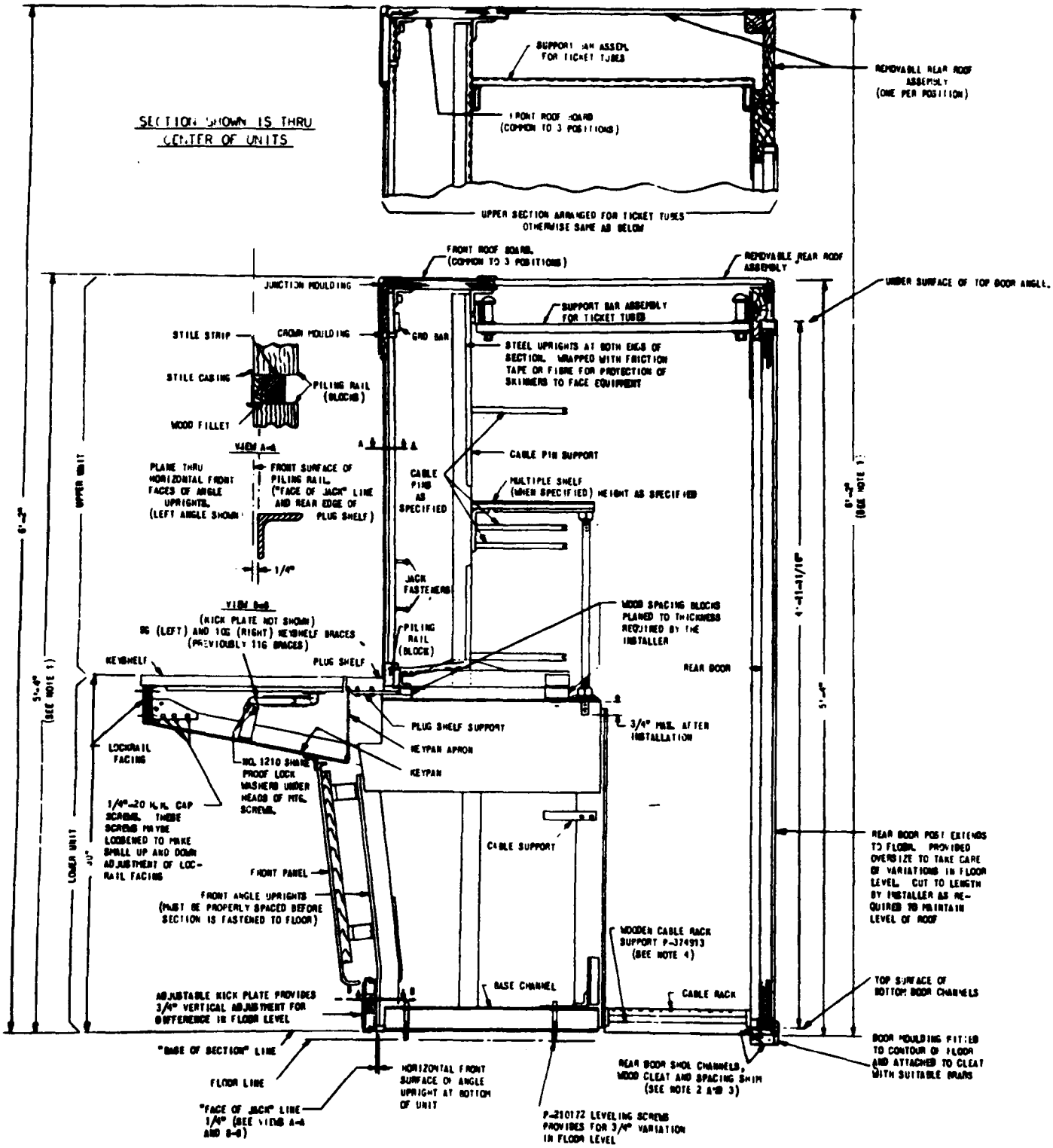
NOTES:

1. THE NUMBER AND SPACING OF THE WOODEN SUPPORTS UNDER CABLE RACKS AT REAR OF SECTION IS SHOWN ON THE UPPER SECTION IRON FRAME ASSEMBLY DRAWINGS. IT IS NOT NECESSARY TO FASTEN THE WOOD BLOCKS TO THE FLOOR. THIS ALSO APPLIES TO THE CABLE TURNING AND ANGLE SECTIONS. JUNCTION CLAMPS NOT REQUIRED ON CABLE RACKS SINCE CLAMPING OR SEWING OF CABLES TO THE RACKS WILL PROVIDE SUFFICIENT RIGIDITY OF THE PARTS.

2. THE WOODEN FILLER STRIPS SHOULD BE CUT TO LENGTH AND THICKNESS REQUIRED TO MAINTAIN DOOR SHOE AT LEVEL NECESSARY FOR PROPER FIT OF DOOR. THE FLOOR MOULDING SHOULD BE FITTED AT BOTTOM TO CONTOUR OF THE FLOOR AND ATTACHED TO FLOOR SHOE OR FILLER STRIP WITH SUITABLE BRADS.

3. THE KEY SHELF HEIGHT MAY BE 30" OR 40". A 40" KEY SHELF IS SHOWN. SECTIONS WITH 30" KEY SHELF NOT PROVIDED WITH FOOT RAILS.

FIG. 7 - TYPICAL UNIVERSAL TYPE SWITCHBOARD SECTION - OTHER THAN NOS. 3CL, 5, 607A AND 607B SECTIONS, MAY BE EITHER ONE, TWO OR THREE POSITION UPPER UNITS - SINGLE POSITION SHOWN. (Pars. 10.111a, 11.12, 11.212, 19.12)



NOTES:

1. DIMENSIONS SHOWN MUST BE MAINTAINED BETWEEN POINTS INDICATED AT BOTH FRONT AND REAR OF SECTION.
2. METAL DOOR SHOE CHANNELS ARE ATTACHED TO BOTTOMS OF DOOR POSTS THROUGH HOLES DRILLED BY SHOP FOR THAT PURPOSE. SPACE BETWEEN WOOD CLEAT AND FLOOR SHOULD BE SHIMMED, EITHER USING SUITABLE WASHERS AT EACH FLOOR FASTENING OR BY WOOD SHIMS. THE WOOD SHIMS MAY BE FULL WIDTH OF SECTION FITTED TO CONTOUR OF FLOOR OR SHORT SECTIONS SPACED AT FLOOR FASTENING INTERVALS. ARRANGEMENTS ARE BEING MADE TO HAVE WOOD SPACING SHIMS FURNISHED WITH SECTIONS.
3. DO NOT FORCE THE DOOR CLEATS IN POSITION BETWEEN DOOR POSTS AS THIS WILL THROW THE DOOR POSTS OUT OF PLUMB. IF NECESSARY, CUT OFF THE EXCESS LENGTH OF THE CLEAT.
4. THE NUMBER AND SPACING OF THE WOOD SUPPORTS UNDER CABLE RACKS AT REAR OF SECTION IS SHOWN ON DRAWINGS ED-92061-70 OR ED-92063-70. IT IS NOT NECESSARY TO FASTEN THE WOOD BLOCKS TO THE FLOOR. THIS ALSO APPLIES TO THE CABLE TROUGHING AND ANGLE SECTIONS. CABLE RACK JUNCTION CLAMPS ARE NOT REQUIRED. CLAMPING OR SEWING OF CABLES TO THE RACKS WILL PROVIDE SUFFICIENT RIGIDITY OF THE PARTS.

FIG. 8 - TYPICAL NOS. 3CL, 5, 607A AND 607B UNIVERSAL SWITCHBOARD SECTION (Pars. 11.12, 11.212, 16.014, 17.5, 19.12)

11.111 In the case of No. 1 and similar sections not having separate upper and lower units, the "face-of-jack" line should be used for positioning the sections since this is a fixed location and no adjustment with respect to the section framework, keyshelves, etc., can be made on the job.

11.112 Due to the possibility of shifting during shipment the keyshelves of universal type sections are not accurately located by the shop. They are attached to the lower units for shipping purposes only. This also applies to shop mounted upper units. For this reason the position of the keyshelves on all universal type sections must be accurately set on the job, for the front-to-rear location, otherwise the rear edges of the plug shelves, which represents the "face-of-jack" line can not be used for locating the lower units. See information under Paragraph 10.

11.12 Typical universal type sections with one position upper units assembled in place are illustrated in Figures 7 and 8 and show the names of the various parts referred to in this section.

11.13 To avoid possible distortion of the lower units of universal type sections, retain the units on the wooden platform, which forms a part of the shipping case, until ready to place the units in the lineup.

11.131 Where steel reinforcing shipping details have been attached to the tops of lower units, keep them in place until ready to mount the upper units.

11.14 Defer mounting bulletin holders, calculagraphs and other apparatus subject to injury or breakage, as long as possible.

11.15 Substitute Structural Shapes.

11.151 Due to the necessity of making certain framework details from substitute structural shapes, cases will arise where adjacent parts being junctioned or spliced are of different thickness. It is expected that in some of these cases it will be necessary to use shims between the splices and the smaller of the two parts in order to obtain proper alignment of the parts.

11.152 As an example of this condition, sections of Toll Switchboards Nos. 1 and 3 have been furnished in which the steel channel beneath the piling rails may have been any one of two or three different thicknesses. When splicing these channels of adjacent sections it may be necessary to use steel shims or washers between the splice plate and one of the channels in order to obtain proper alignment of the front faces. It also may be necessary to replace some of the splice screws furnished by other of greater length.

11.2 Placing

11.21 In the case of new line-ups first place the section adjacent to the cable turning section in position, noting that the rear edge of the plug shelf (front face of the piling rail blocks on other than universal sections) lines up with the "face-of-jack" line previously laid on the floor. This may be done as follows:

11.211 Hold the 6' straight edge against the front surface of the piling rail blockss, or in line with the rear edge of the plug shelf where the upper unit is not in position, with approximately 2' of the straight edge projecting beyond the end panel. Hang a plumb line over the rear surface of the projecting straight edge and note the relation of the plumb bob with the line on the floor. Where stile casings are mounted on the stile strips the plumb bob should fall in front of the line on the floor for a distance equal to the thickness of the stile casings.

11.212 In the case of universal type sections, the front faces of the angle uprights should be 1/4" to the rear of the "face-of-jack" lines laid out in the floor for the Nos.3CL, 5, 607A and 607B Sections (See Figure 8) and 2-7/8" to the front of the "face-of-jack" line for all other universal type sections (See Figure 7).

NOTE: If the relation outlined above is not met on any section it is an indication that the keyshelf on the section being added or possibly on the originating section in the case of a new line-up, has not been properly positioned in accordance with the information under Paragraph 10.

11.22 Using the information previously obtained when checking for high and low points in the floor (see Section 4) adjust the leveling screws or select wood shims of the proper thickness to insure that level and alignment requirements can be maintained throughout the ultimate line-up without channeling out high spots in the floor as might otherwise be necessary.

11.23 Level and loosely fasten the section to the floor. See Figure 4A for method of fastening section when cable hole sheathing angle interferes with drilling of holes for floor bolts.

11.24 Place suceeding sections, including sections being added to existing line-ups, in position. Shift each section and adjust leveling screws or use shims as required to level and bring the unit into alignment with adjacent section as each unit is positioned. Fasten units to floor as work progresses.

CAUTION: When moving the lower units of universal type sections, do not grasp the keyshelf as this might force the shelf out of square.

11.25 Where an angle section is being installed, place and align the first section in the line-up after the angle section. Then install units within the angle section so that the front faces of the piling rail blocks or the rear edges of the plugshelves are directly over the "face-of-jack" line previously laid out on the floor.

11.26 Check the overall length of a line-up of one position lower units as each section is installed in order to detect any accumulative error. This can be verified by noting that the side edges of the keyshelves are directly over the junction lines previously marked on the floor. If it is found that the width of units across the pilasters is oversize to the extent that the overall length of the line-up can not be met, the condition can be corrected as follows:

11.261 Loosen the screws securing the pilasters to the framework and then relocate the pilasters so that the required dimensions can be met. This is possible since the holes in the framework through which the screws pass are larger in diameter than the screws. In some cases after completion of this adjustment, it may be found that the doors will not fit in place. Where this occurs, it will be necessary to plane the ends of the doors to facilitate a correct fit.

11.27 On boards equipped with pneumatic tubes, calculagraph shelves should be set in place as the work progresses but not fastened until after the tubes are in place.

11.28 Kick plate assemblies, where furnished, should be installed along with the placing of each individual section.

11.3 Aligning

11.31 Switchboards and desks should be level. Wooden strips or shims should be used except where leveling screws rest directly on the surface of a cement, tile, terrazza or similar hard surface floor or on steel plates resting on these floors. When placed in a line-up; the level should be maintained throughout the line-up.

11.311 Where the variation in floor level is 3/4" or more, the section framework should be set directly on the floor at the high points to insure that the space at lower points will not exceed 3/4". If an excessive space would be required to maintain a level, the line-up as a whole may be set with the minimum slope practicable. See "Note" following Paragraph 8.1

11.32 After being fastened in place, the following conditions should be met:

11.321 Upright parts should be approximately vertical.

11.322 Horizontal parts should be approximately level.

11.323 Other than horizontal or vertical parts should be at the angle specified as far as praticable.

11.324 No pronounced irregularity should exist throughout a line-up.

11.325 The top surface of the piling rails in any two adjacent panels should be as nearly in alignment as practicable and in no case should the variation in level between them exceed 1/32".

11.326 The front surfaces of the piling rail and of the stile strips or wood fillets on which the stile casings mount, in any two adjacent panels should be in alignment, any variation being kept as small as practicable.

NOTE: Obtaining alignment of sections at turns will be facilitated by having the angle section woodwork temporarily in position.

12. ALIGNING NO. 1 AND SIMILAR SECTIONS NOT HAVING SEPARATE LOWER AND UPPER UNITS

12.1 Stretch a tight line, between the end sections in straight portions of the line-up, along the front of the stile strips or casings and at a height corresponding to the top surfaces of the piling rails.

12.2 Adjust the leveling screws, or select wood shims of proper thickness where used, and shift the intermediate sections as required to meet the following conditions.

12.21 Top surfaces of piling rails in panels of adjacent sections at approximately the same level. Any variation shall not exceed 1/32".

12.22 Front faces of piling rails and stile strips or wood fillets of adjacent sections in line. Any variation shall be as small as practicable.

12.23 Keyshelves level as checked with a level.

12.24 Front pilasters plumb - check with a level.

12.3 The top surfaces of adjacent keyshelves should be as near in line as practicable. If separators are used between the keyshelves the variation between any two adjacent keyshelves shall not be in excess of one half the normal projection of the separator above the surface of the keyshelf. For example, if the normal projection of the separator, as shown on the assembly drawings, is 1/16" the "up and down" variation between top surfaces of adjacent keyshelves should not exceed 1/32". This also applies to other junctions in the woodwork where separators are used. See Paragraph 16.143.

12.4 If unable to meet the conditions outlined in Paragraph 12.3 and at the same time keep the top surfaces of piling rails in adjacent panels within 1/32" of the same level (see Paragraph 12.21) it will be necessary to dress down the top surface or shim up the piling rails as found necessary.

12.5 Where keyshelf separators are not provided the top surfaces of adjacent keyshelves should be as near the same level as practicable and the piling rails dressed down or shimmed as found necessary.

12.6 When in final alignment the front surfaces of adjacent keyshelves should not project beyond each other so as to be conspicuous. Where separators are used the variation shall not exceed one half of the normal projection of the separator beyond the keyshelf. See Paragraph 16.143. If this condition is not met it will be necessary to dress down the front surfaces of the protruding keyshelves on wooden keyshelves and refinish to match the original finish. On fiber faced keyshelves or calculagraph shelves remove the shorter shelves and attach a fiber shim of the required thickness to the rear edges. Smooth the top edges of the shims and finish to match, as near as practical, the finish of the shelf.

31. ALIGNING LOWER UNITS - UNIVERSAL TYPE SECTIONS

NOTE: On boards equipped with pneumatic tubes, the valve and calculagraph shelves should be in place when aligning the lower units. If the shelves are not available, use equivalent spacers.

13.1 Providing the keyshelves have been accurately located as outlined under Paragraph 10 and the two end sections in the straight portions of the line-up have been accurately positioned with the rear edges of the plugshelves in proper relation with the "face-of-jack" line on the floor, as covered in Paragraph 11.21 to 11.24, no trouble should be encountered in the alignment of the intermediate sections.

13.2 Check that the intermediate units meet the conditions listed below. Shift the units and adjust the leveling screws of each unit as may be necessary.

CAUTION: When moving the lower unit do not grasp the keyshelf as this might force the shelf out of square.

13.21 Front surface of front angle uprights in proper relation with "face-of-jack" line on floor. See Paragraph 11.212.

13.22 Top surfaces of keyshelves in adjacent sections at approximately the same level.

13.23 Rear edges of adjacent plugshelves in alignment. Use the 6' straight edge for checking this. If not in line it is evident that the keyshelves have shifted from their correct predetermined position.

13.24 Front pilasters plumb. Check with a level.

13.3 After the units have been positioned and adjusted for level and height, in accordance with the above, check that floor fastenings are tight and that wooden floor shims are in place as required. The shims can be readily marked and planed to correspond to the space beneath the floor channels. Cut notches in the shims to clear the leveling screws. Where required remove the leveling screws after the units have been secured in position.

NOTE: It is not necessary to use spacers between the ironwork of adjacent lower units on the bolts securing the units together. Tighten the bolts only sufficiently to keep the units from being moved out of position.

13.4 Correct oversize keyshelves, lockrails, etc., before proceeding with the installation of other units.

13.5 Correct excessive spacing between wooden parts, binding at keyshelves, fit of piling rail blocks and other irregularities noted during the aligning operation, as outlined under "Assembly of Woodwork".

14. MOUNTING AND ALIGNING UPPER UNITS - UNIVERSAL TYPE SECTIONS

14.1 Mount upper units on lower units starting at the C.T.S. end of the line-up.

14.2 Align upper units so as to bring piling rail (top surface) in the end panel in line with piling rail in adjacent unit.

14.21 To facilitate checking the overall alignment stretch a tight line between the end sections at a point corresponding to the top surface of the piling rails.

14.22 Plane off or add suitable shims under the wooden spacers, between upper and lower units, as required to bring the top surfaces of piling rails in adjacent sections in line and to plumb the stile strips. (See Paragraph 11.321 and 11.325).

14.3 On Nos. 3CL, 5, 607A and 607B and on trouble positions in No. 11 switchboard line-ups temporarily unfasten and set aside the cord shelf in order to gain ready access to fastenings which are to be installed to secure the upper to the lower units.

14.4 Bolt each upper unit to the adjacent upper unit after they are aligned using washers (P-160105), as required, to fill space between uprights.

14.5 To compensate for any twist in stile strips resulting from slight irregularities of the ironwork where the strips fasten to the top junction plate, place metal shims, as required, at the back of the stile strips at the top junction plate.

15. WRAPPING STEEL UPRIGHTS TO PROTECT SKINNERS TO FACE EQUIPMENT

15.1 To protect the skinners to jacks, lamps, keys, and similar face equipment in the switchboard from the vertical steel framework members, the steel uprights should be covered with sheet fiber (preferably gray) or wrapped with friction tape (preferably gray) as outlined below. Where sheet fiber is used it should be formed to cover three sides of the upright leaving uncovered the side having the cable pin holes.

15.11 Protection will be necessary where the overall widths of the uprights are greater than the widths of the stile strips, except in the case of the No. 12 switchboard where the greater space between the upright and the first set of skinners mades protection unnecessary.

15.12 Intermediate cable pin support bars of a section which are not as wide as the stile strips do not require protection.

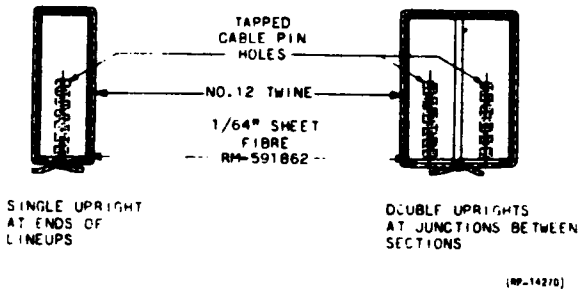
15.13 The end uprights for all 8-1/2" wide panel sections, when equipped with 92 type jacks will require protection. These bars in the No. 1 teletypewriter switchboard are an exception and do not require protection.

15.14 The end uprights of each section of switchboard having 10-1/4" wide panels do not require protection when the section is equipped with 49 type jacks.

15.2 To apply the protection cut 1/64" sheet fiber, RM-591862, to the length and width required to fit around the back and both sides of the upright or uprights being covered leaving uncovered the sides having the cable pin holes. The protection should extend the entire length of the uprights, that is, from the piling rail to the crown mouldings so as to provide for the ultimate as well as the initial cabling being installed.

NOTE: The protection should be applied to the uprights at both ends of the switchboard line-up and at junctions between sections at the time the sections are installed and before the multiple cables have been run in. See Figure 9.

15.3 Tie the fiber strips in place with double bands of No. 12 twine. Space the bands of twine approximately 6" apart using a starting stitch ended with a square knot. Where fiber is not available, friction tape may be substituted. Wrap tape with a half lap and apply a coat of orange shellac varnish to be thinned as required with shellac solvent. Puncture the tape with a sharp pointed tool or a screwdriver to provide access for the cable pins.



NOTE: FIBRE SHOULD EXTEND THE FULL LENGTH OF THE UPRIGHT AND BE FITTED AROUND BACK AND SIDES OF UPRIGHTS AS SHOWN. SECURE FIBRE TO UPRIGHTS WITH DOUBLE NO. 12 TWINE MADE AS A STARTING STITCH AND ENDED WITH A SQUARE KNOT. SPACE BANDS 6" (APPROX.) APART.

FIG. 9 - USE OF SHEET FIBER FOR COVERING END UPRIGHTS IN SWITCHBOARD SECTIONS (Pars. 15.2 Note)

16. ASSEMBLY OF WOODWORK - ALL SWITCHBOARDS

NOTE: Some of the operations covered under this heading may not apply to the particular type of switchboard being installed.

16.01 Omitting rear woodwork until cabling is completed will facilitate the cabling operations.

16.011 Where switchboards have a cable rack located on the floor (for example, the 3C toll board) the screw securing the rear door post to the door shoe will be covered by the cable racks; therefore, neither the shoe nor the posts should be installed until after cables are run in. The rear door posts and the door shoe are then put in place as a unit. The rear moulding at the top of the door should not be installed until after rear door posts and door shoe are secured in position; otherwise the holes in the door posts for securing the posts to the roof angle or cleat will also be obstructed. This does not apply to 3CL and similar sections.

16.012 The rear door posts on 3CL and similar sections are furnished several inches longer than required to provide for variations in floor level. Before cutting door posts to length be sure that the roof is level in both the front-to-rear and the lateral direction. A level at least 42" long (R-3053 level) should be used in determining the front-to-rear level, otherwise bows in the roof boards may not permit obtaining the true level.

Use the R-3052 wood straightedge (6' x 5-3/4" long) for checking the roof level in the lateral direction.

16.013 Before fastening the rear door posts in position be sure that they are plumb, both front-to-rear and left to right, otherwise trouble will be encountered in obtaining the proper fit of the rear doors. Use the 42" level for plumbing the posts.

16.014 To provide for the proper fit of the rear doors the dimension between the bottom of the rear door shoe cleats and the top surface of the roof must be the same as the dimension between the top surface of the roof and bottom surfaces of base channels on the front side of the section. See Figure 8. This condition will be met providing that the rear door posts have been cut to the proper length, are plumb, the roof level and the rear door shoes attached to the curtain posts through the holes drilled in the door posts for that purpose. As a further check note that the dimension between the under face of the angle supporting the top of the doors and the top face of the bottom door shoe channels is as shown in Figure 8.

16.02 Any bind between keyshelves on single position sections or at the end of two or three position sections can generally be eliminated by placing a shim between adjacent units at or in back of the lockrail.

16.03 Excessive space between keyshelves can be corrected by placing black fiber between keyshelf and rubber separation strip.

16.04 Fitting piling rails on universal sections may be done where necessary by shimming or trimming the rails.

16.05 Trim roof boards of No. 1 and similar sections as each section is installed. The boards are furnished approximately 1/16 in. oversize to allow fitting.

16.06 Roof boards for 8-1/2" panel sections with which metal roof strips (dust shields) are provided, are cut in the shop to allow a space of approximately 1/8" between the boards of adjacent sections.

16.07 Roof joint cleats are fastened to one roof member only so as to permit roof boards to expand and contract.

16.08 Door and curtain shoes, not arranged for fastening to the section framework, may require shimming to agree with the length of the door or curtain posts. Cord weight panel shoes should be shimmed as required to prevent the panels from being pushed back against the cable forms when placing or removing the panels.

NOTE: Shoes are secured by means of 1/4" Loxin expansion shields and 1/4"-20 F.H.M. screws, or with F.H.W. screws on wooden floors.

16.09 For fastening C.T.S. door shoes to the cable hole sheathing angles, spot the location of the holes in the door shoes on the angles and drill and tap holes for 1/4"-20 machine screws.

16.10 Junction mouldings on No. 1 and similar sections are made 1/16" oversize to allow for manufacturing variations in the length of the crown mouldings. Junction mouldings should therefore be dressed by the Installer to fit the openings between crown mouldings of adjacent sections after the adjacent sections are aligned.

16.101 Junction mouldings on universal type sections are furnished within plus or minus 1/64" of their nominal thickness. However, they may still require dressing by the Installer as outlined above.

16.11 Where crown mouldings are out of apparent alignment at junctions between sections the condition can frequently be corrected by interchanging the crown moulding with one from another section without affecting the other section.

16.12 Fit floor mouldings to the contour of the floor, trimming the moulding only where it extends too high on the door shoe.

16.13 Where platforms are used, it is the standard practice to shorten the front panels. When the platform is 8" or 9" high, the required amount is cut off the bottom of the panel. When the platform is 10" high, 1/2" is cut off the top and the required amount off the bottom in order to retain the minimum desirable width of the cross-rail at the bottom of the panel.

16.131 Transfer the panel shoe moulding to the top of the platform. It is desirable that the shoe rest directly on the platform but it may be necessary to block up the shoe a slight amount under certain conditions. The floor moulding will cover the blocking beneath the shoe.

16.14 After sections have been aligned and all woodwork fastened in place, the following conditions should be met:

16.141 The front of crown mouldings of adjoining sections should be as nearly flush and in alignment as practicable, except where junction mouldings are provided. Where junction mouldings are provided the crown mouldings should be in apparent alignment. In either case the space at the joints should be as small as practicable.

16.142 The space between the adjoining edges of adjacent keyshelves (older type without spacers between adjacent keyshelves) should be as small as practicable. Keyshelves should not bind with adjoining keyshelves to such as extent that any keyshelf cannot be readily opened without causing an adjacent keyshelf to rise.

16.143 Where spacers are furnished between adjacent keyshelves and plugshelves, the alignment of the top surfaces of the adjacent keyshelves and plugshelves should not vary more than one-half the distance that the spacer projects above the surface of the keyshelf and plugshelf to which it is attached. The front contiguous surfaces may be out of alignment not to exceed 1/16" provided neither of the surfaces projects beyond the outermost surface of the spacer. Where spacers are not furnished, the surfaces should be as nearly flush as practicable.

16.144 Doors, drawers, removable panels, and similar parts of switchboard, desk, or cabinet woodwork, should have sufficient clearance between the fitted surfaces to make them readily removable.

NOTE: The shop requirements for switchboard rear doors at the time of shipment allows warpage to the extent of 3/8" bow from the top to the bottom and a 3/16" bow across the width in a 5-1/2" panel.

17. ASSEMBLY OF MISCELLANEOUS METAL DETAILS - ALL SWITCHBOARDS

NOTE: Some of the operations covered under this heading may not apply to the particular type of switchboard being installed.

17.1 Make measurements for the location of foot rail brackets from the bottom of the section floor angles or channels instead of from the floor.

17.2 Temporarily omitting the multiple shelf (where possible) until the O.G.T. multiple and other multiple below the shelf is run in, may facilitate the cabling.

17.3 Cable pins at the junction of adjacent sections are required only in one section.

NOTE: When tightening cable pins, place a piece of fiber tubing over the screwdriver blade and slide it forward to cover the ends of both the cable pin and the screwdriver blade after the screwdriver is set into the slot of the pin. The tube will prevent the screwdriver from slipping out of the cable pin slot and possibly resulting in an injury.

17.4 The auxiliary multiple shelf in new No. 11 sections, preferably should not be installed until the four-wire multiple is laid in the sections.

17.5 Keyshelf braces are normally mounted by the shop. However, if mounted in the field, care should be taken to see that the shakeproof washers furnished with the braces are placed under the heads of the screws securing the brace to the section framework. Washers are not required at the keyshelf end of the brace. See Figure 8.

18. CABLE HOLES IN ROOFS OF CABLE TURNING SECTIONS AND IN END PANELS

18.1 For high type sections, cut to the size required for the ultimate cabling and fit the cable hole closing details as closely as practicable around the equipped cabling.

18.2 For low type sections having finished roofs, cut to fit the actual cabling as closely as practicable.

18.3 For cutting cable holes in the roofs of sections use a keyhole or compass saw (obtained locally) or a hacksaw blade with the end protected by wrapping it with cheesecloth. A 3/4" hole may be drilled for starting the cut.

NOTE: Where more than one cable rack passes through a roof, it may be found advantageous to provide two or more cable holes. This will depend largely on the proximity of one rack to the other, convenience for cutting and subsequent closing operations.

18.4 When no material is furnished for closing cable holes, the closing details should be made from wood obtained locally. White pine, finished with two coats of varnish, is satisfactory for high type sections. For low type sections, hard wood finished to match the switchboard finish as near as practicable, should be used for the closing details.

NOTE: These details should overlap the hole so that they can be fastened to the roof by means of wood screws.

18.5 Information covering the arrangement for closing cable openings in end panels of 3CF switchboards, where a cable turning section is not provided, is shown on ED-55010-01 and ED-91513-70.

19. STILE CASINGS

19.1 Where insulated stile casings are provided a check shall be made to insure that the casings are not grounded. See Paragraph 23.1.

19.11 Stile casings on the older switchboard sections such as 49-type jack boards, all No. 1 manual boards and certain PBX sections are grounded.

19.12 The stile casings on the new 92 jack universal type switchboards, having separate upper and lower units, are insulated from the framwork ground by wooden strips (stile casing fillets) placed between the stile casing and the stile strip. See Figures 7 and 8.

19.2 When it is specified that the stile casings on these older switchboard sections be insulated, a strip of cellulose acetate should be inserted between the stile strip and the stile casing and secured in place with fiber screws. The strip of cellulose acetate as furnished, is long enough to fit the maximum jack opening

in the high type sections and should be cut off as desired to fit the lower sections. The following are the piece parts for these items:

P-369807 - Special .138-32 Vulcanized Fiber FHM Screw
P-415910 - Cellulose Acetate Insulator, 3'-6" long for 49-type jack switchboards
P-415911 - Cellulose Acetate Insulator - 3'-6" long for 92-type jack switchboards

19.21 When performing the above operations the following should be observed:

19.211 Exercise care when installing to prevent heads of screws from breaking off.

19.212 Should the head of a fiber screw break off, drill out the broken section using a small drill (.120", No. 31, R-2308). Clean the threads in the stile strip using the .138" (No. 6)-32, tap, R-1520.

19.3 The space between bottom of stile casing and top of plugshelf shall not exceed 1/32 inch.

19.4 Stile casing for removable number plates should be crimped at the top ends, to prevent the number plates from being pushed out from the top.

19.5 When stile casings with removable number plates are applied to stile strips originally arranged for mounting beveled bar type stile casings, the mounting screws should not be separated more than 8-1/4" for 42-A stile casings or 9" for 40-A stile casings.

19.6 When stile casings with removable number plates are mounted on the job, it is advantageous to assemble number plates and spacers in the casing before mounting. See Section 30H. Omit one or two of the lower plates temporarily to facilitate placing of mounting screws.

20. NUMBER PLATES AND SPACERS

20.1 Installing procedures and requirements for number plates and spacers are contained in Section 30H.

21. FRAMEWORK GROUNDS

21.1 Ground the framework of all switchboards and desks.

21.11 Where arranged in a line-up, each section framework should be connected to a common "line-up" ground wire.

21.12 In general, PBX's such as the 507 and the 555 which do not have a power supply of their own, but which are fed from a central office power supply over a cable pair, do not require a framework ground.

22. APPARATUS GROUNDS

22.1 In wooden frame switchboards, desks or cabinets, ground each group of apparatus mounting plates fastened to a common metal support by means of a 20 gauge "AM" lead equipped with a suitable terminal fastened under the head of a mounting screw of one of the mounting plates. A separate group should be provided for each group of plates on separate metal supports in all wooden switchboards, desks or cabinets and to all isolated mounting plates on separate metal supports not otherwise grounded, such as the roof of switchboard sections or at other locations in desks and wooden cabinets having steel frameworks. The several leads may be attached to a common lead if convenient.

23. NON-GROUNDED PARTS

23.1 Exposed metal parts on keyshelves or face of switchboards and desks should not be grounded through contact with a grounded framework except parts that are arranged for ground contact with the framework, such as the exposed portion of key levers or exposed key screw heads.

NOTE: New 92 jack universal type switchboards have insulated stile casings. Certain types of older switchboards, when specified, have the stile casings insulated in the field. See Paragraphs 19.11 and 19.12.

23.2 Metal foot rails and brackets attached to the switchboard framework shall be insulated from ground.

24. BUS BARS AND TERMINAL LUGS

24.1 Requirements and method information applying to the assembly and to the treatment of the contact surfaces of current carrying connections and protective grounds are covered in Section 1B.

CAUTION: Exercise care when tightening cap screws securing connections to battery bars and the junction plates to ground bars on fuse panels of adjacent sections to prevent stripping of the threads.

25. ROLLING CURTAINS

25.1 Adjust rolling curtains to meet the following requirements:

25.11 Should not rise, unaided, from closed position.

25.12 Should not drop, unaided, from any open position.

25.13 Should not buckle or jam when raised or lowered with reasonable care.

25.131 Buckling or jamming of the curtains can sometimes be eliminated by using shims to improve the alignment of the curtain brackets.

25.14 Rollers arranged so that the pawls will not operate.

25.2 Provide and locate stops to prevent curtain from rising high enough to strike the hand when raising the curtain by the handle.

26. D.O.T.C. CONSOLES

26.1 Each of the three Data Observing and Testing Center (D.O.T.C.) consoles, coded H-336-200, -201, and -202, has two doors and a hinged frame on the rear which must remain open during cabling and wiring operations. If the hinged frame is opened to its extreme position, the equipment on the frame may contact the inner edge of the door and become damaged. Several design changes are presently being considered which will alleviate this condition.

26.2 After the consoles are in place, remove the six screws, nuts and washers which fasten the right door (facing rear) to the hinge and remove the door from each console. The left door should be removed from all consoles that have another console immediately to the left of it-facing rear. While the doors are off, the hinges should be kept in the fully closed position.

26.3 With the door removed, the equipment on the hinged frame may contact the console upright when fully opened. Therefore, CARE is still required to prevent the equipment from being damaged. DO NOT PUSH OR LEAN AGAINST THE FRAME.

26.4 When all of the cabling and wiring operations are completed, replace the doors.

[Vertical lines at right of paragraphs indicate requirements.

Manager, Product Engineering

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