Installation Engineering Handbook 30
Western Electric
Service Division

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ALIGNMENT OF FRAMES

CROSSBAR FRAMES (BULB ANGLE TYPE) (NO. 1 AND NO. 4 TOLL)

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1. GENERAL

1.1 Scope

1.11 This section covers the specific requirements and installing procedures for the alignment of bulb angle type crossbar frames. It is assumed that the frames will be in final position and all frame fastening details loosely assembled before the aligning operations are started.

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

1.2 Associated Information

1.21 Refer to Table 1 for the location of information to which reference may be necessary when performing operations covered by this section.

1.3 General Information Pertaining to Arrangement of Tools, Precautions, Verification, Specification, Drawings and Figures

1.31 Refer to Section 27A for information pertaining to the above subjects.

2. INSTALLING EQUIPMENT

2.1 Tools

2.11 The tools listed below will be required for the operations covered by this section. Other tools available in the General Tool Kits also may be required.

No. 43 Kit, Erecting and Aligning
R-2792 Wrench Set, General Use

TABLE 1

ASSOCIATED HANDBOOK INFORMATION REFERENCE

Subject	Handbook	Section
Alignment of Frames - Common Requirements and Information	30	27A
Erecting and Fastening Crossbar Frames (Bulb Angle Type) No. 1 and No. 4 Toll	30	19B1
General Requirements Covering Bolts, Nuts and Screws	30	20A
Precautions, General, to Avoid	0	
Damage to Building and Equipment	0	
Personal Injury	0	
Service Interruptions	0	

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3. ALIGNING PROCEDURE

3.1 Front to Rear and Endwise Location

3.11 During the erecting operation the front edges as well as the ends of the frame base should have been located properly with respect to the scribed lines on the floor and the space between adjacent frames should be 1/8".

3.12 The aligning of the frame base with respect to the scribed lines on the floor can be accomplished by using the R-4414 Frame Setting Tool (See Figure 1) as follows:

(a) Adjust head of tool to fit under frame guard rail.

(b) Adjust leg to a vertical position and place foot flat on floor.

(c) Apply pressure on handle to move frame in, out or sidewards.

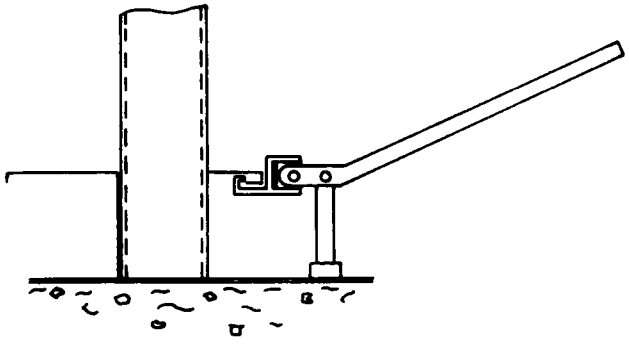

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FIG. 1 USE OF R-4414 FRAME SETTING TOOL (PAR. 3.12)

3.13 Since the leveling screws are pointed at the end it is necessary that the frame bases be correctly located and aligned horizontally before the screws are turned down into the linoleum. Otherwise, difficulty would be encountered in attempting to change the location of the frames since the screws would tend to drift back into the original indentations.

3.2 Vertical and Horizontal Alignment

3.21 During the following aligning operations the frames should remain directly on the floor except where it is necessary (due to uneven floors) to raise one end of a frame, or possibly both ends, a slight amount in order to plumb the frame and to maintain satisfactory mutual alignment of the frame guard rails.

3.22 Plumb the two end uprights of each lineup of frames with the R-2642 Plumbing Fixture as shown in Figure 2. In the case of an isolated frame, plumb the two end uprights of the frame. The fixture details must be mounted bottom side up on the upright at the end of the frame opposite to that illustrated.

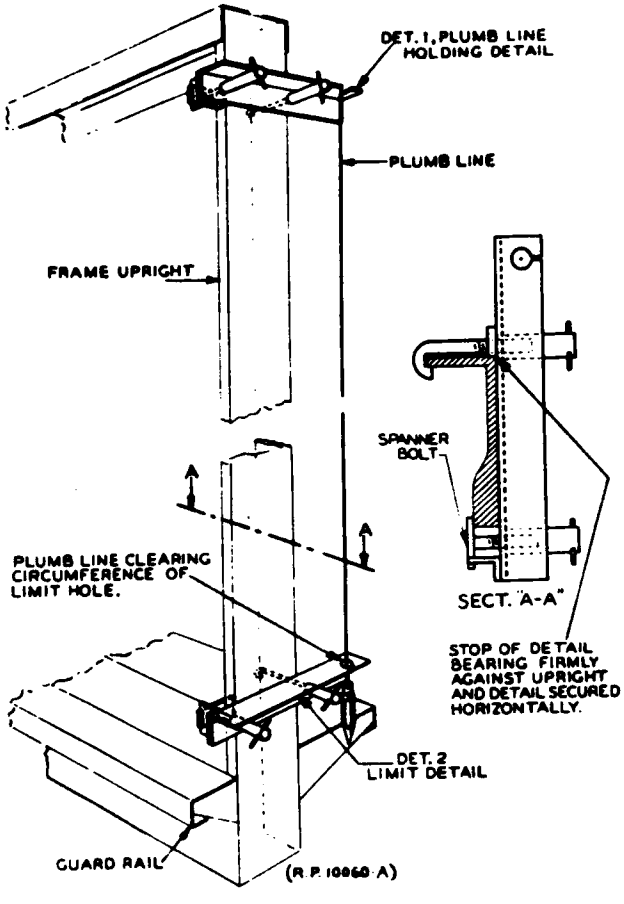

FIG. 2 USE OF R-2642 PLUMBING FIXTURE (PAR. 3.22)

3.221 Assemble the fixture on the end uprights as follows:

(a) Attach Detail 1 of the fixture as close to the frame top angles as convenient and Detail 2 just above the frame guard rail.

(b) When securing Details 1 and 2 to the frame upright, tighten the "spanner" bolt first and then the hook bolt. This will prevent the end of the detail from being drawn away from the upright when the hook bolt is tightened.

(c) Note that the stop of each detail bears firmly against the upright and that the detail is approximately level.

3.23 Shift the frame as required by adjusting the leveling screws or striking the top with a hammer. Turn the leveling screws by means of the R-2795 Socket Wrench and R-2806 Ratchet Handle.

3.231 After each end frame of the lineup has been plumbed, secure both frames at top and bottom to prevent movement. See Paragraph 3.4.

3.24 Align the intermediate uprights on other frames by means of the R-1313 Fish Line stretched tightly horizontally between the two top assemblies of the R-2642 Plumbing Fixture.

3.241 Shift the tops of the frames, if necessary, so that the space between the uprights of adjacent frames is approximately equal at top and bottom and the clearance between the tight line and face of the uprights of all the frames is approximately the same.

3.242 Adjust the leveling screws so that the guard rails of adjacent frames are approximately in line at the adjoining ends. Where the floor slopes appreciably for some distance, allow a maximum of 1/16" vertical misalignment between adjacent guard rails in order that the frames can, in general, follow the contour of the floor and still meet the plumbing requirements.

3.243 In the final lineup of the frames it may be necessary, due to a high spot of the floor in the length of the lineup, to loosen one or both end frames and realign them to remain within the overall vertical alignment requirement.

3.25 When in final alignment, the frames should meet the following requirements:

3.251 Uprights plumb within 1/4".

3.252 A frame should not be out of its normal position (in or out from a straight line extending the full length of the lineup) more than 1/8".

3.253 Joined ends of frames at points other than at the sheet metal guard rails should not be out of line more than 1/8".

3.254 The junctions in ladder guard rails on frames of sheet metal base construction should be as nearly flush as practicable.

3.255 The difference in level of crossbar and other frames of sheet metal base design shall be gauged at the top surface of the sheet metal guard rail and shall not exceed 1/16".

3.3 Cabinet Door Alignment

3.31 Check cabinet doors for the following conditions:

(a) No binding of doors.

(b) Proper latching of doors by turning door handles.

(c) No gap visible between upper or lower edge of door and inside edge of cabinet flange.

3.32 If doors do not meet the above outlined conditions, loosen up the mounting screws holding the cabinet frame and doors to the framework. Then try to shift the cabinet in whatever direction is necessary to bring the doors into alignment and meet the conditions, and retighten the screws.

3.321 In some instances, the ends of several mounting plates may be touching the sides of the cabinet which will prevent shifting of the cabinet. In this case, loosen the screws holding the mounting plates in question and then follow the instructions

outlined in Paragraph 3.32. Retighten the mounting plate screws after cabinet is aligned.

3.33 If doors cannot be adjusted as outlined in Paragraphs 3.32 and 3.321, remove the mounting screws holding the cabinet frame and doors to the framework:

(a) Place cabinet with the doors downward over a protected flat surface to prevent paint scratches.

(b) Use a 6" round file and elongate the holes in the direction required.

(c) If the holes are sufficiently elongated, it will be possible to remount the cabinet in such a position that the doors will line up properly as described in Paragraph 3.31.

3.34 Where the door stops on casing enclosed units per ED-90978-57 comes loose during shipment, the adjusting screw should be reset so that the distance from the "L" shaped bracket to the outer surface of the screw head is 7/16" and retightened.

3.4 Securing Frames

3.41 To achieve the proper results, frames are to be secured in stages. As the aligning and plumbing limits are met, the junction plates and bolts securing frames to auxiliary framing are then tightened to prevent motion, the leveling screws are set for height and the junction bolts are snugly set. A final check of the alignment of the frame line-up should be made at this point and then all details firmly secured.

NOTE: Junction plates, P-419893, tend to distort when the nuts are tightened excessively. While this distortion does not prevent the junction plate from functioning satisfactorily, it is recommended that, in order to prevent excessive distortion, the tightening of the nuts be stopped when perceptible bending is noted.

3.42 After the frames have been aligned, the column braces should be checked for evidence of shifting. If necessary, relocate and securely tighten them against the columns taking care not to disturb the alignment of the frames.

3.43 Bolt the frames to the floor by installing the removable stud and the associated details of the expansion bolt assembly. When installing the stud, make sure that it is turned into the shield far enough to fully engage the expansion nut at the base of the shield. Use the R-2795 Combination 5/8" Hex. - 1/2" Sq. Wrench Socket and R-2806 Ratchet Handle for tightening the nuts on the expansion bolts.

NOTE: It is not necessary to cut off the excess floor bolt length on frames with sheet metal base construction.

4. VERIFICATION ITEMS

	VERIFICATION ITEM AND BRIEF STATEMENT OF REQUIREMENTS	REFERENCE PAR. NO.	REFERENCE FIG. NO.
4.1	Bays and Frames		
4.11	Bays, frames and other similar type structures should meet the following alignment requirements insofar as they apply to the particular type of framework.	3.25	
4.12	Vertical parts plumb to within allowable tolerance.	3.251	
4.13	Lineup of bays or frames not out of alignment (front-to-rear from a straight line) more than 1/8" in full length of lineup.	3.252	
4.14	Difference in level of crossbar and other frames of sheet metal base design not more than 1/16" gauged at top surface of sheet metal guard rail.	3.255	
4.15	Junctions in ladder guard rails approximately flush-vertical misalignment not more than 1/16".	3.254	
4.2	Cabinets		
4.21	Cabinet doors should be checked for the following conditions:		
4.211	No binding of doors.	3.31(a)	
4.212	Proper latching of doors by turning handles.	3.31(b)	
4.213	No gap visible between upper and lower edge of door and inside edge of cabinet flange.	3.31(c)	
4.3	Securing Bays and Frames		
4.31	Junction plates and bolts securely tightened and leveling screws set.	3.41	
4.32	Floor bolts securely tightened. Bolts cut off when required.	3.41	
4.33	Alignment of frame checked after all bolts are tightened.	3.41	
4.34	Column braces (if any) checked to determine whether they have shifted.	3.42	

→ Indicates new or changed information.

[Vertical lines at side of paragraphs indicate requirements.

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Reason for Reissue:
To add paragraphs 1.2, 3.12, 4, and Fig. 1