Installation Engineering Handbook 30
Western Electric
Service Division

Section 27G
5-14-73
Replaces: Section 27G
Dated 2-21-57
Partially Replacing Section 27V
Dated 12-20-56

ALIGNMENT OF FRAMES

RELAY BAYS, FUSE BAYS AND MESSAGE REGISTER FRAMES - COMMON SYSTEMS

CONTENTS

1. GENERAL
1.1 Scope
1.2 Associated Information
1.3 General Information Pertaining to Arrangement of Tools, Precautions, Verification, Specification, Drawings and Figures
2. INSTALLING EQUIPMENT
2.1 Tools
3. COMMON REQUIREMENTS
4. RELAY BAYS AND FUSE BAYS
4.1 Bulb Angle Bays
4.2 Channel Bays
5. MESSAGE REGISTER FRAMES
6. SECURING RELAY BAYS, FUSE BAYS AND MESSAGE REGISTER FRAMES
7. VERIFICATION ITEMS

---

1. GENERAL

1.1 Scope

1.11 This section covers the specific requirements and installing procedures for aligning single bulb angle and channel relay bays and message register frames.

1.12 The bays and frames covered by this section are shop welded.

1.13 In this section the term "bay" is used to refer to a single bay framework on which relays or fuse panels are mounted. The term "frame" is used for frames on which message registers are mounted. These frameworks have been referred to as "racks" and this term may still appear in specifications and on drawings.

1.14 Double relay bays are considered as frames and should be aligned in accordance with requirements and methods covered in Section 27B.

1.15 The requirements and installing procedures for erecting and loosely fastening bulb angle, channel and message register frames are covered in Section 19B1.

1.16 The requirements covered in this section shall be followed except as modified by applicable specifications and drawings. Framework shall be assembled as shown on assembly and equipment drawings.

1.2 Associated Information

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

ASSOCIATED HANDBOOK INFORMATION REFERENCE TABLE 1

Subject	Handbook	Section
General Information	30	1 Series, 20A
Erecting, Placing and Fastening Frames - Bulb Angle, Channel and Message Register Frames	30	19B1
Alignment of Frames - Common Requirements and Information	30	27A
Grouting or Caulking Beneath Frames	30	29

This section includes material from BSP 800-614-154
Copyrighted 1956, by American Telephone and Telegraph Company
Printed in U.S.A.

Printed in U.S.A.

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:

R-2642 Fixture, Plumbing
R-2806 Handle, Reversible, Ratchet (for 1/2" sq. drive wrench sockets)
R-1314 Plumb Bob, Steel
R-2792 Wrench Set, General Use
R-2795 Wrench, Socket, 1/2" Sq. and 5/8" Hex, Combination
R-2813 Wrench, Socket, Hex., 1/2" Offset.)
R-3057 Wrench, Socket, Hex. Pivoted, D.E. 5/8" - 7/8"

3. COMMON REQUIREMENTS

3.1 Bulb angle and channel relay bays, fuse bays and message register frames are provided with leveling screws. These frameworks may be installed directly on the linoleum, when previously laid, and leveled by means of the leveling screws, care being taken to insure that these screws cut through the linoleum to the concrete when the screws are turned down in order to prevent settling of the bays or frames. Spaces between the base angles and the floor should be filled in accordance with information contained in Section 29.

(a) An exception to the above is in carrier auxiliary stations where such spaces are not filled.

3.2 Welded bays and frames should be as level as the plumbing tolerances and squareness of the structure permit. Adjacent bays or frames in a lineup may step up or down to conform to the general contour of the floor provided the difference in the level of the joined ends does not exceed 1/8" measured at the base.

3.3 Joined ends of bays and frames should not be out of alignment (in or out from a straight line extending the full length of the lineup) more than 1/8". Bays of sheet metal base construction, including box-type frameworks (No. 5 Crossbar), should be as nearly flush as practicable.

3.4 The vertical parts of relay bays, fuse bays and message register frames should be plumb to within the allowable deviations below.

Height	Maximum Allowable Deviation from Plumb
Less than 4' - 6"	1/16"
Over 4' - 6" but less than 7' - 0"	1/8"
7' - 0" to 9' - 0" incl.	3/16"
Over 9' - 0"	1/4"

4. RELAY BAYS AND FUSE BAYS

4.1 Bulb Angle Bays

4.11 During the aligning operations the relay bays and fuse bays should remain directly on the floor except where it is necessary (due to uneven floors) to raise one end of a bay, or possibly both ends, a slight amount to plumb the bay and to maintain satisfactory mutual alignment of the bay guard rail.

4.12 Plumb the two end uprights of each lineup of bays with the R-2642 Plumbing Fixture as shown in Figure 1. In the case of an isolated bay, plumb the two end uprights of the bay. The fixture details must be mounted bottom side up on the upright at the end of the frame opposite to that illustrated.

4.121 Assemble the fixture on the end uprights as follows:

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

(b) When securing Dets. 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.

4.13 Plumb and align intermediate uprights of a lineup of relay bays by means of an R-1313 Fish Line stretched tightly between the end uprights near the top of the bays, proceeding as follows:

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

4.132 Adjust the leveling screws so that the guard rails of adjacent bays 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 bays can, in general, follow the contour of the floor and still meet the plumbing requirements.

4.133 In the final lineup of the bays, it may be necessary, due to a high spot of the floor in the length of the lineup, to loosen one or both end bays and realign them to within the overall vertical requirements.

4.14 When in final alignment, the bays should meet the following requirements:

4.141 A bay or frame shall 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".

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

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

4.144 The vertical parts of the bays should be plumb to within the allowable deviations covered in Paragraph 3.3.

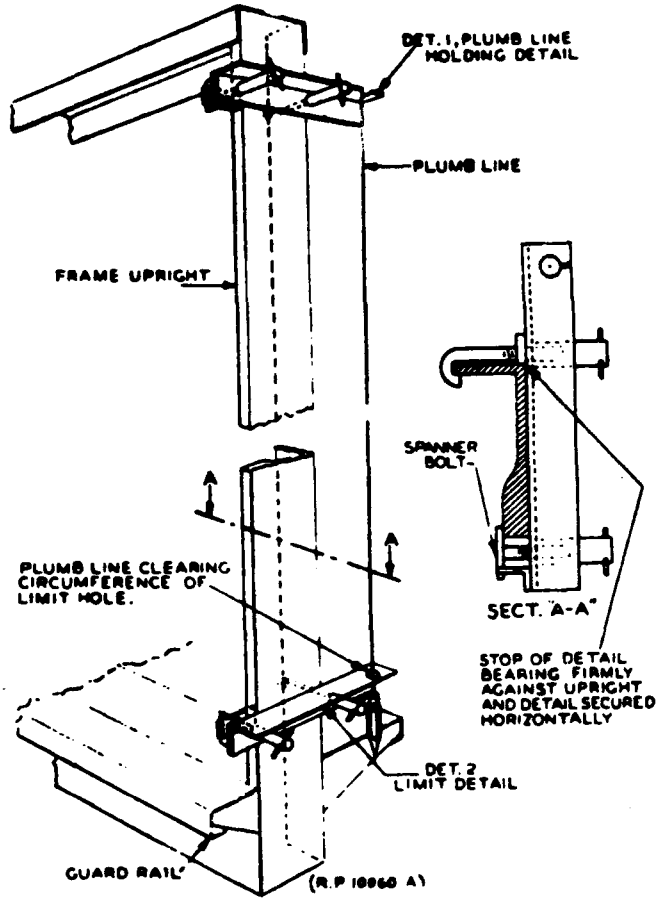

FIG. 1 USE OF R-2642 PLUMBING FIXTURE ON BULB ANGLE BAYS (PAR. 4.12)

4.2 Channel Bays

4.21 Plumbing of uprights of channel bays is performed with an R-1314 Plumb Bob. Suspend the plumb bob from either the bay top angle or from a wooden block clamped to the upright.

CAUTION: WHERE A "C" CLAMP IS USED, GUARD AGAINST INJURY WHICH MIGHT RESULT IF JARRING OF THE UPRIGHT LOOSENED THE CLAMP SUFFICIENTLY TO ALLOW IT TO FALL. A CORD SHOULD BE TIED AROUND THE "C" CLAMP AT ONE END, AND TO THE CABLE RACK OR AUXILIARY FRAMING AT THE OTHER END, TO PREVENT THE CLAMP FROM FALLING.

4.22 The aligning requirements and methods covered in Paragraphs 4.13 to 4.143 for bulb angle bays also apply to channel bays.

4.23 The R-2813 1/2" Offset Socket Wrench is used for junctioning adjacent bays of channel type relay racks in cases where interference from apparatus in the bay prevents the use of other types of wrenches.

5. MESSAGE REGISTER FRAMES

5.1 The requirements and procedures for aligning shop welded message register frames (equipped or unequipped) are the same as those covered in Paragraphs 4.21 to 4.22 for channel relay bays except for message register frames for the No. 5 Crossbar System.

5.11 The message register frame for the No. 5 Crossbar system consists of a single 11' - 6" high sheet metal framework 1' - 11 - 9/16" wide. These frames are aligned in accordance with the procedures covered in Section 27C for No. 5 Crossbar frames.

6. SECURING RELAY BAYS, FUSE BAYS AND MESSAGE REGISTER FRAMES

6.1 The frameworks covered by the alignment procedures in this section were erected and loosely fastened as covered in Section 19B1. After the alignment operations have been completed, the frameworks should be securely fastened as outlined below:

6.11 To achieve the proper results, bays or frames should be secured in stages. As the aligning and plumbing limits are met, the junction plates and bolts securing the framework 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 bays or frames in the lineup should be made at this point and then all details firmly secured.

6.111 Use the R-3057 Double End 5/8" - 7/8" Socket Wrench for tightening the 1/2" hexagon nuts on the bolts securing the top angles of bays or frames.

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.

6.12 After the bays or 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 bays or frames.

6.13 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 bays or frames with sheet metal base construction.

7. VERIFICATION ITEMS

	VERIFICATION ITEMS AND BRIEF STATEMENT OF REQUIREMENTS	REFERENCE PAR. NO.	REFERENCE FIG. NO.
7.1	Bays and Frames		
7.11	Bays, frames and other similar type structures should meet the following alignment requirements insofar as they apply to the particular type of framework.		
7.12	Vertical parts plumb to within allowable tolerances.	3.4, 4.144	
7.13	Lineup of bays or frame not out of alignment (front-to-rear from a straight line) more than 1/8" in full length of lineup.	3.3, 4.141	
7.14	Rigid (welded) bays and frames as level as the plumbing tolerances and squareness of structures permit. Except as otherwise specified, adjacent frames in a lineup may step up or down to conform to the general contour of floor provided difference in level of joined ends does not exceed 1/8" measured at base.	3.2	
7.15	Leveling screws in place when ordered on frame drawing, and cut through linoleum to concrete.	3.1	
7.16	Joined ends of frames, other than sheet metal base construction type, not out of alignment more than 1/8" (except fuse boards and power boards).	3.2, 4.142	

→ Indicates new or changed information.

[Vertical lines at side of paragraphs indicate requirements.

Assistant Manager
Common Installation Engineering

Reason for Reissue:
To add Paragraphs 1.2, 1.3 and 7.
To remove Figure 2.