ERECTING FRAMES
EQUIPMENT AND CROSS-CONNECTION CABINETS

CONTENTS

1. INDEX
2. GENERAL
3. INSTALLING EQUIPMENT
4. RELAY CABINETS
5. SEQUENCE OF INSTALLATION
6. NUMBER AND LOCATION OF FLOOR BOLTS
7. SUPPORT OF CHAIN HOISTS
8. ERECTING, PLUMBING AND ALIGNING RELAY CABINETS
9. PLACING, PLUMBING,AND ALIGNING READER, PERFORATOR AND PRINTER CABINETS
10. HOISTING CROSS CONNECTION CABINETS
11. FILLING SPACE BETWEEN BASES OF CABINETS AND FLOOR

1. INDEX

Subject	Figure	Paragraph
Aligning	9	8.41 to 8.46
Doors (Relay Cabinets)		8.45 (Note),9.5
Readers, Perforators & Printers		9.3 to 9.7
Shims for		8.44
Auxiliary Framing		4.13, 7 (Note) 7.11
Cabling		4.13,8.32,9.2,9.3
Caulking		
Space between floors and cabinets		10.1, 10.11
Chain Hoist		
Support of	4,5	7 (Note) 7.11,7.12
Description		
Relay Cabinets		4.1
Erecting		
Double Bay Cabinets	6,7,8,9	8.3,8.36,8.37
Special fixture for	7,8	8.33 to 8.35
Readers, Perforators and Printers		9.1
Single Bay Cabinets	-	8.11, 8.12
Cross Connection Cabinets	10	10,10.1
Floor Bolts		6.1
Assembling		8.21,8.22,8.38
Location	2	6.2,6.3
Size of	3	6.4
Junctioning	1	8.13,8.39,9.2
Materials		3.3
Tools		
General		3.11,3.2
Special		3.4

2. GENERAL

2.1 Scope

2.11 This section covers the specific requirements and installation procedures for erecting and aligning single and double bay shop equipped relay and cross connection cabinets and for placing and aligning reader, perforator, printer and similar accounting machine cabinets on Automatic Message Accounting installation for all systems.

2.12 This section also includes information for locating the floor bolts in the relay cabinets.

2.13 Information covering the layout and drilling of floors, the installation of expansion shields, cable racks etc., and other operations common to all systems will be found in other sections of this handbook.

2.2 Associated Information

2.21 Sections 1A and 1B covering general requirements and information on safety and location, erection and assembly of equipment.

2.22 Specifications, floor plan and cabinet assembly drawings furnished the job.

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3. INSTALLING EQUIPMENT

3.1 Following is a list of the tools required for the operations covered by this section.

3.11 Tools

No.	Description	No. Req.
R-2384	Bar, Pinch, 30"	1
R-1370	Bench Level	1
R-72068	Bolt, "U" Chain Hoist	2
R-2092	Chisel, Ripping	2
R-1748	Clamp, C, 3"	3
R-3032	Drill, Electric 1/2"	1
R-3128	Fixture, Hoisting, AMA Relay Cabinet	2
R-9430	Hammer, Claw	1
R-1279	Hoist, Chain, 1/2 ton	1
R-1496	Hoist, Chain, 1 ton	1
R-1497	Hoist, Rope, Self-Locking	1
R-1503	Nail Puller	1
R-1314	Plumb Bob	3
R-2541	Saws, Hole	1 Set
R-2599	Truck, Dolly	2
R-1605	Truck, Hand	1
R-2792	Wrench Set, General Use	2
→ R-4098	Strap, Hoisting	1

3.12 Materials

P-159014	Shim, Frame .010" x 1" x 1-3/4"
P-159016	Shim, Frame .031" x 1" x 1-3/4"
P-159018	Shim, Frame .050" x 1" x 1-3/4"
83542330	Tape, Cellophane (See Par. 8.21)

3.2 The list of tools required for associated operations such as laying out and drilling floors, installing expansion shields, caulking beneath frame bases, etc., should be obtained from the sections of this handbook covering such operations.

3.3 Items Required When Using R-2923 Portable Scaffolds for Support of Chain Hoists (See Note under Paragraph 7)

No.	Description	No. Req.
R-2923	Scaffold, Portable	2
R-2923	Det. 4, Diagonal Brace (These diagonal braces are in addition to those furnished with the R-2923 Portable Scaffold)	
R-3112	Support, Hoisting Frame	4
Auxiliary Framing Bars (2" x 3/8" x 8'-7" long)		4
Auxiliary Framing Bars (2" x 3/8" x 7'-8" long)		2
Auxiliary Framing Bars (2" x 3/8" x 5'-4" long)		8
P-420300	"U" Bolt	4
P-125614	1/2"-13 Hex. Nut	8
P-420306	Clip	8
P-420315	Clip	26
P-420316	Clip	8
P-205259	Sq. Hd. Bolt 5/8"-11 x 5"	10
P-205261	5/8"-11 Hex. Nut	11
P-160919	Sq.Hd.Bolt 5/8"-11 x 3-1/4"	1

NOTE: The necessary framing bars and fastening details should be requisitioned from Stockkeeping unless available locally.

4. RELAY CABINETS

4.1 The relay cabinets are shop wired and equipped and may be furnished as single units or two cabinets may be bolted together in the shop to form a two-bay unit. The single bay cabinets can be erected manually without the aid of chain hoists and no provision has been made for attaching hoists to these units. In addition to the regular junctioning bolts, 3/8" rods are placed through the tops and bottoms of the two-bay units to reinforce the parts during handling and shipment and to provide a means for attaching hoisting fixtures when erecting the units in the field. See Figure 1.

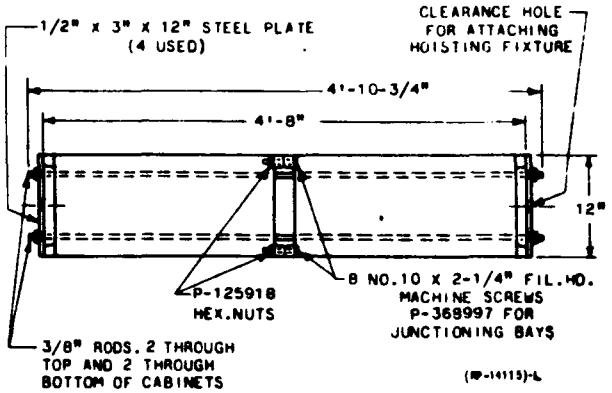


FIG. 1 PLAN VIEW OF DOUBLE BAY RELAY CABINET UNIT SHOWING TEMPORARY REINFORCING SHIPPING DETAILS TO WHICH HOISTING FIXTURES ARE ATTACHED (PARS. 4.1, 8.13)

5. SEQUENCE OF INSTALLATION

5.1 The preferred sequence of installing the several components comprising an accounting machine is as follows:

(1) Erect, junction and align the relay cabinets starting with the cabinet or cabinets at the extreme end of a lineup.

(2) Place the reader, perforator or printer cabinets in their proper order in the lineup starting with the unit nearest the relay cabinets.

(3) Junction and align the reader, perforator or printer cabinets starting with the unit nearest the relay cabinets.

(4) Loosely feed the cables from the relay cabinets through the associated reader, perforator or printer units starting with the cables for the unit most distant from the relay cabinets, then the next most distant, etc.

6. NUMBER AND LOCATION OF FLOOR BOLTS

6.1 The readers, perforators and printer cabinets require no fastenings to the floor.

6.2 Relay cabinets shall be fastened to the floor as follows:

(a) Two floor bolts shall be used at the outer ends of the first and last cabinet in the lineup or as cabinets are added.

(b) One floor bolt shall be placed in staggered locations at junctions between cabinets.

(c) One floor bolt in each corner or four per cabinet shall be used in the case of isolated cabinets.

6.3 Information for locating and drilling the floor bolt holes for fastening relay cabinets is shown in Figure 2.

6.4 The floor bolt holes in relay cabinets to be furnished the first few installations are 1/2" in diameter. This necessitates that the holes for the expansion shields be very accurately located otherwise difficulty will be encountered in assembling the 3/8"-16 studs through the holes in the cabinet floors after the cabinets have been placed in position. See Figure 7B.

7. SUPPORT OF CHAIN HOISTS

NOTE: Chain hoists are required only when erecting the double bay shop equipped relay cabinets. Since no regular auxiliary framing is required on these installations, either temporary framing must be installed for the support of the chain hoists, provided that ceiling inserts are available and are accessible; or R-2923 Portable Scaffolds may be used as described below. No temporary framing bars, threaded rods, etc. for the support of chain hoists have been listed under "Installing Equipment" in Paragraph 2 since it is expected that the portable scaffolds will be used in most cases.

7.1 Adapting the R-2923 Portable Scaffolds for Supporting Chain Hoists

7.11 Two R-2923 Scaffolds, assembled in accordance with Handbook 0 are required. Supplementary framing, to which the chain hoists are attached, and 4 additional diagonal braces are mounted on the scaffolds as shown in Figure 3. The assembly of the supplementary framing is detailed in Figure 4.

CAUTION: Be sure that the wheel brakes are locked before adding the supplementary framing, fastenings and chain hoists.

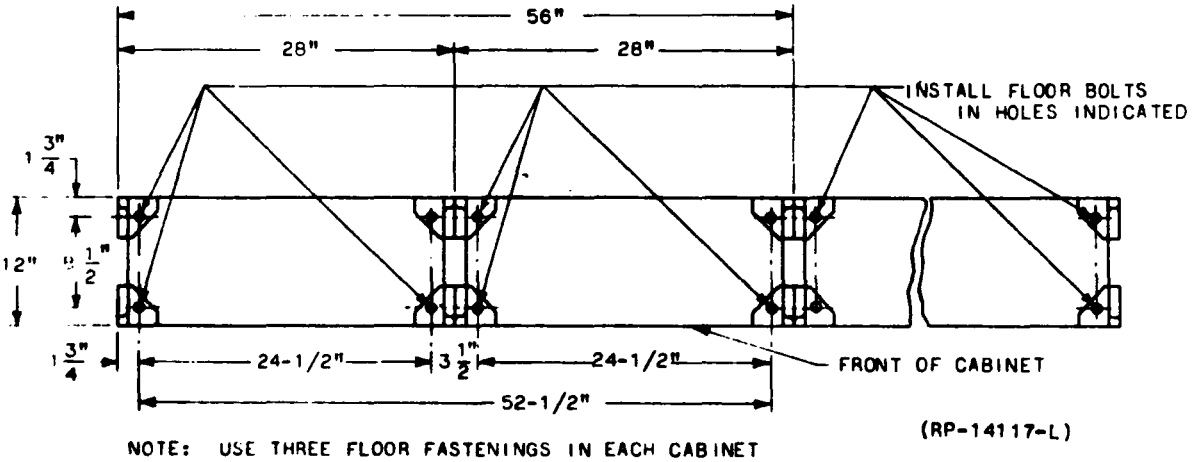
7.12 After the supplementary parts have been assembled on the scaffolds, place the 1/2 and the 1 ton chain hoists in position as shown in Figure 5.

8. ERECTING, PLUMBING AND ALIGNING RELAY CABINETS

CAUTION: The upper doors of the relay cabinets should be kept closed whenever practicable so that the bottom edges of the doors will not be a hazard to anyone working below.

8.1 Erecting Single Bay Cabinets

8.11 Place the shipping case containing the cabinet on the R-2599 Dolly Truck. Remove the top and four sides of the shipping case and move the cabinet to its final position in the linup.



NOTE: USE THREE FLOOR FASTENINGS IN EACH CABINET WHERE TWO OR MORE CABINETS ARE JOINED TOGETHER IN A LINEUP. IN ISOLATED BAYS USE FOUR FASTENINGS. ALL DRILLINGS ARE FOR 3/8"-16 EXPANSION SHIELDS P-428519.

FIG. 2 LOCATION OF FLOOR BOLT HOLES IN RELAY CABINETS (PAR. 6.3)

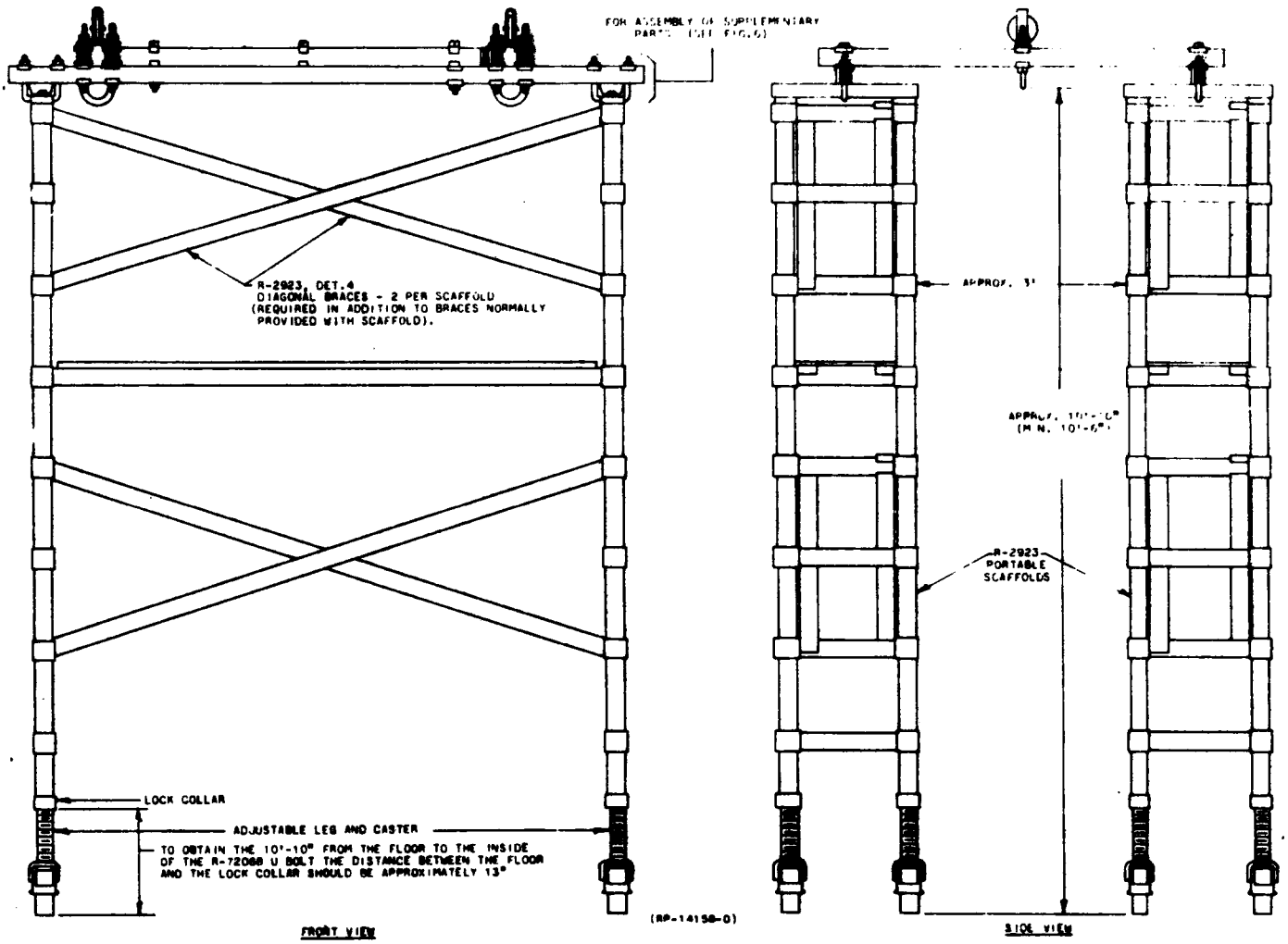


FIG. 3 USE OF R-2923 PORTABLE SCAFFOLDS FOR SUPPORT OF CHAIN HOISTS (PAR. 7.11)

8.12 Manually raise the cabinet to a vertical position and install the floor bolts as described below. Leave the nuts sufficiently loose so as to permit shimming if found necessary during the aligning operations.

8.13 Erect the other cabinets following the sequence outlined under Paragraph 4.1 and loosely junction adjacent cabinets together as shown on the assembly drawings. See Figure 1.

8.2 Assembling Floor Bolts

8.21 As shown in Figure 7B, the relay cabinets are provided with a raised floor, or false bottom. This necessitates that the floor fastenings be installed through the 1" holes in the false bottom. This can best be accomplished by first placing the washer and the nut on the stud, using a piece of scotch tape to prevent them from dropping off when being placed into position. Insert the stud with the nut and washer attached, through the 1" hole in the false bottom and into the expansion shield. Using a screwdriver in the slot, provided in the end of the stud for that purpose, turn the stud until it bottoms in the expanding nut of the shield.

8.22 Use the R-2795 wrench socket and the R-2806 reversible ratchet wrench handle for turning the nuts on the studs.

8.3 Erecting Double Bay Cabinets

8.31 Locate the R-2923 Scaffolds, to which the chain hoists are attached, over the position that the unit will occupy in the line.

8.32 Place the shipping case containing the cabinets on the R-2599 Dolly Truck. Remove the top and four sides of the shipping case and move the cabinet in position under the R-2923 Scaffolds as shown in Figure 5.

CAUTION: Care should be taken that cables, mounting plates, or any other equipment which may be secured to the outside of the cabinets during shipment will not be damaged when the cabinets are hoisted.

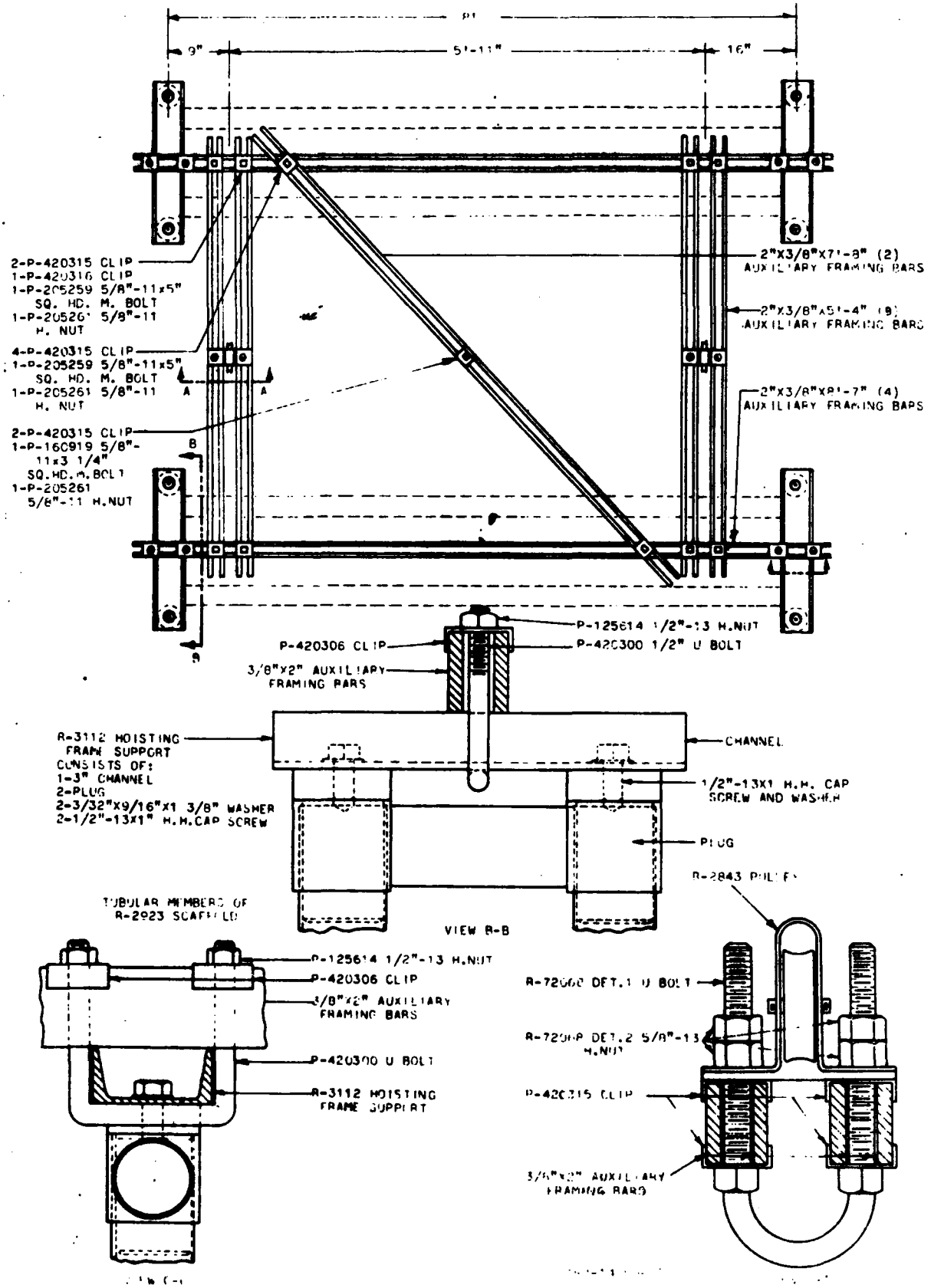
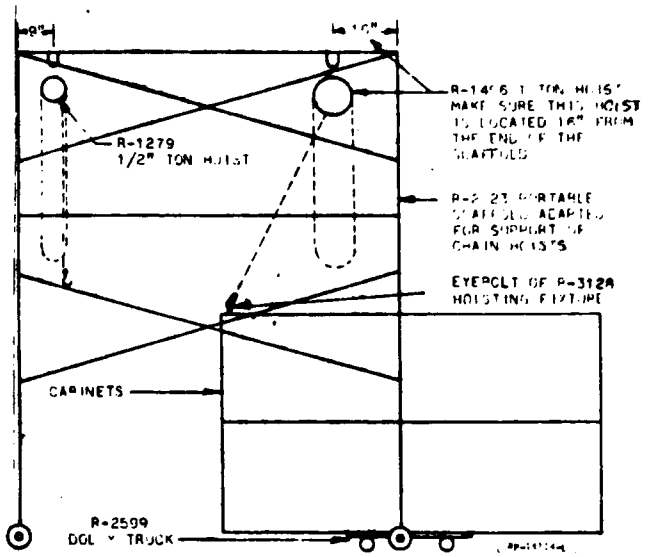


FIG. 4 ASSEMBLY OF SUPPLEMENTARY PARTS FOR ADAPTING R-2923 SCAFFOLDS AS CHAIN HOIST SUPPORT (PAR. 7.11)



CAUTION - ALWAYS LOCK ALL CASTERS IN POSITION BEFORE ASCENDING OR WORKING ON THE SCAFFOLD.

FIG. 5 DOUBLE BAY RELAY CABINET IN POSITION FOR HOISTING (PARS. 7.12, 8.32)

8.33 Attach one of the R-3128 Hoisting Fixtures to the 1/2" x 3" steel plate shipping details which are secured to the narrow side cabinets by 3/8" rods, as shown in Figure 6.

8.331 If, when attaching the R-3128 Hoisting Fixture, interference is encountered with the cable form located on one side of the cabinet, reverse the 1/2" x 3" steel plate (shipping details) so that the clearance hole for attaching the hoisting fixture is nearer the opposite side of the cabinet.

8.34 With the load hook of the 1 ton chain hoist engaging the R-3128 Det. 4, eye bolt, hoist the bay sufficiently high off the floor so that the skid or any other support used for packing can be removed.

8.35 Attach the second R-3128 hoisting fixture to the opposite side of the cabinets and secure the load hook of the 1/2 ton hoist to the other Det. 4 eye bolt. Raise the cabinets to an upright position and suspend them a few inches above the floor.

8.36 Detailed steps for raising the cabinets to the vertical position are illustrated in Figure 8.

8.37 Gradually lower the cabinets directly on the floor so that the sides will be approximately flush with the lines previously laid out on the floor. The floor bolt holes in the bases of the cabinets should be directly over the expansion shields in the floor.

8.38 Place the floor bolts in position following the procedure outlined under Paragraph 8.2. Leave the nuts slightly loose so as to permit shimming and shifting if found necessary during the aligning operation. Remove the R-3128 Hoisting Fixtures and the Shipping details.

8.39 Place and moderately tighten the junctioning screws between adjacent cabinets as shown on the cabinet assembly drawings.

8.4 Plumbing and Aligning Relay Cabinets

8.41 The cabinets may be plumbed and aligned using the R-1370 Bench Level or with the use of plumb bobs and tight lines as shown in Figure 9.

8.42 Shift the cabinets, if necessary, so that the bottom edges coincide with the lines previously laid out on the floor.

8.43 Suspend plumb lines, with plumb bobs attached, over the edge of the roof at one end and at the front of the cabinets as shown in Figure 9.

8.44 Plumb the cabinets both endwise and front-to-rear, placing as many shims, P-159014, P-159016 and P-159018 under the corners and at junctions between cabinets, both front and rear, as found necessary to meet the plumbing and aligning requirements.

8.45 Tighten the floor fastenings and junctioning screws and recheck the plumbing and aligning requirements.

NOTE: Before the final tightening of the floor fastenings make sure that the doors open and close freely. Any binding encountered can usually be corrected by readjusting the thickness of the shims. Take advantage of the plumbing limits. if necessary, to correct the binding condition.

8.46 When in final alignment, the following conditions should be met:

(a) The cabinets should be plumb within 3/16" in all directions. In this requirement the deviation should be measured at the top of the cabinets. Any variation from straightness of the parts may be ignored.

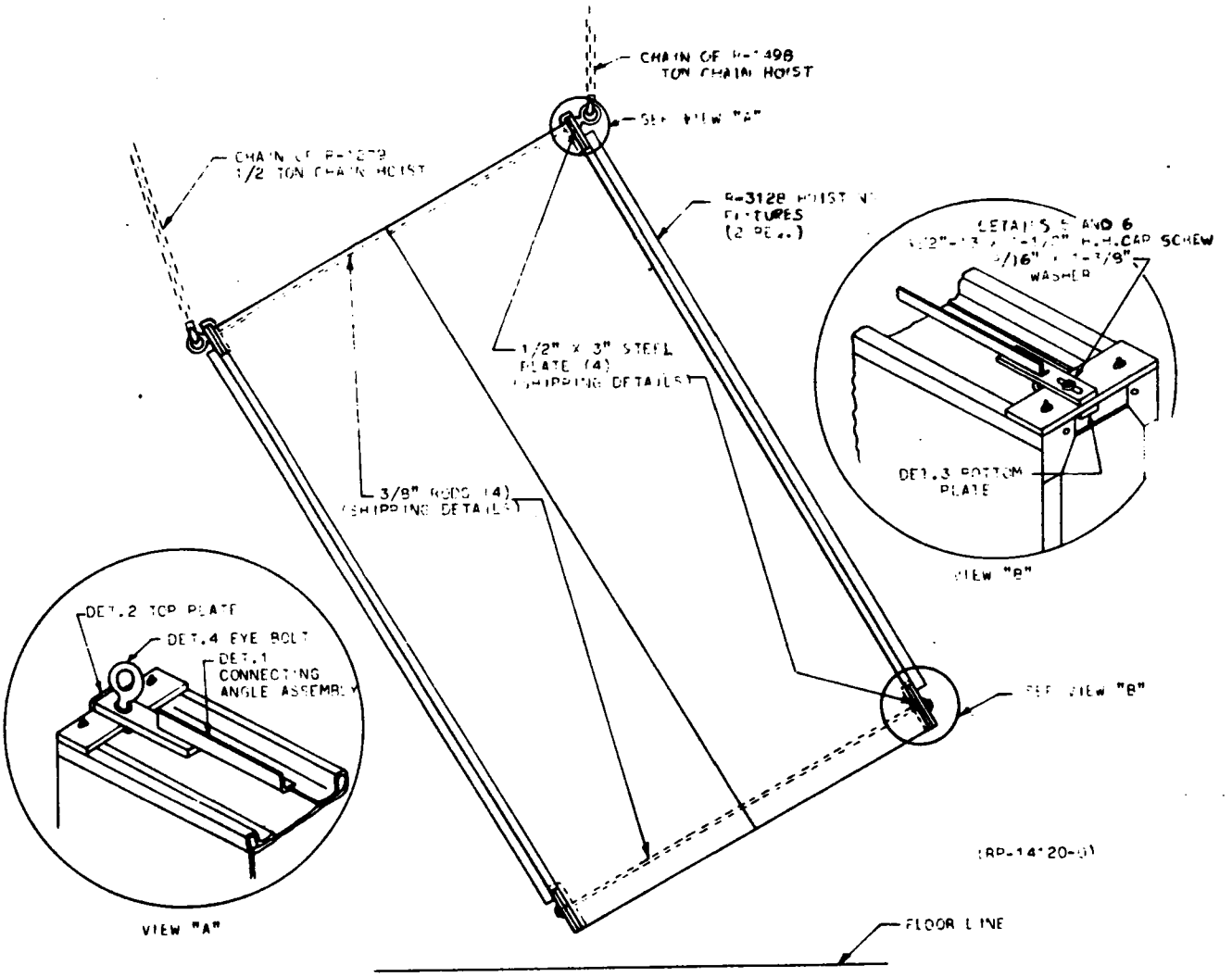


FIG. 6 DOUBLE BAY RELAY CABINET SHOWING HOISTING FIXTURES ATTACHED (PAR. 8.33)

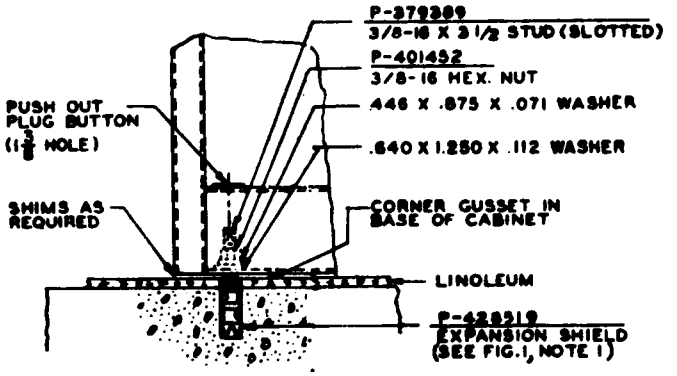


FIG. 7B EXPANSION BOLT ASSEMBLY IN BASE OF RELAY CABINET (PARS. 6.4, 8.21) (BSP AA614.004, Fig. 7B)

(b) The front surfaces at the joined ends of the cabinets should be as nearly flush as practicable.

(c) A lineup of cabinets may in general follow the contour of the floor, that is, within the limits permitted by the plumbing requirements. However, the difference in level between adjacent cabinets, measured at the top surfaces, should be as small as practicable.

9. PLACING, PLUMBING AND ALIGNING READER, PERFORATOR AND PRINTER CABINETS

9.1 Remove the cabinets from the shipping cases and place them in the lineup following the sequence outlined in Paragraph 5.1(3).

9.12 Before placing cabinets in AMA centers, run those cables which may be run easier at this time while cable openings in relay cabinets are more accessible. Refer to the cabling plan drawing for additional information.

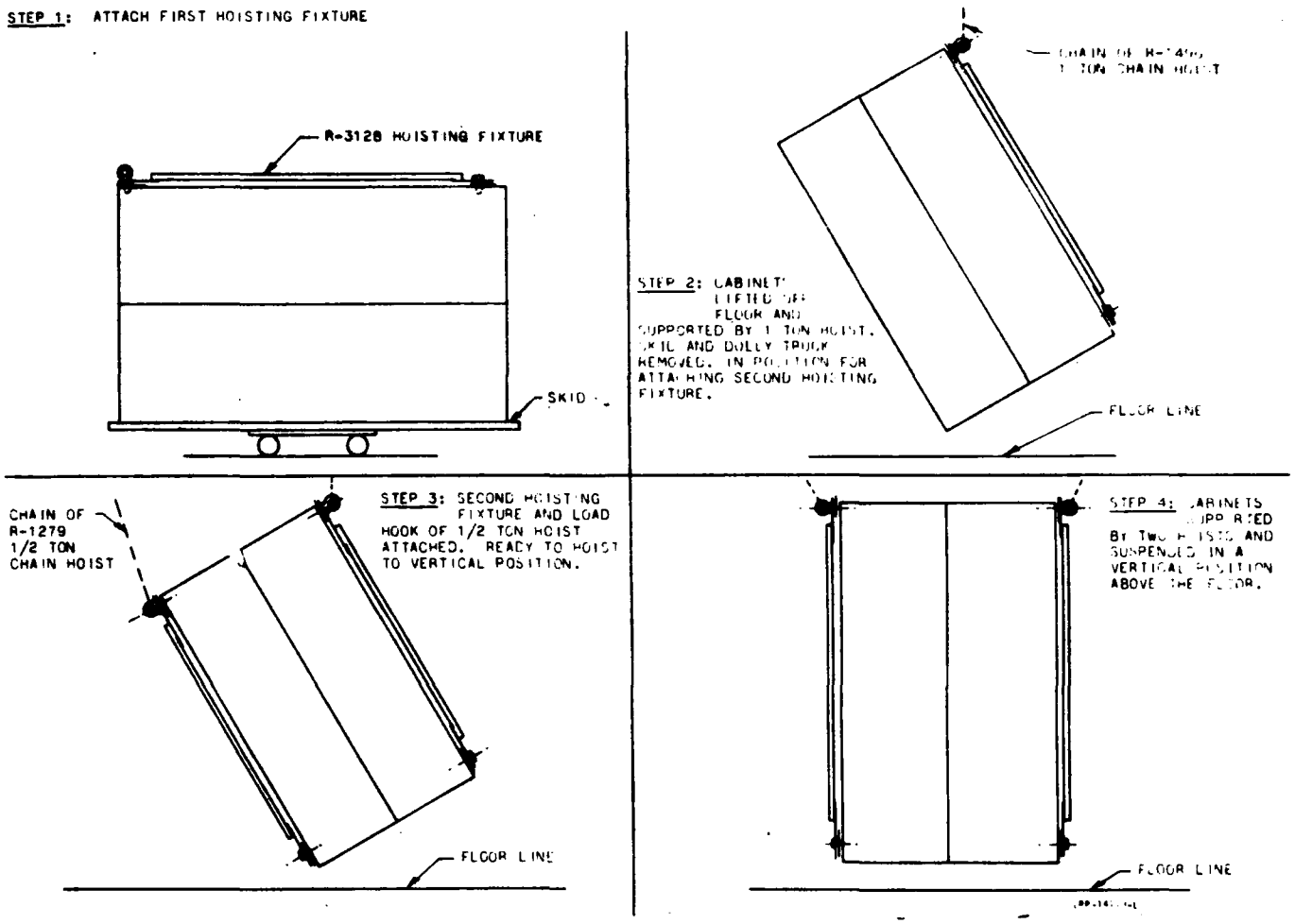


FIG. 8 DETAILED STEPS FOR HOISTING DOUBLE BAY RELAY CABINETS TO VERTICAL POSITION (PAR. 8.36)

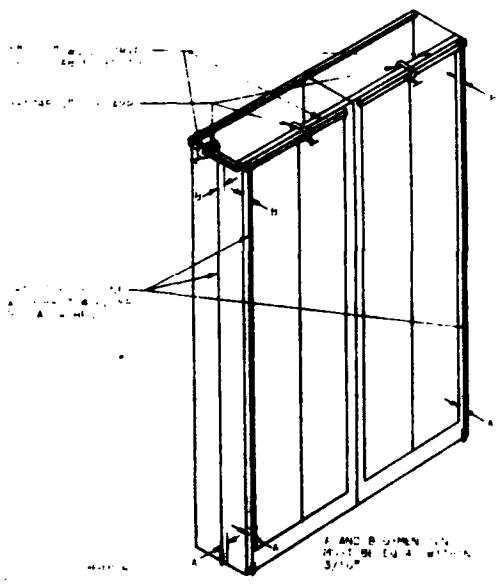


FIG. 9 PLUMBING AND ALIGNING RELAY CABINETS (PARS. 8.41, 8.43)

9.2 Place each cabinet to coincide with the floor layout lines. On AMA installations there in a 2" space between the first equipment cabinet and relay cabinets for the end panels as indicated on the floor plan drawing.

9.3 As each cabinet is placed in position, shim under the corners as required to meet the plumbing and aligning requirements. Junction the cabinet to the preceding cabinet in the lineup.

9.4 Hinged covers or doors on cabinets or casings should not bind with adjacent covers or doors to such an extent that any cover or door cannot be readily opened without causing an adjacent cover or door to move.

9.5 As each cabinet is leveled and aligned, check the cover to see if there is any binding with the cover of the adjacent cabinet. Generally, proper leveling and aligning will eliminate any binding between covers. However, if this does not remove the binding, it will be necessary to shim the cabinets apart slightly at one or

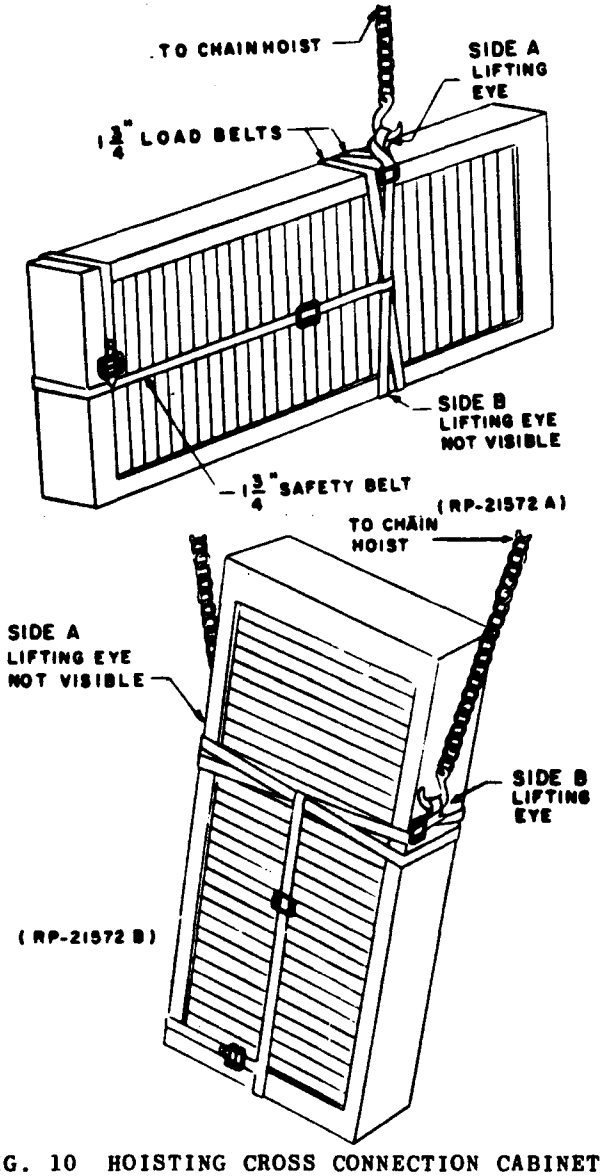


FIG. 10 HOISTING CROSS CONNECTION CABINET (PAR. 10.1)

more points where the cabinets are fastened together. One or two metal washers with a 1/4" hole placed on the sleeve nuts can be used for this purpose.

9.6 See that the bases of the cabinets coincide with the lines previously laid out on the floor and shim under the corners of each of the cabinets as required to meet the plumbing and aligning requirements.

9.7 When in final alignment, the cabinets should be plumb to within 1/8" in all directions. The requirements outlined under Paragraphs 8.46 (b) and (c) should also be met.

9.8 Assemble the end and top panels and other end-of-line parts as shown on the associated drawings furnished the job. Securely tighten all bolts, screws and nuts.

10. HOISTING CROSS CONNECTION CABINETS

10.1 The R-4098 Hoisting Strap

10.11 Use the R-4098 to hoist cross connection and/or equipment cabinets of a box type construction.

10.12 The straps are adjustable for a range of cabinet sizes from 7' to 11'-6" in height and from 23" to 53" in width. Maximum lifting capacity 1200 lbs.

10.13 The strap consists of the following parts:

(a) A 1-3/4" wide by 20' long safety strap with 6" long eyes at each end and an adjustment buckle, and a 68" long side strap.

(b) Two load straps each 1-3/4" wide by 11'-6" long with 6" long eyes at each end. One end of each strap is equipped with an adjustable buckle.

10.14 The safety strap is adjustable to account for variations in height and the load straps are adjustable for variations in width.

10.15 Use the straps to hoist the cabinets as follows. (See Figure 10).

(a) Move the cabinet to its final location in the lineup using the R-2599 Dolly Truck.

(b) Slip one load strap between the cabinet and the skid roughly two feet from the upper end with half the strap on each side of the cabinet.

(c) Place the safety strap as shown in Figure 1. Pull the load strap through each eye in the safety strap and hook on chain hoist through the free eye on the load strap.

(d) Lay the other load strap over the top of the cabinet and thread it through the eyes in the safety strap in opposite direction to previous strap. It will hang until ready to use.

(e) Follow standard hoisting procedure, as in Section 19A2, using the two load straps in choker hitches as the lifting eyes.

NOTE: Make sure lifting eyes are securely seated in hooks.

(f) After the cabinet is righted and anchored to the superstructure with an R-2849 Strap, the load straps can be disengaged from the chain hoists and removed. One side of the cabinet must be lifted slightly with a pinch bar and the safety strap slipped out.

→ Arrowed lines indicate new or changed information.

Vertical lines at side of paragraph indicate requirements.

10.16 Protect the straps from any sharp edges or corners by placing a piece of fiber, between the strap and the sharp edge of the cabinet.

11. FILLING SPACE BETWEEN BASES OF CABINETS AND FLOOR

11.1 Conspicuous spaces (approximately 3/16" or over) between the bases of the cabinets and the floor should, as far as practicable, be filled with Caulking Compound, RM-641598.

11.11 Information for applying the caulking compound is contained in Section 29.

Manager, Engineering Planning

Reason for Reissue:
To include information on use of R-4098 for hoisting cross connection cabinets.

Replaces Section 19C dated 5-19-60.