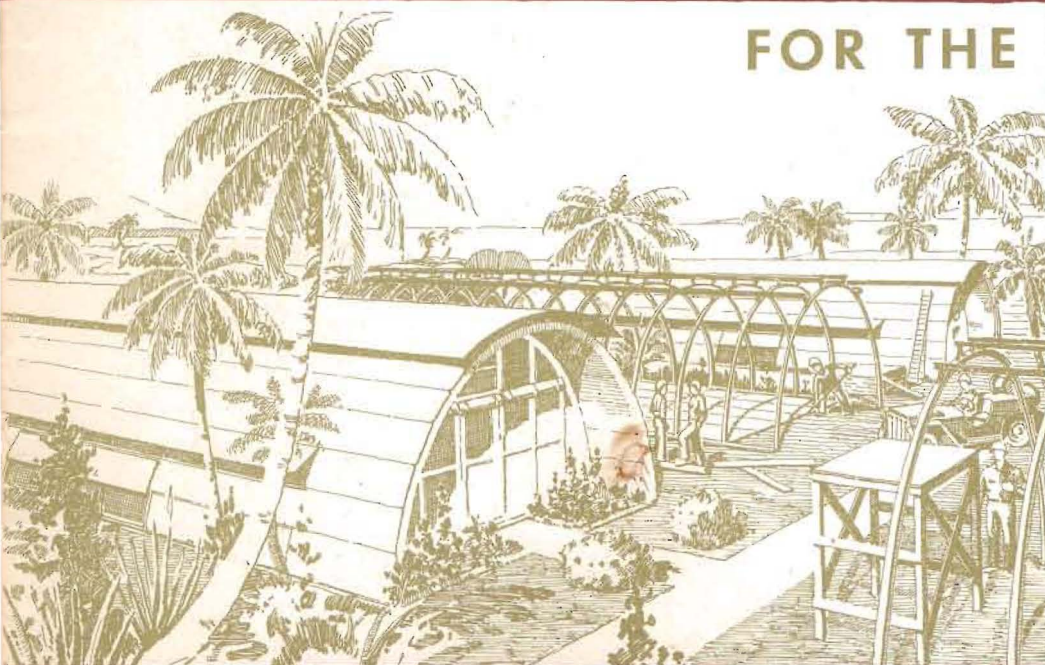




# ERECTION INSTRUCTIONS

A. L. RUSSELL

FOR THE



20'-0" x 48'-0"  
**U.S. NAVY**  
**STEEL ARCH RIB HUT**

WITH 2-4 FT. OVERHANGS

MANUFACTURED FOR

**NAVY DEPARTMENT**

**BUREAU YARDS AND DOCKS**

BY

**STRAN-STEEL DIVISION**

**GREAT LAKES STEEL CORP.**

**PENOBSCOT BUILDING**

**DETROIT 26, MICHIGAN**

UNIT OF NATIONAL STEEL CORP.

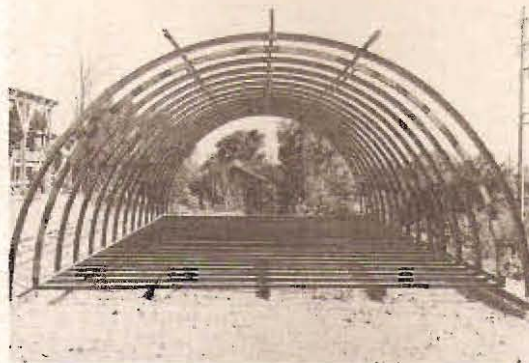
**TROPICAL DESIGN**  
**NOVEMBER 1, 1944**



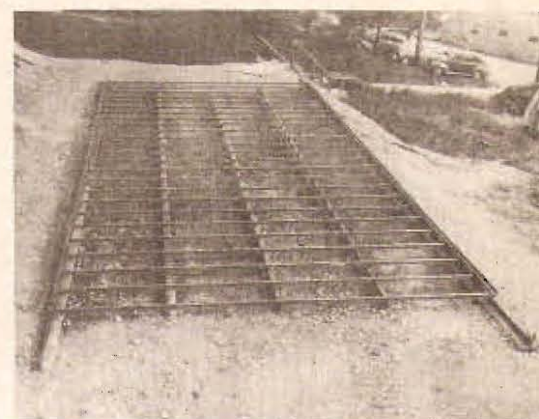
## ERECTION SEQUENCE



CANOPY FRAMING



RIBS AND PURLINS



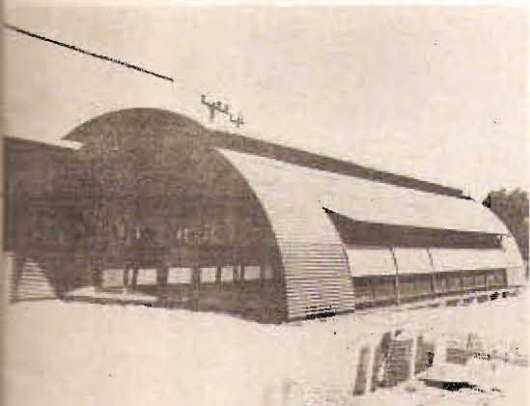
FLOOR FRAME



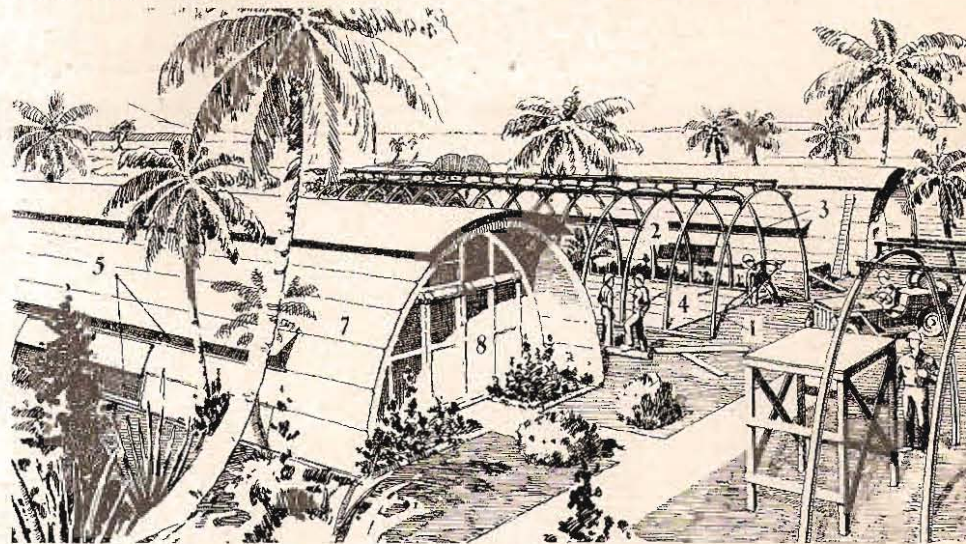
FLOOR PANELS



INTERIOR COVERING



EXTERIOR COVERING



**1. Floor Framing.** Lay the sills first; then the joists, then the channel plates. Level and square the whole assembly. (See pages 2 and 3.)

**2. Ribs, Trimmers and Purlins.** Fasten the half ribs together, attach purlin spacers and trimmers, locate, raise into position, and screw to channel plate. Erect purlins and plumb entire assembly. (See pages 4 and 5.)

**3. Canopy Framing, Wood Sills and Headers.** Install steel framing for canopy, and wood sills and headers at screened openings. (See page 6.)

**4. Floor Panels.** Lay out plywood floor panels on the joists. Install metal splines at longitudinal joints and nail the panels to the joists. (See page 7.)

**5. Interior Covering and Screened Openings.** Place Masonite sheets at raised ceiling first, then on side walls. Nail Masonite filler strips where ribs are exposed at screened openings. (See pages 8 and 9.)

**6. Insulation.** Apply insulation to raised ceiling area first, then above and below canopied opening, then in end bays. (See pages 10 and 11.)

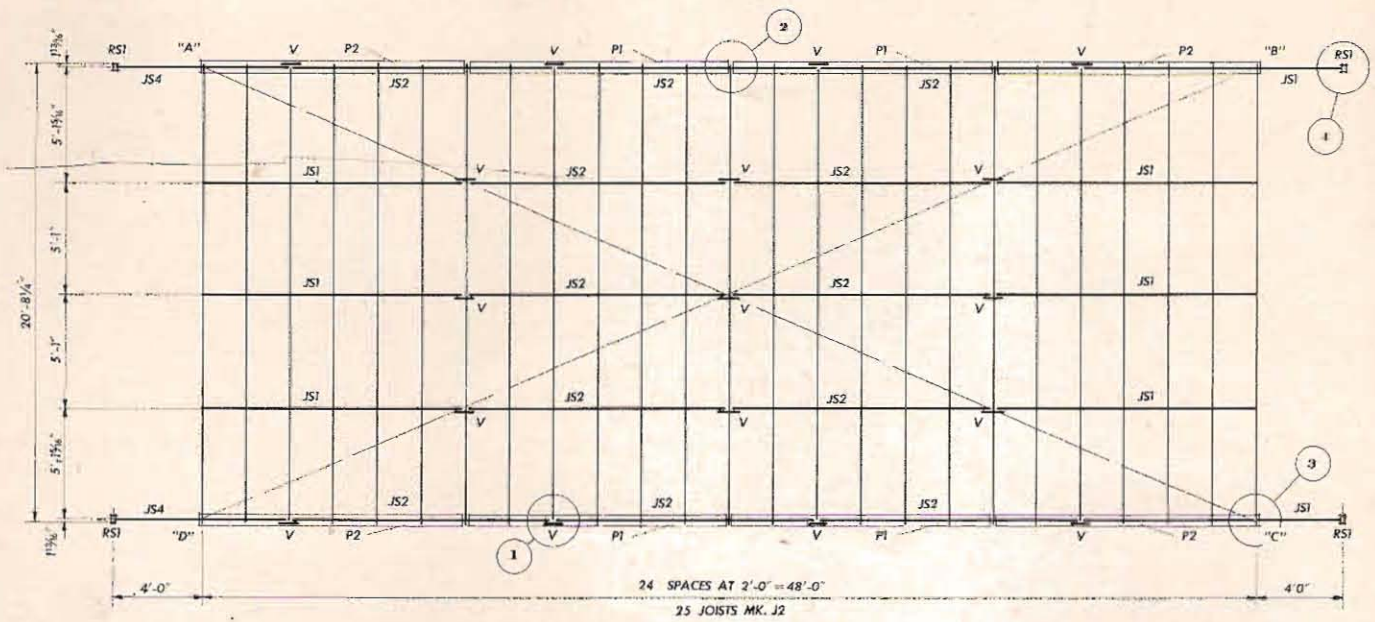
**7. Exterior Covering.** Cover the side walls with flat corrugated sheets, including the hinged ventilator flaps and canopy. Fasten bronze screening and flashings F6 and F7 at raised roof. Nail curved corrugated sheets to purlins. (See pages 12 and 13.)

**8. Bulkheads.** Frame bulkheads in field from pre-cut lumber. Install door, panels, molding, screen, and canvas curtains. (See pages 14 and 15.)

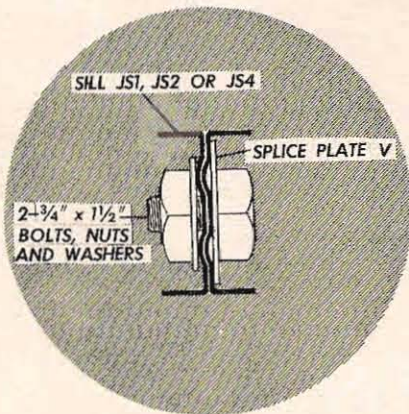
**9. Clean Up.** Save all scraps, bands, blocks, nails, screws, and crating material not used. Sort and store for further use.



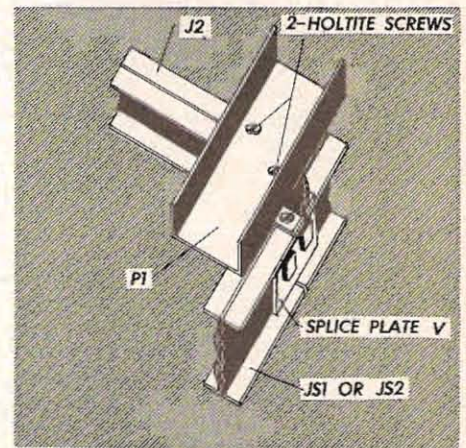
# FLOOR FRAMING



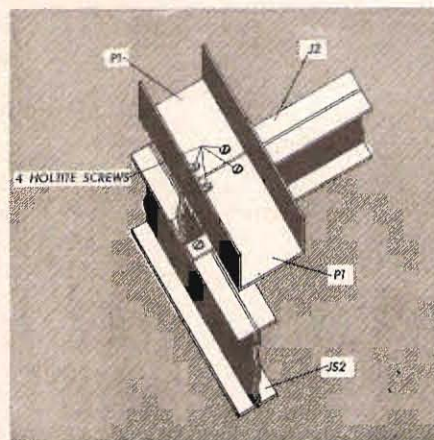
**FLOOR FRAMING PLAN**



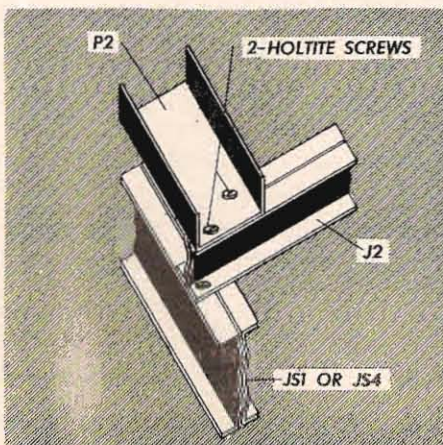
**TYPICAL SILL SPLICE**



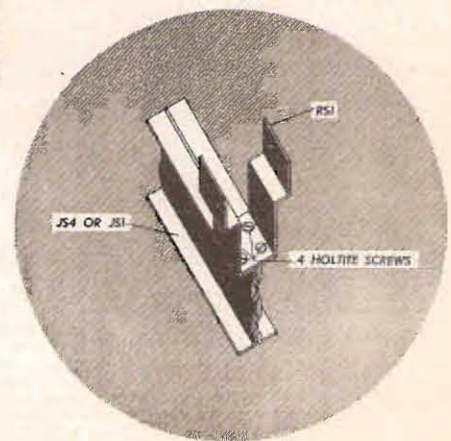
**DETAIL 1**



**DETAIL 2**



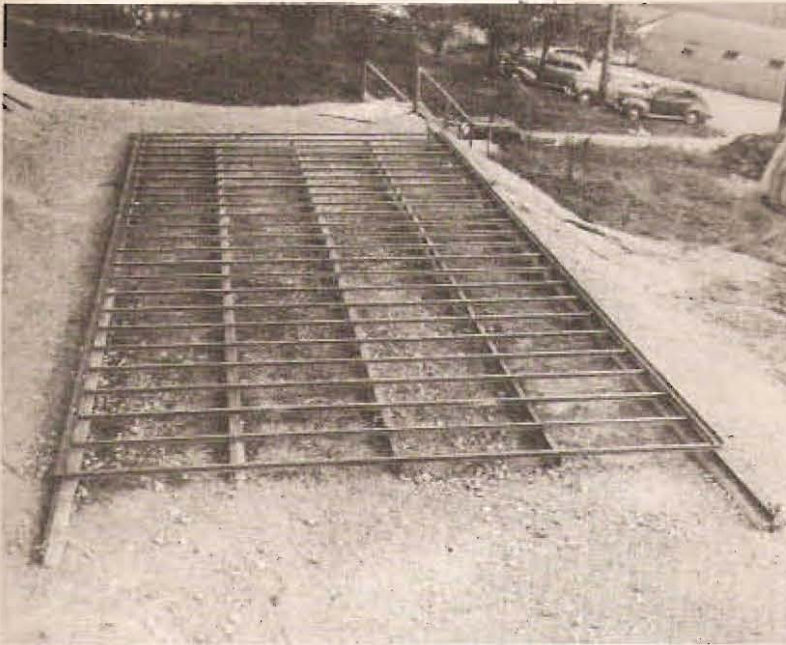
**DETAIL 3**



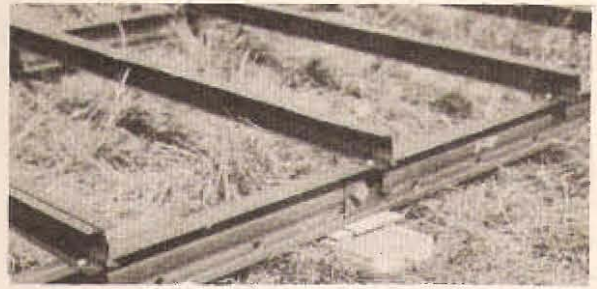
**DETAIL 4**



## FLOOR FRAMING



COMPLETE FLOOR FRAME



SILL AND JOISTS



ATTACH RS1

**1** The floor joist assembly consists of steel sills, joists, and channel plates. The sills run lengthwise of the hut on the ground and support the joists, which are fastened to the sills at right angles to them. At the extreme ends of the joists channel plates are fastened for receiving the ribs.

**1.** Level and tamp an area of ground approximately 30' x 60' for the hut site. If site is too uneven to level easily, see wood foundation adaptation page 16.

**2.** Lay the sills on the tamped ground in five parallel lines about 5' apart with the holes (for connecting the joists) facing upward. The end sills (Mk. JS-4 and JS-1) have 4 holes in one end. Place the 4-hole end to the outside of the hut. Line up the sills with the nailing groove curves matching (see details). Otherwise, when the splice plate is tightened they will be forced out of line.

**3.** Lay the joists, connecting holes down, at right angles to the sills on 2' centers as shown. Use a drift pin to line up the holes and insert 2 screws diagonally opposite to each other at each connection. At each splice in the sills use 4 screws.

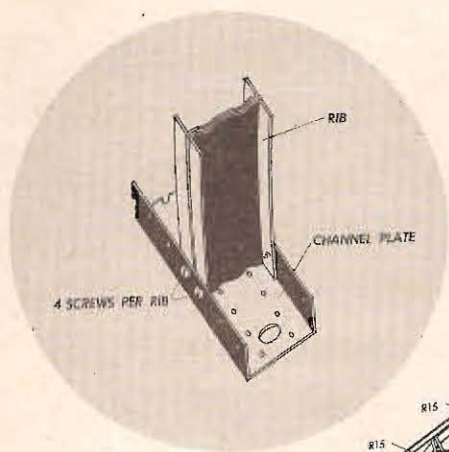
**4.** Place channel plates (Mk. P-1 and P-2) over ends of joists and parallel to outside sill joists. Screw these to

the joists. Use 2 screws diagonally at each joist but use 4 screws where there is a joint in the channel plate. (See detail 2.) Finally screw the four rib shoes Mk. R S to the extreme ends of the outside joist sills. (See photo above and detail 4.)

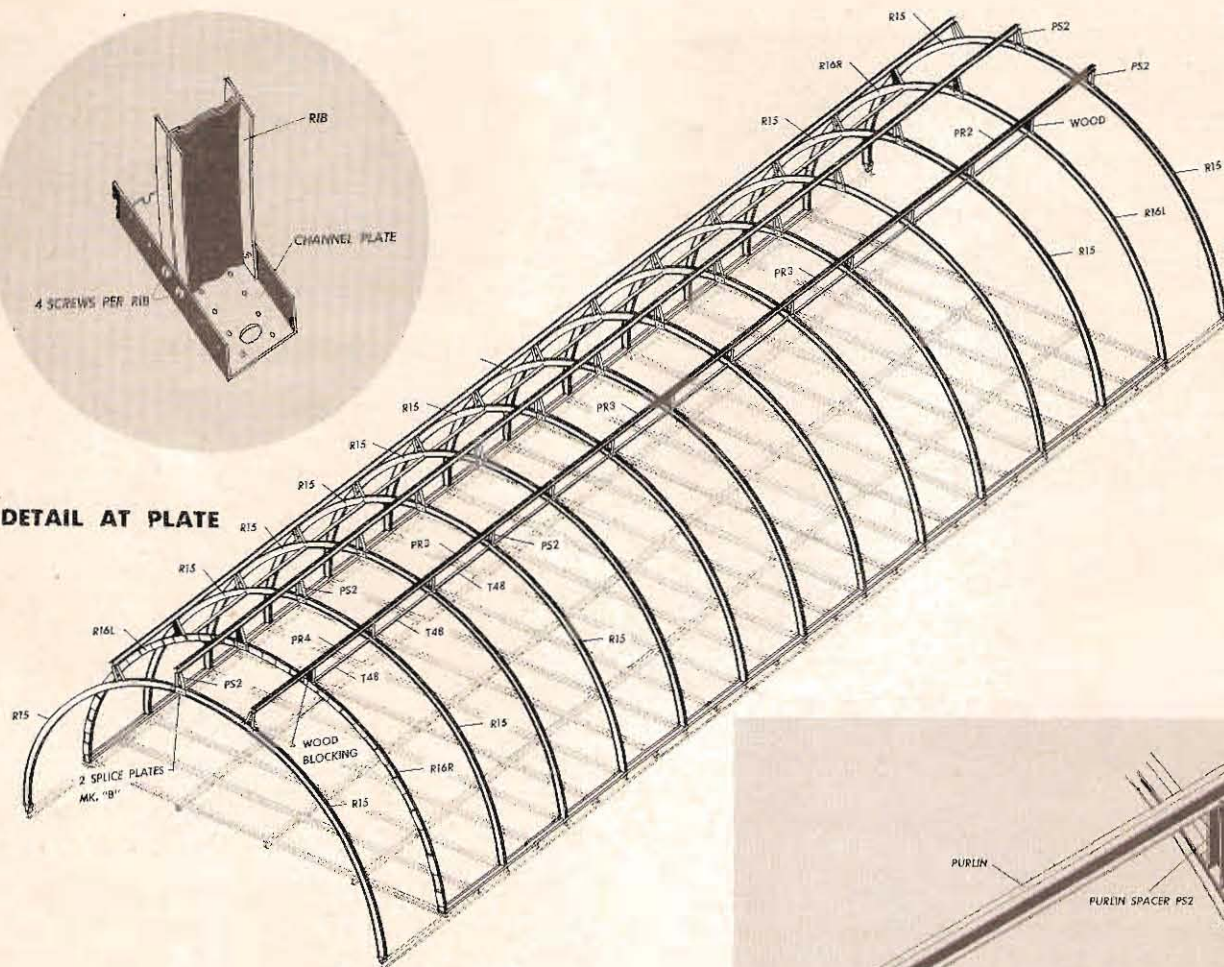
**5. Square Up the Floor Assembly.** Distance A-C should be the same as B-D. (See Plan.) Use the roll of wire from the tool box for measuring these distances. Hold one end of the wire on the inside lip of the channel plate "A." Stretch to the same point at "C." Do the same from B to D. Shift the corners until distances A-C and B-D are equal. Check the ends and sides for straightness, using a line or wire and recheck for square. Then check the assembly for level starting at joist B-C. With this joist level, proceed to level the channel plate, working from C to D. Level the channel plate by placing the level on the lip of the plate in about four locations. When the channel plate is levelled, level the other end joist, working from D to A. Then proceed with levelling the channel plate from A to B. Bring the other joists to level, using level at four points as for opposite side. Use small wedges or blocking made from crating lumber to raise the sills, and scoop dirt from under the sills to lower. *Be sure the floor assembly is level before proceeding.*



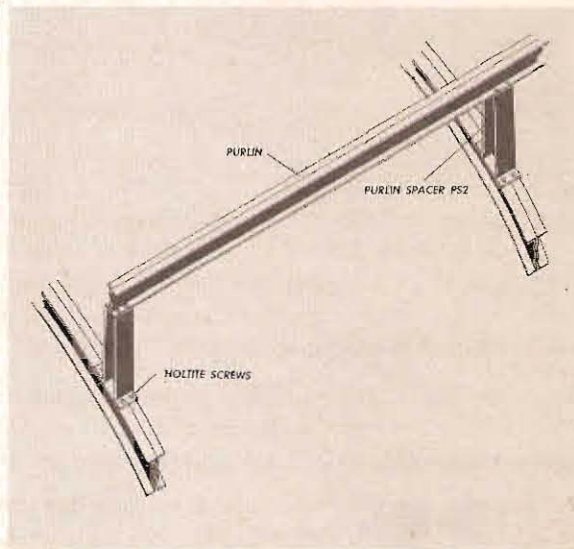
# RIBS, TRIMMERS AND PURLINS



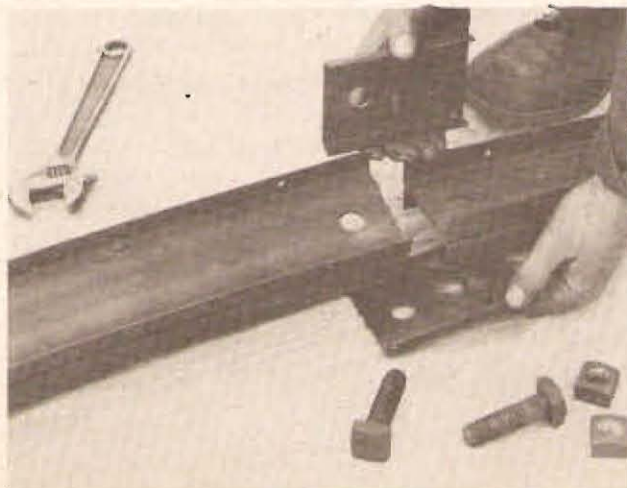
**DETAIL AT PLATE**



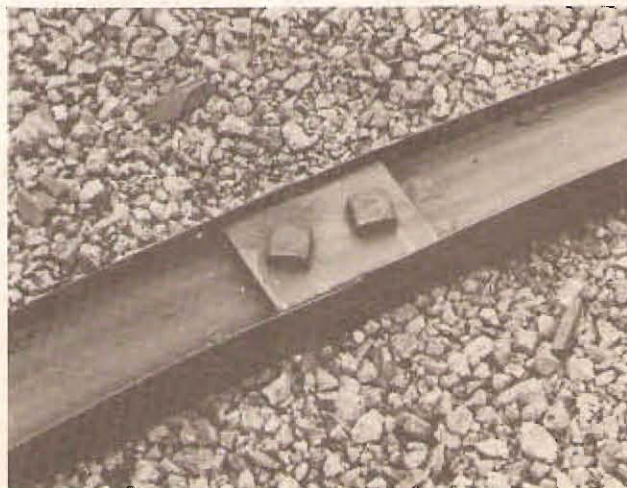
**COMPLETE FRAMING**



**PURLIN SPACERS**

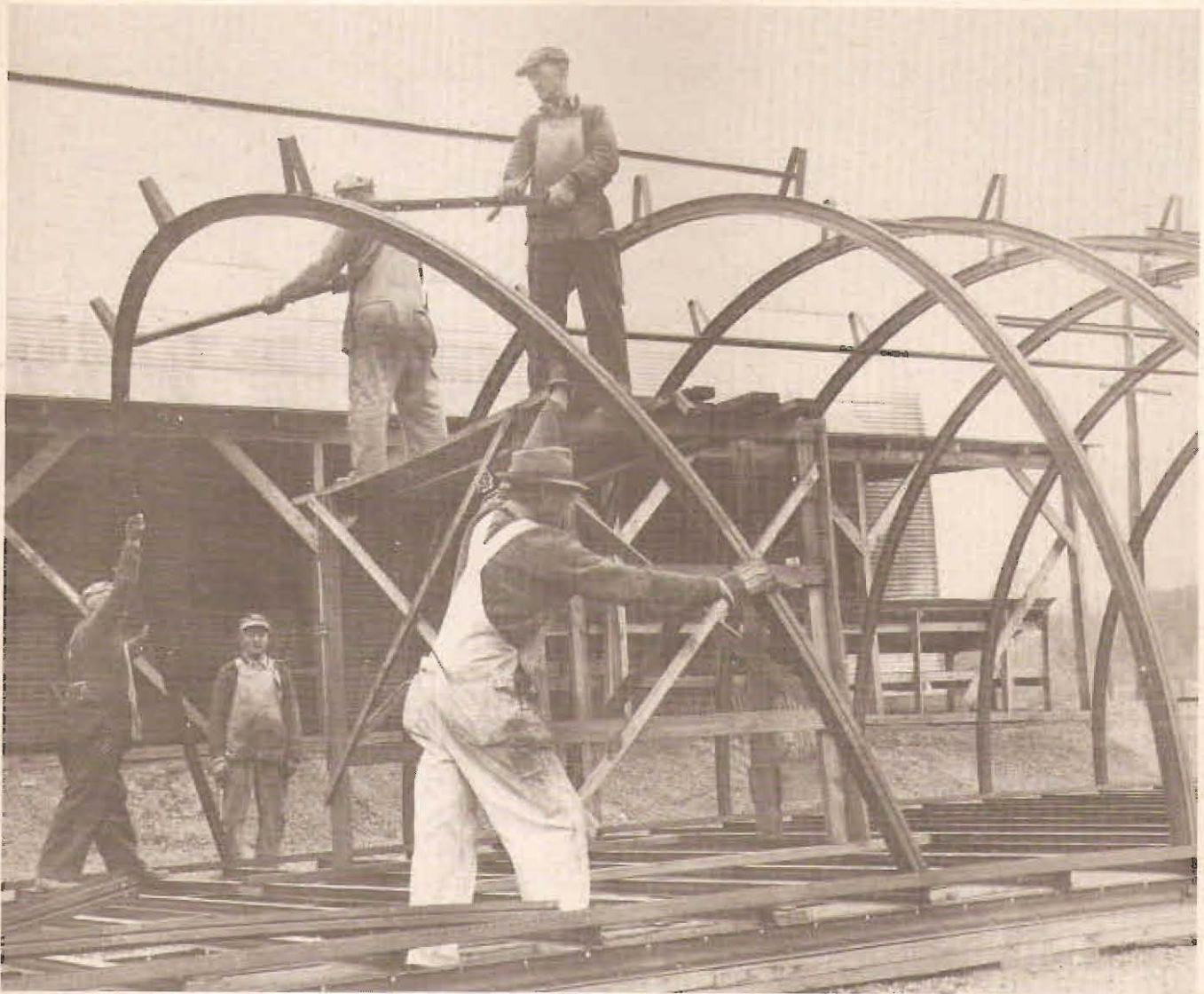


**SPLICING RIB**



**COMPLETED SPLICE**





### ERECTING RIB WITH TRIMMERS ATTACHED

**2** The rib assembly consists of two steel sections, or "half-ribs," which are joined together at the top with splice plates mark "B." The lower ends of the ribs are secured to channel plate, or, in the case of the end ribs, to rib shoe mark "RS1." The three rows of purlins are supported on purlin spacers mark "PS2." Two rows of trimmers, mark "T48" are fastened to lower flanges of ribs. Construct a scaffold from crating lumber to use in making trimmer and purlin connections at top of rib.

**1.** Assemble all the ribs on the ground before raising any. Ribs are joined at the top with two splice plates mark "B" and two  $\frac{3}{4}$ " x  $2\frac{1}{2}$ " bolts. (See photographs.) Attach purlin spacers "PS2" while ribs are on the ground. In assembling the ribs with wood blocking, take care to have the bolt head on the block side of the rib,

so that later work will clear. The ribs with the wood blocking will be the second from each end and the blocking side should face outward. Raise one of these ribs first and secure it to channel plate with four Holtite screws. (See detail.)

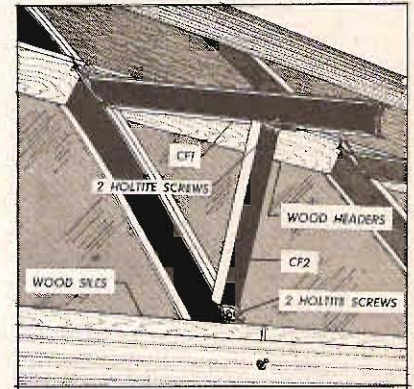
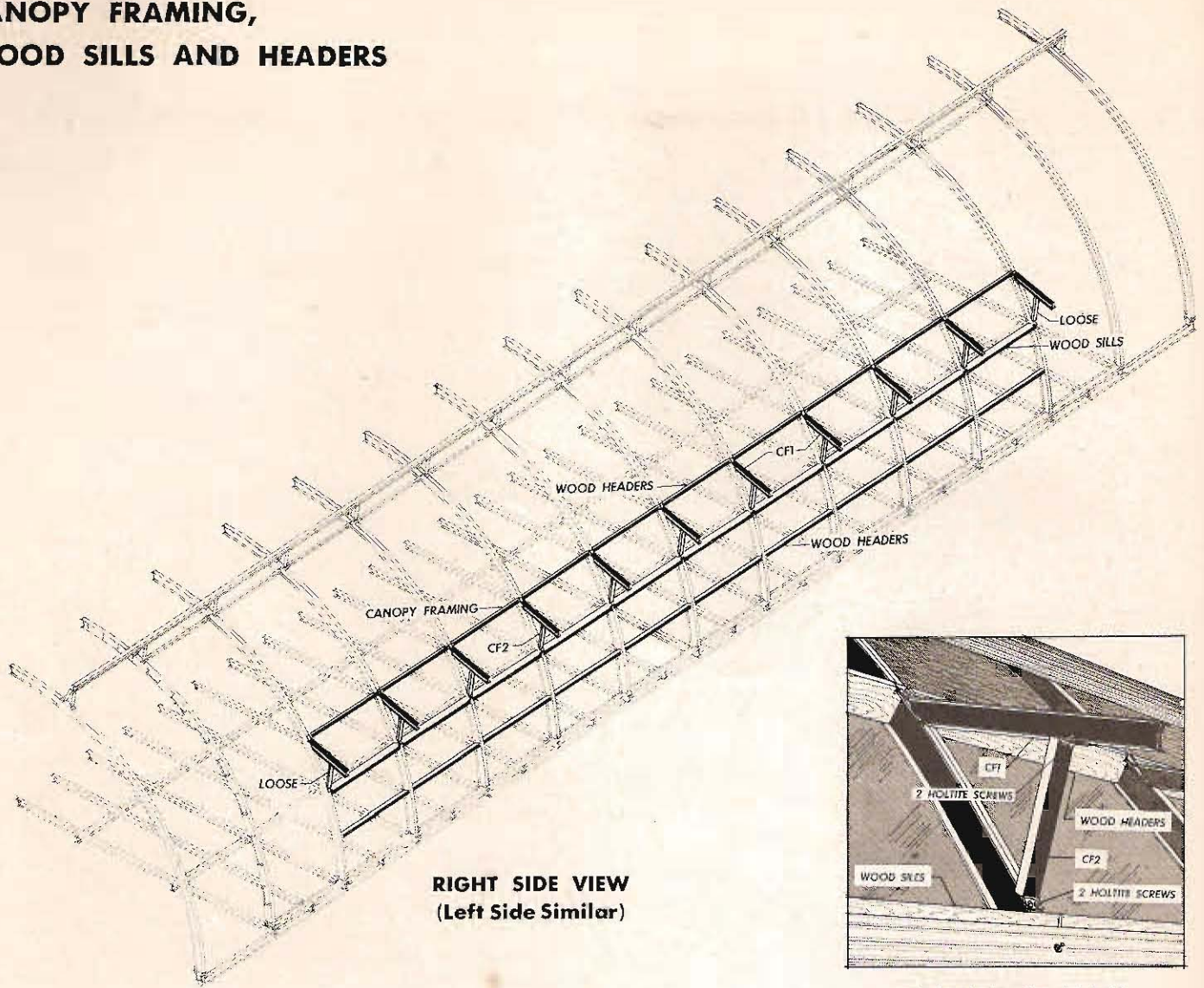
**2.** Fasten the trimmers to the next rib while it is on the ground. Raise this rib, fasten the trimmers to the rib already raised, and secure the rib to the channel plate. Repeat this operation for each successive rib. Since end ribs have no trimmers, do not raise them until purlins are in place.

**3.** Fasten the purlins in place (see detail) after the ribs are raised, using Holtite screws.

**4.** Recheck the entire structure to make certain it is plumb.



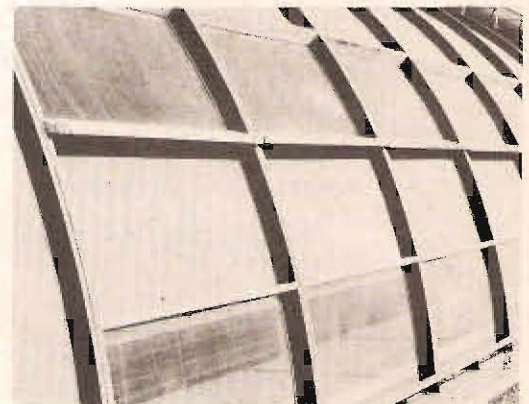
# CANOPY FRAMING, WOOD SILLS AND HEADERS



FRAMING IN PLACE



CANOPY FRAMING



WOOD SILLS AND HEADERS

**3** The steel framing for the canopy consists of 2 $\frac{5}{16}$ " stud section rafters mark "CF1," and channel section struts, mark "CF2."

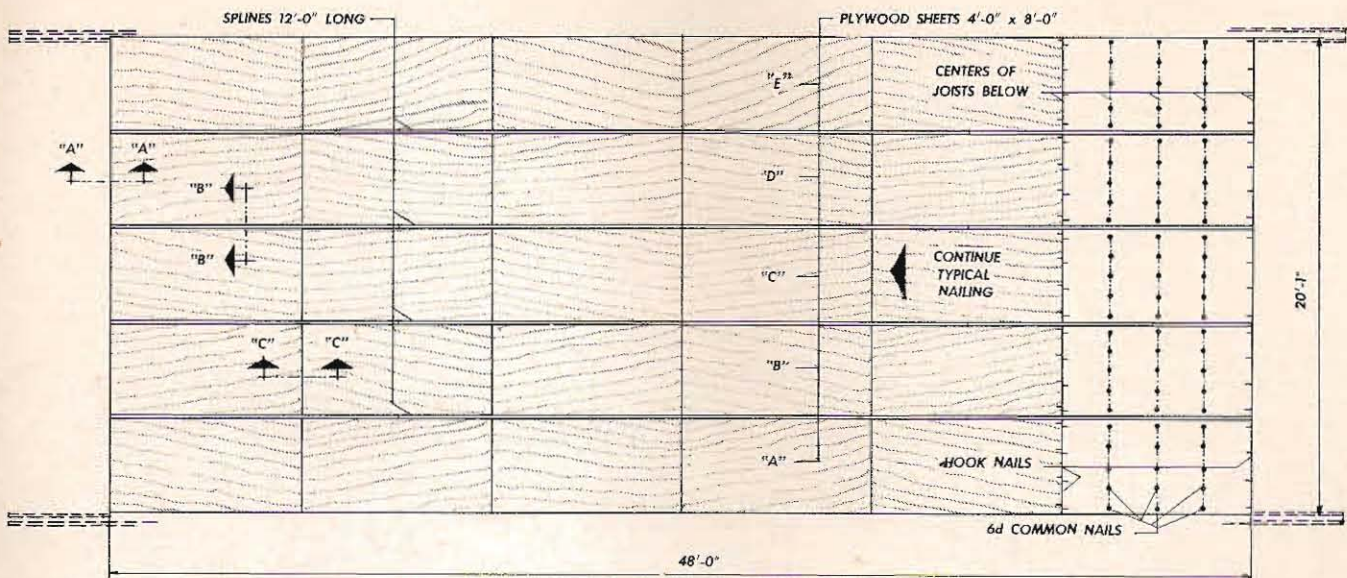
**1.** Fasten these members together with Holtite screws before securing them to the ribs. At end bents *only*, do

not fasten strut "CF2" to ribs until corrugated sheets are applied.

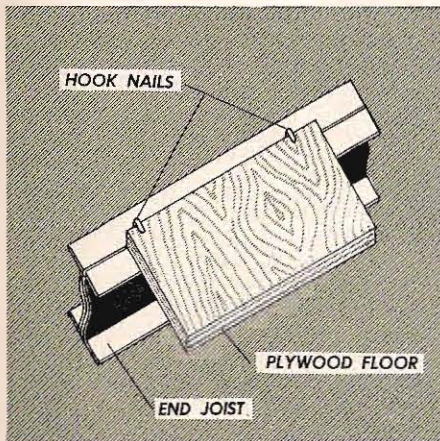
**2.** Nail wood sills and headers in place through holes provided in ribs for this purpose. Start with header for lower screened opening, then sill above, then header at canopied opening.



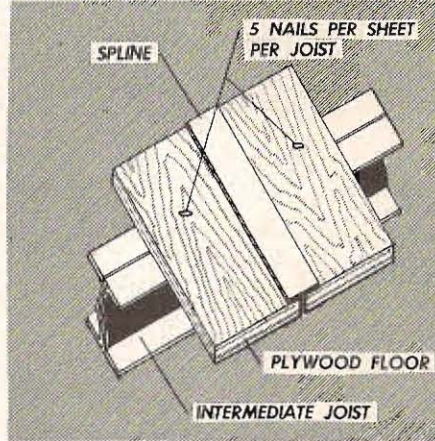
## FLOOR PANELS



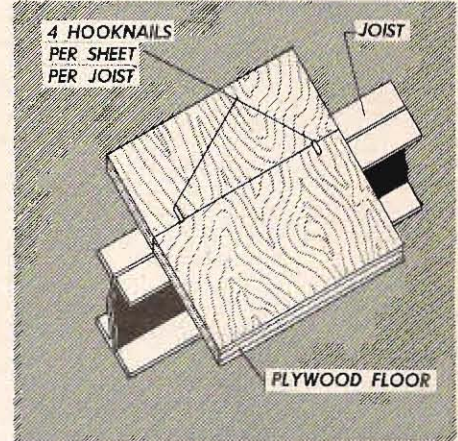
LAYOUT OF PLYWOOD PANELS



SECTION "A-A"



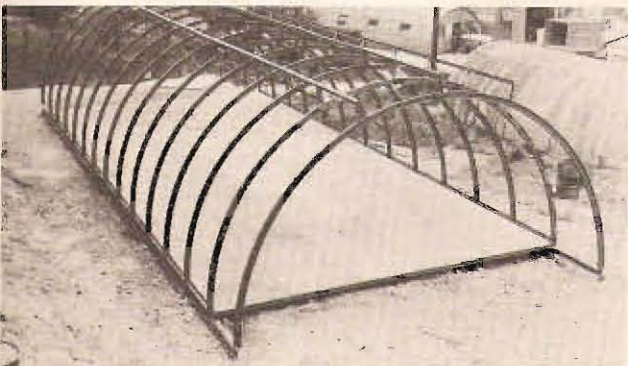
SECTION "B-B"



SECTION "C-C"



APPLYING FLOOR PANELS



COMPLETED FLOOR

4

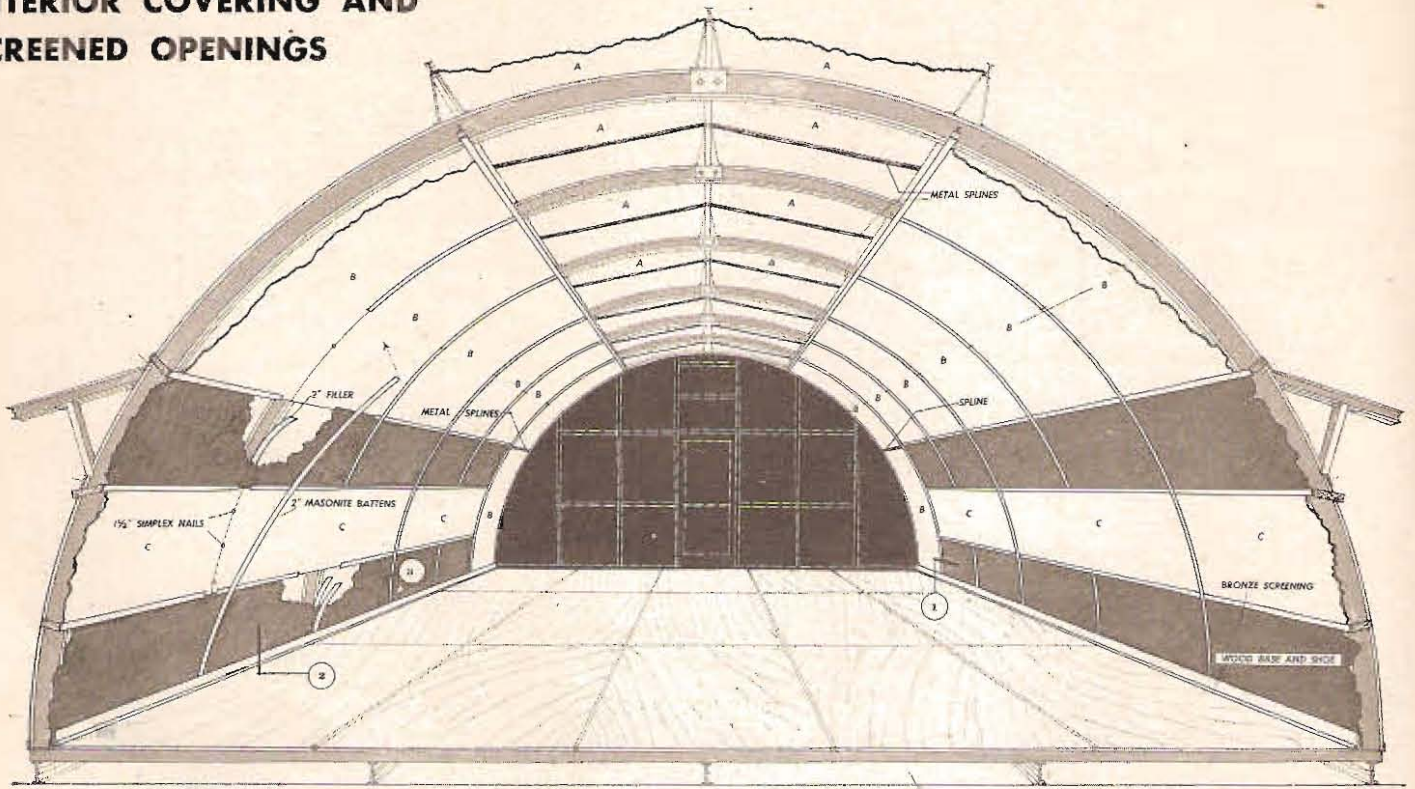
The floor is covered with 4' 0" x 8' 0" plywood panels nailed to the floor joists. Metal splines fit between the lengthwise joints.

1. Lay out all the plywood panels (clear side up) starting with row "A," and proceeding to rows "B," "C," "D" and "E" fitting the metal splines between the rows as each is laid. (See Sect. B-B.) The ends of the panels should butt over the center of joists Nos. 5, 9, 13, 17, 21, and 25.

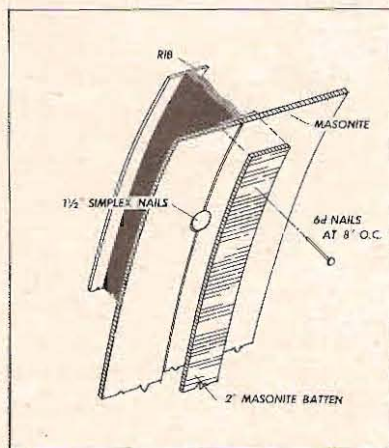
2. Nail the panels in place. Use 6d common nails at intermediate joists (see Sect. B-B), and hook nails at the ends of the panels (see Sect. C-C and A-A). To establish a nailing line for the intermediate rows of nails, take a chalk line, hold each end over the center of the joist, pull the line taut and snap. This will leave a guide line on the panel. Do not use more nails than the sketches call for.



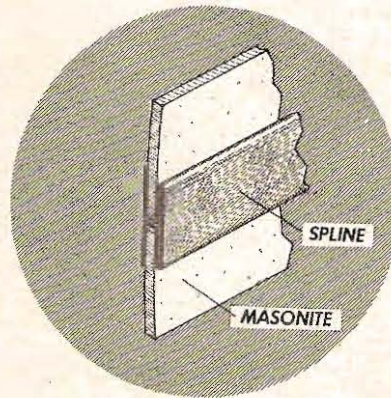
# INTERIOR COVERING AND SCREENED OPENINGS



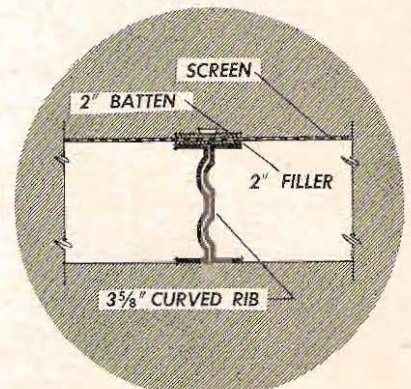
**CUT-AWAY VIEW**



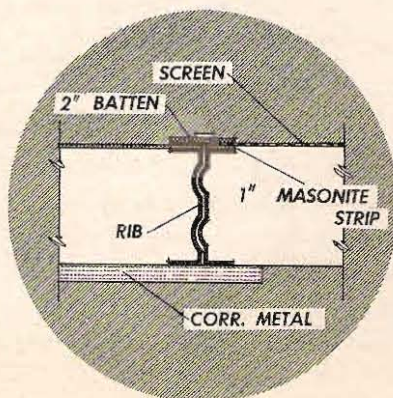
**MASONITE BATTEN**



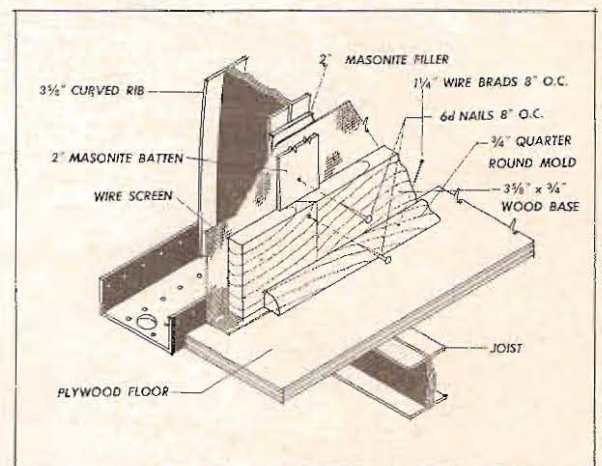
**METAL SPLINE**



**DETAIL 3**



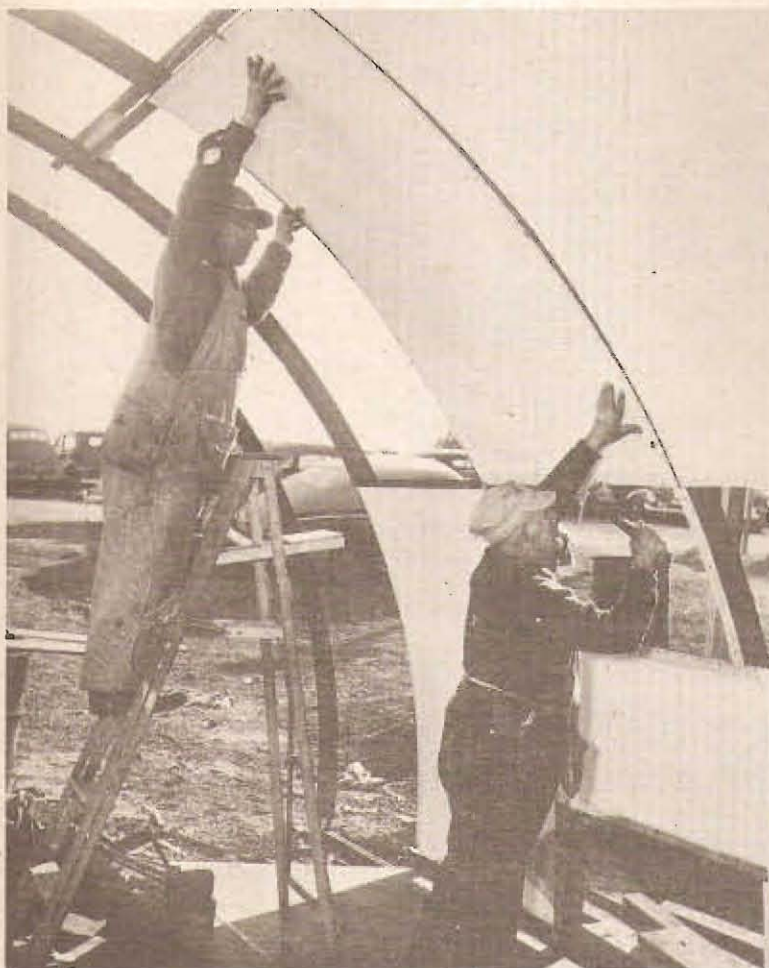
**DETAIL 1**



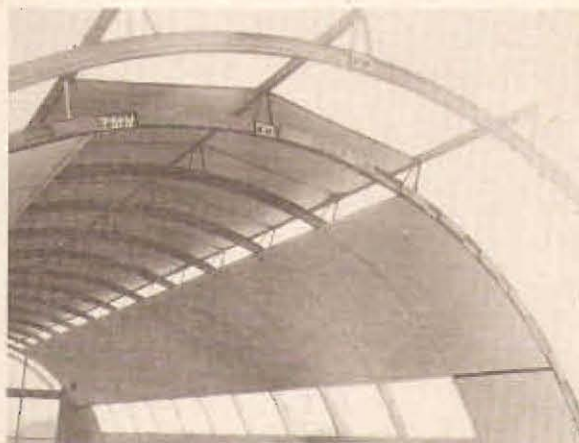
**DETAIL 2**



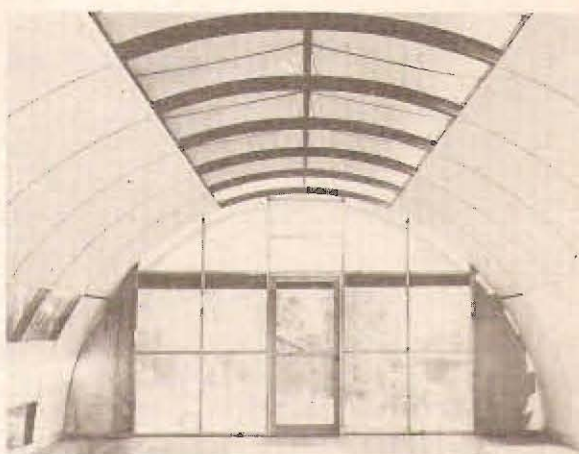
## INTERIOR COVERING AND SCREENED OPENINGS



INSTALLING "B" SHEETS



RAISED CEILING



COMPLETE COVERING

**5** The interior of the hut is covered with sheets of finished Masonite  $\frac{1}{8}$ " thick, nailed to the ribs or supported on purlins, with smooth side facing inside the hut.

**1.** Place twenty-four "A" sheets ( $3' 11\frac{7}{8}" \times 4' 0"$ ) on bottom flanges of purlins, with metal splines between the sheets.

**2.** Check the ribs to see that they are plumb and true, and measure  $4' 0"$  center to center. Fasten the twenty-eight "B" sheets ( $3' 11\frac{7}{8}" \times 6' 0"$ ) to the ribs and wood headers, starting with lowest sheets at end bays. Space

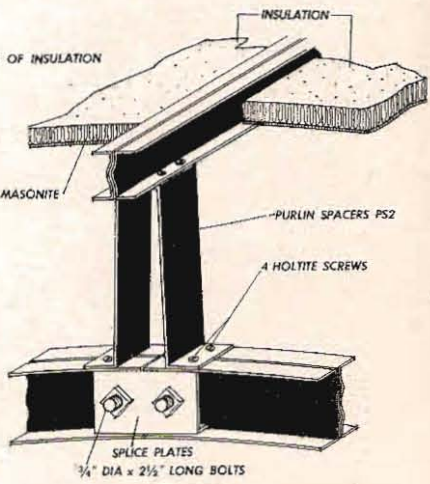
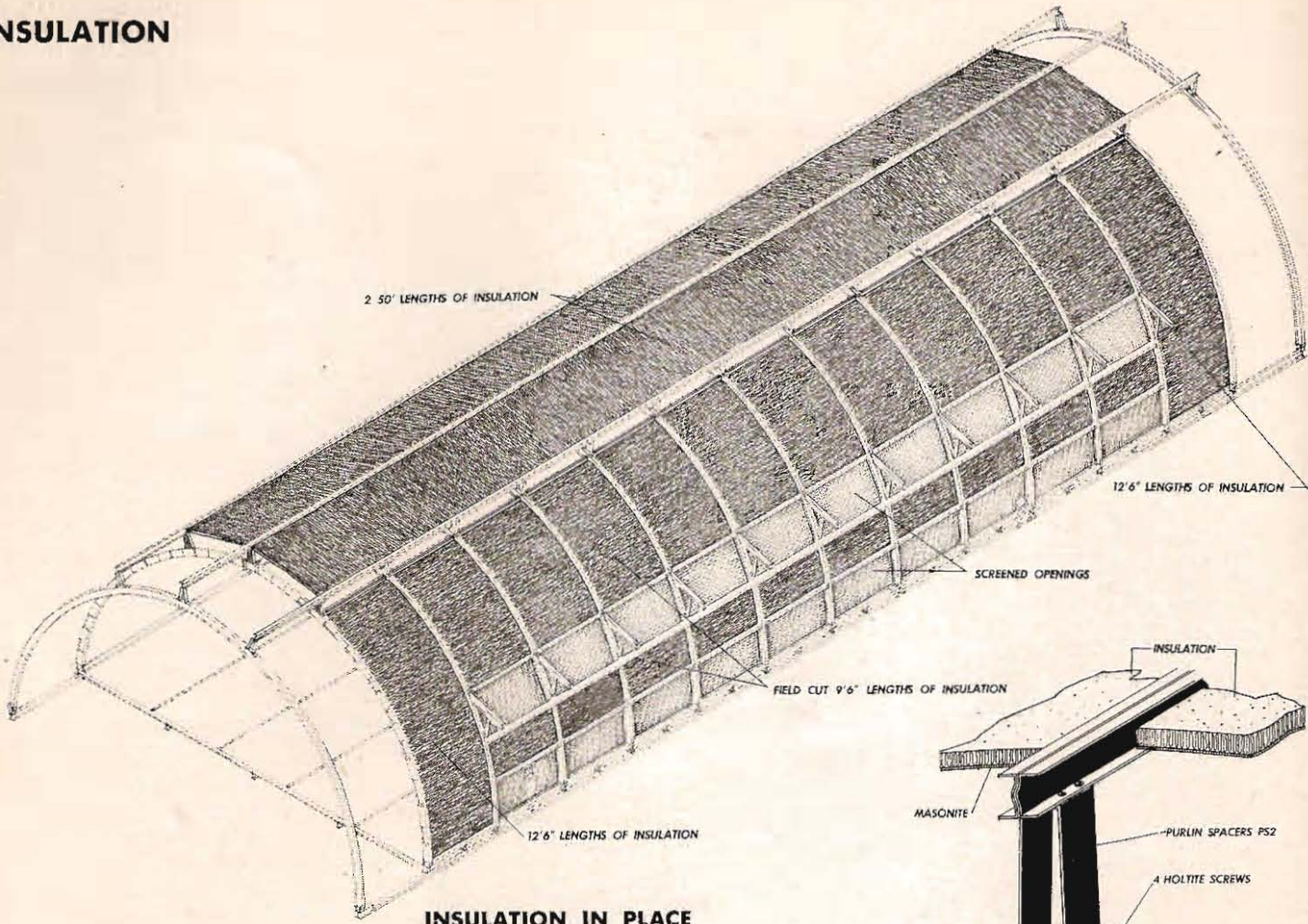
Simplex nails as required to hold sheets snugly against ribs. (See detail.) Note that there is a metal spline between upper and lower "B" sheets at ends of hut.

**3.** Nail ten "C" sheets ( $2' 3" \times 7' 11\frac{7}{8}"$ ) to wood sills and headers with 6d common nails, and to ribs with Simplex nails. Nail 2" Masonite filler strips where ribs are exposed at screened openings.

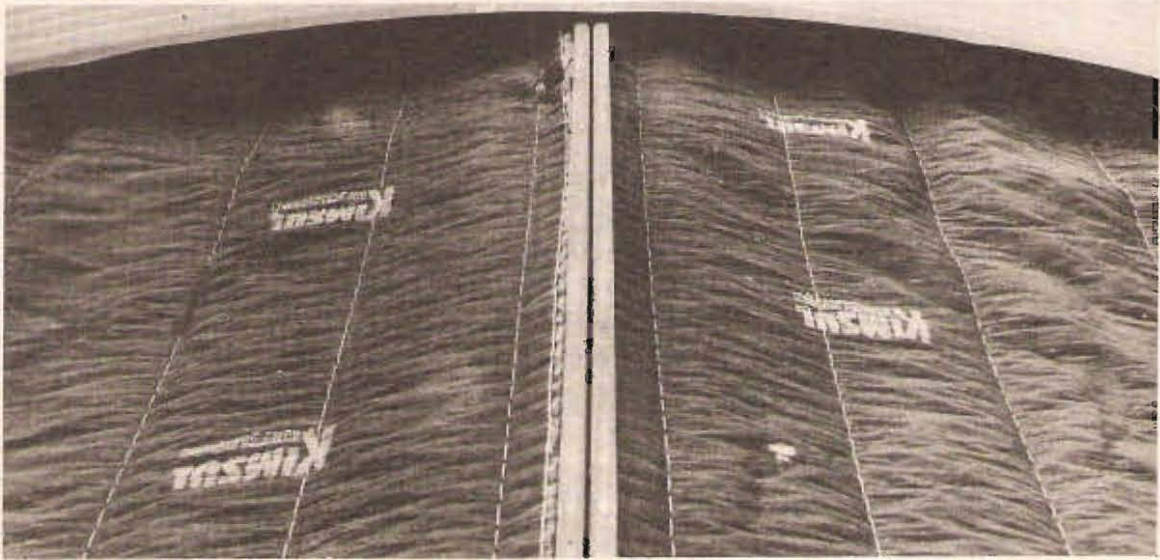
**4.** Cover the openings with bronze screening, install wood base and shoe, and nail 2" Masonite batten strips over all ribs and around screened openings, using 6d at  $8"$  O.C. (See detail 1, detail 2, and detail 3.)



INSULATION

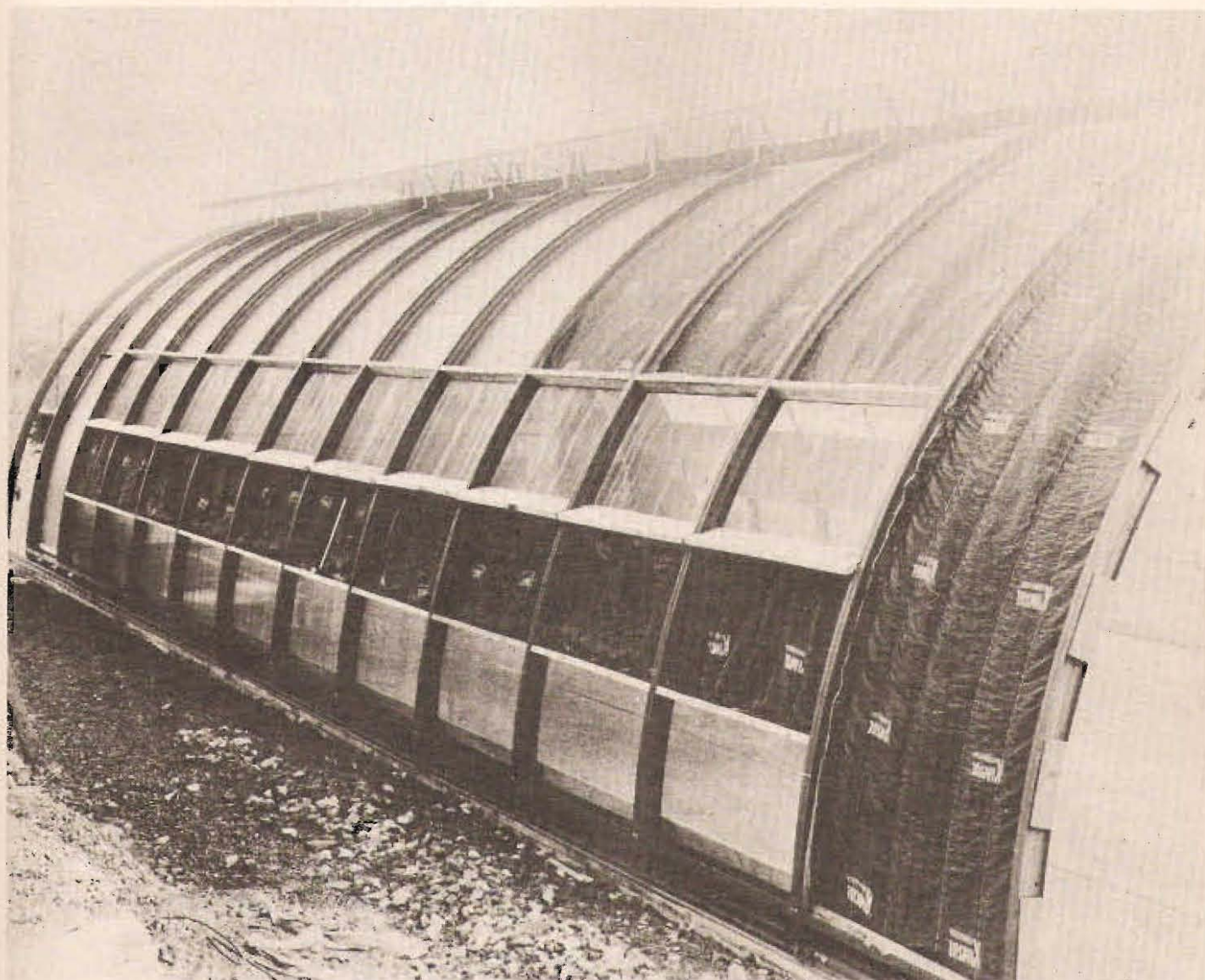


**DETAIL AT CENTER PURLIN**



**DETAIL AT CENTER PURLIN**





### INSTALLING INSULATION

**6** Over the Masonite inside covering and between the ribs of the hut is a layer of flexible-type insulation 4' 0" wide. The insulation is pre-cut to size, with the exception of the twenty 9' 6" lengths, which must be re-cut in the field.

1. First, lay the two 50' 0" lengths of insulation on the Masonite ceiling sheets "A."

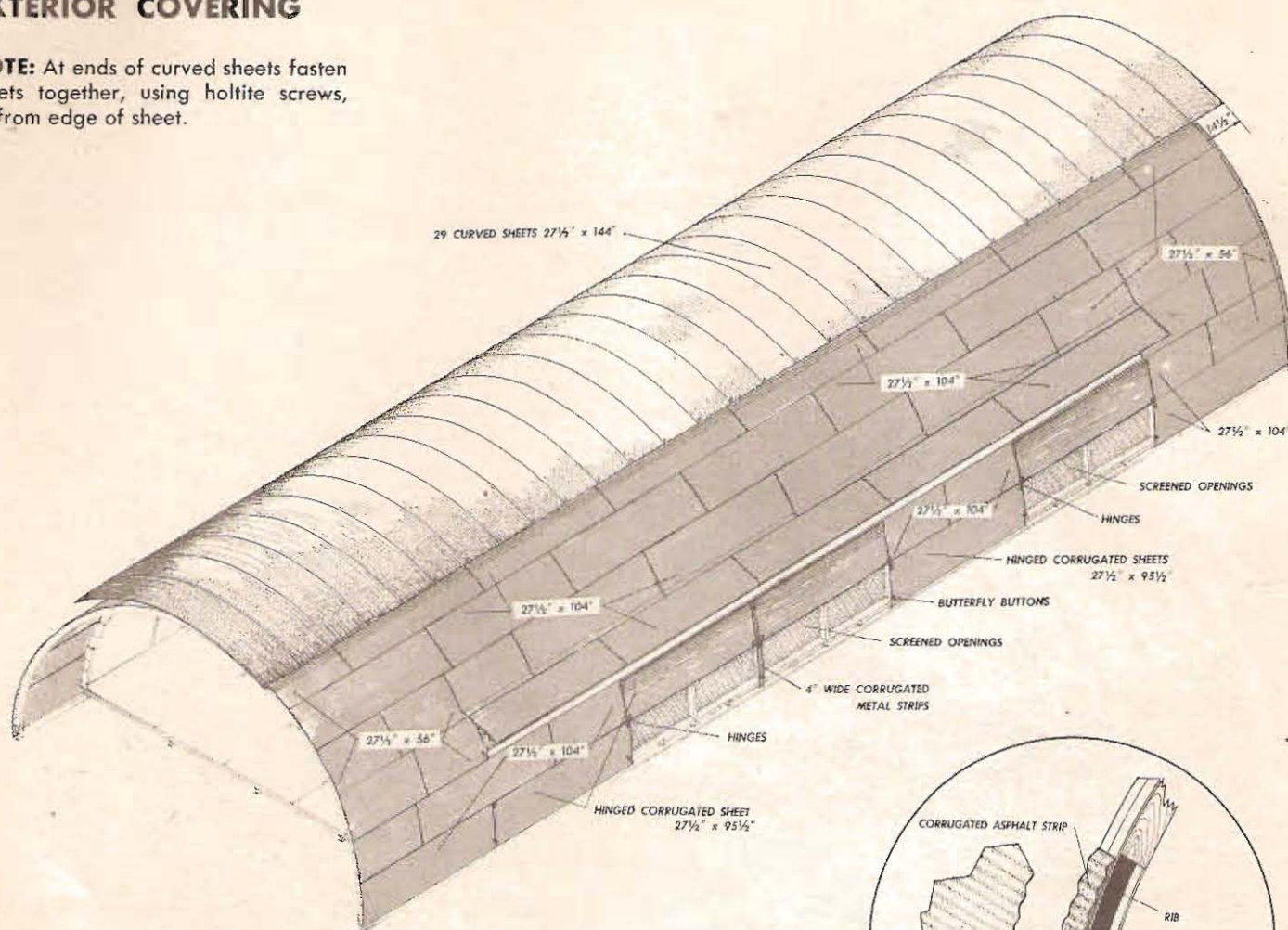
2. Next, secure the four 12' 6" lengths, two in each end bay. (See drawing.)

3. Each of the twenty 9' 6" lengths are to be cut in field into two pieces, 6' 6" and 3' 0" long, which are placed above and below the canopied opening. Nail insulation to wood sills and headers, and secure to trimmers at top with crating lumber battens and clinch nails. (See next page.)

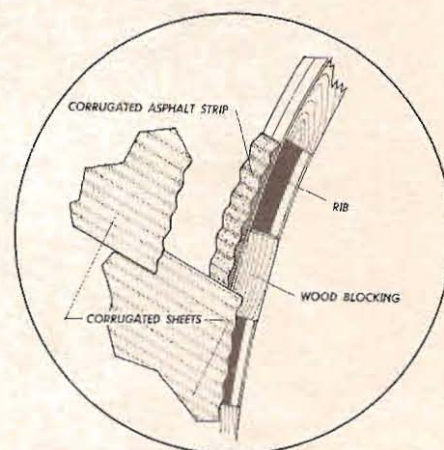


## EXTERIOR COVERING

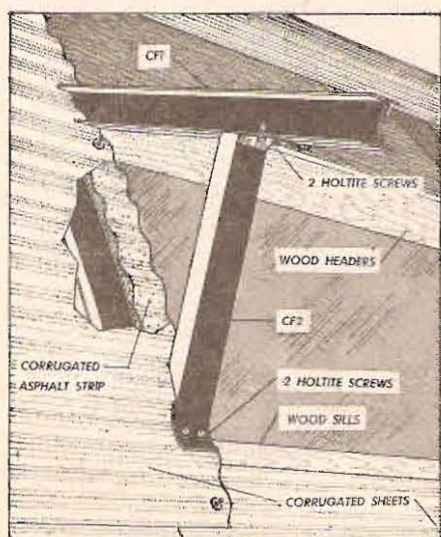
**NOTE:** At ends of curved sheets fasten sheets together, using holtite screws, 1" from edge of sheet.



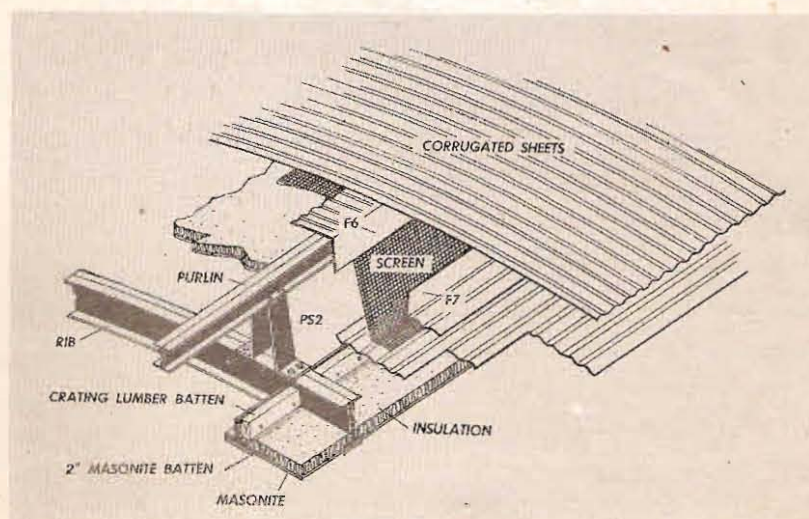
### LAYOUT OF CORRUGATED SHEETS



DETAIL OF CORRUGATED CLOSURE  
AT BULKHEAD RIB

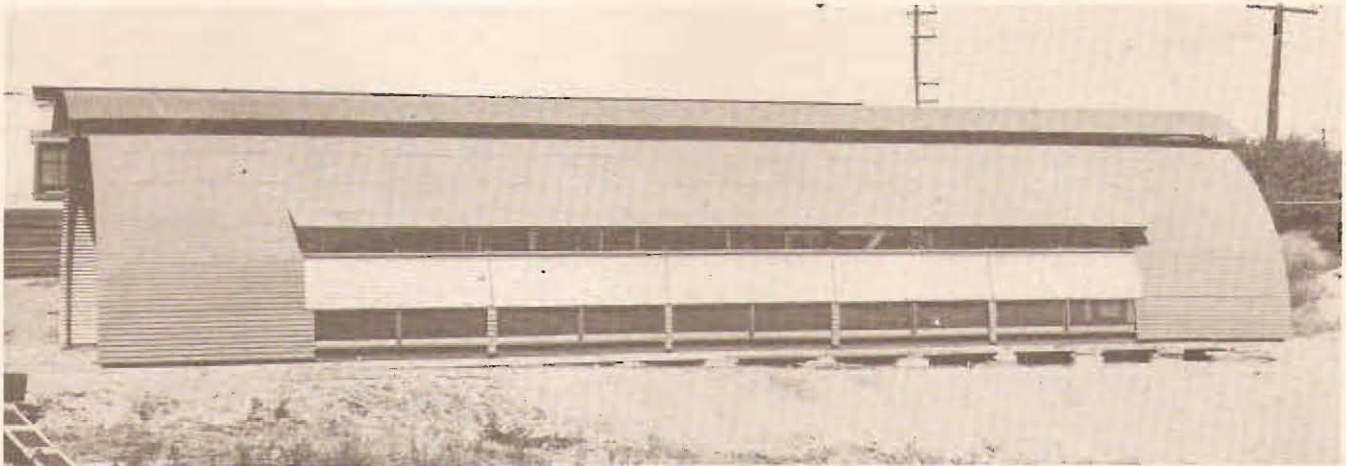


## CANOPY JAMB



### DETAIL AT RAISED ROOF





**HUT WITH ALL SHEETS IN PLACE**

**7** The hut is covered with corrugated galvanized steel sheets. On the sides, these sheets are flat and are nailed to the ribs and canopy rafters, using double headed nails with steel and fibre washers 8" O.C. Always nail through high point of corrugation. The top sheets at raised roof are curved and are nailed to the purlins.

**1.** Start with row of sheets running under canopied opening. Note that these sheets slip into slot in under side of wood sills. Lap sheets 6" at joints, and butter with mastic. Omit nails at bottom until hinged sheets are in place.

**2.** Install the eight 4" wide corrugated mullion sheets (four at each side of hut) with hinges and butterfly buttons. Field cut slot for hinge. Then slip the 27½" x 95½" corrugated ventilator sheets under the lower edge of the row already installed, and fasten to hinges with stove bolts. (See photos.)

**3.** The 27½" x 56" sheets at jambs of canopied openings are now applied, sliding the jamb sheet under canopy framing member CF2, which was left loose for this purpose. Fasten CF2 to rib with holtite screws through corrugated sheet and corrugated asphalt filler strip. (See detail.)

**4.** Install the remainder of sheets on sidewalls and canopy rafters, lapping sheets 6" at vertical joints and 3½" at horizontal joints. Butter all laps with mastic.

**5.** At raised roof, install bronze screening and flashings F6 and F7. Then apply twenty-nine curved roofing sheets, each 27½" x 144", lapping them 3½" and buttering laps with mastic. Nail these sheets to purlins with double headed nails and steel and fibre washers 8" O.C. Always nail through high part of corrugation.

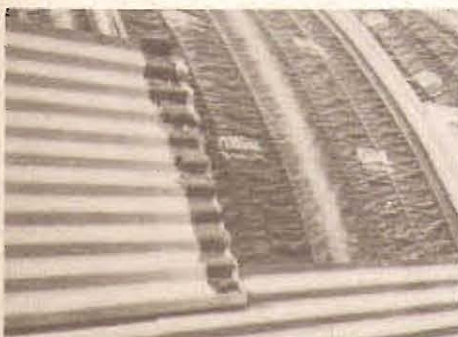
**6.** Touch up metal surfaces scratched during erection with paint provided for that purpose.



**4" MULLION SHEET**



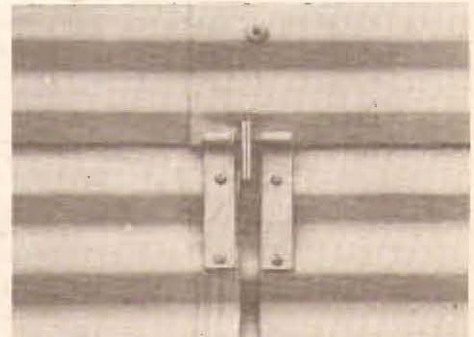
**INSTALLING SHEETS**



**BUTTER LAP**



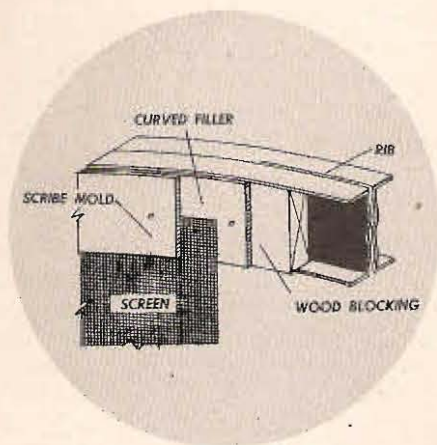
**BUTTERFLY BUTTON**



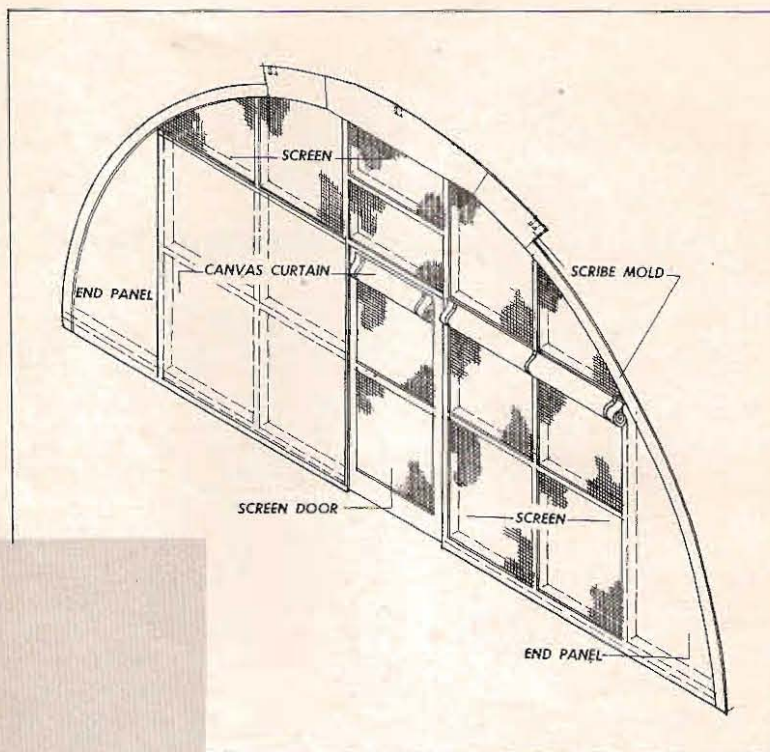
**HINGE**



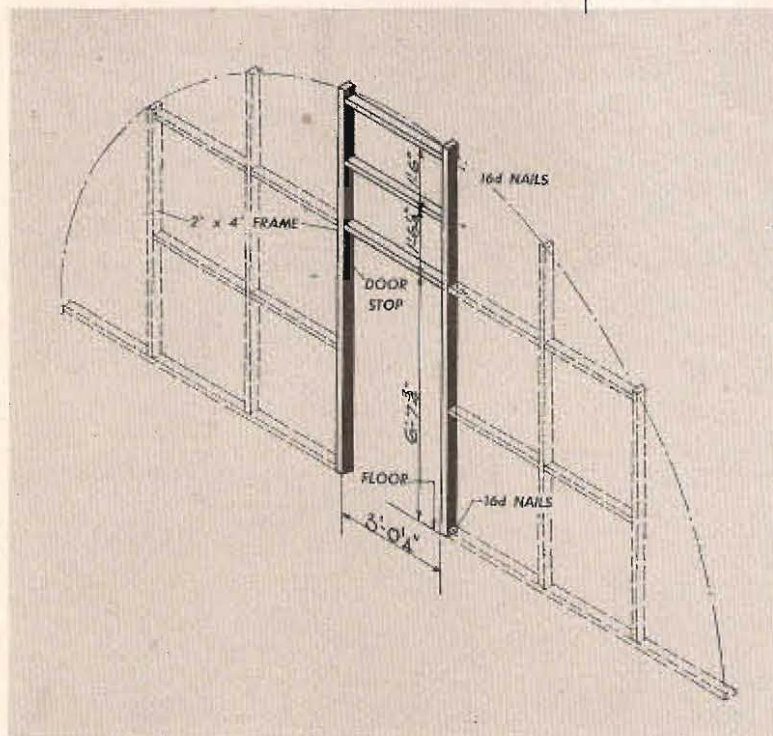
## BULKHEADS



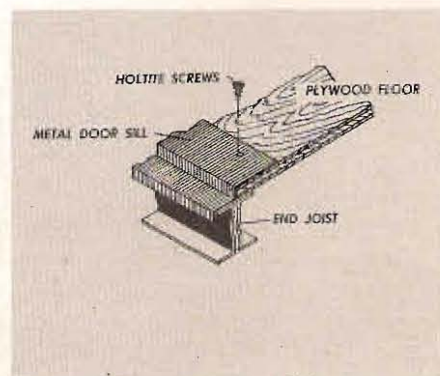
DETAIL AT RIB



CUT-AWAY VIEW



BULKHEAD FRAMING



DOOR SILL

8

The Tropical Bulkhead is erected from materials that are cut to size ready to assemble.

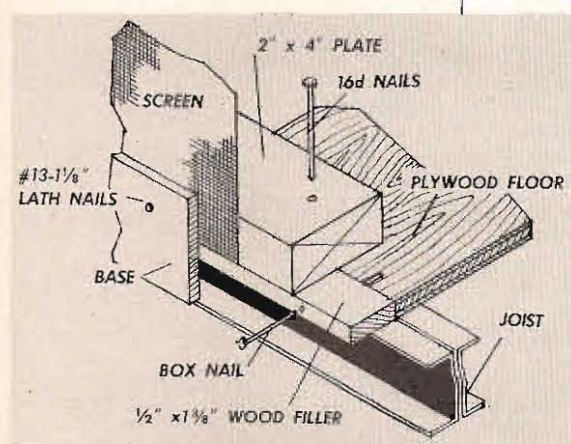
1. With 10d Box nails, nail the  $\frac{1}{2}$ " x  $1\frac{3}{8}$ " wood filler strip ( see Dwg. ) to edge of plywood floor for the width of the hut. Center metal door sill on centerline of hut and screw to floor with holtite screws.

2. Assemble screen door frame on floor of hut before raising. To do this lay the two door jamb studs (2 x 4, 9' 10" long, on edge, space them with the three 2 x 4s 3' 0 $\frac{1}{4}$ " long. Place these in the proper position as door head and bracing members (see Dwg.), square frame and nail jamb studs to bracing members with 2 16d nails at each joint. With 6d nails nail  $\frac{3}{4}$ " x  $2\frac{1}{8}$ " door stops around inside of frame, keeping them flush with one side of door-frame. Lay door in frame keeping  $\frac{1}{8}$ " clearance all around. Hinges are half surface type, the

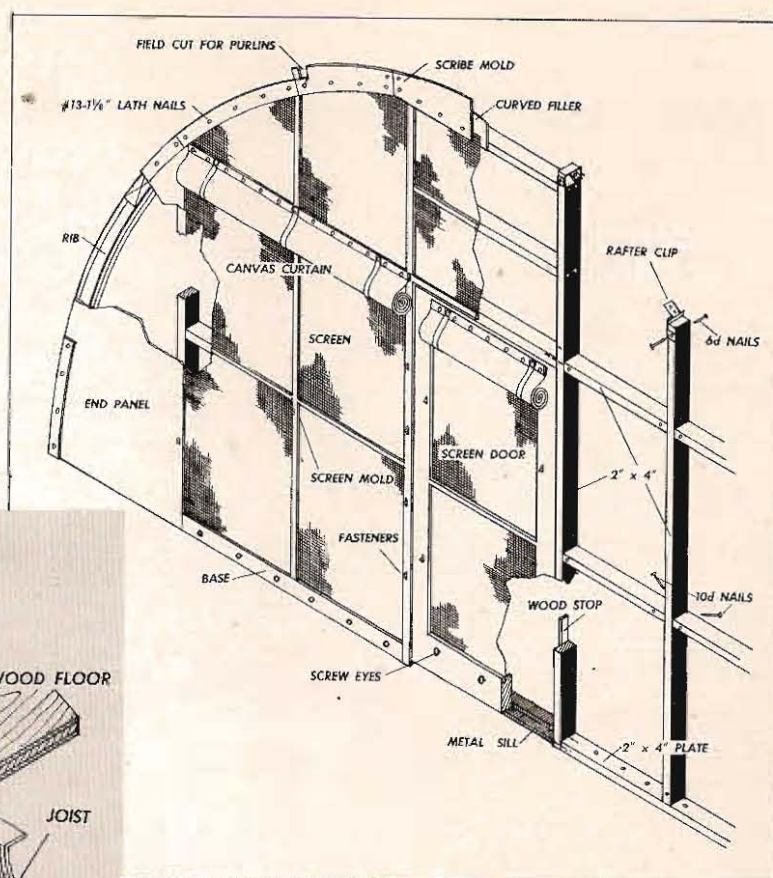
straight leaf goes between door and jamb, the bent leaf lays on the face of the door. With screws attach hinges at 9 $\frac{1}{2}$ " from top and bottom of door. Wedge door in frame before raising.

3. Raise frame to position so door will be on outside of hut, line outside edge with edge of filler piece and center over door sill. Plumb and brace frame, secure to rib at top by slipping rafter clip over stud, adjusting height until projecting lip of clip rests against rib, then nailing clip to studs and rib with 6d nails. Next lay the two sill plates (2 x 4, 8' 5" long) on the floor, one on each side of the door frame, flush with the outside edge of the filler strip and fitting between the jamb studs and the steel rib. Check to see that door frame is still in position and nail sill plate to joist underneath floor with 16d nails. Nail bottoms of jamb studs to edge of sill plates with two 16d nails each side.

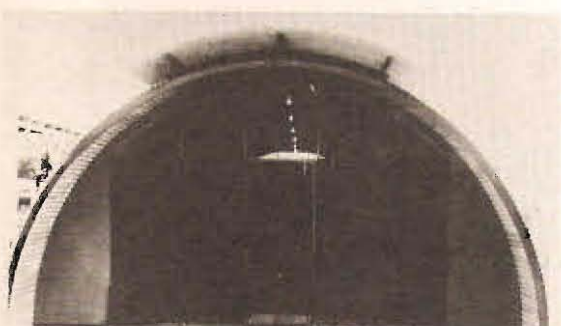




DETAIL AT FLOOR

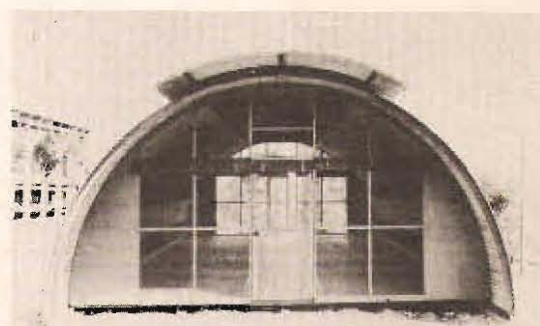


SCREENS AND CURTAINS



CURTAINS DOWN

4. Erect the studs and horizontal braces on each side of the door frame (see Dwg.). Space the 2 x 4 studs so the horizontal braces (2 x 4, 2' 7 3/8" long) will fit between them. Toe-nail the studs to the 2" x 4" sill plate with 10d nails at the bottom, and fasten them to the rib at the top with rafter clips. Toe-nail the horizontal braces to the studs with 10d nails, line one of these braces with the head of the door frame and space the other midway between door head and sill plate.
5. Nail the curved filler (3 5/8" wide) (see Dwg.) to the wood blocks in the rib. These follow the rib curve from one end stud around the top to the other end stud.
6. Cut screencloth to fit the panels and transom on each side of and over the doorway. Stretch the screen and fasten it to the 2 x 4s and filler with No. 5 staples.
7. Nail the two end panels to the end studs and the blocking in the rib with 1 1/8" lath nails.

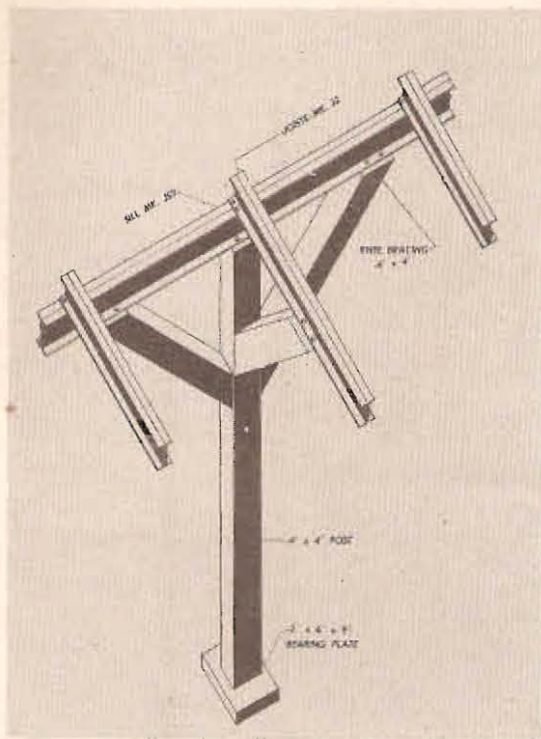


CURTAINS UP

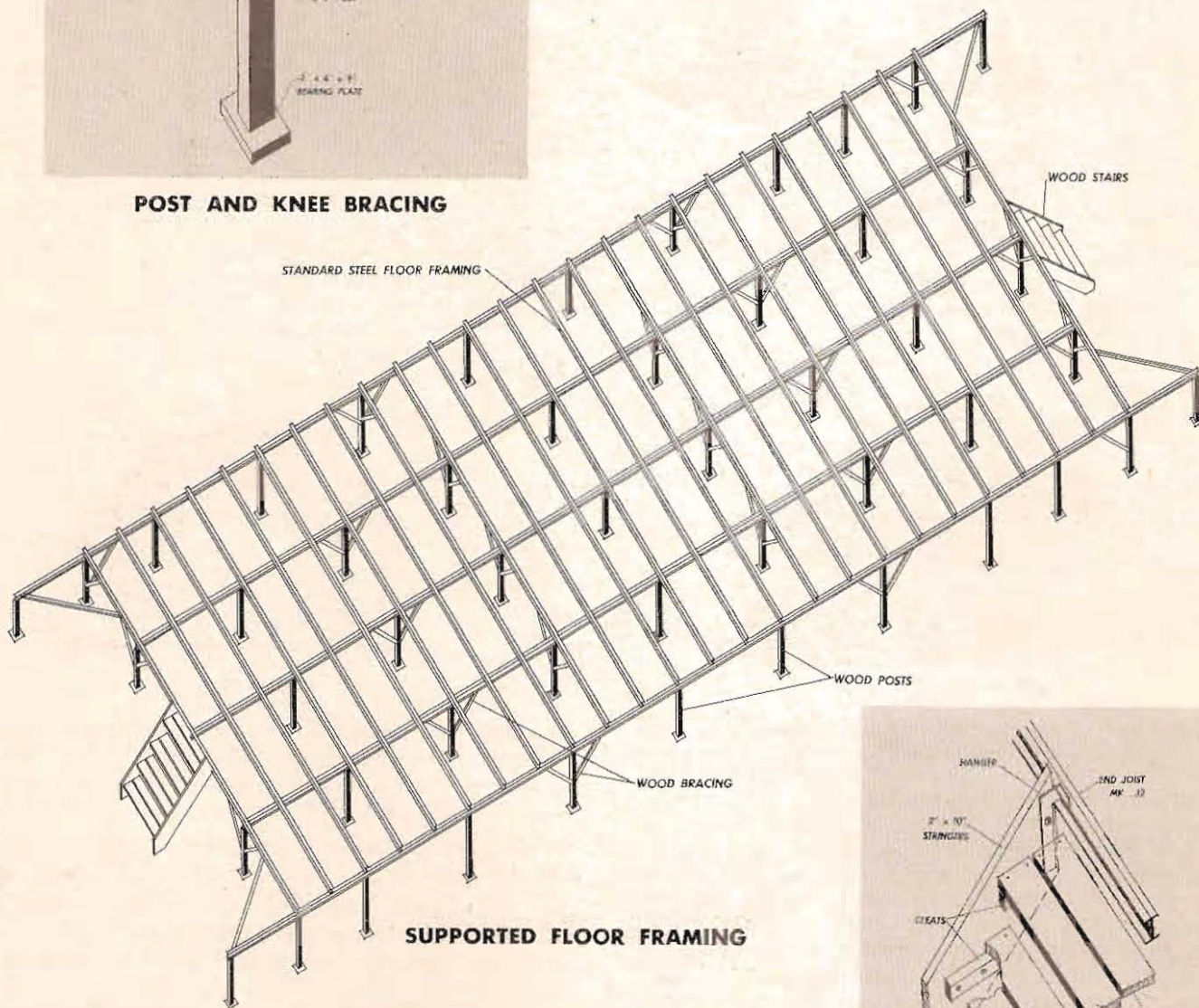
8. Apply the exterior scribe mold. First fit the three pieces at center top, notching them for the purlins. Continue around hut with 3 5/8" wide curved scribe molds, fit tight against roof and nail with 1 1/8" lath nails.
9. Nail base and wood screen mold to 2 x 4s with 1 1/8" lath nails.
10. Nail canvas door curtain to top rail of door and canvas side curtains to the top horizontal brace with lath nails. Cover this nailing with wood screen mold. Allow curtains to hang, stretch and locate position of common sense fasteners at the sides and line the screw eyes at bottom with the tie straps on the curtains.
11. Attach latch set to door through hole in door. Place door knob on outside and box with handle inside. Install keeper on edge of door stop opposite lock bolt.



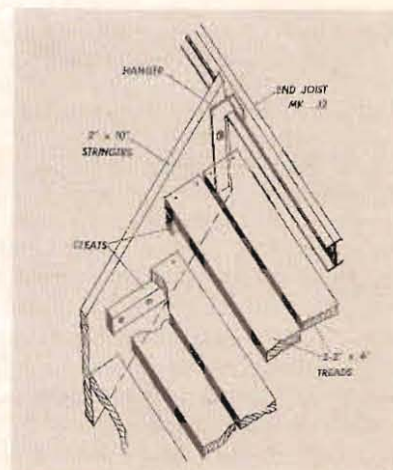
# ADAPTATION WOOD POST FOUNDATION



**POST AND KNEE BRACING**



**SUPPORTED FLOOR FRAMING**

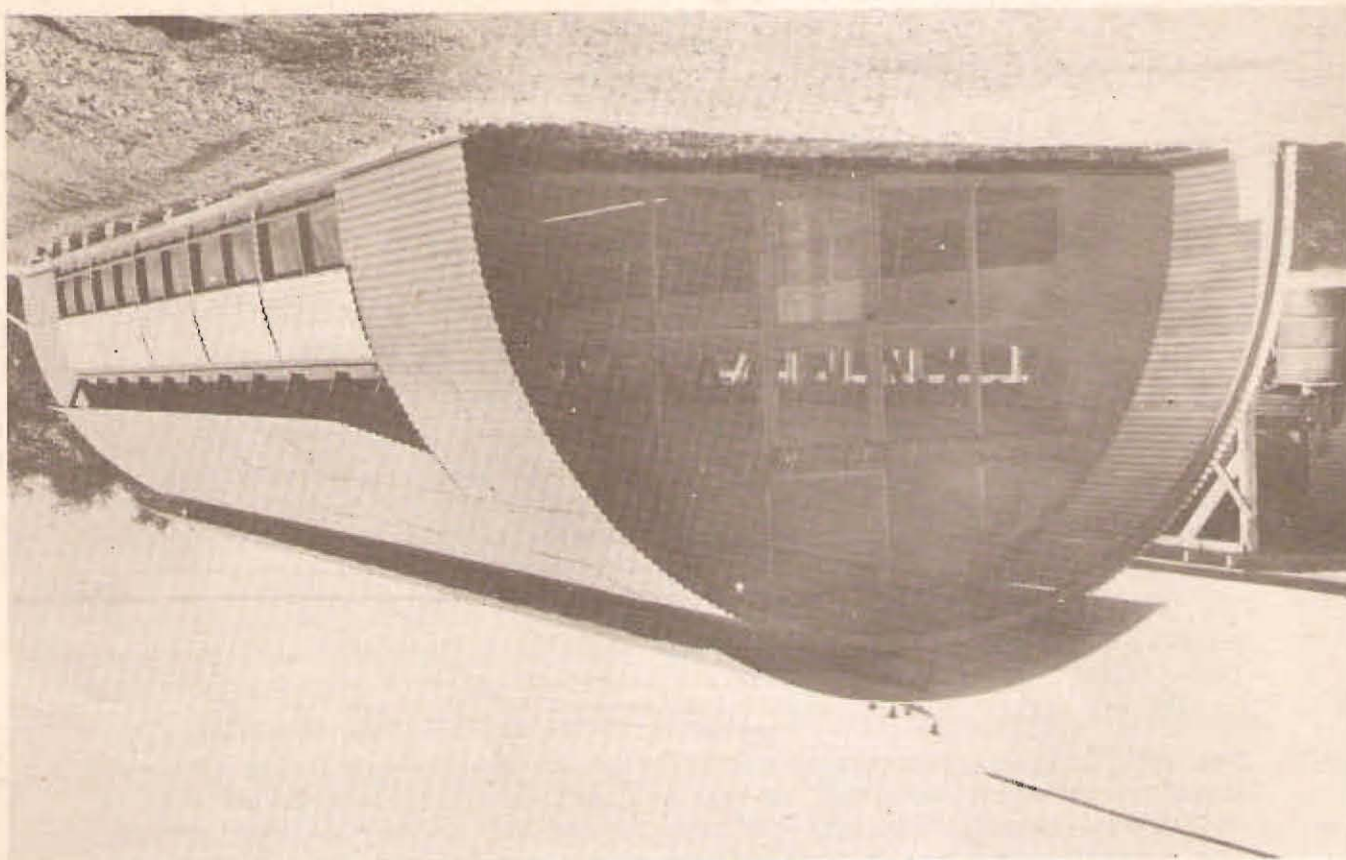


**DETAIL OF STAIR**

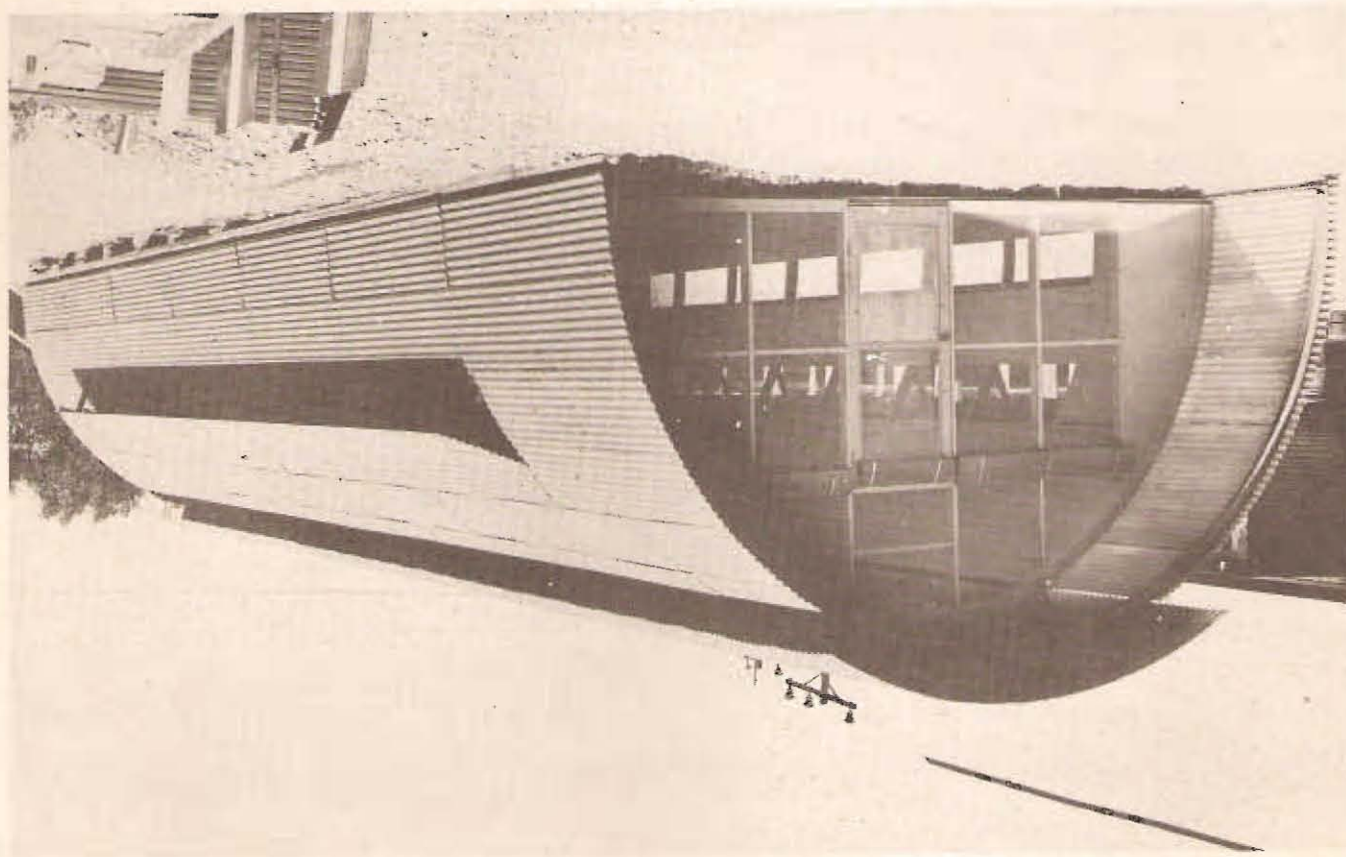
Although materials for this work are not furnished it is suggested that for conditions under which the ground cannot be conveniently leveled, wood posts may be used to level the Hut. See sketches on this sheet for suggestions.



VENT FLAPS OPEN



VENT FLAPS CLOSED



COMPLETED HUT PHOTOS



### SUGGESTIONS TO ERECTOR

**Crews.** The erection of the Arch Rib Hut is simple and fast. One operation quickly follows another—if the first one is done properly. What is most important is getting off to the right start in having the floor joist assembly level and square and having the rib assembly plumb. This insures that subsequent operations will proceed without difficulty. Therefore, your best mechanics should be assigned to setting the frame even though the actual assembly of this portion of the work is the easiest of all. Likewise the roofing operation requires the care of a mechanic or mechanically-minded person. A sensible division of personnel is into separate crews for (1) leveling the site, (2) setting the frame, (3) applying flooring, inside covering and insulation, (4) applying ventilators and roofing, (5) setting bulkheads.

**Hints.** If any of the steel members have become damaged in shipment, the easiest way to straighten them is by placing the bent part over a crate or sawhorse and having a man bear down on each end. The hardest way to straighten is by using a hammer. There is a trick to opening the banded crates. When this is known and used, much time and effort can be saved. Take one of the screwdrivers furnished for assembling the frame, insert flat side under steel band about an inch or inch-and-half. Turn the screwdriver about the handle roughly an eighth turn. This brings the sharp edge of the screwdriver in contact with the band. Pull up quickly. This motion cuts the band rather than breaking it. The latter operation requires a heavy bar and much strength. When the knack of using a screwdriver is learned, opening the crates is an easy job.

The importance of using the right nails, screws, and attachments cannot be too strongly stressed. Follow the instructions closely in this regard because if the wrong ones are used, it will mean borrowing from another Hut all down the line with consequent loss of time.

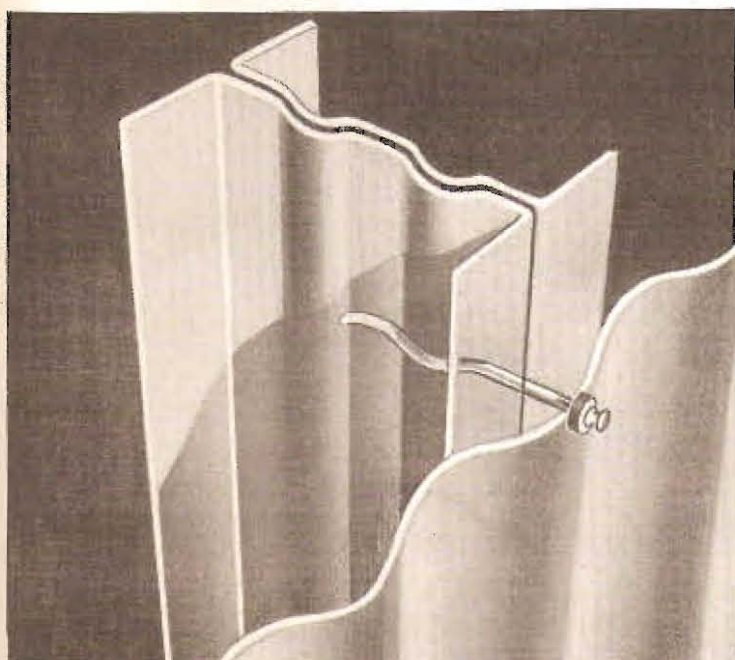
**Tools.** A complete set of necessary tools is furnished for erecting the complete Hut. There is one set for every four Huts. They should be supplied to the men who will use them. If there are many Huts to be erected at one location, the best scheme is to open all the boxes containing tools and pool them. Then issue by tool check.

Take good care of the tools.



## INDEX

	Page
Erection Sequence .....	1
Floor Framing .....	2 and 3
Ribs, Trimmers and Purlins.....	4 and 5
Canopy Framing, Wood Sills and Headers	6
Floor Panels .....	7
Interior Coverings and Screened Openings .....	8 and 9
Insulation .....	10 and 11
Exterior Covering .....	12 and 13
Bulkheads .....	14 and 15
Adaptation—Wood Post Foundation...	16
Completed Hut Photos.....	17
Suggestions to Erector.....	18



PHANTOM VIEW SHOWING NAIL IN NAILING GROOVE

### THE STRAN-STEEL NAILING GROOVE

The distinctive feature of Stran-Steel is the nailing groove. This groove is in all Stran-Steel joists, arch ribs and studs, which are made by welding two pieces of steel together. The small space remaining between these pieces is just large enough to admit an ordinary nail. When a nail is driven into the groove, it is deformed and clinched in a grip of steel with a holding power much greater than that of wood. In this manner collateral materials are secured to the steel framework with the ordinary hammer-and-nails method.

Construction in which Stran-Steel framing is used proceeds in the same way as with ordinary framing. Dimensions of Stran-Steel members conform exactly to the requirements of the collateral materials used with it.



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