MICROWAVE ANTENNAS

KS-15676 HORN-REFLECTOR AND WAVEGUIDE SYSTEM

INSTALLATION

KS-15676 L15 MODIFICATION KITS

CONTENTS PAGE

1. GENERAL

1.01 This section describes the procedures for installing KS-15676 L15 modification kits on standard KS-15676 L8 or L9 horn-reflector antennas.

1.02 Hardening of the KS-15676 L8 or L9 horn-reflector antenna is accomplished by reinforcing the lower edge of the window or weather cover and by adding an external skin of aluminum to the existing structure. The modified antenna will withstand blast overpressures of approximately 2 psi without suffering structural damage or affecting transmission. The modification kits can be applied to tower-mounted antennas without taking them out of service. Fig. 1 illustrates the KS-15676 horn-reflector antenna and identifies the locations of the major components of the modification kit.

2. TOOLS AND MATERIALS

2.01 The following tools are required for installing the KS-15676 L15 hardening kit:

QUANTITY	ITEM
1	Torque Wrench, 1/2-Inch drive, 0 to 150 lbs
2	Ratchet Wrench, 1/2-Inch drive
2	3/4-Inch Sockets, 1/2-Inch drive
1	Drill, air driven, 1/4-Inch capacity chuck. Winslow Product Engineering Company, Arcadia, California, Catalog number B-203
1	Drill, air driven, with 0.562 drill. Winslow Product Engineering Company, Arcadia, California, Catalog number B-204

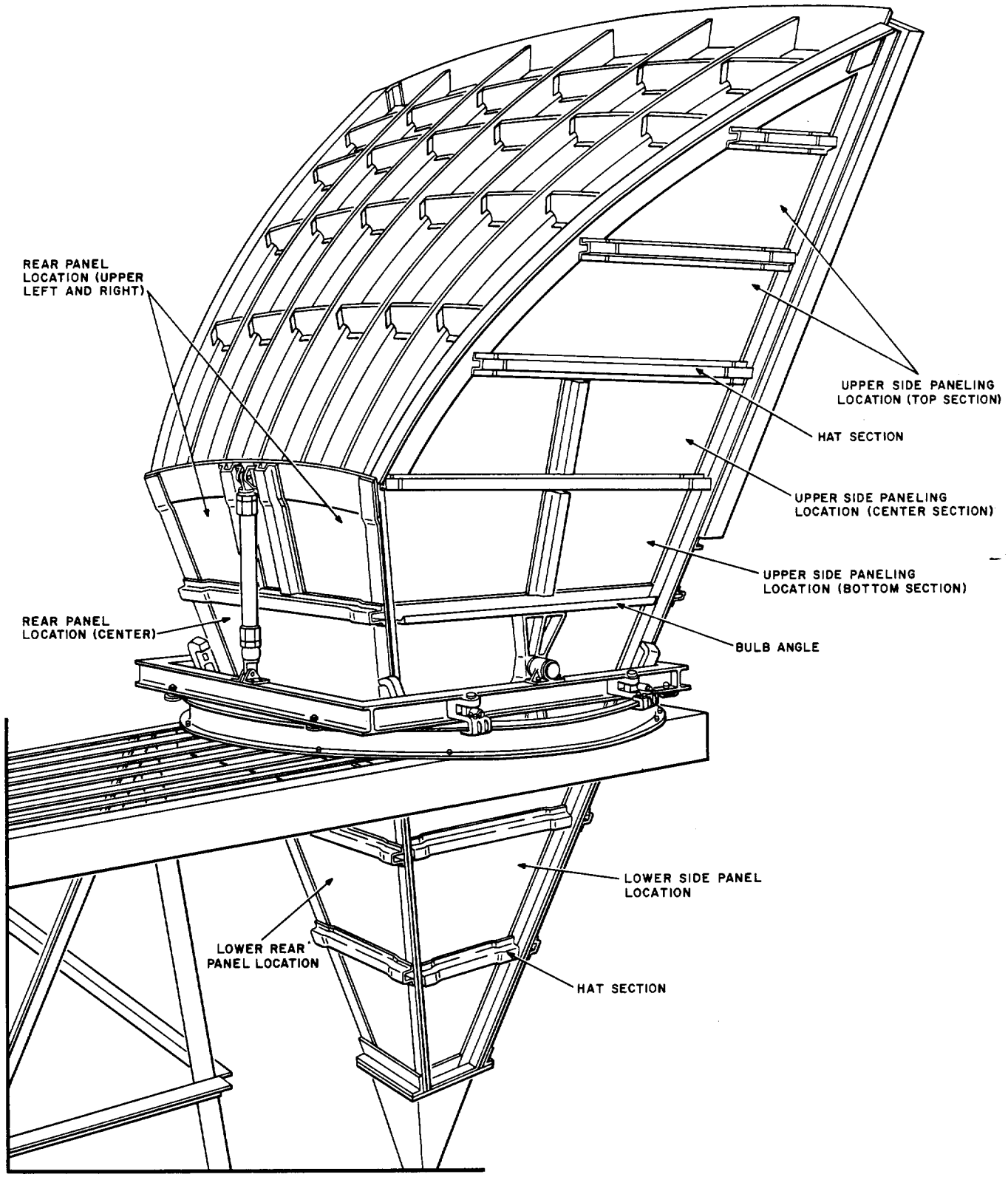


Fig. 1 — KS-15676 Horn-Reflector Antenna

QUANTITY	ITEM (CONT)
1	Template, for drilling 0.562 diameter holes in lower window clamping bar
1	Twist drill, 0.1935 diameter (No. 10)
1	Twist drill, 0.177 diameter (No. 16)
1	Twist drill, 0.125 diameter
1	Tool, air driven, with jig for nut retainer mounting holes. Winslow Product Engineering Company, Arcadia, California, Catalog number B-205
1	File, 10 inch or 12 inch bastard
1	Grinding tool. Aro Corp., Bryan, Ohio
1	Model 350 or 200 Air Tool with No. 78977 Nose Assembly (see note), Huck Mfg. Co., Detroit, Mich.

Note: Model 350 tool requires 0.066 cu. ft. stroke at 90 psi. Model 200 requires 0.355 cu. ft. stroke at 90 psi. The heavier duty Model 200 tool is recommended when a compressor is available.

2.02 In addition to the tools listed in 2.01, the following materials and equipment are required:

QUANTITY	ITEM
–	Tools for opening wooden crates and removing metal straps.
1	Construction truck equipped with power winch, winch line, slings, tag lines, tackle, and associated rigging equipment.
–	Several 4 x 4 timbers approximately 6 ft. long, for unpacking components on rough terrain (optional).
–	Supply of compressed air at 90 psi. Air compressor or pressurized gas (nitrogen) cylinder (see note).
–	Temporary fasteners, Cleco, 1/8-inch, Reed Roller Bit Corp., Houston, Texas. For holding sheets in place during drilling of rivet holes.
–	Auxiliary platforms. The installation of the L15 modification kit is not practical without certain auxiliary platforms to provide work area around the installed antenna, both above and below the tower platform. Auxiliary platforms and associated scaffolding are available from Up-Right Scaffolds, Berkeley, California, as their part number L-1586.

Note: Assuming gas cylinders of 230 cu. ft. capacity at atmospheric pressure, the 200-type tool will require 11 cylinders per kit and the 350-type tool will use 2 cylinders per kit.

3. PACKAGING

3.01 The complete hardening kit is packaged in one shipping container with the following internal boxes:

(a) One box containing all details to be added in the area under the tower platform.

(b) One box containing all panel details which will be added to the side panels above the platform.

(c) One box containing all details which will be added to the front and back panels at the platform level or above.

(d) Two small boxes containing all the angles to be applied to the upper sides. One box for each side.

(e) Two small boxes containing all the zee sections to be applied to the upper sides. One box for each side.

3.02 The shipping container should be opened on the ground and those internal boxes containing the parts to be added under the tower

platform may be raised with the auxiliary platform to the installation position.

3.03 The fasteners are packaged in multi-pocket aprons. An individual apron, with fasteners segregated, and a location drawing are packed in the detail boxes to coincide with the major areas of the antenna. Fasteners, packaged in the aprons, are provided for four areas as follows:

(a) Under paltform area fasteners

(b) Front and back upper panel fasteners

(c) Side angles and zee detail fasteners

(d) Upper side panel details

4. PRELIMINARY CHECKS AND ADJUSTMENTS

4.01 Make a visual inspection of the antenna for any signs of damage that may require repair prior to installing the hardening kit.

4.02 Perform the checks and adjustments in the following list before installing any of the hardening kit parts on the existing antenna. It is important that these checks be made before attaching the outer panels (skins) to the antenna because much of the existing hardware will be inaccessible after the outer skins are riveted in place.

(a) Tighten all bolts to the torque specified in the assembly procedures, Section 402-421-201.

(b) Check the antenna for gas leakage per Section 402-421-201 and make any repairs that are required.

5. INSTALLATION

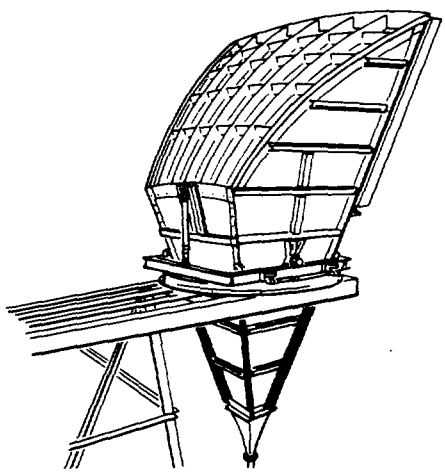
GENERAL

5.01 Air pressure inside the antenna causes some deflection of the antenna structural members particularly the lower window clamping bar. For this reason it is recommended that the hardening kit installation be done with no positive pressure inside the antenna.

5.02 Temporary fasteners should be installed in the hardening panels to insure proper alignment and to prevent their shifting during the drilling operations. Due to the overall size of the panels and the number of mounting holes to be drilled, movement of the panel will result in misalignment of the mounting holes making it difficult or even impossible to install the mounting hardware. When a panel has been properly positioned on the antenna, drill a number of 0.125-inch holes at several locations using the pilot holes in the edge of the panel as a guide. Place 1/8-inch Cleco fasteners at these locations to temporarily hold the panel and then proceed to drill the required number of 0.1935-inch diameter holes (No. 10 drill) for mounting holes. After installing part of the mounting hardware remove the temporary fasteners and drill the holes that were used for the temporary hardware to the proper size for the permanent hardware.

5.03 Extreme care should be exercised during all drilling operations to prevent damage to the inner skin of the antenna. Rupturing of the inner skin will increase air leakage and may result in a degraded signal due to chips or foreign matter being deposited in the waveguide or combining networks.

5.04 The blind rivets used in the assembly operations are all of the same diameter (0.1935 inch, No. 10 drill) but are of various lengths. The Huck Model 200 or 350 air tool sets the rivet and removes the excess stub in one operation. If the wrong size rivet is installed by mistake or the rivet fails to seat properly, it should be removed by drilling through the center of the stub.



INSTALLATION STEPS

A. Attaching the Four Corner Angles to the Lower Corners of the Antenna

5.05 Raise the auxiliary platform and parts to be used in this area into position under the antenna platform.

5.06 Position each angle over the ends of the front and rear hat sections on the lower panels so the inner face of one leg of the angle rests on the hat sections and the other leg of the angle covers the ends of the hat sections and is butted against the edge of the front or rear panel (Fig. 2). It may be necessary to file or grind some material from the ends of the hat sections in order to position the angles properly. The lower end of each angle should be one inch above the feed horn mounting flange.

5.07 Secure the angles to the hat sections with temporary fasteners. Do not obstruct the left or right sides of the antenna with fasteners or other materials since the outer skin will be applied to these areas first.

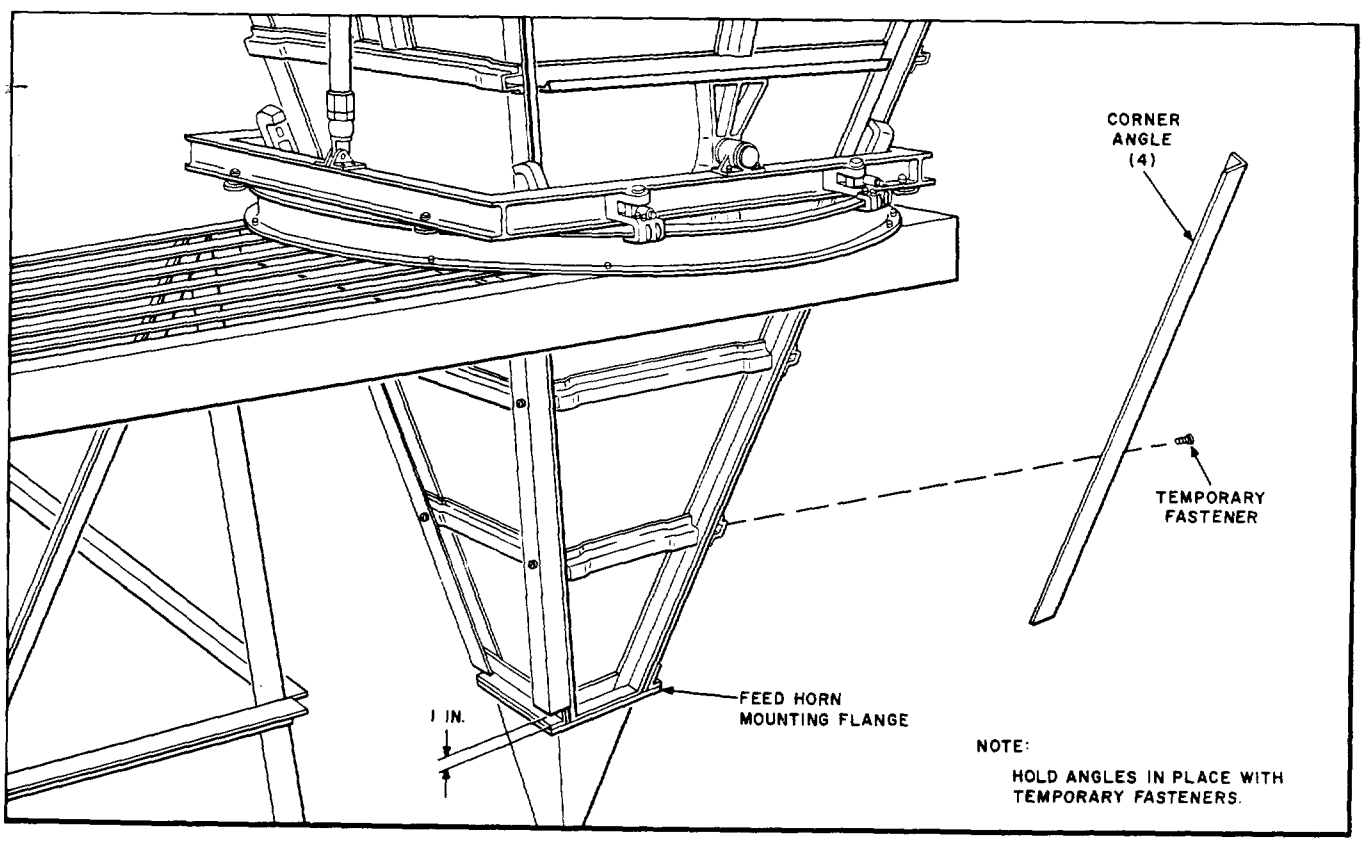
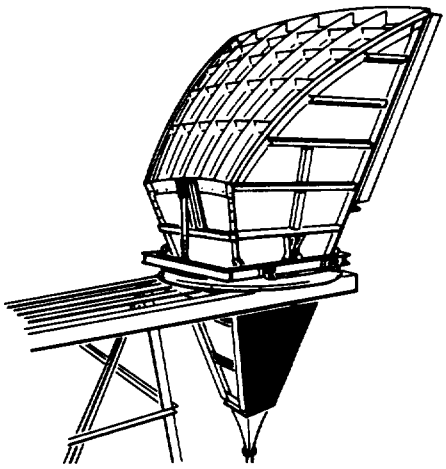


Fig. 2 — Placing Corner Angles



B. Attaching the Two Lower Side Panels

5.08 The panel should be positioned on the side of the antenna so the left and right edges of the panel overlap the corner angles equally with the upper edge of the panel butted against the lower bulb angle. Secure the panel to the antenna using temporary fasteners as shown in Fig. 3.

5.09 Drill sixteen 0.177-inch holes (No. 16 drill) to a depth of 3/4-inch along the upper edge of each side panel at the bulb angle. Use the pilot holes in the panels as a guide.

5.10 Drill ninety-two 0.1935-inch holes (No. 10 drill) in each side panel for riveting the panels to the antenna. Use the pilot holes in the panels as a guide.

5.11 Rivet the panels into place using seventy-two CKL-P6E blind rivets along the side edges and twenty CKL-P6F rivets along the horizontal members (hat sections).

5.12 Secure the upper edge of the panel with sixteen No. 10 x 5/8, self-tapping screws.

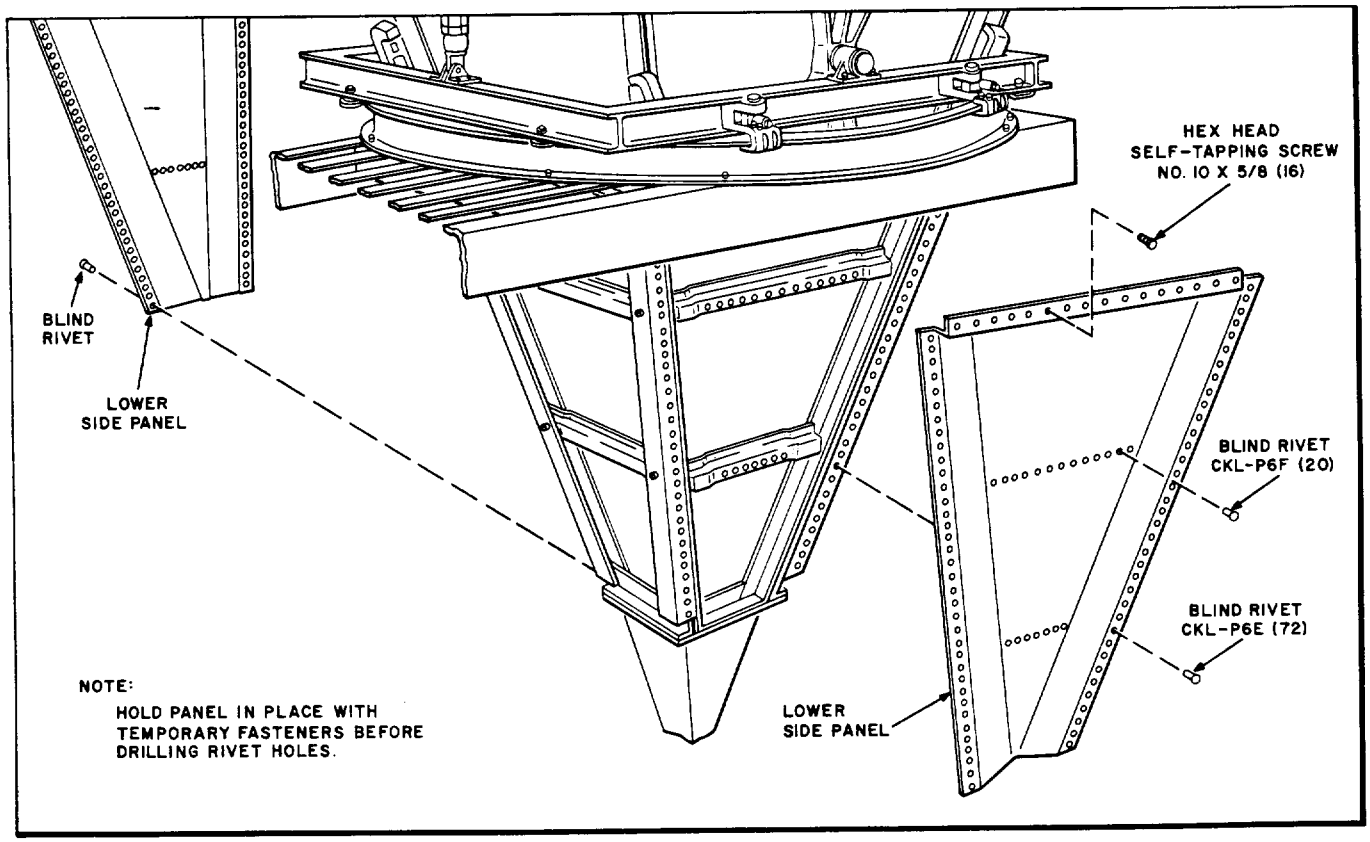
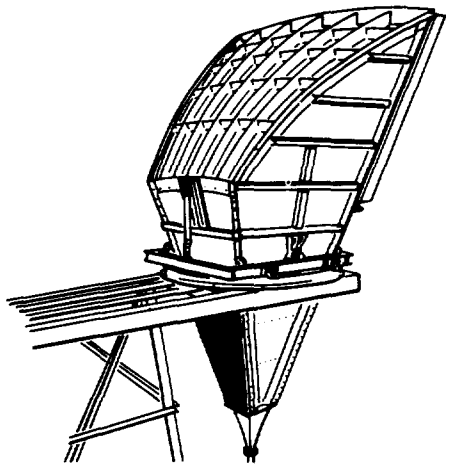


Fig. 3 — Placing Lower Side Panels



C. Attaching the Lower Front and Rear Panels

5.13 Remove the temporary fasteners from the corner angles to permit mounting of the panels.

5.14 Position each panel so the left and right edge of the panels overlap the corner angles equally when the upper edge of the panel is flush with the uppermost edge of the hat section. This should place the lower edge of the panels approximately one inch above the feed horn mounting flange. Secure the panels to the antenna using temporary fasteners as shown in Fig. 4.

5.15 Drill 0.1935-inch rivet holes (No. 10 drill) along the edges and across the face of each panel using the pilot holes in the panel as a guide. No holes are to be drilled along the upper edges of the panels at this time. The upper edges of the panels will be drilled and secured with the overlapping center panels.

5.16 Remove temporary fasteners and secure each panel by placing three CKL-P6J rivets in each side of the panel, one in the end of each hat section. Fit the remaining ninety-six holes with CKL-P6F rivets.

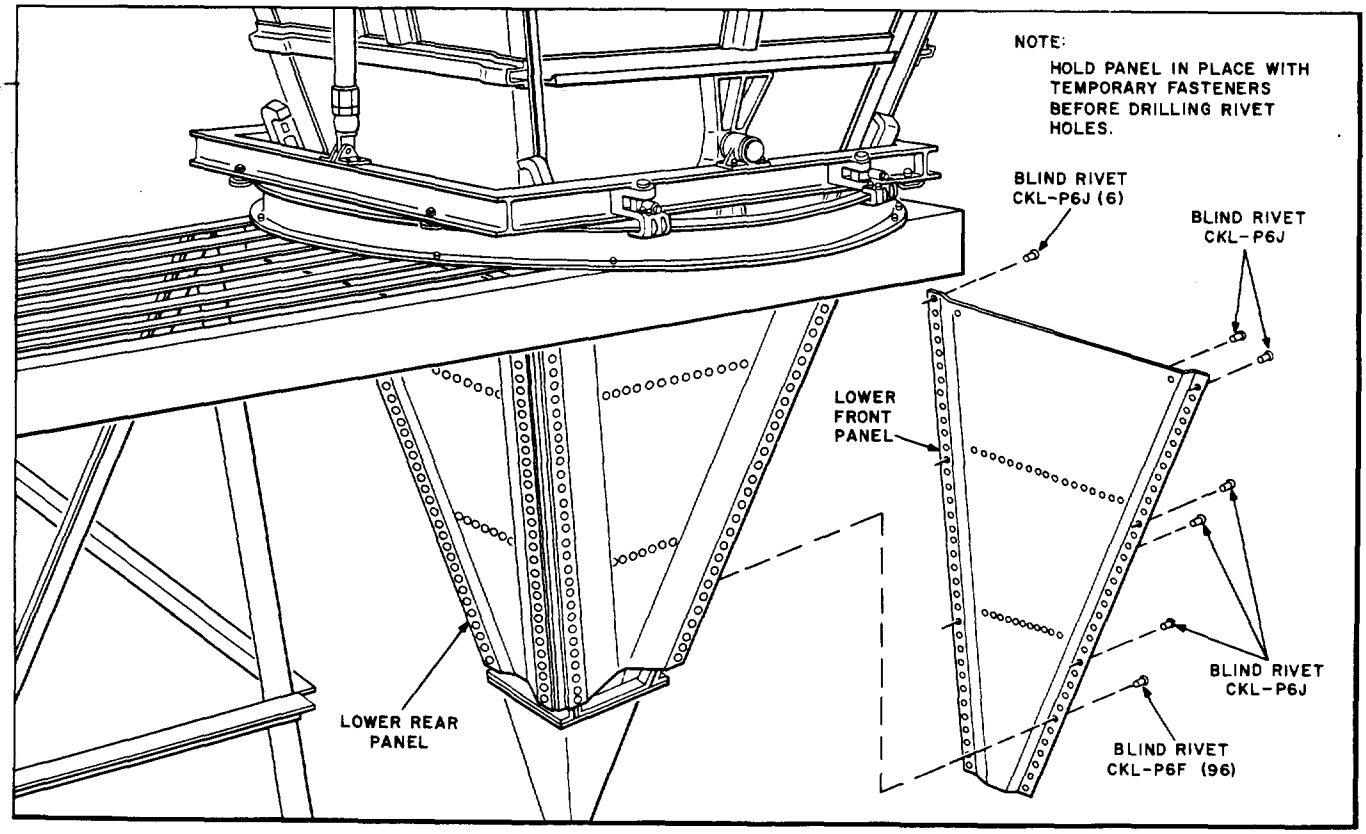
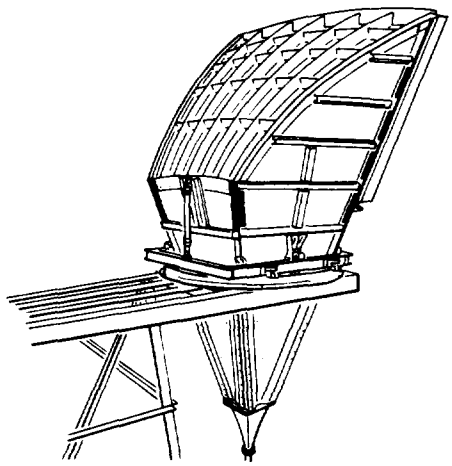


Fig. 4 — Placing Lower Front and Rear Panels

D. Attaching the Mounting Angles for the Left and Right Upper Side Panels

5.17 Locate the two rear angle assemblies used in mounting the side panels, as shown in Fig. 5. Position each angle so the outer surface of the angle is in the same plane as the lower surface of the adjacent hat section (outer surface of angle should be 2 inches from wall of antenna). Use the air-driven tool with the special nut plate drill jig to drill the necessary 0.125-inch diameter holes (max drill depth of 1/2-inch) for mounting the nut retainers. Mount a nut retainer in the three slots in the angles with the nut retainer wings as near parallel as possible to the long axis of the angle. Drive in #6 self-tapping screws to secure the nut retainers and angles to the antenna.



5.18 Locate the remaining four front angle assemblies (Fig. 5) in their respective locations so the pre-assembled nut retainers capture the existing stop nuts. Rotate the existing nuts if necessary for alignment with the one nut retainer already mounted on the angle. The angles shall be positioned so the outside surface of the angle is in the same plane as the offset portion of the hat sections. Drill the necessary 0.125-inch diameter holes and drive in #6 self-tapping screws to secure the nut retainers and angles.

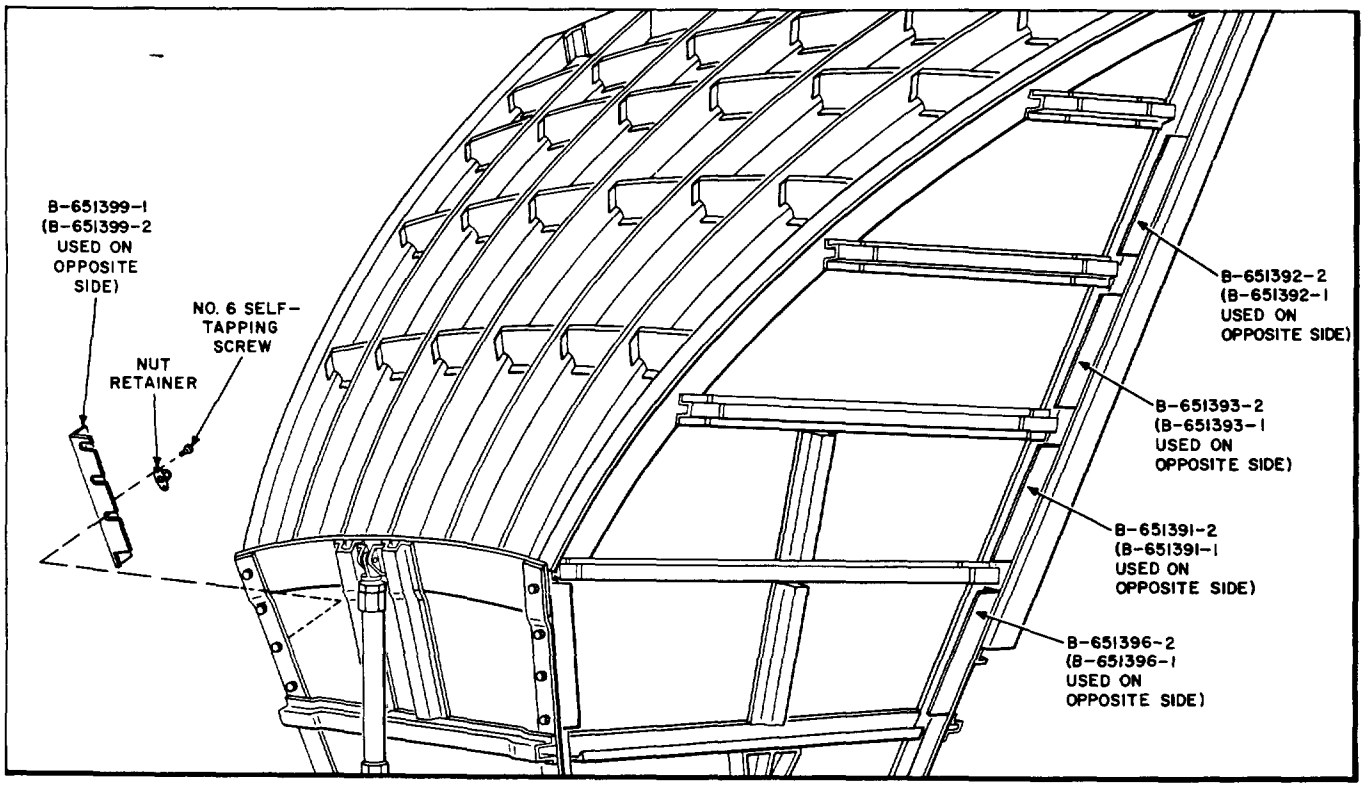
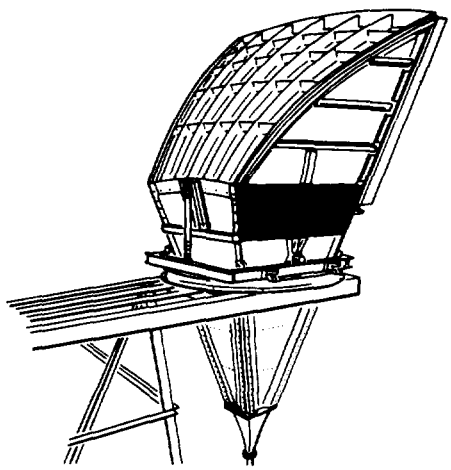


Fig. 5 — Placing Mounting Angle Assemblies



E. Attaching the Bottom Sections of the Upper Side Paneling

5.19 Position the panel on the antenna with the lower edge butted snugly against the upper bulb angle (Fig. 6). Secure the panel to the antenna using temporary fasteners.

5.20 Drill ten 0.1935-inch holes (No. 10 drill) for riveting the panel to the existing vertical hat section on the antenna. Use the vertical pilot holes in the panel as a guide. Fasten with ten CKL-P6F rivets.

5.21 Drill nineteen 0.1935-inch holes (No. 10 drill) for riveting the panel to the front and back mounting angles. Fasten with CKL-P6E rivets.

5.22 Drill nineteen 0.177-inch holes (No. 16 drill) to a depth of 3/4-inch along the upper bulb angle for self-tapping screws. Use the pilot holes in the lower edge of the panel as a guide. Attach the lower edge of the panel to bulb angle with nineteen No. 10 x 5/8 self-tapping screws.

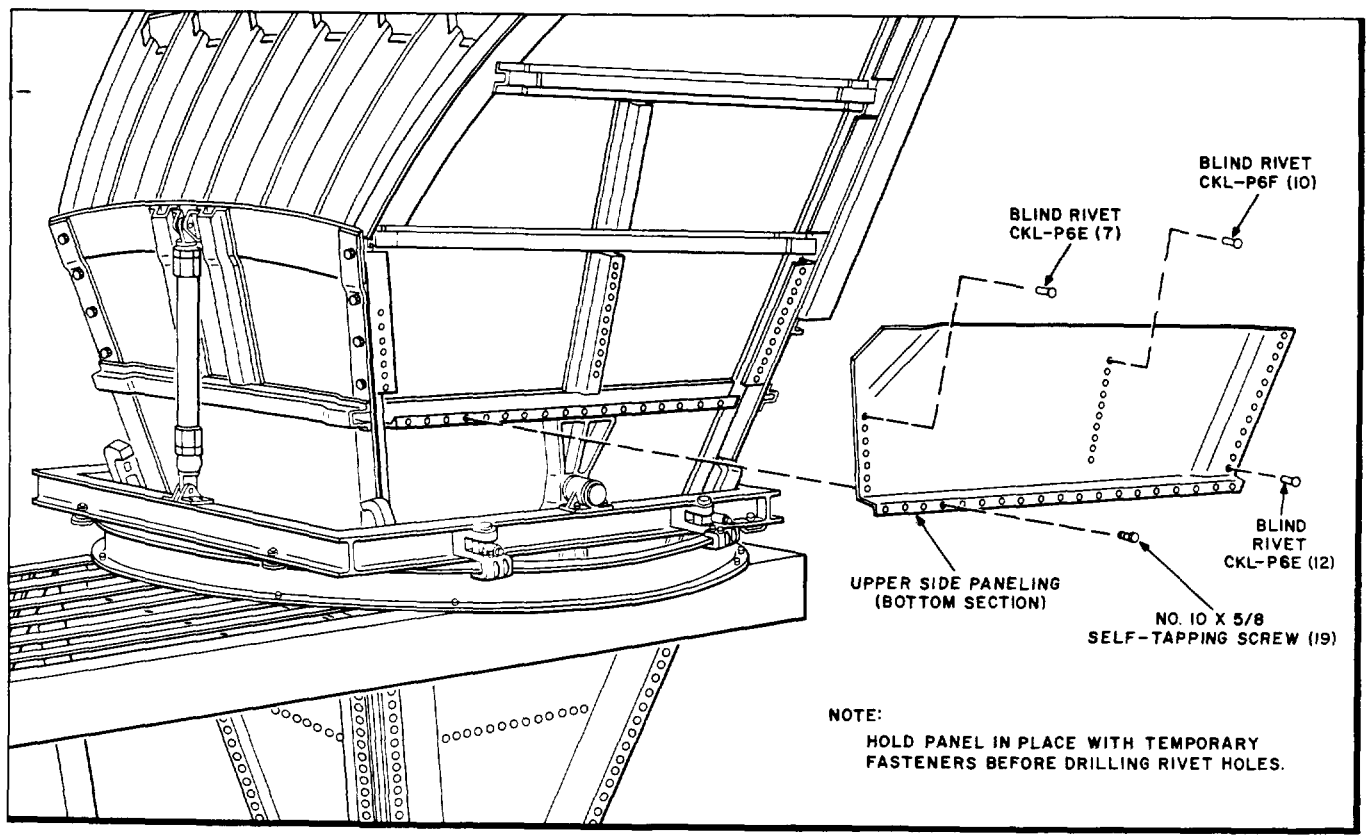
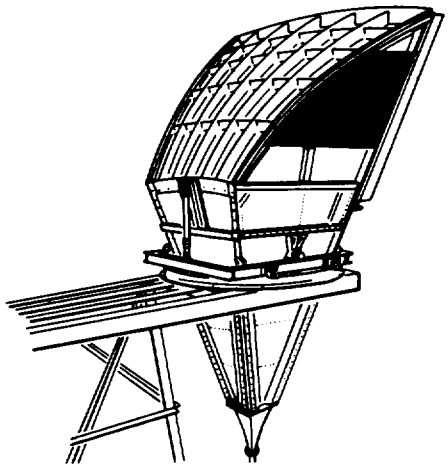


Fig. 6 — Placing Bottom Sections of Upper Side Panels



F. Attaching the Top Sections of Upper Side Paneling

5.23 Position the panel on the antenna with the front edge against the rear side of the window mounting angle and the top edge flush with the upper side of the top hat section. Secure the panel to the antenna using temporary fasteners (Fig. 7).

5.24 Drill thirty-seven 0.1935-inch holes (No. 10 drill) for riveting the panel to the antenna. Use the pilot holes in the panel as a guide.

5.25 Rivet the panel into place using sixteen CKL-P6F rivets common to the hat sections and twenty-one CKL-P6E common to the panel angles.

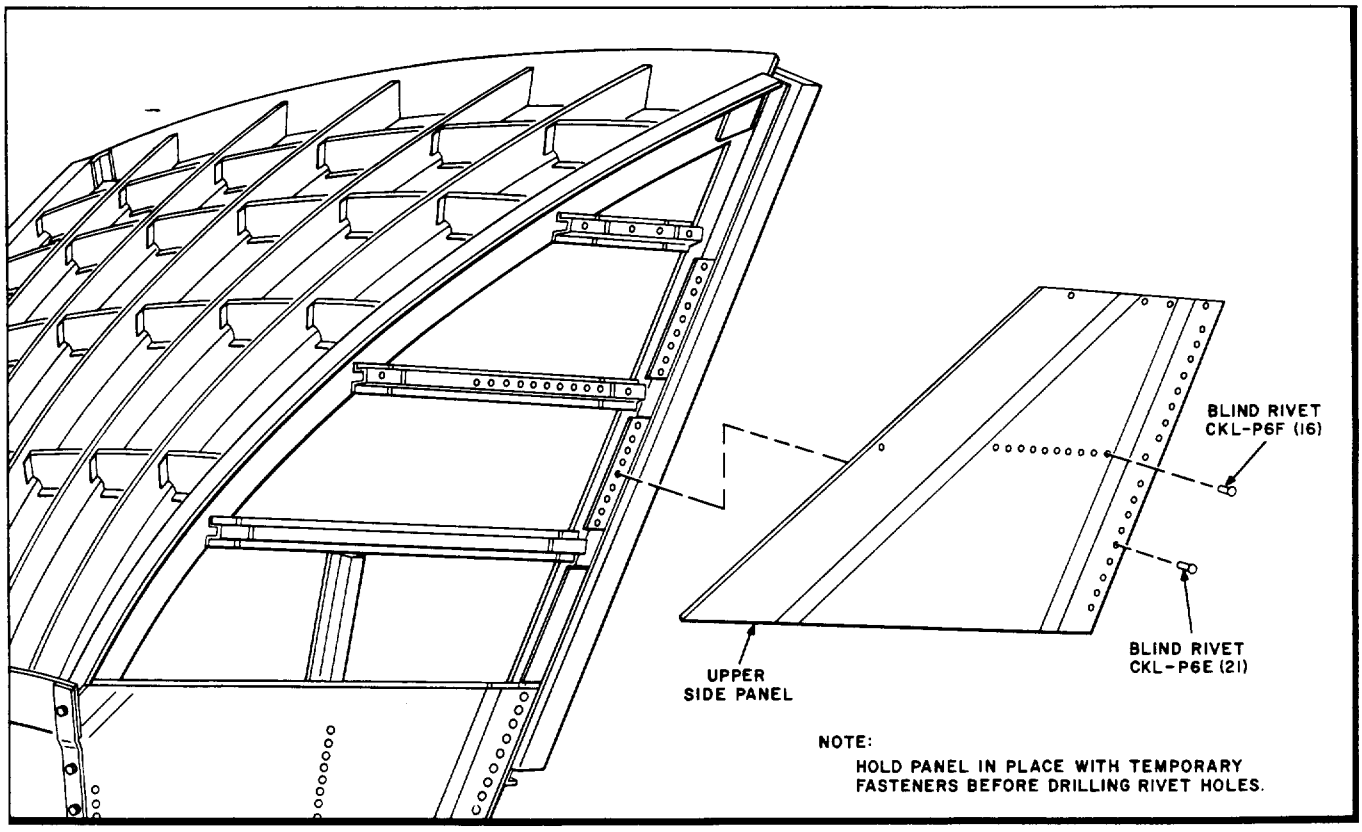
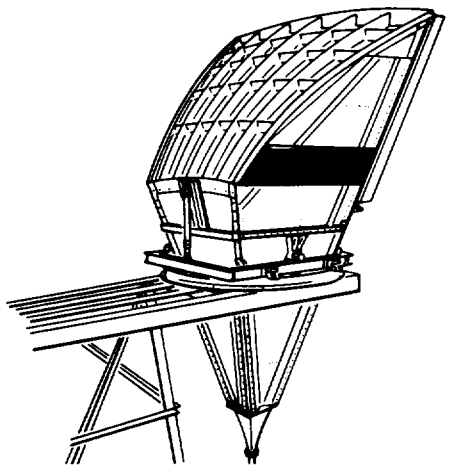


Fig. 7 — Placing Top Sections of Upper Side Panels



G. Attaching the Center Sections of Upper Side Paneling

5.26 Position the panel on the side of the antenna with one edge against the rear side of the window mounting surface (Fig. 8). The upper and lower edges should overlap, by approximately 1-1/2 inches, the upper and lower panel assemblies previously placed. Secure the panel to the antenna using temporary fasteners.

5.27 Drill sixty-three 0.1935-inch holes (No. 10 drill) for riveting the panel to the antenna hat sections. Use the pilot holes in the panel as a guide. Fasten with CKL-P6H rivets.

5.28 Drill twelve 0.1935-inch holes (No. 10 drill) common to the front mounting angle. Rivet the panel into place using twelve CKL-P6G blind rivets.

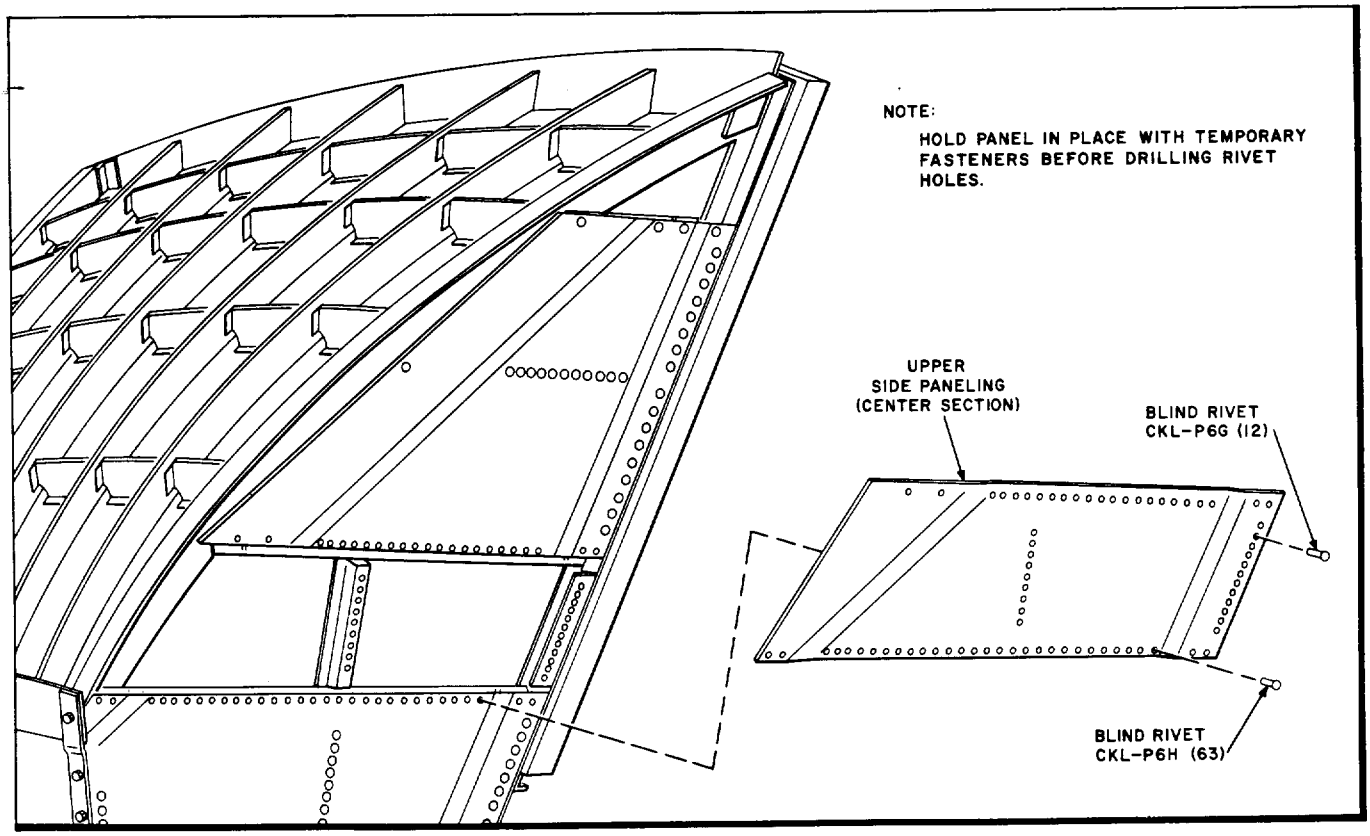
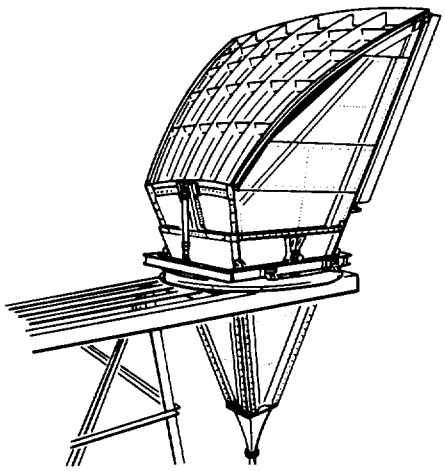


Fig. 8 — Placing Center Sections of Upper Side Panels



H. Attaching the Zee Angles to Rear Edges of Upper Side Panels

5.29 Position the zee angles below the row of hex-head bolts in the rear edge of the upper side panel as shown in Fig. 9. The semi-circular cut-outs in the zee angles should clear the heads of the bolts when the upper edge of the zee is flush with the side panel edges.

5.30 Drill thirty-one 0.177-inch holes (No. 16 drill) for self-tapping screws using the pilot holes in the zee angles as guides. (Use the special air-driven drill.) Secure the zee angles with thirty-one No. 10 x 5/8, hex-head, self-tapping screws.

5.31 Drill forty-two 0.1935-inch holes (No. 10 drill) for riveting the upper and center panels to the zee sections. Use pilot holes in the panels common to the zee angles as guides. Secure the panels to the zee sections with 28 CKL-P6E rivets and 14 CKL-P6G rivets.

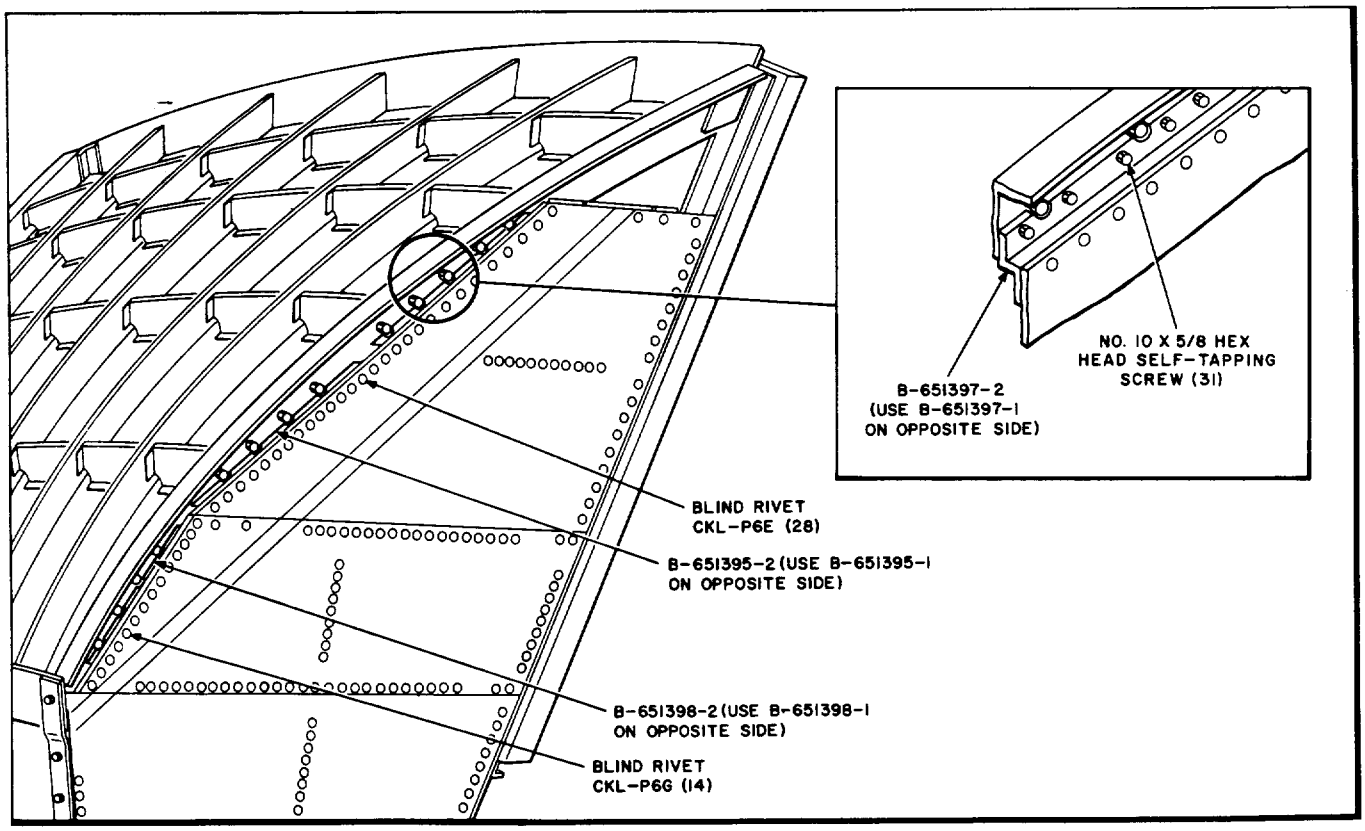
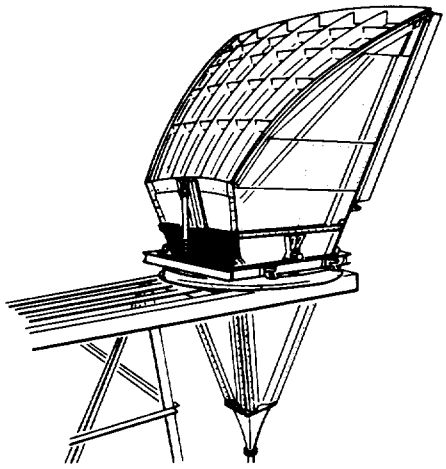


Fig. 9 — Placing Zee Angles



I. Attaching the Center Rear Panel

5.32 Place the center rear panel directly above the lower rear panel with the lower edge overlapping the upper edge of the lower rear panel by approximately 1-1/2 inches. Center the panel, left to right, keeping the upper edge flush with the upper edge of the hat section to which it will be attached (Fig. 10). Secure the panel to the antenna using temporary fasteners.

5.33 Drill twenty-six 0.1935-inch rivet holes (No. 10 drill) in the upper and lower edges of the panel using the pilot holes in the panel as a guide.

5.34 Remove temporary fasteners and secure the panel by placing twenty-one CKL-P6H rivets in the lower edge of the panel and five CKL-P6F rivets in the center of the upper edge.

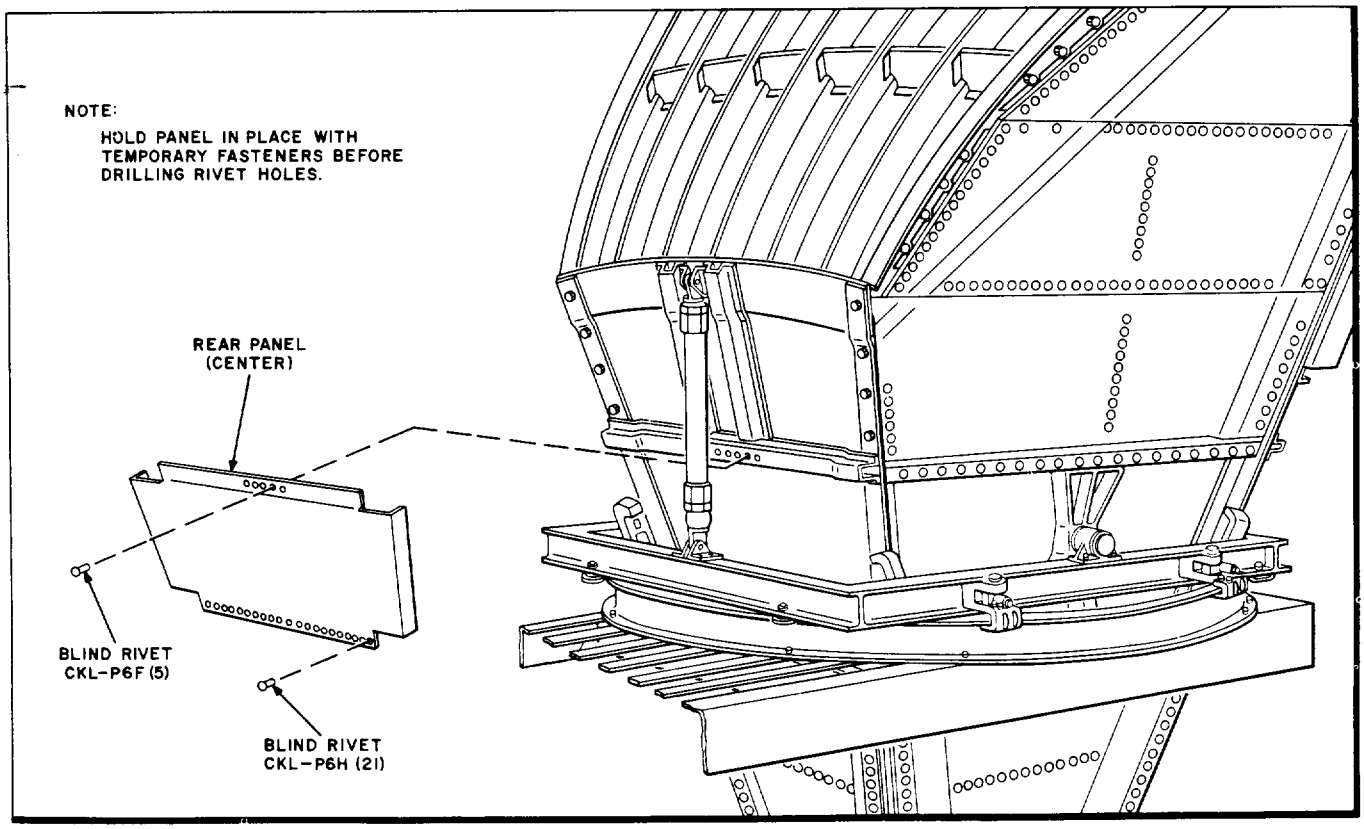
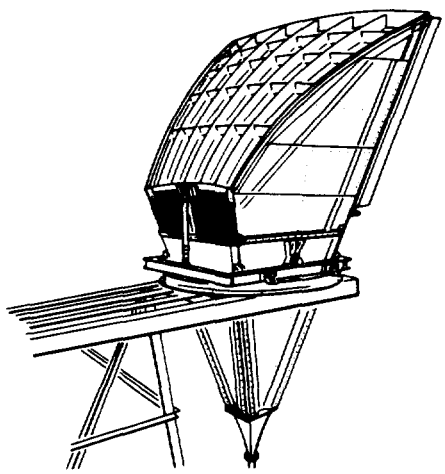


Fig. 10 — Placing Center Rear Panel



J. Attaching the Left and Right Upper Rear Panels

5.35 Remove the lower three existing 1/2 — 20 x 1-3/4 bolts from both the left and right rear edges of the antenna (Fig. 11).

5.36 Using the bolts that have been removed, fasten the outboard edge of each panel to the antenna. Position the panels so the inboard edge is flush with the inner edge of the vertical hat section to which it will be attached.

5.37 Using the ten pilot holes on the inner edge and the twelve pilot holes in the lower edge of each panel as guides, drill forty-four 0.1935-inch holes (No. 10 drill) for riveting the panels to the antenna.

5.38 Rivet the panels into place using twelve CKL-P6H blind rivets in the lower edge of each panel and ten CKL-P6F blind rivets along the inner edge of the panels.

5.39 The upper edge of each panel is secured with eight No. 10 x 5/8, self-tapping screws. Drill sixteen 0.177-inch blind holes (No. 16 drill) to a ***maximum depth of 3/4 inch,*** using the pilot holes in the upper edge of the panels as guides.

Caution: Do not drill beyond depth specified.

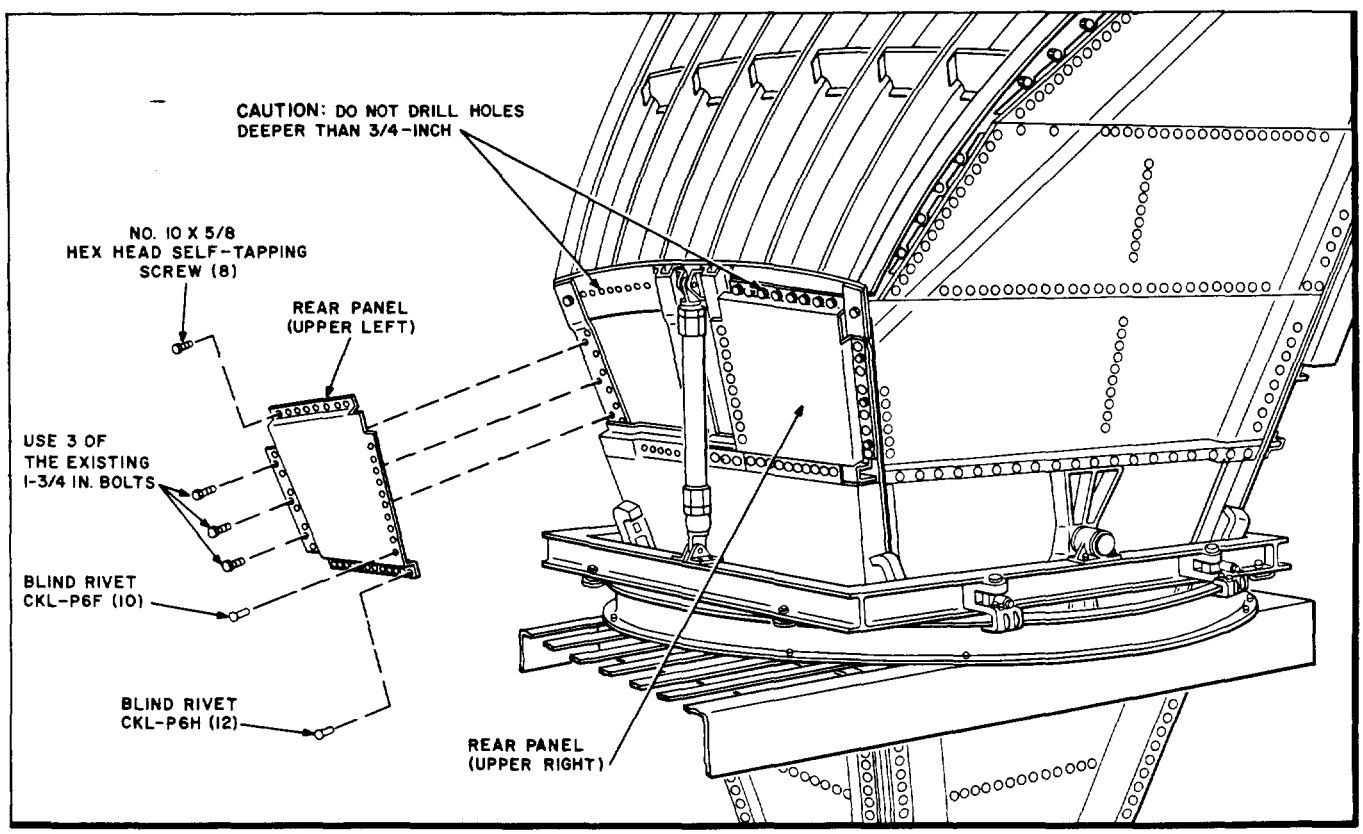
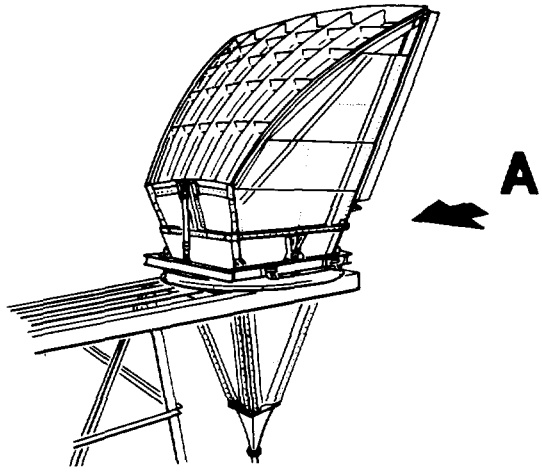


Fig. 11 — Placing Left and Right Upper Rear Panels



K. Attaching the Center Front Panel

5.40 Place the center front panel directly above the lower front panel with its lower edge overlapping the upper edge of the lower front panel by approximately 1-1/2 inches. Center the panel, left to right, keeping the upper edge flush with the upper edge of the hat section to which it will be attached. Secure the panel to the antenna using temporary fasteners (Fig. 12).

5.41 Drill twenty-one 0.1935-inch rivet holes (No. 10 drill) in the ***lower*** edge of the panel using the pilot holes in the panel as guides.

5.42 Remove temporary fasteners and secure the panel by placing twenty-one CKL-P6H blind rivets in the lower edge of the panel.

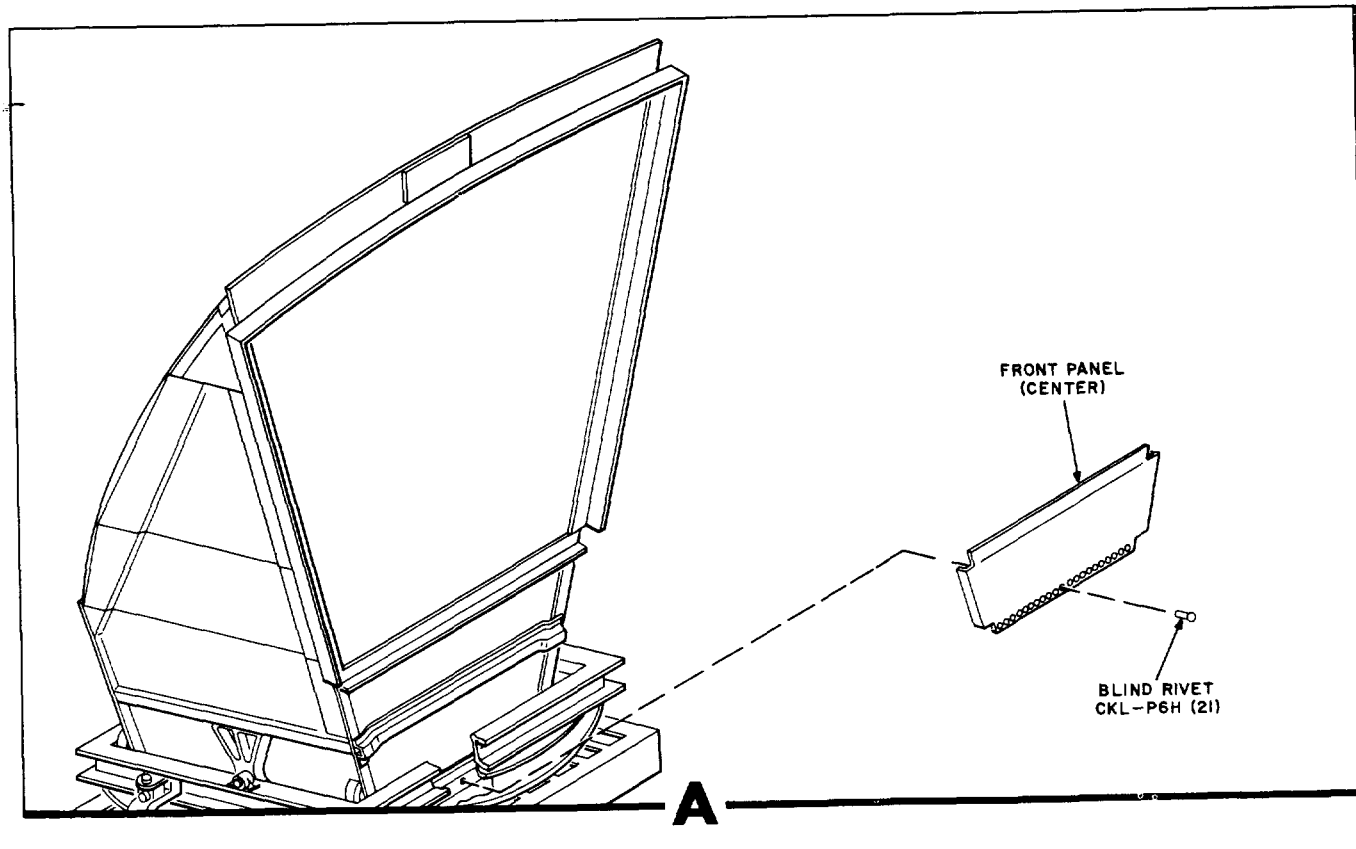
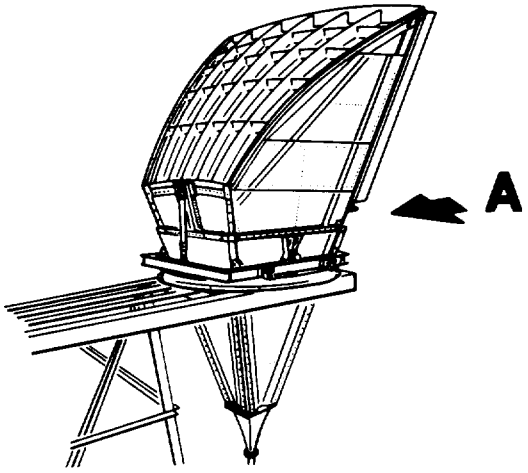


Fig. 12 — Placing Center Front Panel

L. Attaching the Box Section Assembly

5.43 Remove the two 1/2 — 20 x 1-1/2 bolts which are located in the front side angles just below the lower window clamping bar.



5.44 Nineteen 0.562-inch holes (9/16 drill) must be drilled in the lower window clamping bar to match corresponding holes in the box section assembly. Use the locating template when drilling these holes.

5.45 Position the box section assembly (Fig. 13) on the antenna with its rear and upper surfaces butted against the front surface of the antenna and the bottom of the lower window clamping bar respectively. Place a 1/2 — 20 x 2 bolt through each end of the box section, securing it in place. These bolts replace the 1/2 — 20 x 1-1/2 bolts removed in paragraph 5.43.

5.46 Place the anchor nut assembly inside of the box section, in line with the nineteen mounting holes in the lower window clamping bar. Secure the box section to the window clamping bar with nineteen 1/2 — 20 x 1-1/2, hex-head bolts.

5.47 Drill twenty-eight 0.1935-inch holes (No. 10 drill) through the bottom edge of the assembly, the upper edge of the center front panel, and the hat section. Secure with twenty-eight CKL-P6J rivets.

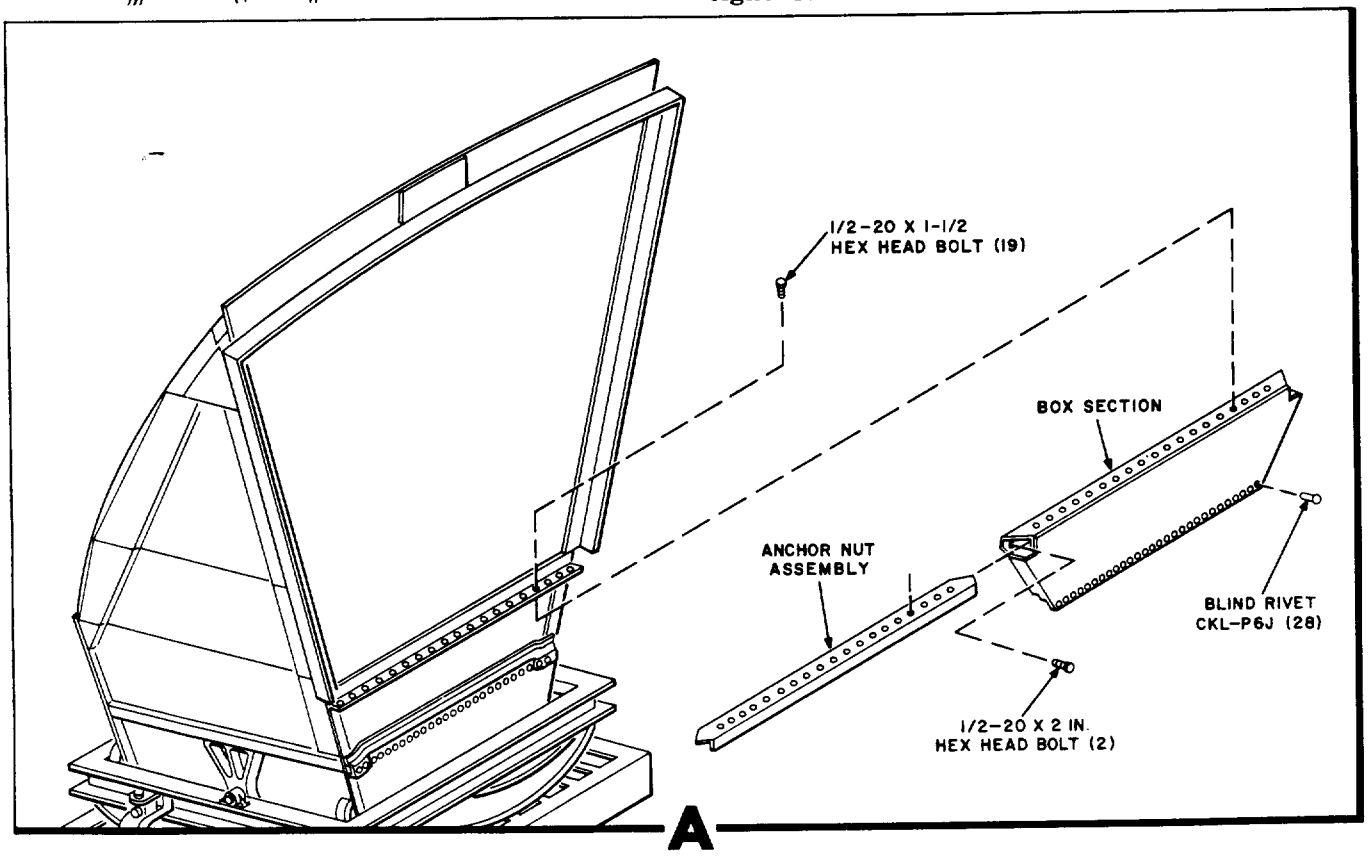


Fig. 13 — Box Section Assembly