

MICROWAVE ANTENNAS

KS-15852 PARABOLIC ANTENNA

ASSEMBLY AND INSTALLATION

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| 2. TOOLS AND EQUIPMENT | 3 | 1.01 The KS-15852 parabolic antenna (Fig. 1) is a 10-foot diameter antenna. It consists of a spun aluminum dish, a broadband center-mounted antenna feed, and a triangle-shaped tubular framework which permits independent azimuth and elevation adjustments. Both the reflector and the feed may be supplied with or without heaters. The feed is arranged to connect through a polarizer assembly to WR90 (0.900- by 0.400-inch) waveguides. |
| 3. UNPACKING AND HANDLING | 3 | |
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| REFLECTOR POSITION ON MOUNTING FRAME | 3 | 1.02 The KS-15852 antenna is intended for use in the TJ and TL Microwave Radio Relay Systems to transmit and receive microwave signals in the frequency range of 10.7 to 11.7 GHz. |
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| REFLECTOR HEATER WIRING | 8 | 1.03 The KS-15852 antenna is covered by the following specification and list numbers: |
| AZIMUTH ADJUSTING ARM | 10 | KS-15852 L1 Reflector Assembly (without feed and heater) |
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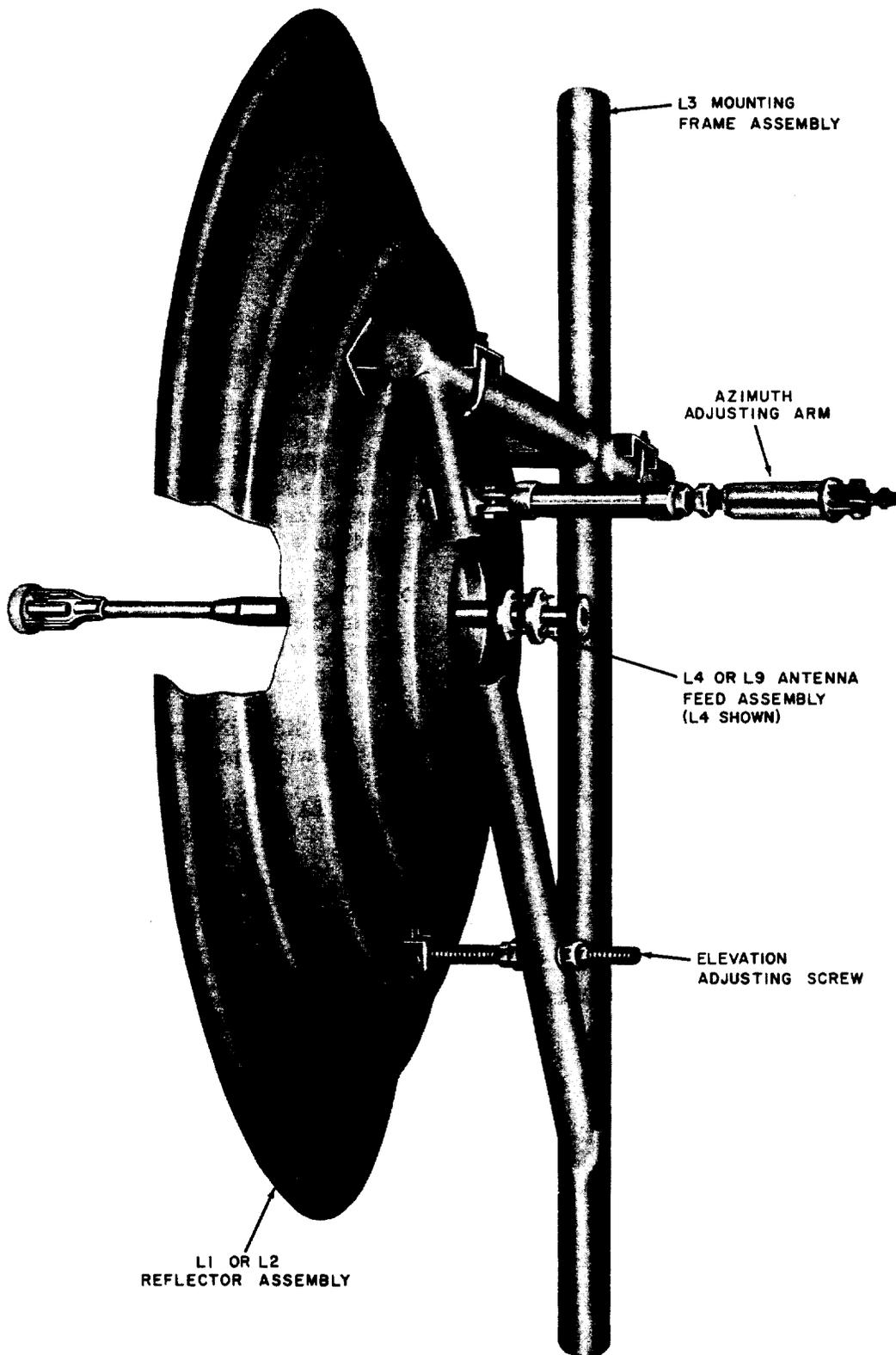


Fig. 1—Overall View of Antenna

2. TOOLS AND EQUIPMENT

2.01 The following tools may be required for the assembly, installation, and orientation of the KS-15852 parabolic antenna:

| QUANTITY | DESCRIPTION |
|----------|--|
| 1 | 5/16-inch Open-End Wrench |
| 1 | 7/16-inch Open-End Wrench |
| 1 | 1/2-inch Open-End Wrench |
| 1 | 5/8-inch Open-End Wrench |
| 1 | 1-inch Open-End Wrench |
| 1 | 1-1/8 inch Open-End Wrench |
| 1 | 1-1/2 inch Open-End Wrench |
| 1 | Adjustable Open-End Wrench with 3-inch capacity |
| 1 | Electrician's Side-Cutter Pliers |
| 1 | Diagonal-Cutter Pliers |
| 1 | Needle-Nose Pliers |
| 1 | Wire Stripper |
| 1 | Screwdriver, 5-inch blade, 5/16- by 0.045-inch tip |
| 1 | Screwdriver, 8-inch blade, 3/8- by 0.050-inch tip |

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

| QUANTITY | DESCRIPTION |
|----------|---|
| | Tools for opening wooden crates and removing metal straps |
| 1 | Ohmmeter |
| 1 | KS-19094, L1 Anti-Seize Compound, 8-ounce tube |
| 1 | Die and Die Stock for 2-inch NPT |
| 1 | Die Lubricant for threading pipe |
| 1 | Pipe Vise with 2-inch capacity |
| 1 | Pint of Red Zinc Chromate Primer |
| 1 | Pint of Semigloss Federal Gray Enamel |
| 1 | 2-inch Paint Brush |

QUANTITY**DESCRIPTION**

Several 4 by 4 timbers, approximately 6 to 8 feet long, for unpacking and assembling antenna on rough terrain (optional, see 3.02)

Z.R.C. Paint (or equivalent), Sealube Company, 14 Valley Street, Wakefield, Massachusetts

3. UNPACKING AND HANDLING

3.01 The antenna is shipped to the installation site partially assembled, and is crated to prevent damage during transit (Fig. 2). The crate has a gross weight of approximately 1000 pounds.

3.02 The crate should be unloaded in an area where the ground is relatively smooth and level and as close to the base of the supporting structure as practicable. If the area is sufficiently flat and smooth, the crate may be placed directly upon the ground. Since the crate consists of open construction, it should be set upon 4 by 4 timbers or other supports when rocks or other ground projections are present.

3.03 The crate should be opened carefully and the lumber retained in case it is necessary to reship the antenna due to damages in transit.

3.04 The shipment should be thoroughly checked against the packing list and each item inspected for damage. Note particularly any signs of a damaged antenna feed, distorted reflector contour, and bent or stripped elevation or azimuth adjustment screws. Notify local supervision if any items are missing or damaged.

4. ASSEMBLY**REFLECTOR POSITION ON MOUNTING FRAME**

4.01 The L3 mounting frame assembly is reversible, ie, it may be used with the vertical member either to the right or to the left of the center of the antenna. Local supervision should review the antenna orientation plan to determine if the reflector is located on the correct side of the mounting frame. Fig. 3 and 4 illustrate the various mounting arrangements and mechanical azimuth limitations of the antenna when mounted on type B towers. The arrangements and limitations shown for the

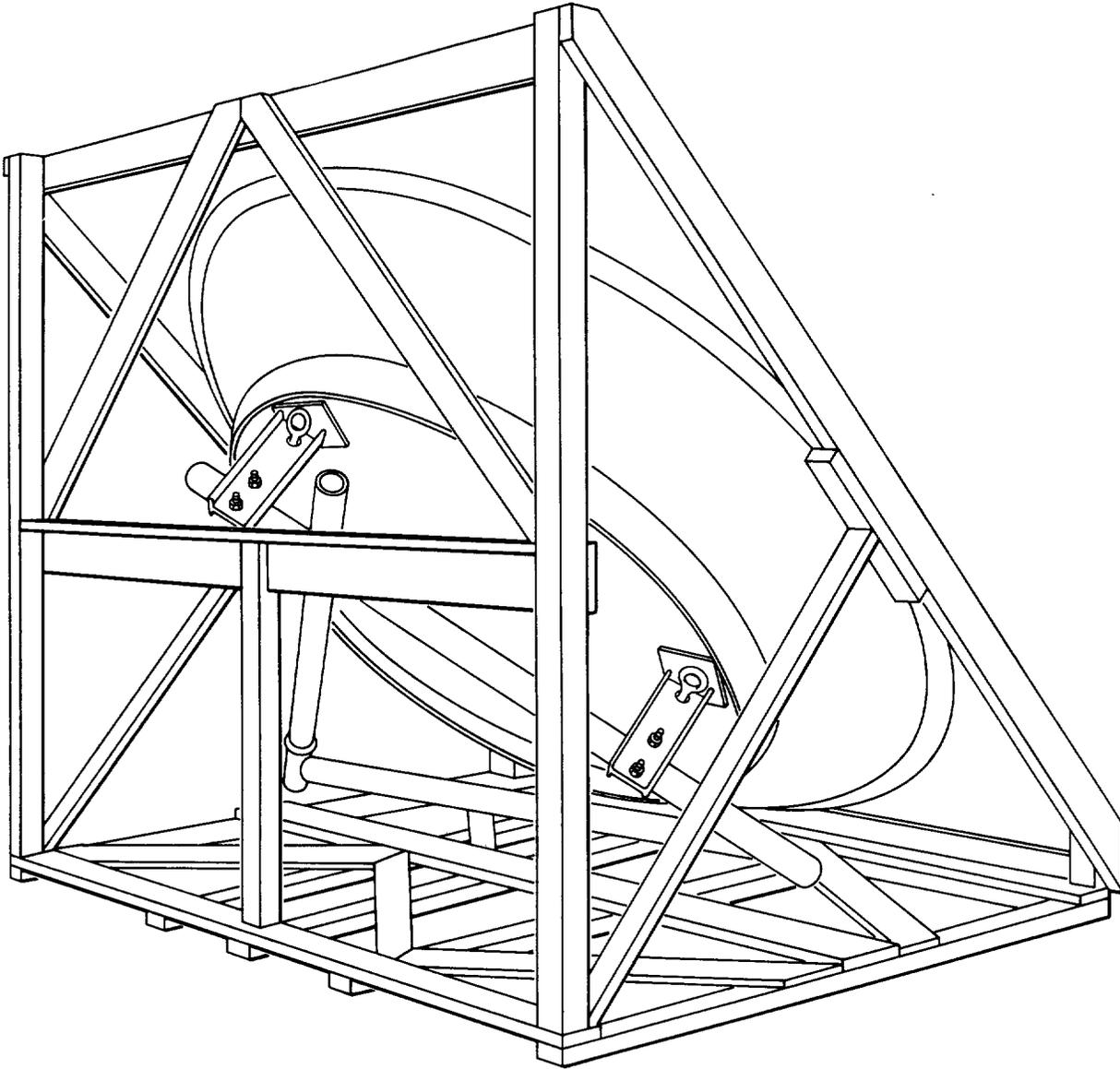
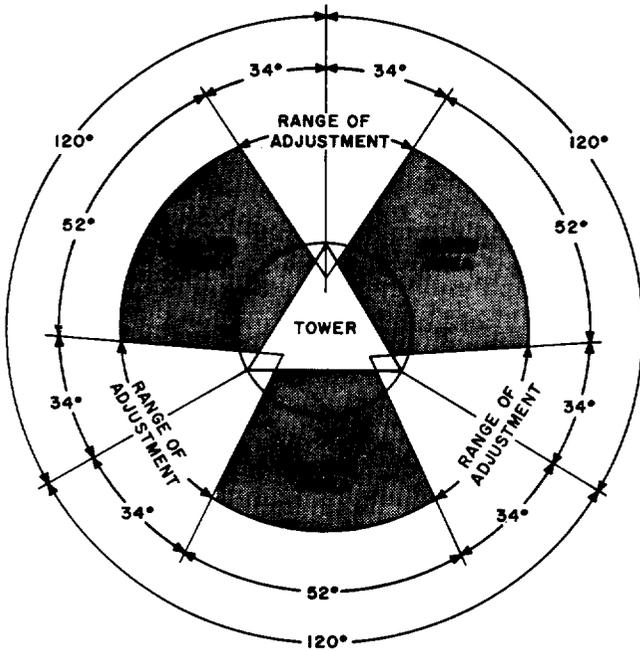


Fig. 2—Antenna in Shipping Crate

AT-7728 B Guyed Tower are also applicable to the AT-8013 C Self-Supporting Tower. Refer to Sections AG25.250 on B Self-Supporting Tower, AG25.200 on B Guyed Tower, and AG25.450 on C Self-Supporting Tower to determine the number of antennas permitted for each tower.

4.02 If the position of the reflector must be changed, the following procedure should be used (Fig. 5):

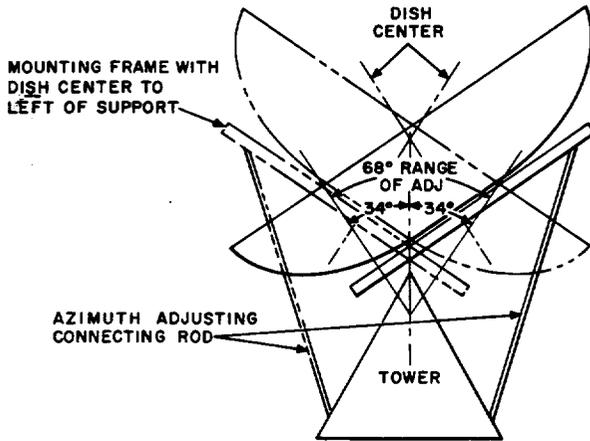
- (a) Remove the 1-14 hex nut, Palnut, and associated hardware from the end of the elevation adjusting screw.
- (b) Loosen the Palnuts and hex nuts on the two U-bolts which secure the reflector to the mounting frame.
- (c) Carefully pull forward on the reflector in the area of the elevation adjusting screw,



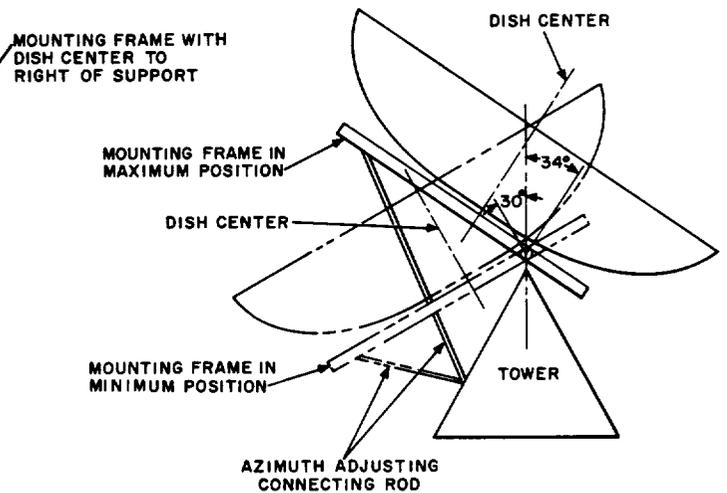
AZIMUTH LIMITATIONS

NOTES:

1. ANGLES SHOWN ARE WITH ADJUSTING ROD AT MIDPOINT AND ALLOW $\pm 6^\circ$ AZIMUTH ADJUSTMENT.
2. WITH ONE, TWO OR THREE ANTENNAS ON A TOWER A $\pm 34^\circ$ AZIMUTH ADJUSTMENT CAN BE OBTAINED ABOUT THREE BEARINGS 120° APART WHEN ANY FACE OF THE TOWER IS 30° OFF OF ONE OF THE BEARINGS.
3. WITH THREE ANTENNAS ON A TOWER, AND TWO OF THEM OPERATING BACK TO BACK, THE THIRD ANTENNA MAY BE ORIENTED $\pm 34^\circ$ IN AZIMUTH ABOUT A BEARING PERPENDICULAR TO THAT OF THE TWO ANTENNAS OPERATING BACK TO BACK.

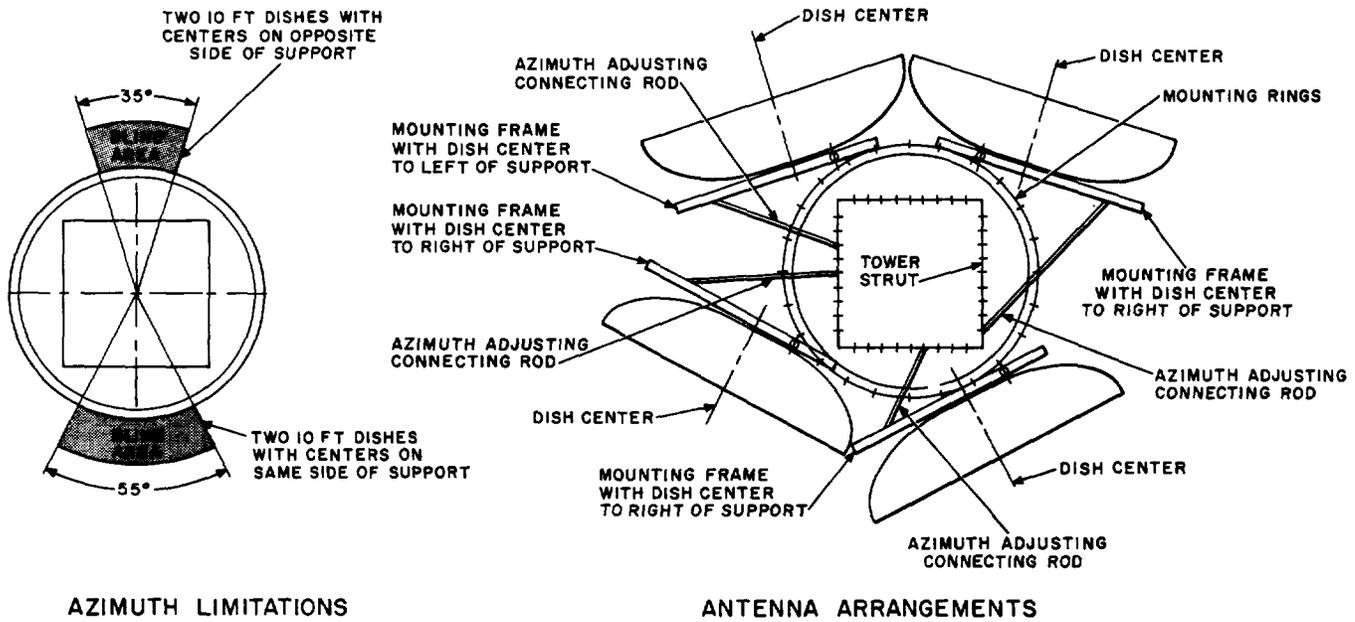


ARRANGEMENT OF ANTENNA AND MOUNTING FRAME TO OBTAIN MAXIMUM ADJUSTMENT



RANGE OF ANTENNA ADJUSTMENT (MOUNTING FRAME SHOWN WITH DISH TO LEFT OF SUPPORT. REVERSE ANGLES WHEN DISH CENTER IS TO RIGHT OF SUPPORT.)

Fig. 3—Antenna Arrangements on B Guyed Tower



NOTES:

1. ANGLES SHOWN ARE WITH ADJUSTING ROD AT MIDPOINT AND ALLOW $\pm 6^\circ$ AZIMUTH ADJUSTMENT.
2. PHYSICAL SIZE OF THE ANTENNA DISH AND MOUNT DETERMINE THE MINIMUM SPACING BETWEEN TWO ADJACENT ANTENNAS ON A TOWER.
3. WITH ADJACENT 10 FT ANTENNAS HAVING THE DISH CENTERS EITHER BOTH TO THE LEFT OR BOTH TO THE RIGHT OF THE SUPPORT, THE MINIMUM SPACING BETWEEN THEM IS 55° .
4. WITH ADJACENT 10 FT ANTENNAS HAVING THE CENTERS ON OPPOSITE SIDES OF THEIR SUPPORTS, THE MINIMUM SPACING BETWEEN THEM IS 35° .
5. THE SUPPORT MOUNTING RINGS PERMIT AN ALMOST UNLIMITED ARRANGEMENT OF 1, 2, 3, OR 4 ANTENNAS ON A TOWER. THE SIZE OF THE ANTENNA AND ARRANGEMENT OF DISH ON ITS MOUNT LIMIT THE AZIMUTH ANGLES BETWEEN ANTENNAS. THE AZIMUTH ANGLE BETWEEN A FACE OF THE TOWER AND THE ANTENNA WILL VARY DEPENDING UPON ITS LOCATION ON THE CIRCUMFERENCE OF THE MOUNTING RINGS.

Fig. 4—Antenna Arrangements on B Self-Supporting Tower

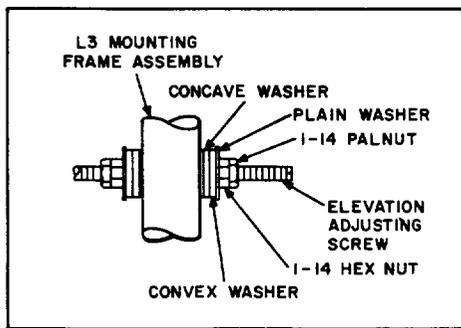
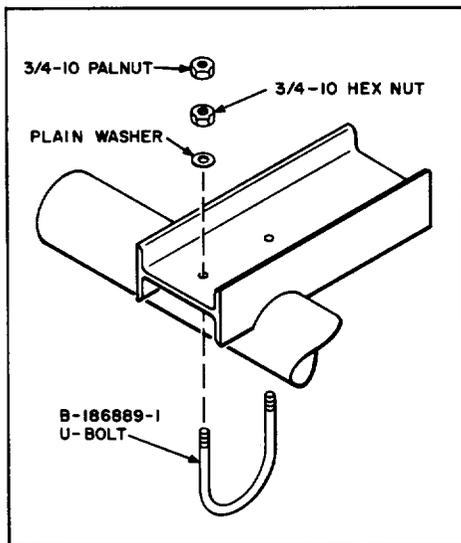
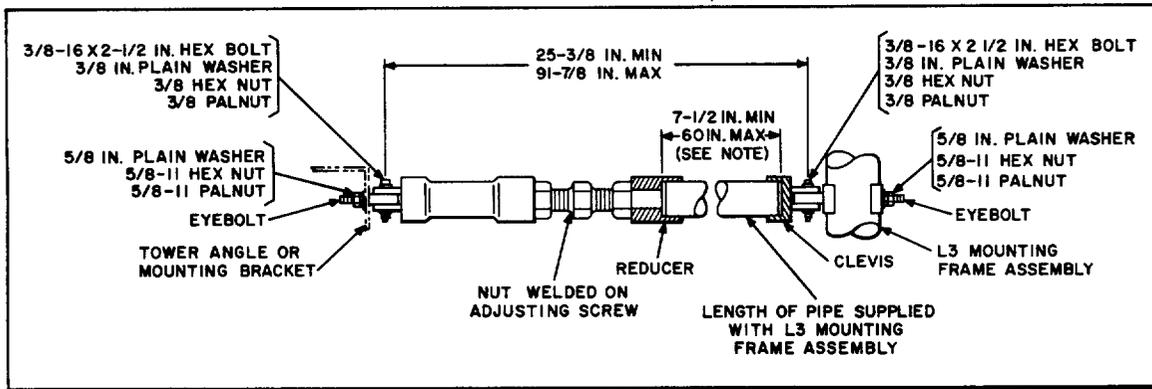
and allow it to pivot about the horizontal member of the mounting frame. When the end of the elevation screw clears the frame, swing it upward and carefully lower the reflector until its rim rests on the bottom of the crate.

- (d) Remove the Palnuts, hex nuts, washers, and U-bolts which secure the horizontal member of the mounting frame assembly to the two supports of the antenna reflector.
- (e) Lift the reflector from the crate, and place it face down on the crate cover or other appropriate supporting material.
- (f) Attach a sling to the mounting frame at the junction of the vertical and horizontal members and connect the load line to the sling. Remove all play from the lines and then cut the steel shipping straps which hold the frame

in place within the crate. Raise the mounting frame until it clears the crate, rotate it 180 degrees, and then lower it back into the crate. The diagonal member should rest in the wooden saddles at the bottom of the crate.

Note: Secure the mounting frame to the crate to prevent shifting during reassembly of the antenna.

- (g) Reorient the threaded clevis portion of the azimuth adjusting arm on the diagonal member of the mounting frame. Remove the Palnut, 5/8-11 hex nut, and plain washer from the eyebolt and withdraw it from the mounting frame. Insert the eyebolt from the opposite side of the frame and reassemble the hardware. Position the eyebolt so the head of the 3/8-16 hex bolt, which secures the clevis to the eyebolt, faces the horizontal member of the mounting frame.



NOTE:
FOR MID-RANGE INSTALLATION, THE LENGTH OF THE PIPE SHALL BE THE OVERALL LENGTH OF THE AZIMUTH ARM, MEASURED FROM CENTER TO CENTER OF THE EYEBOLT MOUNTING HOLE AT EACH END, LESS 25 IN.

Fig. 5—Elevation Adjusting Screw and Azimuth Adjusting Arm

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(h) Lift the reflector and lower it into the crate with the support brackets resting on the horizontal member of the mounting frame. Replace the U-bolts and associated hardware which were removed in Step (d). Do not tighten this hardware until the elevation adjusting screw has been attached to the diagonal member of the mounting frame.

(i) Carefully pull forward on the reflector in the area of the elevation adjusting screw, pivoting the reflector about the horizontal member. Position the end of the elevation adjusting screw over the mounting hole in the frame and guide the adjusting screw through the mounting hole. Replace the 1-14 hex nut and the associated hardware which was removed in Step (a).

ANTENNA FEED ASSEMBLY

4.03 To facilitate installation of the antenna feed and to allow greater access to the rear of the reflector, the two lower diagonal members on the back of the antenna crate may be removed (Fig. 2).

Note: Do not remove the vertical member on the back of the antenna crate.

4.04 Remove the antenna feed from its packing crate. If the feed is supplied with a heater, check the resistance of the heaters before installing the antenna feed assembly on the reflector. The resistance should be 185 to 226 ohms. If the readings are outside of the specified values, notify local supervision. Insert the antenna feed, reflector end first, through the mounting hole in the rear of the antenna reflector (Fig. 6).

Caution: Use extreme care when handling the antenna feed assembly. Slight dents in the feed tube or disc reflector can affect the transmission characteristics of the antenna. The disc reflector is cemented to the feed tube and must not be handled roughly.

4.05 Support the antenna feed from both ends during installation to prevent misalignment of the feed with the reflector. The flange of the feed mounting ring (Fig. 6) should be firmly engaged in the mounting hole. Guide the mounting clamp over the heater leads on the antenna feed (if equipped with heater), and position the holes in

the clamp over the eight threaded studs which project from the rear of the reflector. Secure the clamp to the reflector reinforcing ring by using a lockwasher and 1/4-20 hex nut on each stud.

Note: Do not remove the protective cover on the connecting flange of the feed assembly until the waveguide runs are installed.

4.06 Place the O-ring, supplied with the antenna feed, in a cloth bag and tie it to the feed assembly where it will be readily available for installation of the waveguide runs.

4.07 Each reflector is tested at the factory for optimum feed length. This optimum fine adjustment, as shown on the feed indicator scale (0 to ± 8), is stamped on the reflector designation plate. Check that the setting on the scale agrees with that which is stamped on the plate.

4.08 If it is necessary to change the length of the feed, adjust the four 3/8-16 hex nuts on the rear of the feed support assembly to either increase or decrease the feed length as required. When properly set, the block indicator should line up with the desired value on the scale.

FEED HEATER WIRING

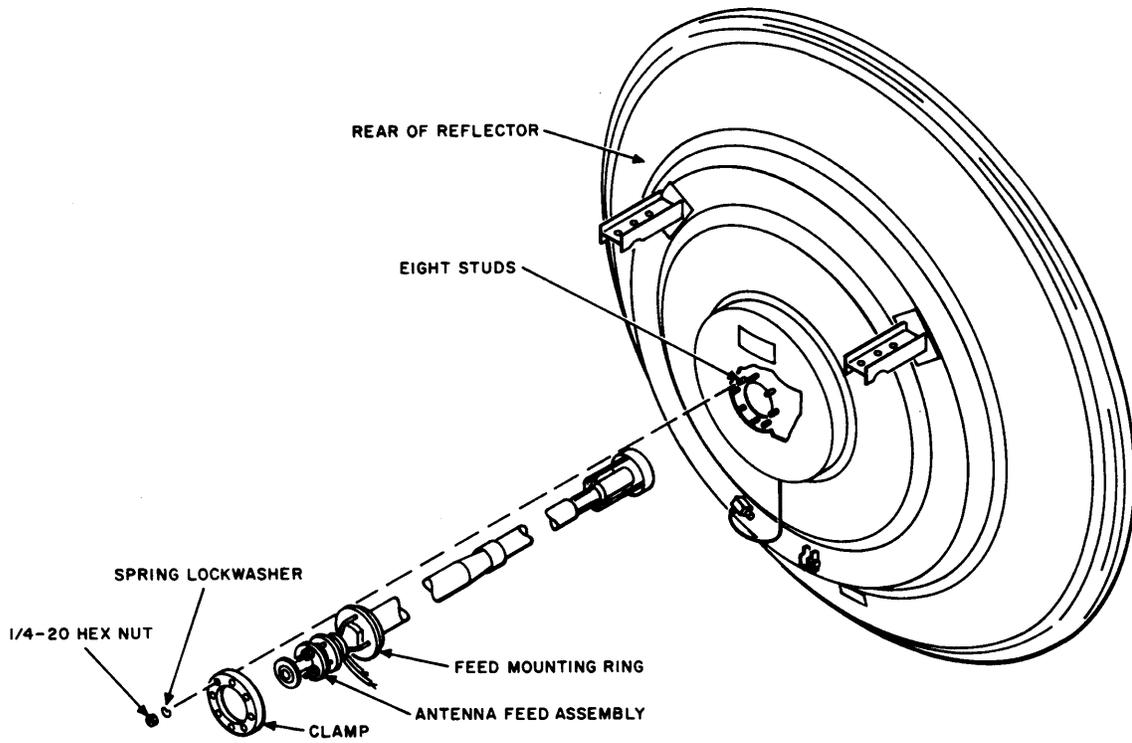
4.09 Antenna feeds with heaters are supplied with a thermostat and self-tapping mounting screws.

4.10 Mount the antenna feed thermostat by using two 8-32 x 1/2, type F pan head tapping screws with lockwashers provided with the L8 heater. The location of the two holes to accommodate these screws is in the rear of the dish, to the right of the junction box, and immediately above the thermostat which controls the reflector heater operation.

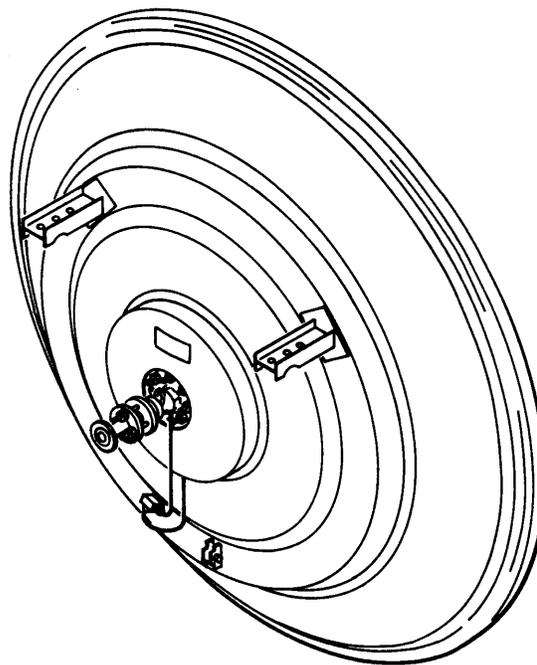
4.11 Make appropriate wire connections as shown in Fig. 7. The feed heater operates on 115 volts ac only.

REFLECTOR HEATER WIRING

4.12 The reflector heater is normally operated on 230 volts ac and will be wired accordingly by the manufacturer unless specifically ordered for operation at 115 volts ac.



ANTENNA FEED ASSEMBLY BEING INSTALLED



ANTENNA FEED ASSEMBLY INSTALLED

Fig. 6—Installation of Antenna Feed Assembly into Reflector

NOTES

1. * DENOTES SPLICE.
2. PT LEADS FURNISHED WITH COMPONENTS.
3. REFLECTOR HEATERS ARE FURNISHED WIRED FOR 230V AC UNLESS OTHERWISE SPECIFIED.
4. FEED HEATERS SHALL BE WIRED FOR AND OPERATE ON 115V AC NOMINAL IN ALL CASES.
5. THE THERMOSTAT CONTROLLING FEED HEATER OPERATION IS FURNISHED AS PART OF THE KS-15852 L8 AND L9 ANTENNA FEED ASSEMBLIES.

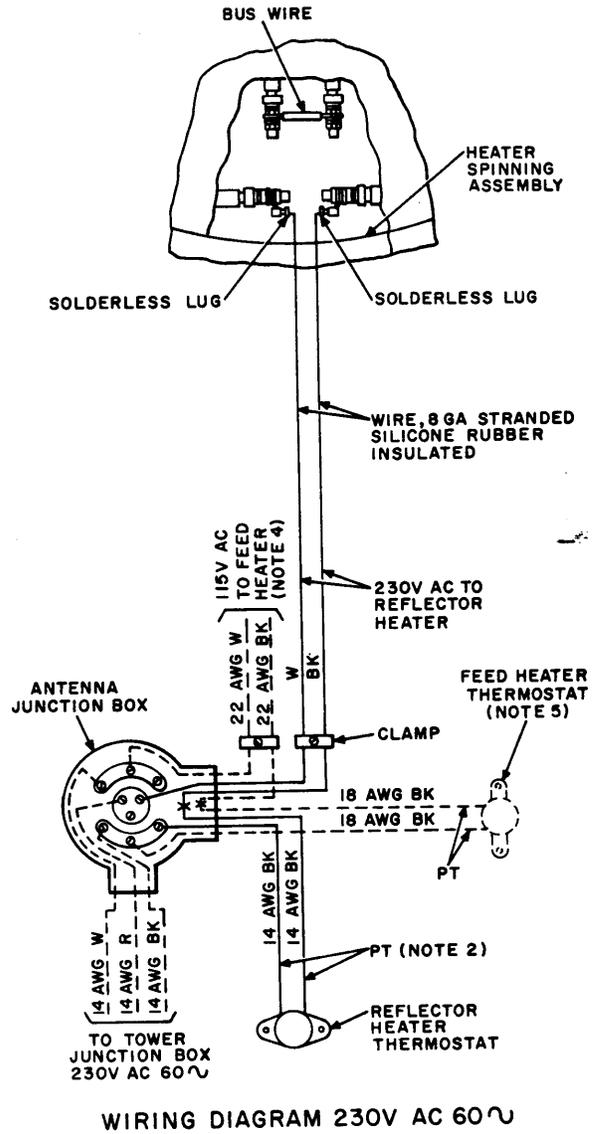
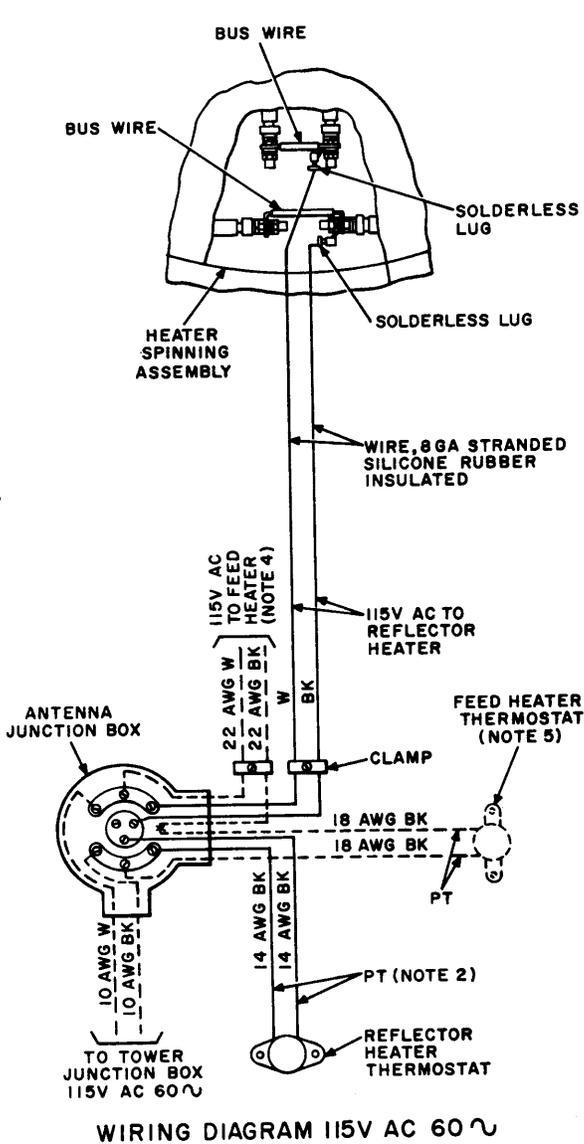


Fig. 7—Feed Heater and Reflector Heater Wiring Diagrams

4.13 The L2 antenna will be shipped with the reflector heater and thermostat completely wired to the junction box located on the rear of the reflector. All required in the field is to connect the junction box to 230-volt ac service (Fig. 7).

AZIMUTH ADJUSTING ARM

4.14 A 5-foot length of 2-inch extra strong galvanized pipe is shipped with each antenna. The pipe has to be cut to its proper length and

threaded in the field to meet the individual site conditions. The length of the pipe is dependent on the orientation of the antenna with respect to the supporting structure. For midrange installation, the length of the pipe should be the overall length of the azimuth arm, measured from center to center of the eyebolt mounting hole at each end, minus 25 inches as shown in Fig. 5. The proper length of pipe must be selected in order for the azimuth adjusting arm to be fastened within the mounting parameters indicated for each installation. The length of pipe should not be less than 7-1/2 inches to permit full adjustment of the adjusting screw.

4.15 Paint the cut and threaded portions of the 2-inch pipe with Z.R.C. paint or an equivalent zinc-rich paint as a corrosion preventive.

4.16 Coat the threads with KS-19094 L1 anti-seize compound and assemble the entire unit as shown in Fig. 5.

Note: Do not use a pipe wrench since the jaws may score the galvanized pipe. The pipe should be hand-tightened into the reducer and clevis. The assembly should then be tightened securely by using an adjustable wrench on the reducer flats, and a 1-5/8 inch open-end wrench on the clevis fork.

4.17 Mount the azimuth adjusting arm on the mounting frame as illustrated in Fig. 5.

4.18 Place the azimuth adjusting arm against the vertical member of the mounting frame and secure the arm to prevent its swinging during the hoisting and installation of the antenna.

5. INSTALLATION

GENERAL

5.01 Provide suitable hoisting tackle and rig the tackle so the 650-pound antenna assembly can be raised directly to the elevation at which the installation is to be made.

5.02 Connect the lifting sling to the two pad eyes supplied with the antenna (Fig. 8). The pad eyes are installed in the mounting support assembly.

5.03 When lifting the antenna from the shipping crate, care must be exercised to prevent rolling the antenna on its rim. This could cause distortion of the reflector contour and degradation of the signal.

5.04 Connect two tag lines to the mounting frame at the junction of the vertical and diagonal member as illustrated in Fig. 8. The tag lines should be used to prevent the antenna from striking the support structure or guy wires during the hoisting operation. As the antenna is raised, it may be necessary for the men on the tag lines to move further from the support structure base in order to guide the antenna properly.

PRECAUTIONS

5.05 Installation of the antenna should not be attempted unless wind velocities are moderate and weather conditions are expected to remain stable.

5.06 While work is in progress, there should be at least one person in attendance on the ground. Anyone who is required to climb the supporting structure while work is in progress aloft, should arrange to climb at a time when there is the least probability of any object being dropped or falling from the work location aloft.

5.07 All personnel who will be on the structure or working in its vicinity must wear safety headgear. Body belts and safety straps are to be worn and used whenever the need is indicated.

5.08 Tools, parts, hardware, etc, should be hauled aloft on a line or carried aloft in a closed bag, pouch, or in suitable slots in a tool belt. Any tools or other objects used aloft should be lowered to the ground when their use is no longer required. Do not leave tools or other loose objects lying on ledges. Place them in a bag or pouch or otherwise secure them where they will not fall.

5.09 When work is being done on guyed structures, exercise care to avoid striking the guys with objects being raised or lowered.

5.10 The precautions given in 5.05 through 5.09 are basic precautions to be observed. However, they are neither all-inclusive nor do they supersede established safety practices of reliable contractors. Bell System personnel should observe the precautions given here as well as those established locally.

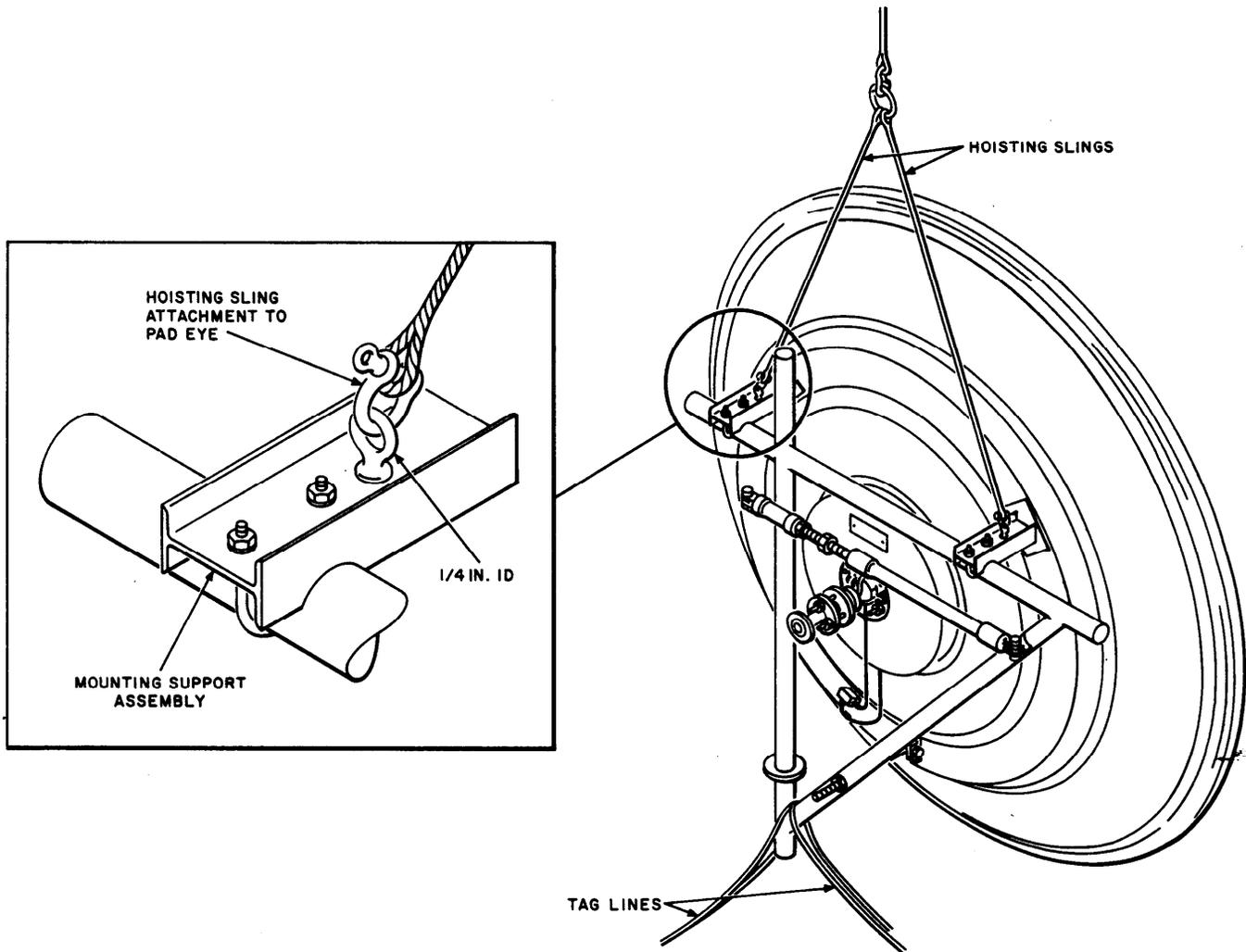


Fig. 8—Hoisting Sling and Tag Line Attachments to Antenna

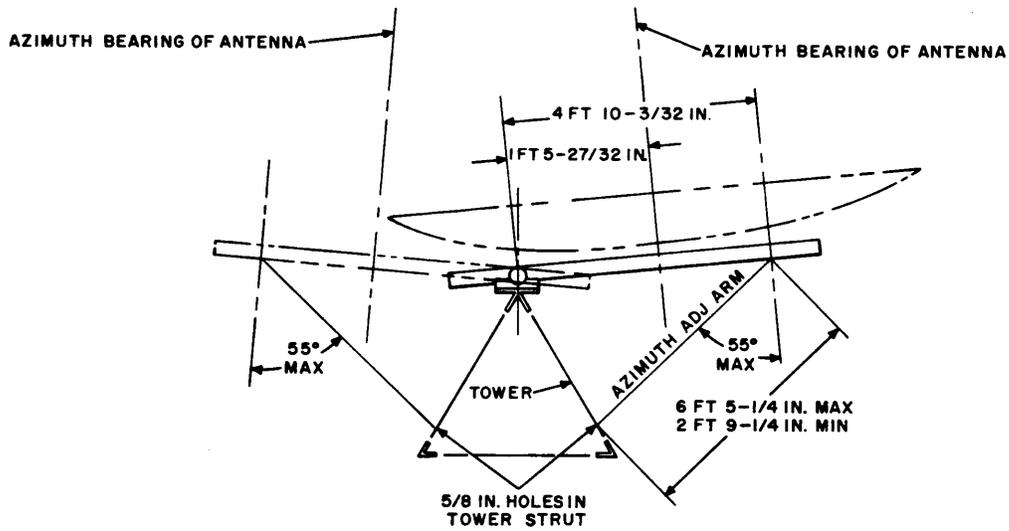
INSTALLATION ON AT-7728 B GUYED TOWER

5.11 All installation procedures are shown in Fig. 9. Determine the location of the P-15G462 brackets. The brackets have an upper or lower position. Use the upper position when the vertical member of the mounting frame is to the left of the reflector center as viewed from the rear of the antenna. Use the lower position when the vertical member is to the right of the reflector center as viewed from the rear.

5.12 Attach the four P-15G462 brackets to the tower leg by using three 1/2-13 x 1-3/4 hex head bolts, 1/2 plain washers, 1/2-13 hex nuts, and 1/2-13 Palnuts for each bracket.

5.13 Hoist the antenna to the proper level and guide it into position against the mounting brackets. Place a P-15G470 saddle between the vertical member of the mounting frame and the P-15G462 bracket at the two attachment points. The collar on the mounting frame should rest on top of the lower mounting saddle. Attach the saddles and the mounting frame to the brackets by using the two B-186889-2 U-bolts, 5/8-11 hex nuts, and 5/8-11 Palnuts supplied with the mounting frame. Draw the U-bolts up snugly, but do not tighten them securely until the azimuth adjusting arm is installed and the antenna is mechanically oriented.

5.14 With the antenna still supported by the winch line, attach the azimuth adjusting arm to



AZIMUTH LIMITATIONS

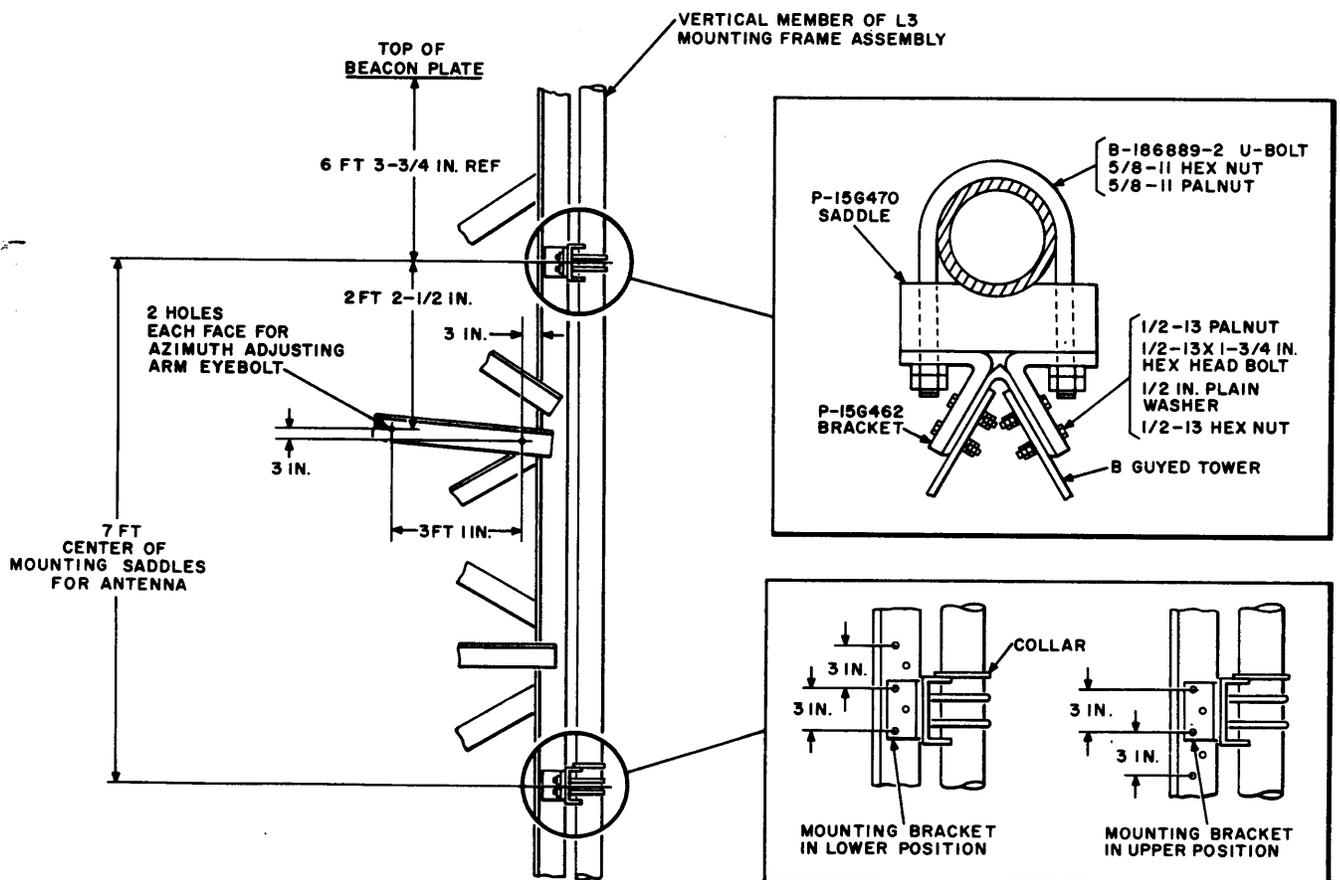


Fig. 9—Antenna Installation on AT-7728 B Guyed Tower

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the tower strut. Secure with a 5/8 plain washer, 5/8-11 hex nut, and 5/8-11 Palnut.

5.15 Mechanically orient the antenna to the azimuth and elevation specified on the plot plan. (See Part 6.)

5.16 Check that all supporting hardware is properly secured and remove the sling and tag lines from the mounting frame.

INSTALLATION ON AT-7729 B SELF-SUPPORTING TOWER

5.17 All installation procedures are shown in Fig. 10. Hoist the antenna to the installation level and guide it into position against the center and bottom mounting rings of the tower.

5.18 Place the two P-15G470 saddles between the vertical member of the mounting frame and the center and bottom mounting rings of the tower. The collar on the vertical member should rest on top of the lower mounting saddle. Attach the saddles and the antenna mounting frame to the mounting rings by using the two B-186889-2 U-bolts, 5/8-11 hex nuts, and 5/8-11 Palnuts supplied with the antenna mounting frame. Draw the U-bolts up snugly, but do not tighten them securely until the azimuth adjusting arm is attached to the tower strut and the antenna is mechanically oriented.

5.19 With the antenna still supported by the winch line, attach the azimuth adjusting arm to the tower strut. Local supervision will determine, from mounting information and the antenna orientation plan, the correct mounting hole for the azimuth adjusting arm eyebolt. Insert the eyebolt and secure with a 5/8 plain washer, 5/8-11 hex nut, and 5/8-11 Palnut.

5.20 Mechanically orient the antenna to the azimuth and elevation specified on the plot plan. (See Part 6.)

5.21 Check that all supporting hardware is properly secured and remove the sling and tag lines from the mounting frame.

INSTALLATION ON AT-8013 C SELF-SUPPORTING TOWER

5.22 All installation procedures are shown in Fig. 11. Determine the location of the P-44Q499 brackets. The brackets have an upper

or lower position. Use the upper position when the vertical member of the mounting frame is to the left of the reflector center as viewed from the rear of the antenna. Use the lower position when the vertical member is to the right of the reflector center as viewed from the rear.

5.23 Attach the four P-44Q499 brackets to the tower leg by using three 5/8-11 x 1-3/4 hex head bolts, 5/8 plain washers, 5/8-11 hex nuts, and 5/8-11 Palnuts for each bracket.

5.24 Hoist the antenna to the proper level and guide it into position against the mounting brackets. Place a P-44Q494 yoke between the vertical member of the mounting frame and the P-44Q499 bracket at the two attachment points. The collar on the mounting frame should rest on top of the lower mounting bracket. Attach the yokes and the mounting frame to the brackets by using the two B-44Q498 U-bolts, 5/8 plain washers, 5/8-11 hex nuts, and 5/8-11 Palnuts. The B-186889-2 U-bolts supplied with the mounting frame should be discarded. Draw the U-bolts up snugly, but do not tighten them securely until the azimuth adjusting arm is installed and the antenna is mechanically oriented.

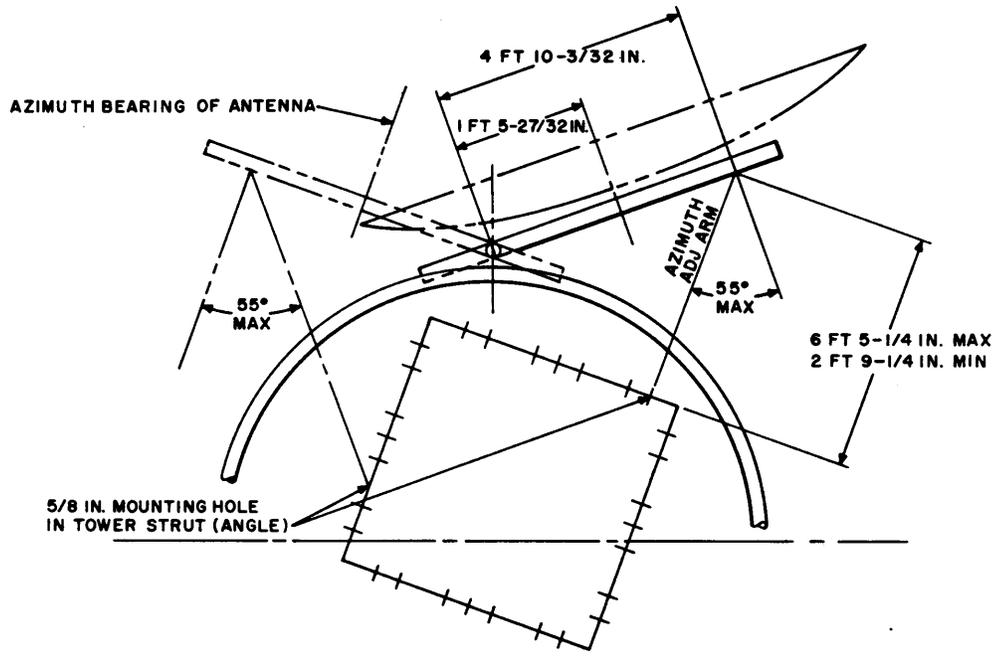
5.25 With the antenna still supported by the winch line, attach the azimuth adjusting arm to the tower strut. Secure with a 5/8 plain washer, 5/8-11 hex nut, and 5/8-11 Palnut.

5.26 Mechanically orient the antenna to the azimuth and elevation specified on the plot plan. (See Part 6.)

5.27 Check that all supporting hardware is properly secured and remove the sling and tag lines from the mounting frame.

INSTALLATION ON ROOF

5.28 Roof mounting of the KS-15852 antenna has not been standardized and detailed information will not be given in this section. Reference should be made to the typical installations described in the preceding paragraphs for general mounting information. This data may be revised and adapted by local supervision to meet the requirements of a given site. See Fig. 12 for general installation procedures.



AZIMUTH LIMITATIONS

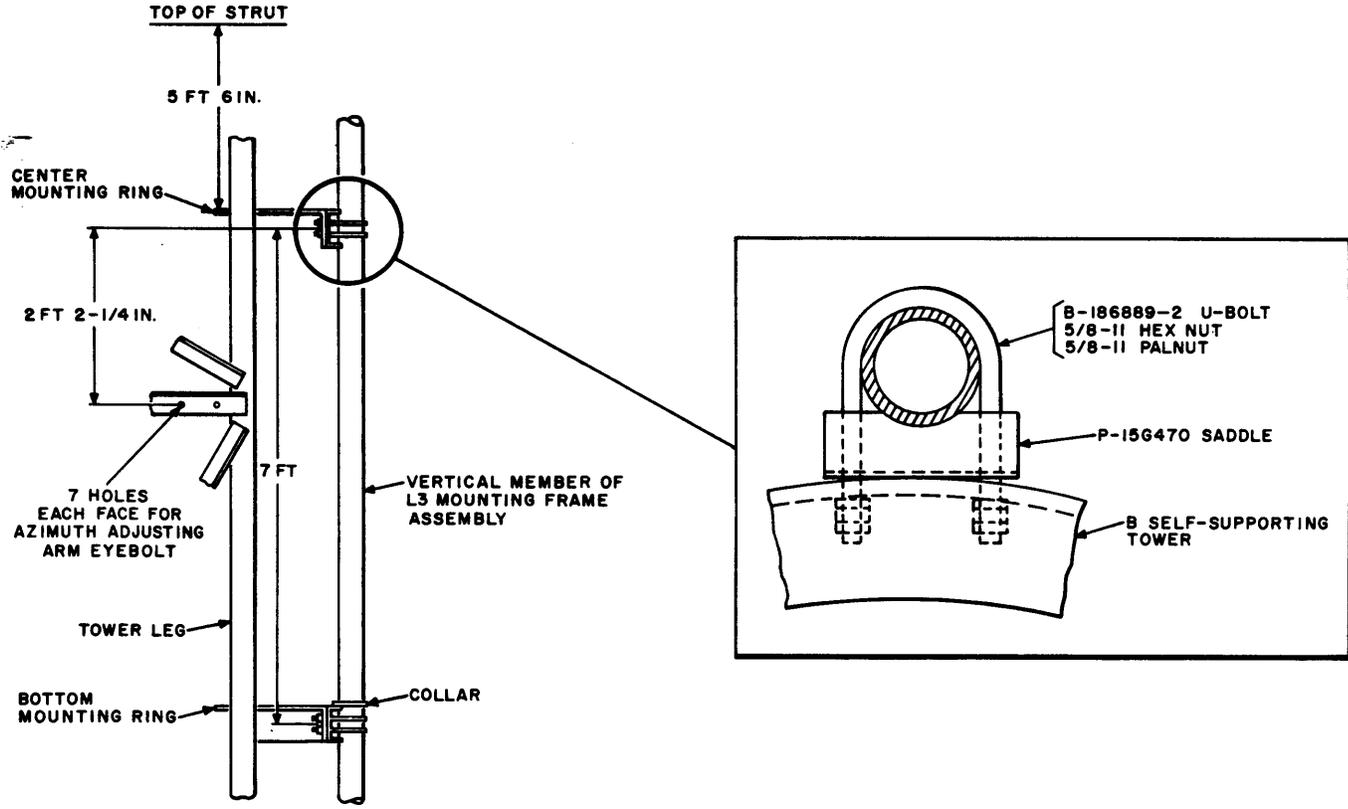


Fig. 10—Antenna Installation on AT-7729 B Self-Supporting Tower

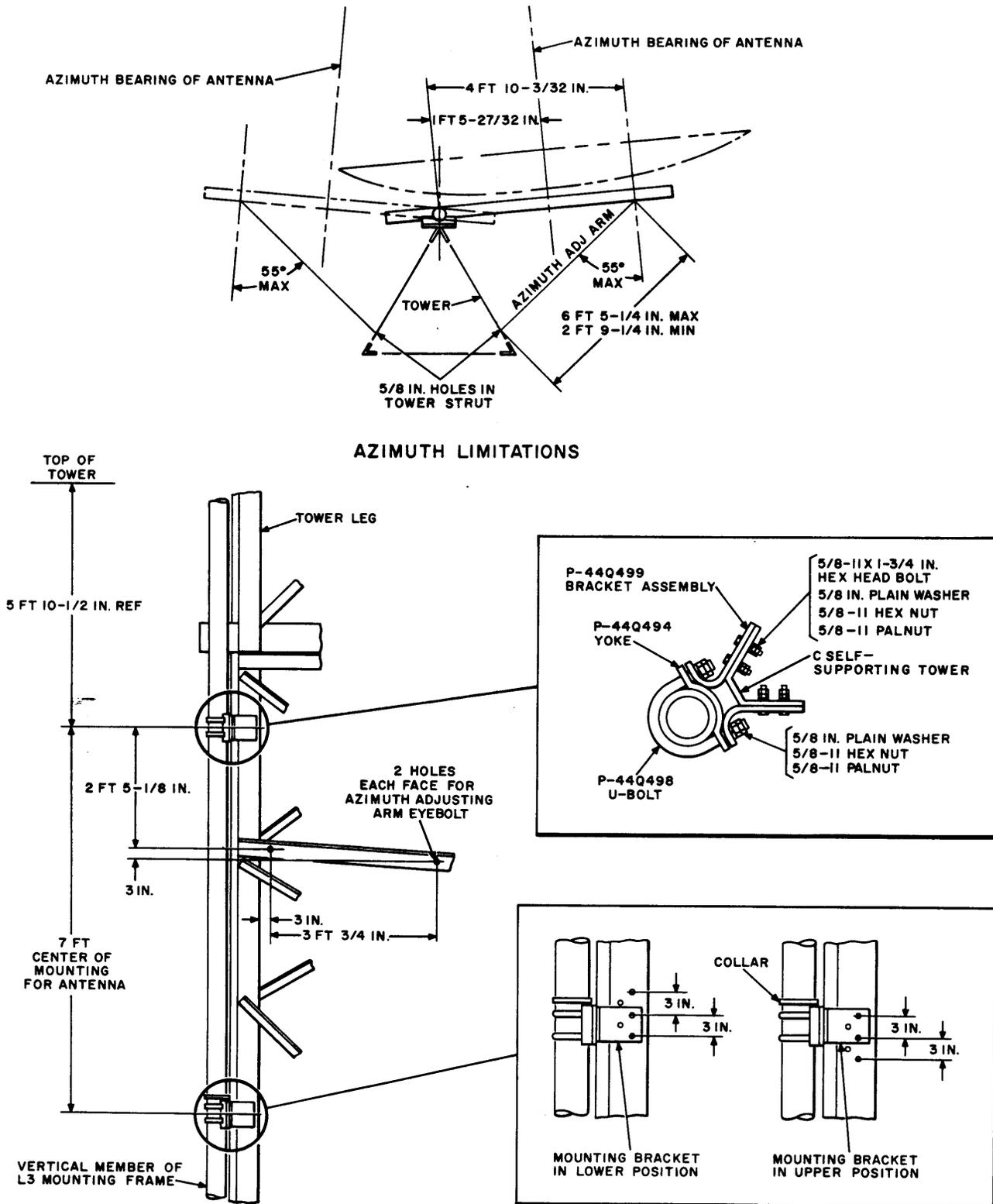


Fig. 11—Antenna Installation on AT-8013 C Self-Supporting Tower

TYPICAL MOUNTING OF ANTENNA ON FRAMEWORK

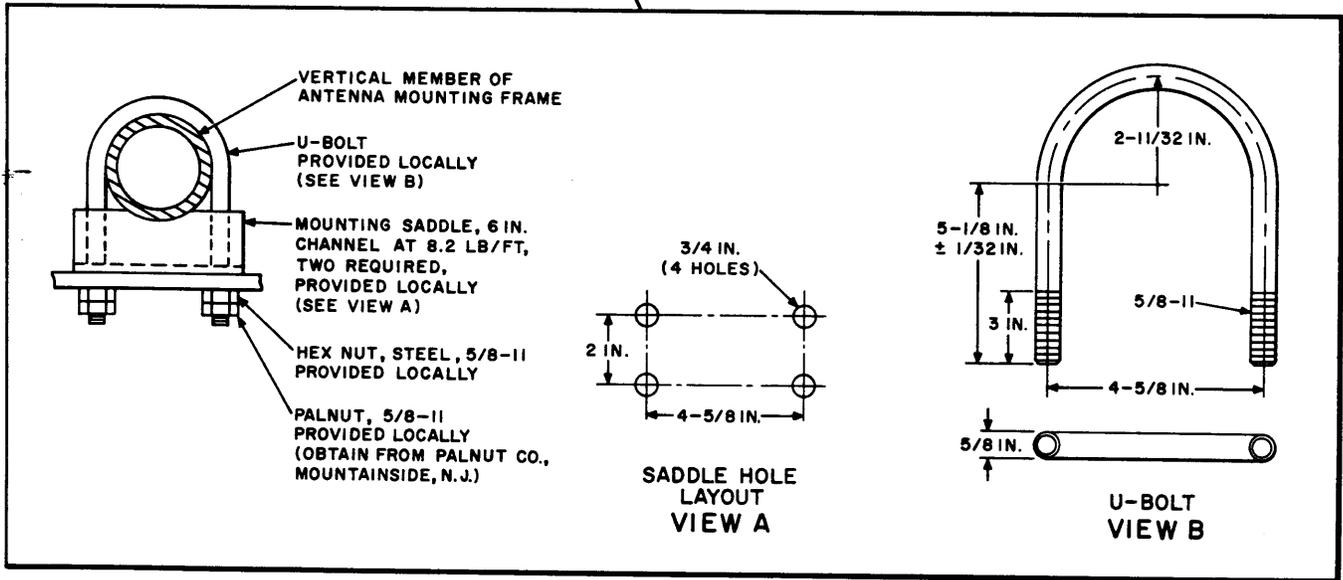
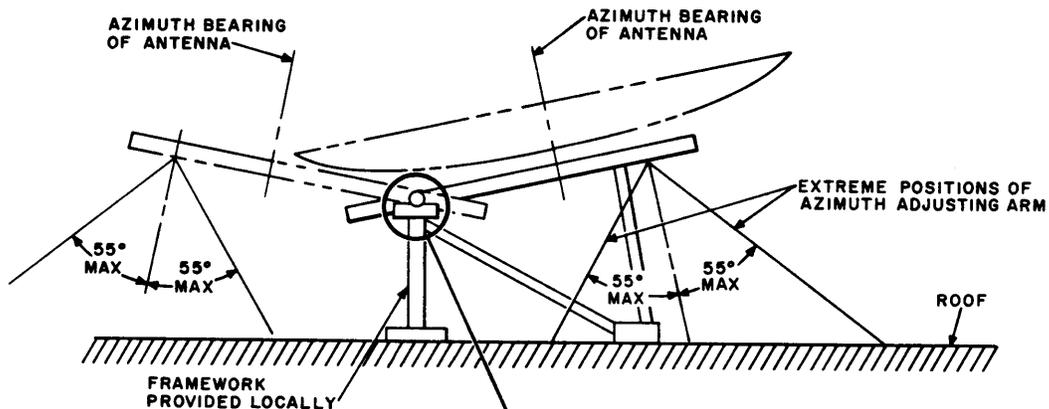


Fig. 12—Antenna Installation on Roof

6. ORIENTATION

GENERAL

6.01 The orientation procedures which follow do not cover electrical orientation of the antenna, but discuss only the mechanical orientation of the antenna in elevation and azimuth.

ELEVATION ADJUSTMENT

6.02 Orientation of the antenna in elevation is accomplished by repositioning the elevation adjusting screw in the diagonal member of the mounting frame. The screw (Fig. 5) is attached to a pillow block on the lower rear position of the antenna reflector. The free end passes through the diagonal member and is locked in the desired position with two hex nuts.

6.03 The antenna feed and reflector will move approximately 0.07 degree in elevation for

each revolution of the hex nuts. This is equivalent to 1.0 degree per inch of travel by the hex nuts on the adjusting screw. The maximum elevation adjustment is ± 4.0 degrees from normal. Normal is the reference point when the antenna feed is perpendicular to the mounting frame.

AZIMUTH ADJUSTMENT

6.04 Orientation of the antenna in azimuth is accomplished by changing the length of the azimuth adjusting arm. The arm (Fig. 5) is between the diagonal member on the mounting frame and a tower angle or mounting bracket.

6.05 The antenna feed and reflector will move approximately one-half degree in azimuth for each revolution of the azimuth adjusting nut, which is an integral part of the adjusting screw. An azimuth adjustment of ± 6.0 degrees from normal is possible. Normal is the mean position of the azimuth adjusting arm.