

## MICROWAVE ANTENNAS KS-16320 PASSIVE REFLECTORS INSTALLATION ELEVATION ADJUSTMENT FOR LISTS 1 AND 2

### 1. GENERAL

**1.01 Reason For Reissue:** To include the information in the Addendum to Issue 1 which corrected Fig. 2.

**1.02** Elevation adjustment will be performed at the direction of local supervision after the reflector assembly has been installed on the supporting structure.

**1.03** The KS-16320, List 7 elevation adjustment screw and list 8 azimuth adjustment screw assemblies are required to perform the work described in this section. *The tools are not furnished with reflector assemblies; they must be ordered separately.* For typical line-up operations, which involve alignment of two reflectors with respect to each other, at least two sets of tools are needed to permit adjustment simultaneously at both ends of the link.

**1.04** Materials used in the elevation adjusting tool are suitable for limited outdoor exposure. The tool may be left in place on a reflector for short periods while system alignment is in progress. *However, when the work has been completed or if a delay in excess of three days is anticipated, the tool should be removed and stored for future use.* Dry the assembly thoroughly after use, wipe a light petroleum oil sparingly onto the screw, and work the screw back and forth in the nut several times to establish an oil film over the inside threads. Apply a few drops of oil at each trunnion. Store the screw in a manner to provide protection from weather, from mechanical damage, and from dirt or grit contamination.

### 2. DESCRIPTION

**2.01** Fig. 1 of this section shows a list 7 elevation adjustment screw in operating position on the lower mount of a passive reflector; Fig. 5 of Section 402-423-400 shows the tool assembly.

**2.02** Two locating pins in the mounting bar register selectively with several pairs of holes in the channels of the lower mount, provid-

ing a number of discrete positions at which the bar may be placed. A pair of clamps retained in slotted holes at the outer ends of the bar can be withdrawn sufficiently to clear the channel flanges for placement and removal of the tool, and can be brought into engagement with the flanges and tightened to hold the tool firmly in place.

**2.03** The drive nut is mounted in a block which is pivoted on trunnions supported from brackets at the center of the bar. The nut is free to rotate, but transmits longitudinal thrust into the tool mount. The screw passes through the drive nut and is captured in the clevis at the back of the reflector framework. A self-locking pin attached to the screw provides the connection.

### 3. OPERATION

**3.01** Elevation adjustment should be done during weather conditions which will permit a man to work in reasonable comfort at the reflector location for periods in excess of one hour. Keep in mind that it is not always possible or desirable to consider an elevation adjustment as being complete after a single operation, but that there is considerable work involved to prepare and secure the reflector assembly, that frequently elevation adjustment will be performed in conjunction with other adjustments, that the work is of a kind which requires patience and attention to detail, and that the success of the operation rests largely with the man at the reflector.

**3.02** Since wind velocity in an exposed location 300 feet above ground may be approximately 180 per cent of the velocity near the ground, elevation adjustment should not be attempted when more than moderate winds are being experienced in adjacent, exposed ground locations. Gusts are particularly troublesome. In general, the lower the wind velocity, the less difficulty is to be expected in making adjustments. When wind conditions are doubtful, a weight of approximately 4 ounces, such as a 5/8- by 2-1/2-inch bolt, should be suspended

freely from 3 feet of light, flexible cord, and exposed broadside to maximum ground wind. If deflection of the weight from the vertical exceeds approximately 1-1/2 inches, wind conditions are unsatisfactory for reflector adjustment.

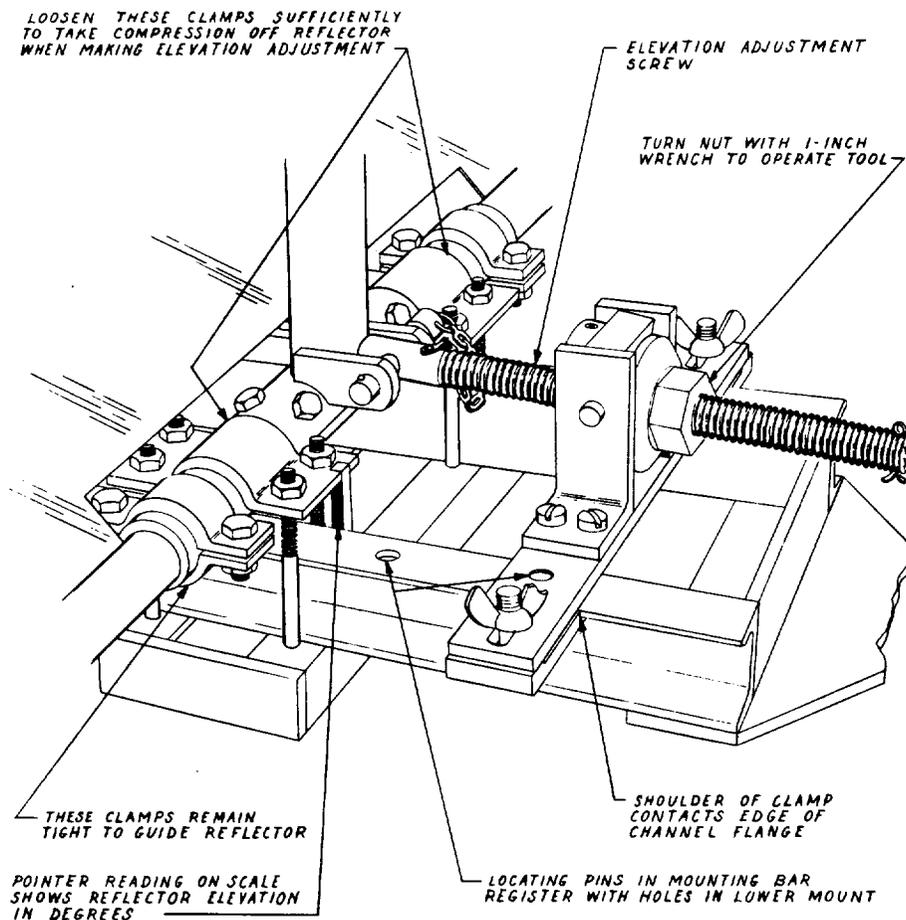
**3.03** Part names used in the following discussion are identified in the assembly drawings contained in Section 402-423-400. Fig. 1 of that section refers to the list 1 reflector and Fig. 2 to the list 2 reflector.

**3.04** Elevation adjustment of KS-16320, List 1 or List 2 passive reflectors is effected by clamping the List 7 elevation adjustment screw to the lower mount, as shown in Fig. 1 of this section, at the position which is most convenient for the adjustment which is to be made.

*Note:* The screw of the elevation adjustment tool is not long enough to permit operation over the full range of elevation adjust-

ment from a single tool position. In general, however, the required adjustment can be accomplished from a single position if discretion is used in placing the tool, such that sufficient screw length is available to produce the required reflector movement. For example, if the reflector is to be moved outward on the mount, the tool should be placed as close as possible to the reflector, and conversely.

**3.05** Inspect guide clamps, Items 33B, Figs. 1 and 2, in Section 402-423-400, and make any adjustment necessary to assure that they meet the outer edges of the channel flanges of the lower mount assembly squarely and are firmly clamped in place. The clamps are to be brought up to the flanges by hand when the base of the reflector is square with the lower mount, and may be tapped lightly to bring them into position. **Do not drive the clamps up.**



**Fig. 1 — KS-16320, List 7 Elevation Adjustment Screw Assembly in Operating Position**

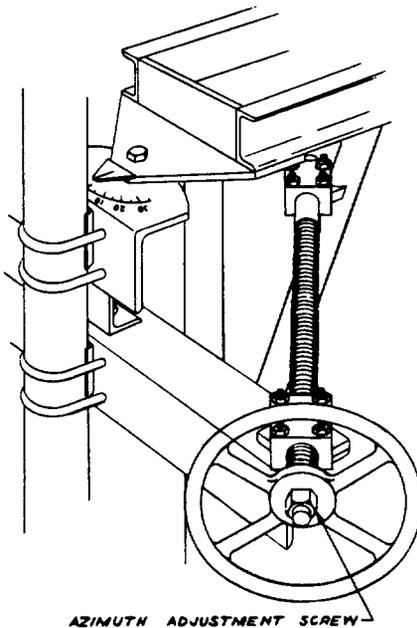


Fig. 2 — KS-16320, List 8 Azimuth Adjustment Screw Assembly in Operating Position

**3.06** The list 8 azimuth adjustment screw assembly is considered to be an accessory for elevation adjustment and is to be in place while work is being performed. Connect the azimuth screw, as shown in Fig. 2 of this section, on whichever side of mounting angle 4B is more accessible, and tighten the screw to hold the azimuth position of the reflector. Then loosen the clamps on strut assembly 32B, being careful not to remove the nuts completely from the bolts.

**3.07** Loosen the bolts which connect the top mount assembly to the reflector and to the top swivel, respectively. Unscrew the nuts just enough to permit the top mount to move freely with respect to its two connections. *Do not loosen the nuts to a point that may cause them to become disengaged from the bolts.* Note that the nut which clamps the top swivel to the mounting angle is not disturbed.

**3.08** Loosen the clamps which hold the reflector onto the lower mount. Back the nuts off equally just enough to remove the clamping load between the reflector base and the lower mount. *Do not loosen the nuts to the point that may cause them to become disengaged from the studs.* Now operate the elevation adjustment screw by

applying a 1-1/2-inch open-end wrench to the hex end of the drive nut to move the reflector to the desired elevation setting.

**Note:** An open-end wrench is recommended for this operation rather than an *adjustable* open-end type, to preserve the hex form of the nut. Since the tool will be used repeatedly in adjusting different reflectors, the relatively loose fit of an adjustable wrench will have a tendency to round the corners of the hex and thereby impair its effectiveness.

**3.09** The elevation setting to which the reflector is adjusted can be determined by reference to the scale mounted on the inside of the lower mount. A pointer on the adjacent holding clamp registers with the clamp to provide a reading. Note that there are two ranges on the scale (angles are measured with respect to the vertical), one from 29 to 41 degrees and the other from 39 to 51 degrees. Referring to Fig. 3 of this section, if the reflector is connected to the top mount at the hole indicated for the 29 to 41 degree range, read elevations from the corresponding range on the lower scale; if the top connection is made at the position indicated for 39 to 51 degrees, elevation is read from the lower scale having the same range. It is important that the pointer be level and at a right angle to the scale when elevation readings are taken. *See that the clamp assembly hangs evenly from the reflector base. Swing or lift the assembly slightly to assure that it is hanging vertically when readings are taken.*

**3.10** If the complete elevation adjustment cannot be made from a single setting of the adjustment tool, tighten the holding clamps sufficiently to hold the reflector in position while the tool is being shifted.

**Caution:** *Do not release the elevation adjustment tool while the holding clamps are loose.*

**3.11** When the reflector has been brought to the desired elevation setting, tighten the holding clamps at the base immediately. Bring the studs up evenly by an orderly cross-over procedure (such as would be used in tightening a flange or plate) to assure even bearing at all points. The cross-over procedure should be

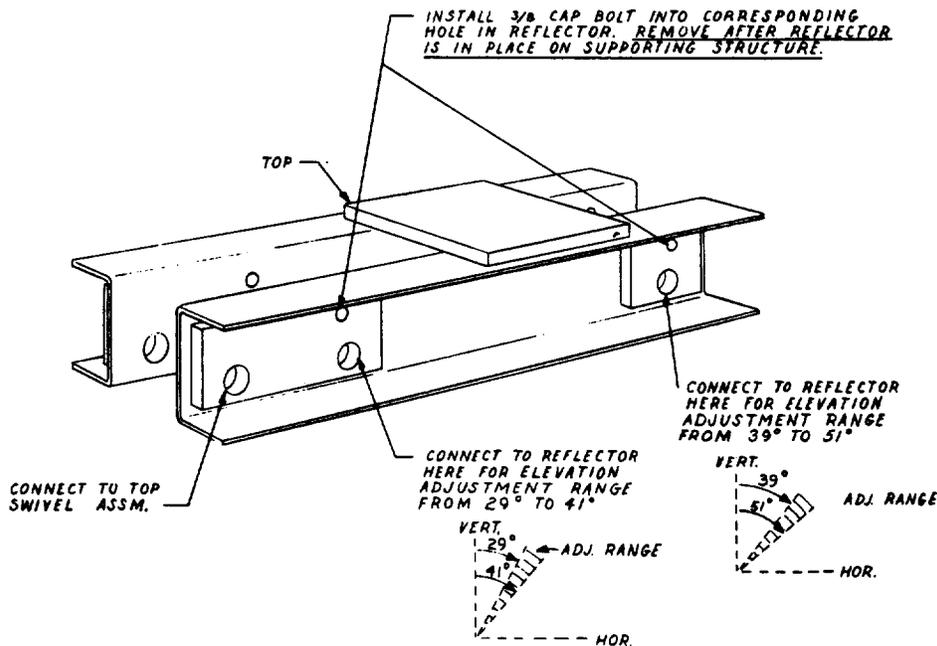


Fig. 3 — Top Mount Assembly — KS-16320 Passive Reflector

worked simultaneously between the two clamps. Tighten the two bolts which connect the top mount assembly to the reflector and to the top swivel assembly, respectively. Remove the elevation adjustment screw assembly as soon as possible after the holding clamps and top mount have been tightened. Provided further azimuth adjustment is not required, use a torque wrench to tighten the clamps on strut assembly 32B to 20 pound-feet and remove the azimuth adjustment screw assembly.

**Caution:** Whenever a reflector is to be left unattended at an intermediate stage in the adjustment, such as overnight, etc, be certain that it is restrained sufficiently to prevent wind damage. Do not rely on adjustment tools exclusively for this purpose. Either the bracing means provided in the assembly or suitable auxiliary restraining gear should be employed.

#### 4. RELOCATION OF TOP CONNECTION

**4.01** If the required change in elevation setting necessitates relocation of the reflector from one to the other of the top mount positions, as shown in Fig. 3 of this section, provide a rope sling, a 3/4-ton lever-operated chain hoist, for connecting the hoist to the 4-inch O.D. pipe,

Item 26, Figs. 1 or 2, in Section 402-423-400, and approximately 3 feet of marline or heavy twine.

**4.02** Install the list 7 elevation adjustment screw and list 8 azimuth adjustment screw, as discussed in 3.04 and 3.06.

**4.03** Refer to Figs. 1 or 2 as applicable of Section 402-423-400, where the following item numbers are identified. **Loosen bolts carefully and only the minimum amount necessary to permit movement between the clamped parts.** Loosen the clamps, Items 12B and 13B, Fig. 1, or Items 10B and 11B, Fig. 2 holding the base of the reflector, the bolts joining the top mount Item 10B, Fig. 1, or Item 12B, Fig. 2, to the reflector and to the swivel, Item 9B, Fig. 1 or Item 8B, Fig. 2, and the split clamps on the strut, Item 32B of either figure.

**4.04** Operate the elevation adjustment screw, as described in 3.09 and 3.10, to bring the reflector to the central scale position.

**4.05** Referring again to figures in Section 402-423-400, attach the sling firmly to the 2- by 2-inch tube, Item 13, Fig. 3, or the 2-1/2-inch O.D. tube, Item 18, Fig. 4, at the back of the reflector, as near the top as possible.

Attach the chain hoist securely to the 4-inch O.D. pipe at the same elevation as the sling. Connect the hook to the sling and draw it in snugly against the tube of the reflector, keeping the hook lined up with the direction in which tension will be applied by the hoist. Operate the hoist to exert moderate tension. Apply a length of marline or heavy twine as a serving around the open end of the hook to prevent the sling from slipping out.

**4.06** Remove the bolt connecting the reflector to the top mount and move the reflector to the alternate bolting position. Insert the bolt immediately and replace the lockwasher and nut.

**Caution:** *It is important that the sling remain in tension during the time that the reflector is disconnected from the top mount.*

**4.07** Proceed with fine adjustment, as described in 3.09 and 3.10. Then clamp the reflector at the desired setting, as described in 3.11.

## **5. PRECAUTION**

**5.01** When all adjustments have been completed, the installation should be examined carefully for immobilization in accordance with Section 402-423-212.