

# MICROWAVE ANTENNAS

## KS-19570 PASSIVE REFLECTORS

### MAINTENANCE

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guys on guyed-supporting structures are readjusted, the orientation of the reflectors, should be checked and adjusted as required.

#### 2. PRECAUTIONS

**2.01** Maintenance on reflectors should be performed only in reasonably clear weather when winds at reflector location do not exceed moderate velocities. At most sites a considerable amount of time will be required to ascend and descend the tower. Therefore, maintenance routines should not be started unless weather conditions are expected to remain stable for the time period required to complete the entire maintenance operation.

**2.02** Do not attempt to climb a structure unless at least one other person associated with the work operation is in attendance on the ground. All personnel who will be on the structure or in its vicinity shall wear safety headgear.

**2.03** Before climbing, be certain the structure is safe by visually examining the entire structure for soundness using field glasses or telescope, if necessary, to check the condition of remote portions. The tower, reflector assembly, and all attachments must be free from unusual vibration, sway, etc. *If guys appear to be unevenly loaded beyond a condition caused by wind loading, or if there is evidence of shifting or heaving at the anchors, do not climb the tower.* Ladders or step bolts should be provided on all structures and are to be used for climbing.

**2.04** Tools should be hauled up separately or carried aloft in a closed pouch, bag, or tool belt in a manner that will keep the hands free for climbing and will not interfere with movement of the climber.

#### 1. GENERAL

**1.01** These maintenance procedures should be performed on KS-19570 Passive Reflector Antenna when it is found necessary as a result of a scheduled inspection or because of an interruption or degradation of service.

**1.02** Intervals for inspecting the reflector will be established by local conditions such as past experience with a particular reflector or a similar installation in the vicinity, the degree of exposure to weather or industrial atmosphere, the frequency and severity of storms, dependability requirements of the system, and accessibility of the reflector site. In any case, the reflector assembly should be inspected as often as the supporting structure. In the absence of a complete inspection, it may be advisable to use field glasses or a telescope to make visual examination of the reflector from ground level. The reflector assembly should be inspected completely within six months to one year after installation and each time servicing of the reflector is necessary for operational reasons. When

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**2.05** Before climbing, be sure the structure is dry and there is no accumulation of ice or snow. Note the locations of any power lines that may be attached to or are near the structure. ***Check to be sure no electrical contact with the structure exists and that any power lines in the vicinity of the structure can be avoided by the climber.***

**2.06** Whenever work is to be done aloft, a canopy or other shield shall be used to protect the antenna from damage due to falling objects. If the equipment is operating, the shield must be transparent to the microwave signal.

**2.07** The act of climbing is strenuous and should be undertaken only by persons in good physical condition to whom height is not objectionable. Avoid overexertion by conserving energy in the early phase of the climb. Stop and rest at each 25-foot interval during the climb until reaching the reflector assembly location. ***Use a body belt and safety strap during each rest period*** and rest for a long enough time to relieve labored breathing and to relax arm and leg muscles.

**2.08** To avoid becoming overheated when climbing, wear clothing that permits freedom of movement and is of a relatively light weight. Heavier clothing may be required while aloft due to increased exposure at elevated positions. Wear fitted gloves to protect the hands, and shoes that provide enough support to permit standing on structural members without undue fatigue.

**2.09** When aloft, ***avoid stepping onto the reflector assembly*** whenever possible. If it is necessary to move onto the reflector, use a ladder or platform that can be firmly attached and will safely support the user as well as protect the reflector from damage. When the ladder or platform is in place, it should be in a position that will allow the person to climb onto it, perform necessary work operations, and dismount safely.

**2.10** Personnel on the ground who are not actively connected with the work aloft, shall remain outside an area that extends outward from the base of the supporting structure a distance equal to one-third of the height at which the work aloft is being performed. Vehicles shall be parked outside this area also except while actually being used in the work operation.

**2.11** Loose items such as tools, hardware, etc, which are required aloft should be kept in a pouch, a belt, or otherwise secured. When their use is no longer required, they should be lowered to the ground. Do not leave loose items on ledges where they inadvertently may be knocked off. Persons working aloft should exercise care to avoid dropping tools or equipment.

**2.12** Any electrically operated tool or other portable equipment used either on the ground or aloft must be effectively grounded.

**3. TOOLS AND MATERIALS**

**3.01** The tools and materials in the following list may be required in performing maintenance on the KS-19570 Passive Reflectors:

QUANTITY	DESCRIPTION
1	Set of open-end or box wrenches for checking tightness of bolts, and nuts — Sizes 7/16, 3/4, 15/16, 1-1/8, and 1-1/2 inch
1	Measuring Tape, 12 foot
1	Measuring Scale, 6 inch
—	CKL-P6B Huck Rivets
1	Hand Tool, Huck #136
1	Nose Assembly for 3/16-inch diameter protruding head rivet, Huck #99-562
1	3/16-inch diameter hex socket screw wrench
—	Files for Aluminum
1	File Card
—	Emery Paper, Fine
1	Screwdriver for No. 6 Screws
1	Keyhole Hacksaw
1	Hand Brace
1 Set	Drill Bits to 1/2 inch to fit chuck on hand brace
—	No. 6 Aluminum Sheet Metal Screws, 1/4 inch long
—	No. 14 GA Aluminum Sheet
1	Wire Brush
1	Chipping Hammer

- Zinc-Rich Paint (Galvicon, Galvicon Corp., Brooklyn, N. Y. or Equivalent)
- Paint Brushes
- Turpentine
- Clean Rags

#### 4. ROUTINE PREVENTIVE MAINTENANCE

**4.01** When maintenance is to be performed at a station which is operating in a transmission system, the transmission at the station should be monitored continuously during the maintenance period so any disturbances may be immediately detected and corrected.

**4.02** Prepare for inspection or maintenance of the reflector by becoming familiar with its operating principles and mechanical details. Make notes of the dimensions of spacing of attachments on pipe mounts, elevation and azimuth settings, etc. Provide a means of communicating between the working position aloft and personnel on the ground so information regarding system operation, etc, can be relayed immediately.

**4.03** Examine the assembly for any indication of corrosion, rust, or removal or loosening of galvanized finish. On steel parts, clean affected areas with a wire brush and/or chipping hammer to remove all traces of rust and any loose galvanized finish. Coat the area with zinc-rich paint. Apply the paint well beyond the boundary of the rusted area to assure continuity of protection. The aluminum parts of the reflector assembly are corrosion-resistant in most environments. However, if corrosion is present, the metal should be carefully examined to determine if repairs are necessary. In cases where excessive corrosion is present, a chemical analysis may be required to determine the cause and method of prevention.

**4.04 Mast Assembly:** Check attachments to the supporting structure. Correct any indication of loosening, slipping, or misalignment of U-bolts as indicated by changes in original spacing or scoring of the pipe wall. Examine welds for cracks or separations.

**4.05 A-Frame Assembly:** Check points of attachment to mast assembly and lower edge of reflector assembly. Check the top section of the A-frame for cracks or separations of welds.

Examine the elevation screw at the point where the screw passes through the A-frame for any signs of looseness in the thrust bearing. Check all bolted connections and tighten where necessary.

**4.06 Backstay Pipe Assembly:** Examine the backstay adjustment and attachment assemblies and the backstay pipe assembly for any signs of looseness or misadjustment. Check all bolted connections and tighten where necessary.

**4.07 Azimuth Stabilizer and Azimuth Adjustment Rod:** Examine connector assembly and turnbuckle end assemblies for any indication of looseness or misadjustment. Check all bolted connections and tighten where necessary.

**4.08 Reflector Assembly:** Examine all bolted connections for signs of looseness and tighten as required. Carefully examine the reflecting surface for punctures, surface irregularities, cracked or separated welds, or loose rivets. Bulging of the reflector face due to separated welds should be repaired as covered in 5.03.

#### 5. MAINTENANCE AND REPAIR TO IMPROVE OR RESTORE SERVICE

**5.01** Misalignment or damage to the reflector assembly can cause fading or a loss of the radio signal. If the cause of signal disturbance is not obvious, check all items covered in 4.03 through 4.07 taking particular care to detect any looseness or other irregularity that could cause reflector misalignment.

**5.02** Minor damage to the reflecting surface, such as a small hole or a surface deformation in an area of less than two square feet, will probably not cause discernible signal degradation unless the reflector orientation was changed by the incident that caused the damage. The need for repair and the method of repair will depend on the extent of the damage. In such cases, inspect the damage carefully and make the following minor repairs as required:

(a) Remove any loose metal.

(b) If there are any splits in the reflecting surface, drill a 3/32-inch hole at the end of each split so the hole extends from the split into sound metal. Use a hand brace and sharp drill.

(c) If necessary to reinforce a split portion, fasten a strip of 14 GA aluminum in place over the damage using a minimum number of No. 6, 1/4-inch long, aluminum sheet metal screws. Holes in the reflecting surface that are large enough to affect performance of the reflector will constitute major damage to the reflector. The method or feasibility of repair of such damage will have to be determined by local supervision.

**5.03** Loose welds on the reflector face may be detected by signs of slight bulging of the face skin. To repair, drill two .194-inch diameter holes (use No. 10 twist drill) in the areas having loose welds (one hole on each side of broken weld) and install a Huck P6B rivet in each hole. Holes shall be spaced so there will be a minimum of four inches between rivet heads.