

ART TEST TARGET CRITERIA

Background

The ART test target antenna is used to check the orientation accuracy of the ART system. A 1,680 MHz signal from a test target transmitter is fed to the test target antenna to provide a signal for the ART tracking system to lock on to. The angular position displayed on the ART system should agree with the surveyed angular position of the test target antenna within 0.05E.

1. Test Target Antenna Tower Requirements

- S The tower should be constructed of corrosion free metal and should have steps for climbing. If it is a problem to have metal towers, wooden towers may be used. However, termite and creosote are disadvantages of using wooden towers.
- S The tower should be capable of withstanding a minimum of 600 lbs of weight.
- S A corrosion free metal frame should be installed on the tower. The frame will provide support for the test target transmitter and its shelter.

2. Test Target Antenna Tower Siting Requirements

- The tower and the elevation of the base for situating the tower should be high enough so that the test target antenna mounted at the top of the tower will present a target of at least 6E in elevation above terrain or obstructions (see Figure 1 and 2).
- S The tower must be rigidly installed on a firm area so that proper leveling and orientation may be obtained.
- S The tower should be as close to the ART pedestal as possible. But it should not be less than 150 feet from the ART pedestal.
- S There must be a direct line-of-sight (LOS) transmission from the test target antenna to the ART antenna.
- S There should be no large objects existing 45* on either side of the LOS between the two antennas.
- S A 115 VAC outlet should be available at the tower site.

3. Test Target Antenna Tower Grounding Requirements

- S The metal tower should be properly grounded to earth to prevent damage to the electronic devices due to lightning and

to prevent "re-radiating" from the tower. Make sure that good electrical connections are achieved when grounding the metal tower. If necessary, scrape painted surfaces to obtain a good electrical connection and then repaint.

- S The grounding resistance of the grounding conductor and the grounding electrodes should be maintained to 5 ohms or less.

A. Grounding Electrodes

- S Copper-clad steel ground rods of at least 5/8-inch in diameter and at least 8-foot in length should be used as grounding electrodes. In cases where bedrock is near the earth surface, horizontal strips of metal, solid wires, or stranded cables buried 1 to 3 feet deep should be used. Several wires, strips, or cables should be interconnected and arranged in a star pattern.
- S Grounding electrodes should be free from nonconductive coatings, such as paint or enamel.
- S In general, Two to four ground rods should be used. However, the actual rods needed will depend on the surrounding soil conductive property.
- S Spacings between ground rod should be twice the length of the ground rod. Spacing between the test target antenna tower and the ground rod should be about the length of the ground rod.
- S Ground rods should be installed such that at least 8 feet of length is in contact with the soil. Ground rods should be driven vertically or at an oblique angle not to exceed 45° from the vertical. If this can not be achieved, the ground rods should be buried in a trench that is at least 2½ feet deep.

B. Grounding Conductor

- S The grounding conductor should be of copper, aluminum, copper-clad steel, or bronze.
- S The grounding conductor should not be smaller than No. 10 copper or No. 8 aluminum or No. 17 copper-clad steel or bronze.
- S Insulation on the grounding conductor is not required.
- S The grounding conductor should be installed in one continuous length and be run in as straight a line as practicable along

the test target antenna tower.

- S The grounding conductor should be securely connected to the test target antenna tower and to the grounding electrodes by exothermic welding, listed lugs, listed pressure connectors, listed clamps, or other listed means. Connections depending on solder shall not be used. Clamps used should be listed for the materials of the test target antenna tower, the grounding electrodes, and the grounding conductor. Clamps used on buried electrodes should also be listed for direct soil burial.

4. Test Target Transmitter Requirements

- S The 1,680 MHz test target transmitter stocked at NLSC under NSN 5955-00-185-5116 should be used to power the test target antenna. The transmitter is an oscillator assembly, model TS-1362-S2, manufactured by Microwave Products Group (MPG).
- S The test target transmitter should be checked and set to 1,680 MHz prior to installation. The frequency is set by rotating the FREQ adjustment screw on the test target transmitter until a frequency of 1680 MHz is indicated on the ART system frequency meter. Clockwise rotation of this control decreases the output frequency.
- S The audio modulation switch on the test target transmitter should be set to the CW position (unmodulated).
- S The test target transmitter should be installed on the tower behind the test target antenna parabolic reflector.
- S The test target transmitter should be installed in a weather proof metal shelter. The metal shelter should be grounded to the test target antenna grounding conductor. The shelter should be painted white.
- S A 2 foot RG-8/U coaxial line terminated with UG-21/U, type N, male connectors on both ends must be fabricated. The line is connected between the test target transmitter and the test target antenna.
- S A 10 dB attenuator must be installed between the test target transmitter and the test target antenna.
- S A switch for the 115 VAC to the test target transmitter must be installed in the ART MCU office. The power requirement of the test target transmitter is less than 10 watts. A 15 amps circuit breaker or fuse should be used.

5. Test Target Antenna Requirements

- S The 30 inch test target assembly stocked at NLSC under NSN

5985-00-983-2216 should be used. The assembly should be mounted at the top of the tower. It must be secured to prevent movement and vibration from high wind.

- S** The true angular position of the test target antenna should be obtained using an optical theodolite or a surveyor's transit.

- S** The test target antenna should be oriented so the horizontal axis of the test target dipole faces the ART radome. The test target transmitter power should be adjusted after the antenna has been oriented, the desired radiation path is cleared of objects, the ground below the radiation path is dry, the air is clear, and the humidity is low. To set the power, turn on the ART system and observe the meter reading of the received signal on the MCU or R/ACU signal level meter. Adjust the test target transmitter power level for a 35 to 40 dB reading on the MCU or R/ACU signal level meter. Clockwise rotation of the PWR adjustment screw on the test target transmitter will decrease the power output. The final test target antenna orientation is made by adjusting the reflector slightly until the correct angular position of the test target antenna is obtained.

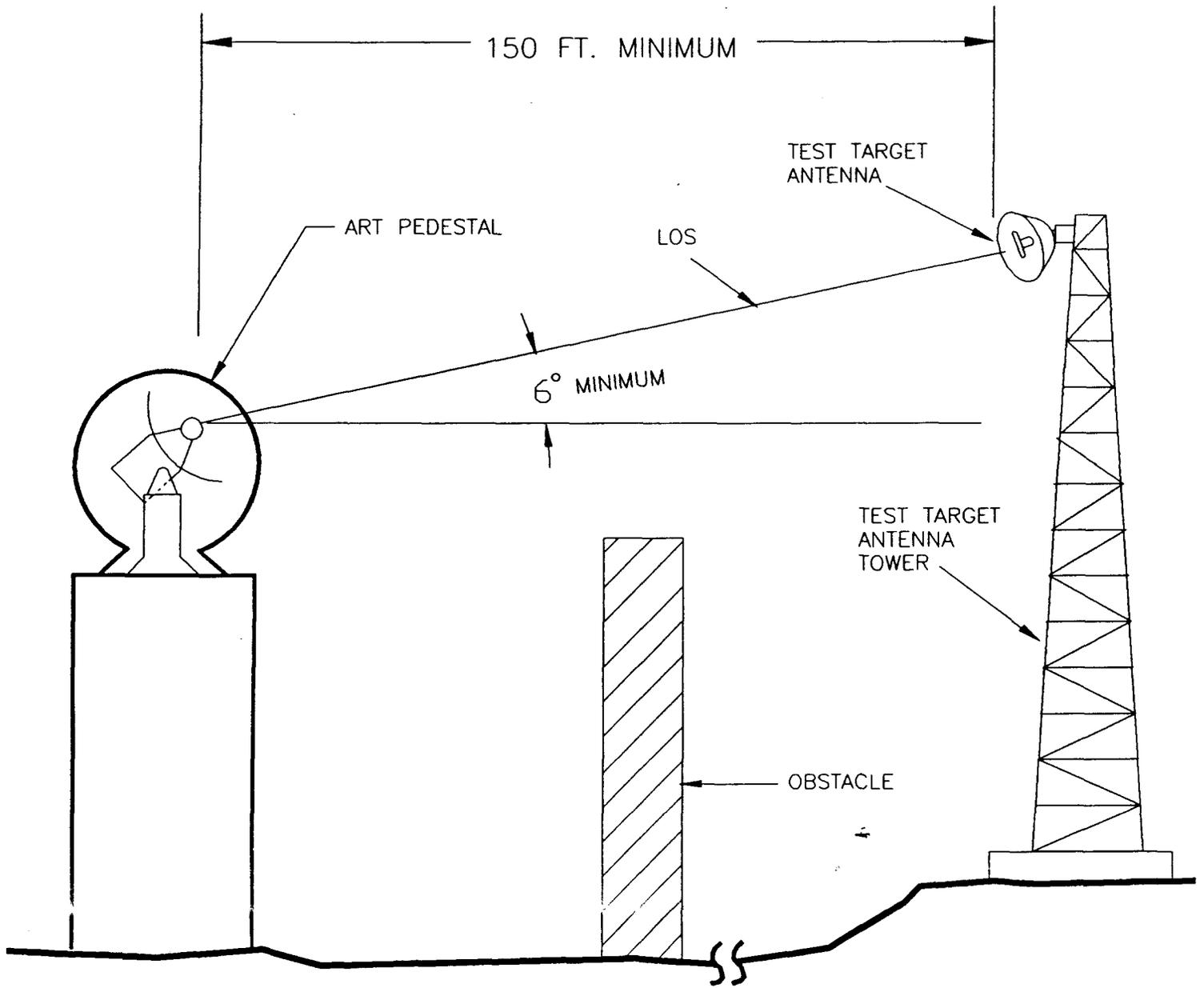


FIGURE 1 - DISTANCE AND ELEVATION OF TEST TARGET ANTENNA WITH RESPECT TO ART PEDESTAL WHEN NO OBSTACLE IS ABOVE ART ANTENNA HEIGHT.

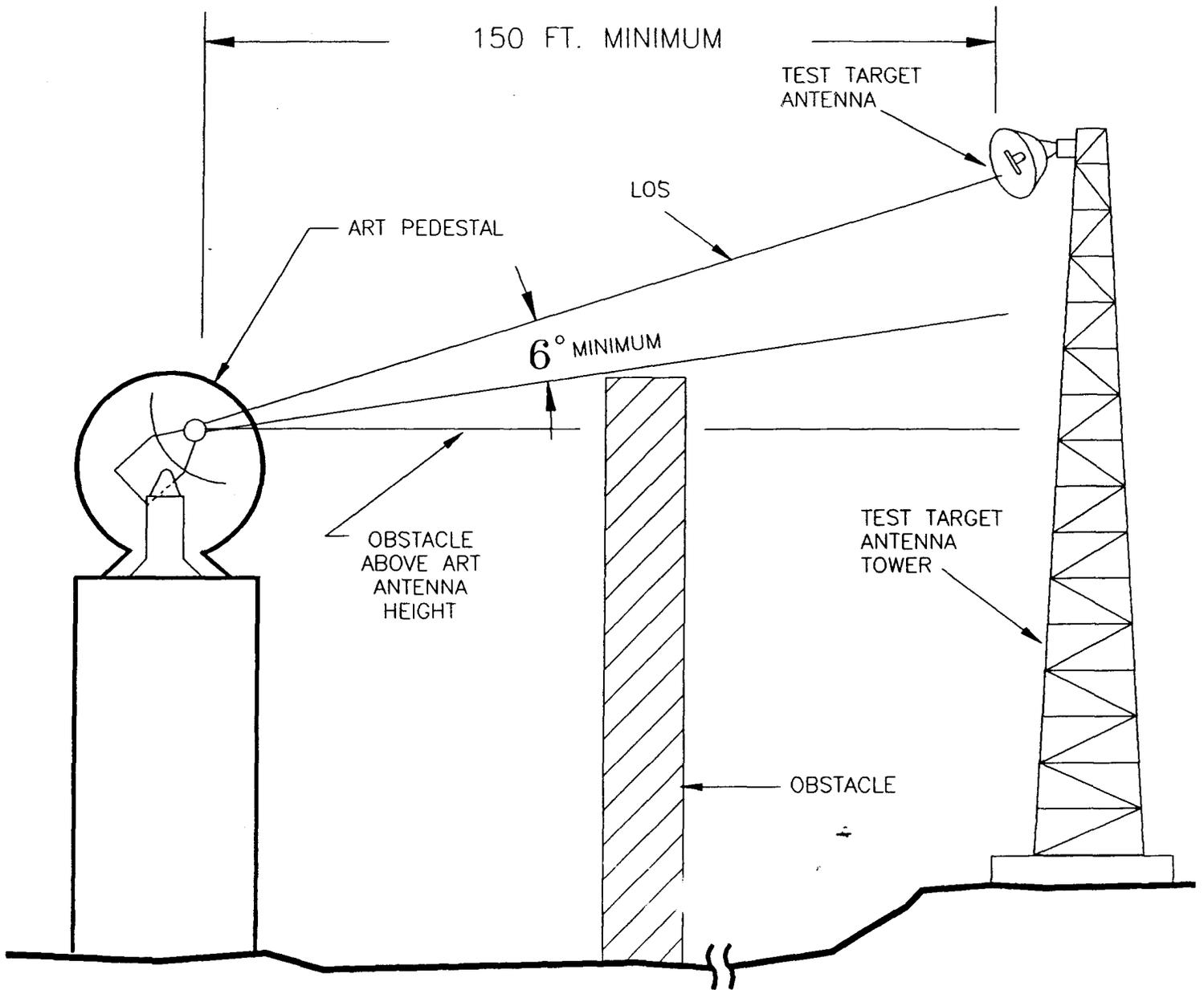


FIGURE 2 - DISTANCE AND ELEVATION OF TEST TARGET ANTENNA WITH RESPECT TO ART PEDESTAL WHEN OBSTACLE IS ABOVE ART ANTENNA HEIGHT.