

Federal Aviation Agency

ADVISORY CIRCULAR

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PREVENTIVE MAINTENANCE,
REBUILDING, AND
ALTERATIONS

EFFECTIVE :

6/11/65

SUBJECT : MAINTENANCE OF WEATHER RADAR RADOMES

1. PURPOSE. This advisory circular provides guidance material useful to repair facilities in the maintenance of weather radar radomes.
2. GENERAL. Radomes may be considered as lenses which protect radar antennas from the elements. Radar efficiency, definition, and accuracy of display depends upon a clear, nondistorted, reflection free antenna view through the radome. In addition to its "optical" properties, the radome must be structurally sound. This latter point may be overlooked because of concentrated efforts to achieve optimum operational performance. Structural characteristics should not be ignored or minimized as a structural failure of a nose radome, besides being an economic loss, can result in aircraft damage.
3. RADOME CHARACTERISTICS. There are two general types of radomes, the "thin wall" and "sandwich" types. Thin wall radomes are considered to be thin relative to the wavelength of the radar. They are generally useful when the radar frequency is low enough to permit a skin thickness which will satisfy the structural requirements. Sandwich radomes consist of two or more plastic skins separated by a dielectric core. The core may consist of honeycomb plastic sections, hollow flutes, or foam plastic. The dielectric and separation of the skins will depend upon the wavelength of the radar frequency or frequencies. All of the physical characteristics of a radome have an effect upon its electrical characteristics, and this is of prime importance when making a repair.
4. MAINTENANCE. High performance radar radomes are very precisely constructed and sometimes the slightest change in their physical characteristics, such as excessive layers of paint, can adversely effect radar system performance. For this reason, all repairs to radomes should be precisely made using proper material, techniques, tools, and procedures. Even minor repairs can affect one or all of the following:

- a. Transmissivity. Which is the ability of a radome to pass radar energy through it.
- b. Reflection. Which is the return or reflection of the outgoing radar energy from the radome back into the antenna and waveguide system.
- c. Diffraction. Which is the bending of the radar energy as it passes through the radome.

These electrical properties, when altered by improper repair, can cause loss of signal, distortion and displacement of targets, and can clutter the display to obscure the target. Poor radome electrical performance can produce numerous problems which may appear to be symptoms of deficiencies in other units of the radar system. The following are examples of improper repair:

- a. Use of wrong materials - not compatible with original radome materials.
- b. Patches of different thickness.
- c. Poor fabrication techniques.
- d. Nonvoid-free patches.
- e. Repairs overlapping.
- f. Holes plugged with resin, screws, metal, wood, and plastic plugs.
- g. Cuts or cracks simply coated with resin.
- h. Tape (including electrical tape) over hole or crack and covered with resin.
- i. Oversize patches.
- j. Too much resin or too little resin.
- k. Exterior coatings - too many coats, too thick, uneven thickness - metallic base paints.
- l. Filled honeycomb cells.
- m. Repairs made without removing moisture or moisture contamination from inside of radome wall.
- n. Abrupt changes in cross-sectional areas.

- o. Patches projecting above outside contour lines.
 - p. Improper cure.
 - q. Wrong size cells or density of honeycomb.
 - r. Excessive overlap in honeycomb joints.
 - s. Poor bonding of skin to core.
 - t. Gaps in honeycomb core.
5. RECOMMENDATION. Both the physical and electrical properties of radomes should be given careful consideration during repair operations. These properties are carefully controlled during manufacture and should not be altered by improper repairs.


George S. Moore
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