

## RADOME SURVEY

### HUGHES AIRCRAFT COMPANY, CULVER CITY, CALIFORNIA ANTENNA DEPARTMENT

#### A. Current Research and Development Projects

1. Design and development of radomes for use in missiles and interceptors.
2. Measurement of dielectric constant and loss tangent of dielectric materials at elevated temperatures.
3. Development of equipment for the measurement of insertion phase delay of dielectric walls.
4. Development of microwave antennas for use in missiles which require a radome as an integral part.
5. Theoretical and experimental investigations of the various types of obstacles which affect radome pointing errors.
6. Investigation of the various techniques of radome error prediction.
7. Study of the electromagnetic transmission characteristics of doubly curved dielectric walls.
8. Measurement of the near-field of antennas with and without radomes.
9. Investigation to compare the error produced by a radome when mounted in front of a monopulse type antenna and when the same radome is mounted in front of a conical scanning antenna.

#### B. Additional work is required on the following subjects:

1. Near-field measurement accuracy required for the prediction of radome pointing errors.
2. The accuracy of the presently known techniques of measuring near-fields.
3. The permissible electrical non-uniformity in a fabricated radome resulting in a so-called "uniform radome" as determined by measurements made on pointing error measuring facilities.
4. Investigation of the electromagnetic effect of the nose of a streamlined radome in producing radome pointing errors.

#### C. The chief investigators are:

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|--------------|-----------------|-----------------|
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| M. Bar       | H. R. Hope      | G. I. Tsuda     |
| C. B. Barker | V. J. Jenkins   | B. L. Walsh     |
| S. R. Boyle  | S. Kaspin       | L. W. Wilson    |
| J. E. Fromm  | L. L. Philipson | J. Zorzy        |

## PLASTICS DEPARTMENT

### A. Current Research and Development Projects

1. Investigation of heat-resistant polymers, directed toward the development of materials capable of withstanding flight at high Mach numbers, including a study of the mechanisms of thermal degradation, the prevention of loss of strength at elevated temperatures, and the development of new and improved polymers for high temperature applications.
2. Development of radome materials of uniform and controlled dielectric constant, by the use of combinations of high dielectric constant fillers.
3. Investigation of alternate techniques and tooling for economical production of high quality radomes, particularly for interceptor aircraft.
4. Investigation of materials, configurations, protective devices, etc., for missile radomes to render them capable of flight at tactical velocities in rain and after prolonged exposure to adverse climatic conditions.

### B. Suggestions for Future Programs

Investigation and development of dielectric materials adequate for use on missiles and aircraft at supersonic speeds. Some required characteristics are listed below:

1. Maintenance of dielectric constant within acceptable limits over the operating range of temperatures.
2. Mechanical strength at operating temperatures sufficient to withstand acceleration and aerodynamic loads.
3. Ability to withstand thermal shock caused by aerodynamic heating.
4. Resistance to rain erosion at tactical velocities.

### C. The Chief Investigators are:

Dr. E. L. Armi, Head of Plastics Department  
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