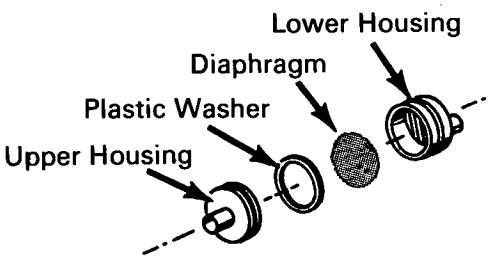
February 1967

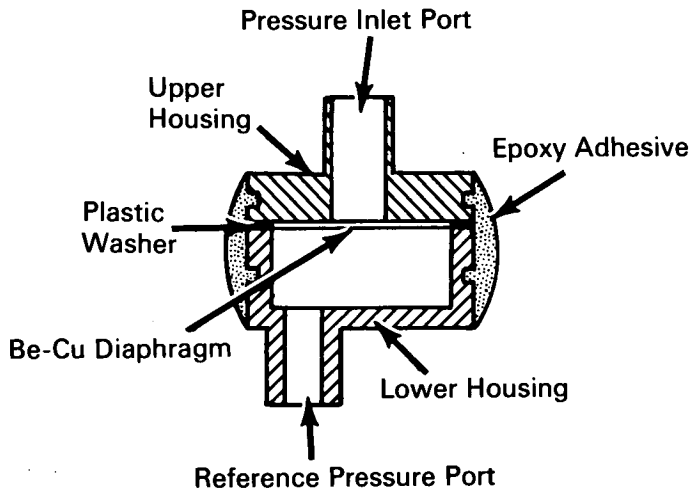
Brief 67-10020

NASA TECH BRIEF

Miniature Capacitor Functions as Pressure Sensor



ACTUAL SIZE



The problem:

To devise a miniature capacitor that will operate reliably as a differential-pressure telemetry sensor over wide ranges of pressure, temperature, and acceleration encountered during free flight of an instrumented test model in a hypersonic continuous-flow wind tunnel.

The solution:

A capacitor incorporating a beryllium copper diaphragm that produces a variation in capacitance as a function of the pressure applied to one face of the diaphragm relative to a reference pressure applied to the opposite face.

How it's done:

The actual size of the unit (exploded view) and the construction details (sectional view) are shown in the illustrations. The diaphragm is secured to the rim of the lower housing by means of a low-melting solder in a specially designed fixture. This subassembly and electrically insulating washer are then fitted to the upper housing and aligned in another specially designed fixture. An epoxy adhesive is used to hold the assembly together and provide a pressure seal at the seam.

When the respective pressures are applied to the inlet and reference ports, the diaphragm moves slightly and correspondingly changes the capacitance of the unit in response to the pressure difference. The capacitance is measured between the upper and lower housings connected to the tank circuit of a telemetry oscillator.

Notes:

1. The capacitor is capable of withstanding an overpressure of 50 psi and is insensitive to the accelerations and temperatures encountered in a hypersonic wind tunnel. It may also be used as an absolute pressure sensor by sealing the reference port.

(continued overleaf)

2. The units can be easily produced within close capacitance tolerances using the specially designed assembly fixtures.
3. Capacitors of this design can be used for remote measurement of rapid as well as slow changes in pressure in a variety of applications.
4. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference: B67-10020

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: R. G. Harrison
(JPL-903)