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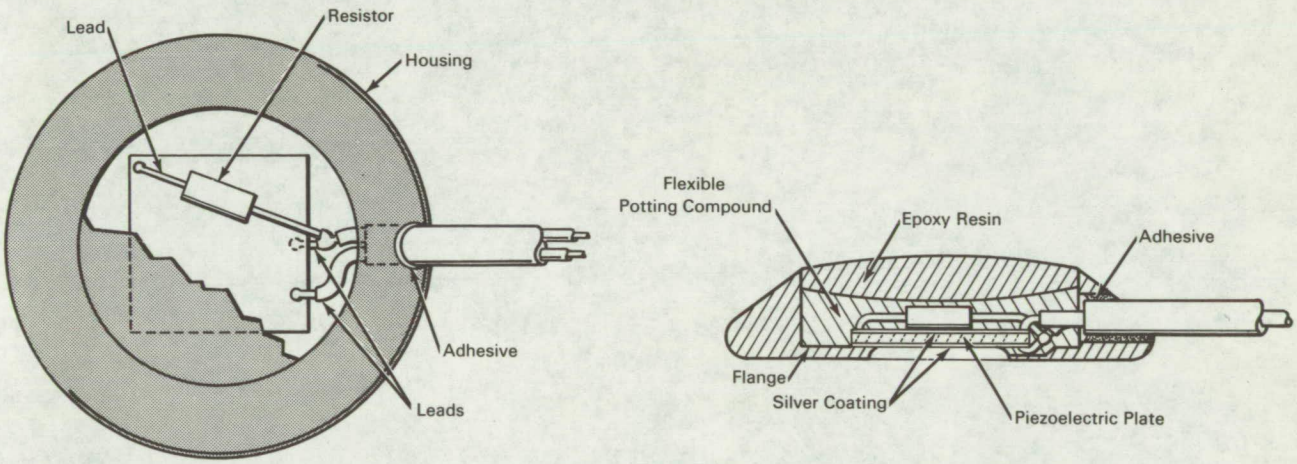
NASA TECH BRIEF

Phonocardiograph Microphone Is Rugged and Moistureproof



The problem:

To design a microphone to be used as a phonocardiograph transducer under conditions such as experienced by an astronaut. The microphone must be capable of monitoring small amplitude audio signals in the presence of large shock loads, accelerations of up to 40g, temperatures from 30° to 200° F, and high humidity.

The solution:

A microphone incorporating a lead zirconate–lead titanate piezoelectric plate encapsulated in a flexible polyurethane resin contained in a sealed nylon case having a diameter of less than 1 inch.

How it's done:

A square plate (approximately 0.4 inch on a side) of the piezoelectric ceramic with a silver coating on opposite faces, to permit soldering of lead wires to the plate, is supported at diagonally opposite corners on a flange at the bottom of the nylon case. The lead wires are soldered to the plate surfaces as shown in the illustration. A 470 Kohm (0.1 watt) carbon resistor, soldered in parallel with the terminals of the piezoelectric plate, serves to provide the required low frequency response of the transducer. The plate is secured to the support points on the flange by means of a suitable adhesive coating. This adhesive material is also used to seal the joints between the case and the cable.

The space directly above the plate is partially filled with a polyurethane resin, which, when cured, remains sufficiently flexible so as not to interfere with the piezoelectric characteristics of the plate. The polyurethane resin also holds the resistor in fixed relation to the plate and effectively seals the internal circuit against moisture in the atmosphere and from perspiration from the body to which the transducer is attached. The remainder of the cavity is filled with an epoxy resin, which, when cured, serves as an

(continued overleaf)

electrical and thermal insulator and exhibits high resistance to mechanical shock. This epoxy resin is also applied as a seal to the interface junction between the piezoelectric plate and the opening at the base of the transducer.

Notes:

1. In use, the base of the microphone is secured to the skin over the area to be monitored with a piece of double-backed surgical tape.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas 77058
   Reference: B66-10314

Patent status:

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

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