

September 1971

Brief 71-10374

NASA TECH BRIEF

Lewis Research Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

Dynamics of Short Pressure Probes

The problem:

In studies of stall propagation through an engine, several transient total pressure probes are located in the inlet and in between the engine compressor stages. The probes have internally mounted miniature pressure transducers connected to short total-head tubes. To protect the transducer from damage by entrained particles in the airstream, either the transducers are mounted at right angles to the axis of the probe, or offsets or baffles are included in the internal geometry of the probe. The problem involves incorporating the particle impact protection features and the average total pressure measurement into the probe design without degrading the transient response of the measuring system.

The solution:

An experimental program was conducted, and the report on that program presents practical design information for optimizing the transient response of the probes. A computer program calculates the probe response, based on the Bergh-Tijdeman equation.

How it's done:

The frequency response and the frequency response variations resulting from probe geometry variations were measured for probes 2.54 cm long with i.d.'s

of 0.325 and 0.160 cm. Geometrical variations were designed to permit simultaneous measurement of time-average pressure and to protect the pressure transducer from particles entrained in the airstream. For comparison, a computer program was used to calculate the frequency response of a multi-tube volume system, using the Iberall and Bergh-Tijdeman equations. Measured frequency response showed good correlation with predictions made by the computer program.

Notes:

1. This program is written in FORTRAN IV for use on the IBM-7094 computer.
2. Requests for further information should be directed to:

COSMIC
112 Barrow Hall
University of Georgia
Athens, Georgia 30601
Reference: B71-10374

Patent status:

No patent action is contemplated by NASA.

Source: T. W. Nyland, D. R. Englund, and
R. C. Anderson
Lewis Research Center
(LEW-11293)

Category 09