NASA TECH BRIEF

Telemetry for Impact Acceleration Measurements

The problem:

To provide, for impact studies on structures, a miniature inexpensive telemetry system that is compatible with a three-axis accelerometer.

The solution:

The telemetry package uses three separate FM/AM transmitters, one for each axis of measurement. At the ground station three inexpensive AM receivers and a tape recorder are used for receiving, demodulating, and recording the acceleration signal.

How it's done:

The output from each axis of the piezoelectric accelerometer is connected to a separate FM/AM telemeter circuit. The input stage of each circuit is a high impedance (300 megohms) voltage follower which drives a voltage-controlled subcarrier oscillator. The center frequency of the subcarrier is set to approximately 54 kHz and is capable of ±40% deviation for a specified input voltage. The subcarrier output is then used to modulate the rf carrier at 100% amplitude.

At the ground station three AM receivers (300 kHz bandwidth) demodulate the rf carrier, providing the FM subcarriers at their respective outputs. The three subcarriers are then directly recorded on tape. When the tape recorder is played back using FM-reproduce electronics (center frequency of 54 kHz), the subcarrier is demodulated, providing the analog waveform of the impact acceleration. Performance features include the following: 1) 60 db signal to noise ratio; 2) Frequency response 0.5 Hz to 9 kHz; 3) Channel cross-talk below the noise level; 4) Time correlation (phase shift) less than 1 degree; 5) Acceleration measurements from 0 to 1000g.

Notes:

1. Additional information is contained in the paper "FM/AM Telemetry To Measure Impact Accelerations" published in Proceedings of the Fourteenth International ISA Aerospace Instrumentation Symposium, June 3–5, 1968, Boston, Massachusetts.
2. Requests for further information may be directed to:

   Technology Utilization Officer
   Ames Research Center
   Moffett Field, California 94035
   Reference: TSP70-10079

Patent status:

No patent action is contemplated by NASA.

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