

MX MISSILE IN-FLIGHT VIBRATION DATA PROCESSING

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The quantity of measurements and broad frequency spectrum of interest for dynamic measurements required to support the development phase of the MX Missile, in conjunction with a limited downlink telemetry bandwidth, necessitated a unique vibration measurement system. This was accomplished by on-board vibration data processing comprising a sensor system (transducer/ low noise cable/charge amplifier) and a multi-channel digital Vibration Data Processor (VDP). The processor is a 1/3 octave frequency band analyzer, employing digital filter circuitry covering 22 bands over a frequency range from 14 Hz to 2245 Hz, providing an output that represents the energy(G^2) per band/time interval. A Master Data Control Unit (MU) controls the VDP operation via a full duplex data bus.

This paper will describe the sensor system, with its designed in-post installation test/verification features and the capabilities and design features of the VDP. Processor characteristics such as the self-test operation whereby all 1/3 octave analysis bands are verified, the ability to meet a 60 dB dynamic range, the individual instructions code capability along with other features will be presented. The most important facet of this on-board processing allows a downlink data bandwidth conservation ranging up to 184:1 which is compatible with the digital telemetering system.