

Earth flying in space. The observing scenario may be customized by uploading new control software to the SIDECAR.

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Amplitude-Stabilized Oscillator for a Capacitance-Probe Electrometer

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A multichannel electrometer voltmeter that employs a mechanical resonator maintained in sustained amplitude-stabilized oscillation has been developed for the space-based measurement of an Internal Electrostatic Discharge Monitor (IESDM) sensor. The IESDM is new sensor technology targeted for integration into a Space Environmental Monitor (SEM) subsystem used for the characterization and monitoring of deep dielectric charging on spacecraft. Creating a stable oscillator from the mechanical resonator was achieved by employing magnetic induc-

tion for sensing the resonator's velocity, and forcing a current through a coil embedded in the resonator to produce a Lorentz actuation force that overcomes the resonator's dissipative losses. Control electronics employing an AGC loop provide conditions for stabilized, constant amplitude harmonic oscillation.

The prototype resonator was composed of insulating FR4 printed-wireboard (PWB) material containing a flat, embedded, rectangular coil connected through flexure springs to a base PWB, and immersed in a magnetic field having two regions of opposite field direc-

tion generated by four neodymium block magnets. In addition to maintaining the mechanical movement needed for the electrometer's capacitor-probe transducer, this oscillator provides a reference signal for synchronous detection of the capacitor probe's output signal current so drift of oscillation frequency due to environmental effects is inconsequential.

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