Loss cone imager digital system design

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Abstract: The Loss Cone Imager (LCI) will sample the energetic-particle pitch-angle distributions relative to the local geomagnetic field vector in the magnetosphere as a part of the Demonstration and Science Experiment (DSX) satellite. A description of the LCI electrical interfaces and data flow will be presented. The pitch angle and energy of energetic particles are recorded by the FSH (Fixed Sensor Head) and HST (High Sensitivity Telescope) sensor electronics using solid state detectors. Energetic particle data must be extracted from the FSH and HST by the DPU (Data Processing Unit) and stored in a format that is practical for ground data analysis. The DPU must generate a data packet that is sent to the experiment computer containing science and housekeeping data, as well as receive ground and time commands from the experiment computer. The commands are used to configure the sensor electronics and change the data acquisition periods of the science data. The instrument works in conjunction with the WIPER (Wave-Induced Precipitation of Electron Radiation) VLF (Very Low Frequency) transmitter on the DSX satellite to view the effects of VLF waves injected in the Earth's magnetic field on the precipitation of electrons into the Loss Cone. The system is designed to operate autonomously with the changing state of the transmitter to provide more appropriate data for examining the effects of the VLF transmitter. © 2009 SPIE.
Author Keywords: Data processing; DSX; LCI; Loss cone; Space weather

Year: 2009
Source title: Proceedings of SPIE - The International Society for Optical Engineering
Volume: 7438
Art. No.: 743809
Cited by: 1
Link: Scorpus Link
Document Type: Conference Paper
Source: Scopus
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