

powers up to 3.5 W at 200 K. Self-induced vibration measurements indicate that the cooler can be balanced to reduce vibration forces below 0.02 newtons from 0 to 500 Hz.

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ENVIRONMENTAL MONITORS IN THE MIDCOURSE SPACE EXPERIMENTS (MSX). O. M. Uy, Applied Physics Laboratory, The Johns Hopkins University, Laurel MD 20723, USA.

The Midcourse Space Experiment (MSX) is an SDIO-sponsored spacebased sensor experiment with a full complement of optical sensors. Because of the possible deleterious effect of both molecular and particulate contamination on these sensors, a suite of environmental monitoring instruments are also being flown with the spacecraft. These instruments are the Total Pressure Sensor based on the cold-cathode gauge, a quadrupole mass spectrometer, a Bennett-type ion mass spectrometer, a cryogenic quartz crystal microbalance (QCM), four temperature-controlled QCMs, and a Xenon and Krypton Flash Lamp Experiment. These instruments have been fully space-qualified, are compact and low cost, and are possible candidate sensors for near-term planetary and atmospheric monitoring. The philosophy of adopted during design and fabrication, calibration and ground testing, and modeling will be discussed.

opportunity to obtain composition information from spectra at those wavelengths. We propose construction of a flight instrument functioning in the 1100–3200-Å spectral range that is suitable for a dedicated satellite ("QuickStar") or as a space-station-attached payload. It can also be an autonomous package in the space shuttle cargo bay.

The instrument structure is of graphite fiber epoxy composite, and has an objective diffraction grating, low expansion optics, multichannel plate electro-optics, and event discrimination capability through processing of video data. It would either have a field-of-view (fov) of 12° and f number of 0.75 or a wider fov of 20°–25° and f number of 1. The instrument has a heritage from the UV auroral imager of the Swedish Viking spacecraft [4].

References: [1] Harvey G. A. (1977) *NASA TN D-8505*. [2] Richter N. B. (1963) *Nature of Comets*, p. 75, Methuen. [3] Henize K. G. et al. (1975) in *NASA SP-355*, 129–133. [4] Anger C. D. et al. (1987) *GRL*, 14, 387–390.

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DEVELOPMENT OF MINIATURIZED OPTIMIZED SMART SENSORS (MOSS) FOR SPACE PLASMAS. D. T. Young, Southwest Research Institute, Instrumentation and Space Research Division, San Antonio TX 78228-0510, USA.

The cost of space plasma sensors is high for several reasons: (1) Most are one-of-a-kind and state-of-the-art, (2) the cost of launch to orbit is high, (3) ruggedness and reliability requirements lead to costly development and test programs, and (4) overhead is added by overly elaborate or generalized spacecraft interface requirements. Possible approaches to reducing costs include development of small "sensors" (defined as including all necessary optics, detectors, and related electronics) that will ultimately lead to cheaper missions by reducing (2), improving (3), and, through work with spacecraft designers, reducing (4). Despite this logical approach, there is no guarantee that smaller sensors are necessarily either better or cheaper. We have previously [1] advocated applying analytical "quality factors" to plasma sensors (and spacecraft) and have begun to develop miniaturized particle optical systems by applying quantitative optimization criteria. We are currently designing a Miniaturized Optimized Smart Sensor (MOSS) in which miniaturized electronics (e.g., employing new power supply topology and extensive use of gate arrays and hybrid circuits) are fully integrated with newly developed particle optics to give significant savings in volume and mass. The goal of the SwRI MOSS program is development of a fully self-contained and functional plasma sensor weighing ~1 lb and requiring ~1 W. MOSS will require only a typical spacecraft DC power source (e.g., 30 V) and command/data interfaces in order to be fully functional, and will provide measurement capabilities comparable in most ways to current sensors.

References: [1] Young D. T. (1989) *AGU Monograph*, 54, 143–157.

56299 **N93-28829** *160775*

X-RAY, FAR, AND EXTREME ULTRAVIOLET COATINGS FOR SPACE APPLICATIONS. M. Zukic and D. G. Torr, Physics Department, University of Alabama in Huntsville, Huntsville AL 35899, USA.

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ULTRAVIOLET IMAGING SPECTROMETER. T. J. Wdowiak, Department of Physics, University of Alabama at Birmingham, CH 310, 1300 University Blvd., Birmingham AL 35294-1170, USA.

Wide-field imaging systems equipped with objective prisms or gratings have had a long history of utility in groundbased observations of meteors [1] and comets [2]. Deployment of similar instruments from low Earth orbit would allow the first UV observations of meteors. This instrument can be used for comets and Lyman alpha coronae of Earth-orbit-crossing asteroids. A CaF₂ prism imaging spectrograph designed for stellar observations was used aboard Skylab to observe Comet Kohoutek (1973f), but its 1300-Å cut-off precluded Lyman alpha images and it was not used for observation of meteors [3]. Because the observation of the UV spectrum of a meteor has never been attempted, researchers are denied the

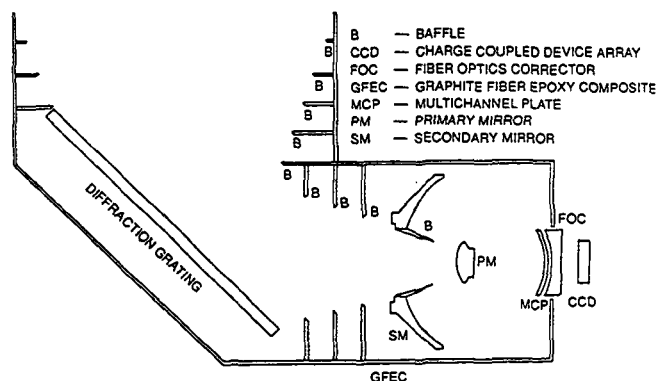


Fig. 1.

The improved FUV filters that we have designed and fabricated