AVIRIS:
RECENT INSTRUMENT MAINTENANCE, MODIFICATIONS AND 1992 PERFORMANCE

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1. INTRODUCTION

Over the past five years the AVIRIS engineering team has worked to improve the performance, reliability and calibration accuracy of the AVIRIS sensor. Recent modifications to the instrument include a new tape recording subsystem and an improved blocking filter for the D spectrometer. Maintenance activities during the 1992 engineering cycle include the recoating of the spectrometer spherical mirrors, replacement of the fiber optic harness and routine noise reduction tuning and optical alignment.

2. TAPE RECORDER UPGRADE

The Ampex AHBR 1700 tape recorder system has been replaced by a Metrum VLDS. The VLDS provides a number of advantages over the old Ampex unit. The lower cost of the VLDS has made it possible to purchase a field replaceable spare. The T120 VHS cassette tape format eliminates the need for preflight tape threading. The 10 Gigabyte storage capacity enables the acquisition of approximately 70 AVIRIS scenes per flight.

3. SIGNAL THROUGHPUT

The AVIRIS scan mirror has been re-coated. The new coating has a 10% improvement in reflectivity at 400 nanometers. A new fiber harness has been installed and will return the D spectrometer to full service. A new, more resilient IR fiber material was used. An additional anti-reflection coating has been added at the foreoptics end of the new fiber harness. The recoating of the spherical spectrometer mirrors has increased signal throughput and eliminated the scattering caused by a previous incident of water damage.

A new blocking filter has been installed in the D spectrometer. The old blocking filter impacted the signal level of the last five spectral channels. The new blocking filter will enable good signal out to 2500 nanometers. The channel positions will be shifted to take advantage of this fact. The new filter also has a 20% better transmittance in the pass band.

4. SYSTEM NOISE

A detailed study of sensor related noise was useful in identification of a number of noise reduction actions. The result is reduced system noise and

better external noise rejection. Modifications include (1) timing signal opto-isolators with lower jitter, (2) nested timing of the clock driver signals, (3) RFI shielded timing cables, (4) better routing of dewar internal wiring, and (5) rerouting of the focal plane temperature sensor wiring.

5. PREDICTED PERFORMANCE

The current instrument performance as assessed by the preseason laboratory calibration and inflight calibration experiment will be presented. Performance will be stated in terms of signal-to-noise ratio for a standard reference radiance and in terms of noise equivalent radiance for each of the spectral channels.

6. FUTURE MAINTENANCE WORK

The primary maintenance activity for the 1993 engineering cycle will be the replacement of the focal plane arrays. The A spectrometer FPA experienced a wire debond immediately after the 1991 flight season. Other FPAs have shown an increase in the number of noisy pixels. Each FPA has over 1000 liquid nitrogen cool down cycles in which the temperature goes from 300 K to 77 K in less than one minute.

7. REFERENCES

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