Spacecraft Subsystem Performance and 2-Gyro/FSS Control System Development Status Summary

IUE NASA Newsletter No. 20 provided information on the development of a backup control system for the IUE; for a review of this problem area see that report. This report updates the status of that effort and summarizes other spacecraft subsystem status reports that were presented to the IUE Users' Committee on March 21, 1983

The development of the 2-Gyro/Fine Sun Sensor (FSS) backup spacecraft control system, for use in the event of another gyro failure, is progressing satisfactorily. The new on-board computer (OBC) software control system has been assembled and all design tests have been successfully completed. The ground software modifications have also been completed. Operational simulations are now being performed to verify the interactive capability of all ground and spacecraft software, as best we can, using the ground spacecraft simulator. In June we plan to perform tests with the spacecraft. During these tests operational capabilities and limitations of the new control system will be evaluated.

IUE Spacecraft Operations are continuing normally. Even though the spacecraft has been effectively supporting the science operation, after 5 years there are several areas where operational constraints are developing.

The Solar Array power output continues to decrease about 6% per year. (This is less than was projected by the designers.) This reduced power now limits the time of operations at extreme spacecraft/sun angles. Two batteries supplement the Solar Array power when needed. We operate at high and low Beta until reaching a battery discharge limit; then the spacecraft must be maneuvered to a positive-power attitude to recharge the batteries.

The Hydrazine subsystem temperatures continue to rise. Higher operating limits were established in February 1983 to avoid impact to science operations. The new limit is 85°C, except for a 90°C limit for the +Z line. The rate of temperature rise vs. time would indicate that the new limits will give at least one more year of operation without significant impact to science operations. Certain elements overheat at high Beta while others overheat at low Beta; depending upon the Beta the transition from cold to hot temperature can occur in about 3 to 5 hours. It is quite evident that science operations will be adversely affected if we have to start maneuvering the spacecraft to keep various elements of the Hydrazine Auxillary Propulsion System (HAPS) cool.

We are currently evaluating our potential work-arounds for these problems. We believe that the impact of these problem areas can be minimized by carefully scheduling the science programs.

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