

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

IUE NASA Newsletter No. 20 and 21 provided information on the development of a backup control system for the IUE; for a review of this problem area see those reports. This report updates the previous report and summarizes the status reports that were presented to the IUE User's Committee on September 26, 1983.

The development of the 2-Gyro/Fine Sun Sensor (FSS) Hold/Slew backup spacecraft control system, for use in the event of another gyro failure, is complete. The Hold/Slew program is the control program used for normal science operations and it is ready for use in the event of another gyro failure. Operations simulations are continuing to be performed by the IUEOCC and IUESOC staffs to further evaluate the 2-Gyro/FSS system performance and capability. These operations simulations are also being performed to test the ground operating procedures (software) that have been modified for the new control system. The Delta-V OBC software, which provides the control during station keeping maneuvers, is in engineering test. Station keeping maneuvers are required about every 10 months. When this Delta-V control system is fully tested the 2-Gyro/FSS control system development will be complete. The GSFC has decided not to test this software with the IUE spacecraft until it is required.

Science operations under this 2-Gyro/FSS backup control system will be impacted. Some examples of these limitations are:

1. Maneuver accuracy will be degraded; a need for intermediate verification of spacecraft attitude during long maneuvers is expected.
2. The capabilities to perform blind-offset and moving-target operations will have to be tested and the limitations identified. Limitations are expected.
3. When there is no guide star, spacecraft roll will be controlled from the FSS, i.e., using the sun, which moves in the spacecraft's inertial frame.
4. Operations cannot be performed below Beta 15°.

The use of the two batteries to supplement the Solar Array power at high and low Beta, mentioned in Newsletter 21, has been reviewed with the subsystem engineers. They have advised us to limit the use of the batteries for routine science operations, if we want maximum battery life. The batteries are required to support the spacecraft subsystems during the spring and fall eclipse seasons each year. In response to the power subsystem designers' advice operational limits have been placed upon high and low Beta operations where the batteries would be used. The allowable operating Beta range will change with the time of year, with the spacecraft equipment

being used, and with age, as the Solar Array current continues to decrease at about 6% per year. However, the Solar Arrays currently provide adequate power for operations from about Beta 20° to 120° if the spacecraft heaters are carefully managed to reduce power load and camera cycling (exposure, read, prep) is low. The IUESOC Resident Astronomers will advise you on this operational limitation.

The "HOT OBC" problem is being experienced again, now that we are into the winter months. This operational limitation has existed since the start of the IUE mission and may impact operations between Beta 55° and 95°.

The LWR camera has developed a "flare" at the bottom of the image. Flare intensity increases with exposure time. The camera engineers witnessed similar phenomena during camera development. In several test images the LWR camera flare was not detectable when the UVC voltage was reduced from 5kv to 4.5kv. The lower UVC voltage is expected to increase exposure time by about 36%. The LWP camera has now been designated as the operational longwave camera. The LWR camera will be available only upon request, currently at the 5kv UVC setting, but probably only at the lower UVC voltage in the future.

The spacecraft has been in orbit more than 5-1/2 years and continues to effectively support science data acquisition. We will learn to work around the operational limitations and try to minimize their impact on Guest Observer programs. We believe that the impact of these limitations can be minimized by carefully scheduling the science programs. Our staff is dedicated to helping the Guest Observer acquire the desired science data. If you have questions or comments on the IUE spacecraft status and operations, I would be pleased to talk with you.

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