

IUE Gyro Subsystem and Spacecraft Attitude Control System Status

IUE NASA Newsletter No. 19 provided information on the Gyro subsystem status as of early July; significant events have occurred since that report. On July 27, Gyro 2 failed and the spacecraft control system was modified to use Gyros 3, 4 and 5. Gyro 2 was the third Gyro to fail, leaving IUE without any backup Gyro capability. Three operating Gyros are the minimum required by the current control system. All three Gyro failures have been different so we do not believe there is a generic failure mode showing up.

The GSFC Guidance and Control Branch has designed a new backup spacecraft software control system that will use two Gyros and the Fine Sun Sensor, in the event of another Gyro failure. This new control system design has been completed and dynamic simulations show that this backup control system is feasible. There will be some limitations on spacecraft operations using this new system. These operational limitations will be further defined during the simulation and test programs. More information will be made available to the science community when the tests are completed. Major changes will also be required to the ground operations software (especially the maneuver processor) and ground operating procedures. The design Interface Control Document (ICD) has been received from the control system designers and the ground software design modifications are being made. A high priority is being placed upon this work; we expect the new control system will be ready for spacecraft testing in April 1983.

If another gyro fails before the new control system is operational we would make a concentrated attempt to restart Gyro 6, one of our three failed gyros. The design engineer's recommended technique for restarting Gyro 6 is to make it very hot and repeatedly turn it OFF and ON. This will also drive the temperature of the other gyros up, so we will not attempt to turn on Gyro 6 until it is required to continue the mission. The HEAO project was able to restart two gyros that failed; we believe the two HEAO gyro failures were similar to our Gyro 6 failure. There is no hope for returning Gyros 1 or 2 to operational use.

In the event of another failure there is an analog "safe-hold" mode that would hold the spacecraft in a safe attitude until Gyro 6 is restarted or the new backup control system is ready for use.

Ivan Mason
IUE Project Operations Director
January 3, 1983