

## Use of a FORTH-Based Prolog for Real-Time Expert Systems

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A frame/rule-based expert system is being developed to serve as the astronaut interface for a series of vestibular investigations to fly aboard the IML-1 Spacelab mission. This expert system is written in a fully-Clocksin and Mellish compatible Prolog, which is itself written in poly-FORTH. The Prolog contains a predicate that can be used to execute any FORTH definition; thus, the polyFORTH becomes an embedded real-time operating system. Using this Prolog, the power of FORTH for handling classical real-time tasks such as data acquisition, experiment control, serial communication, and graphical data display is available with the powerful procedure call mechanism, backtracking control, and built-in data base of Prolog.

The expert system data base comprises six frames, each of which contains detailed set-up, calibration, performance, sequencing, and debriefing information for a separate vestibular experiment. The expert system rule base consists of approximately 50 Horn clause format rules used to determine the next step in the experiment sequence based on operator input or real-time requirements. The expert system is used to step the operator logically through a complex experimental procedure, to initiate and suspend data acquisition and experiment control tasks, and to signal data display intervals and formats to a computer in the ground-based science monitoring area.