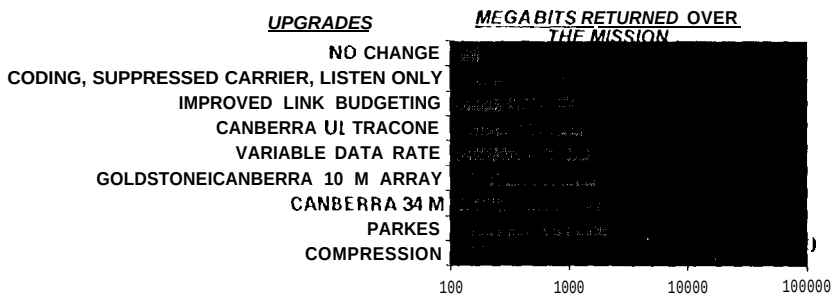
# AUTOMATED OPERA˙ IONS FOR GALILEO COMMUNICA˙ IONS

Joseph 1. Statman
Patrick Beyer
Dean Hardi
Jet Propulsion L aboratory
California Institute of Technology'
Pasadena, California

## Abstract

*After the Galileo High Gain* Antenna *(HGA) failed to deploy in 7991, the Jet Propulsion laboratory (JPL) faced the challenge of implementing a science-rich mission with a Low-Gain Antenna (LGA), at data rates that were almost four orders of magnitude less than originally planned. To accomplish this, JPL has completely redesigned the downlink to maximize the data return and increase its reliability, requiring the implementation of dramatic changes both in the* Galileo *on-board software and in the Deep Space Network (DSN). Key features of the new* link include data *compression, antenna arraying, recording and reprocessing of telemetry, suppressed* carrier *tracking, and highly efficient err-or-correcting coding, resulting in an effective* data *return that is approximately two orders of magnitude above that that would have* been feasible with *the L GA have the changes not been implemented (see figure). In particular, JPL* has *developed and deployed a new DSN Galileo Telemetry (DGT) subsystem at the three DSN sites: Goldstone, USA, Tidbinbilla, Australia, and Madrid, Spain. To maximize the dafa return, the DG T parameters (data rate, tracking loop bandwidths, array configuration)* are *con tinuously adjusted and the link operates* on a razor-thin *margin. Because the operation will continue for* almost two *years, 24-hours-per-day, the DGT is designed as an automated sysfem that continuously monitors and adjusts its operational parameters and environment in response to either pre-loaded sequences or changes in infernal* state, *with minimal operator intervention. The single-antenna DG Ts have been deployed at the DSN sites* and *the follow-on array DG Ts will be deployed shortly. In addition to the Galileo support, these automated DGTs are suitable to provide ground support for other low rafe missions.*

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