1. Abstract Title:

TURBOROGUE: GPS RECEIVER, SCIENCE INSTRUMENT, SMALL SATELLITE SYSTEM CORE

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7. Abstract Text

In addition to the navigation applications of the Global Positioning System, there are many scientific opportunities available for a high precision space borne receiver. Examples are: ionospheric tomography, atmospheric refraction profiles, altimetry, gravity field measurements, and attitude determination. GPS can also support other investigations such as synthetic aperture radar by providing track repeatability, precise time, trajectory, and attitude information

Also, such a receiver, with its powerful computing engine, can provide platform monitoring and control functions, In some applications, it can serve double duty as the flight computer and low rate (1-2 kbps) command receiver.

The JPL developed TurboRogue GPS receiver (which is produced commercially by Alan Osborne and Associates of Westlake Village, California) is potentially such an instrument. It's highly digital architecture enables the receiver to simultaneously act as a dual frequency GPS receiver, tone tracking science receiver, and digital command receiver. These functions have been demonstrated in ground applications that make use of additional frequency conversion hardware. A "rugged dized" flight TurboRogue will fly with the Orbital Sciences Corporation MicroLab-l mission scheduled for March 1995 and versions arc in preparation for other small satellite missions. The TurboRogue processor is an AMD 29050 which performs functions from digital tracking loops to navigation, scheduling, data formatting and handling, and general housekeeping.

This paper will describe TurboRogue hardware, software and space applications which have been or could be demonstrated. Emphasis will be place on results from the GPS-MET atmospheric profile science demonstration.

This work was performed for NASA under contract to the Jet Propulsion Laboratory - California Institute of Technology.

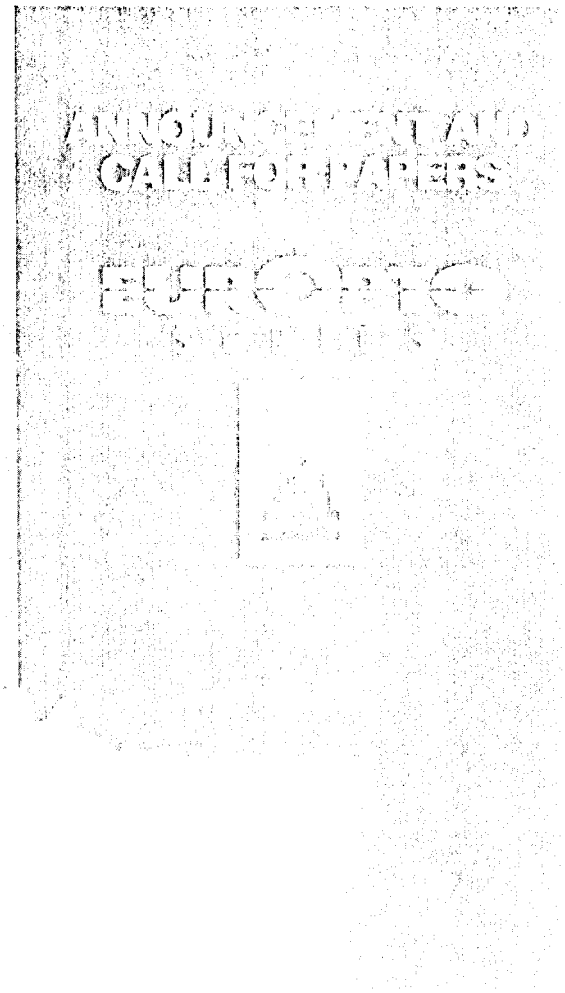
8. Brief Biography (Principal Author)

Courtney Duncan, BSEE (University of Houston), BM (Baylor University). Jet Propulsion Laboratory Member of the Technical Staff 1 987 to present.

JPL work has been in the GPS Systems Group of Section 335. Responsibilities have included application software for the Rogue and TurboRogue GPS receivers, specifically navigation solution and DSN equipment interface modules; simulation software; delivery of the Rogue (as the GPS Receiver/Processor Assembly, GRA) to DSN stations and sites at cooperating agencies; software maintenance; and documentation. Has been involved in a variety of field experiments with these receivers including seafloor geodesy, airborne SAR, "rapid static" surveying and tone tracking. Currently developing orbiting position and attitude determination software for a flight version TurboRoguc to be flown on the Pegasus-launched Orbcomm/GPS-MET mission in March 1995. Goals include the development of low-parts-count, highly-digital receivers and transponders and supporting software for deep space and earth based radio metric and communications applications.

In a volunteer role, set up and managed a world wide volunteer command station organization for four amateur radio microsats which were launched with Spot 2 on Ariannc V-35 in 1990. Continues as FCC licensee for the AMSAT-NA (Radio Amateur Satellite Corporation - North America) microsat from the group, AMSAT-OSCAR 16. Was Operations Vice President of AMSAT-NA 1981S-1991.

Lives in La Canada, California with wife Viann (a psychiatric nurse) and three children.



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