

# **APPLICATION OF THE GLOBAL POSITIONING SYSTEM (GPS) TO SPACE SHUTTLE NAVIGATION**

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## **Abstract**

The present baseline Space Shuttle navigation system is comprised of several separate subsystems: TDRSS doppler ranging, TACAN (Tactical Air Navigation), MSBLS (Microwave Scanning Beam Landing System), and ground tracking. With the advent of the DOD development of the GPS, it may be possible to replace several of these subsystems with an on-board GPS navigation system. However, the Shuttle signal dynamics and environmental considerations impose unique and severe requirements for a GPS navigation system. Consequently, a preliminary study has been conducted to define requirements and configure candidate GPS systems for the Shuttle navigation function.

Three configurations have been considered: an early test/demonstration system, which could be flown on early OFTs (Orbital Flight Tests), an interim system having greater capability but still not having full operational capability, and, finally, a fully operational system. A description of the test/demonstration and interim systems and the results of performance analyses are given. These preliminary results indicate that a GPS navigation accuracy greater than that obtained from the baseline system can be obtained for the orbital and de-orbit phases of the Shuttle mission.