ABSTRACT

U. S. AUTOMATED RENDEZVOUS AND CAPTURE CAPABILITIES REVIEW

TITLE: AUTONOMOUS DOCKING GROUND DEMONSTRATION (Category 3)

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TECHNICAL DESCRIPTION

The NASA Johnson Space Center (JSC) is involved in the development of an autonomous docking ground demonstration. The demonstration combines the technologies, expertise and facilities of the JSC Tracking and Communications Division (EE), Structures and Mechanics Division (ES), and the Navigation, Guidance and Control Division (EG) and their supporting contractors.

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The autonomous docking ground demonstration is an evaluation of the capabilities of the laser sensor system to support the docking phase (12ft to contact) when operated in conjunction with the Guidance, Navigation and Control software . The docking mechanism being used was developed for the Apollo Soyuz Test Program. This demonstration will be conducted using the Six-Degrees of Freedom (6-DOF) Dynamic Test System (DTS). The DTS environment simulates the Space Station Freedom as the stationary or target vehicle and the Orbiter as the active or chase vehicle. For this demonstration the laser sensor will be mounted on the target vehicle and the retroreflectors on the chase vehicle. This arrangement was used to prevent potential damage to the laser. The sensor system, GN&C and 6-DOF DTS will be operated closed-loop. Initial condition to simulate vehicle misalignments, translational and rotational, will be introduced within the constraints of the systems involved.

Detailed description of each of the demonstration components (e.g. Sensor System, GN&C, 6-DOF DTS and supporting computer configuration) including their capabilities and limitations will be discussed. A demonstration architecture drawing and photographs of the test configuration will be presented.

The test runs are tentatively scheduled to be conducted in late October-early November 1991. If this occurs, videos of the demonstrations and preliminary results will be presented.

TEST EXPERIENCE/RESULTS:

The sensor system being used is a brassboard version of the laser docking sensor that was being developed for application in the Lunar/Mars programs. The laser system being used has been tested in the Six-DOF Sensor Test Bed (granite rail) in Building 14 at NASA/JSC. The results of these tests will be presented. Further laser docking system development is not presently funded.

SOURCE/SPONSORSHIP AND CURRENT FUNDING:

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