

# NASA TECH BRIEF



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## Earth Orbit Rendezvous Evaluation Program

### The problem:

Future missions for large launch vehicles require rendezvous with previously orbited satellites. These missions include the setup and supply for interplanetary and advanced lunar missions. A major technical question for these missions is that of providing the precision vehicle guidance required to accomplish the rendezvous. The techniques used so successfully for Gemini rendezvous are not applicable to missions for large payload vehicles such as Saturn V.

### The solution:

A study program concentrating on (1) an investigation of the direct extension of the present Saturn Iterative Guidance Mode (IGM) Scheme, and (2) a scheme formulated in a reference frame moving with the target satellite.

### How it's done:

An orbital rendezvous guidance scheme for large, constant thrust launch vehicles is developed in a relative coordinate system that moves with the target satellite and provides an improved gravity model. For burn-coast-burn trajectories to 100 nautical mile orbit, the payload delivered agrees with the optimum calculus of variation payload within 0.1 percent over more than a two-minute launch window. A method for calculation of optimum switch-on time for final burn and

a technique for management of thrust level variation are also developed. A rendezvous guidance scheme is also formulated in the inertial reference employed with the present Saturn IGM.

### Notes:

1. This program was written in Fortran IV and checked out on an IBM 7044/7094 Direct Couple under IBSYS version 13.
2. Inquiries concerning this program may be directed to:

COSMIC  
Computer Center  
The University of Georgia  
Athens, Georgia 30601  
Reference: B67-10407

### Patent status:

No patent action is contemplated by NASA.

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