DSPSE  Asteroid Flyby Operations

Presentation To Engineering

8 October 1992

Note: If you have comments, information, or corrections, please contact Lou Wheatcraft @ (713)280-1892 or send comments via QuickMail or Connect.
DSPSE Asteroid Flyby Operations

Lunar Swingby To Pre-Flyby Activities Overview:

- This Briefing Covers Activities From Lunar Swingby To The Post Geographos Flyby Portion Of The Geographos Transfer Trajectory & Is Divided Into Three Phases:
  - Lunar Swingby To Pre-Flyby (≈ 5 Days Before Flyby).
  - Pre-Flyby Activities To Flyby
  - Post Flyby
- Experiments & Tests Will Be Conducted During This Phase To Fine Tune Algorithms & Operations Associated With The Geographos Flyby
- The Actual Sequence Of Events Will Probably Change From What Is Contained In This Briefing
  - The Baseline Sequence Defines The Envelop Of Operations For Which The Subsystem Hardware & Software Should Be Able To Support
  - The Actual Flyby Sequence Is Being Developed By A Joint Working Group Lead By NRL. Members Include: NRL, LLNL, JPL, & Goddard.
- Activities To Be Conducted During This Phase Include:
  - Full-Up Rehearsals In Preparation For The Geographos Flyby
  - Autonav Experiments
  - Autonomous Scheduling Experiments
  - Sensor Calibrations
  - Other Scientific Observations (TBD)
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Geographos Transfer Trajectory: (Based On Original CSC Trajectory)

S/C Trajectory Parameters

<table>
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<tr>
<th>Date</th>
<th># Days From May 27</th>
<th>Distance From Earth (km)</th>
<th>Velocity S/C - Earth (km/s)</th>
<th>Distance From Geographos (km)</th>
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Pre-Flyby Geometry:

Note: The X-Z Plane is in the plane of the Ecliptic, thus the Y axis (Solar Array Axis) will be the rotation axis during the flyby.

Point Of Closest Approach

Directio of Motion

Naval Research Laboratory
Washington, DC 20375-5000
Because +Z Axis is pointing to Geographos & the X-Z plane is in the plane of the ecliptic, the amount of attitude change for pointing the high gain antenna (-X axis) to Earth is the EVG angle minus 90°. Thus during the approach, with a EVG = 40°, the rotation for dump is -50°.
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Vehicle Distance From Geograph

Point Of Closest Approach
≈ 80 - 200 Km
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Orbit Determination & Planning:

- During Asteroid Transfer Portion Of The Mission, Both Pomonkey (Up To ~2 Million Km) & DSN Sites Will Supply Range & Range Rate Data For Spacecraft Orbit Determination To Goddard Space Flight Center (GSFC) & JPL Who Will Compute The State Vector & Supply It To The DMOC.
  - DSN Geographos Transfer Tracking Scenarios: (17 Jun GSFC/CSC Draft Memo)
    -- Actual Scenario Will Be Detailed In GSFC/CSC Study Due Apr 93
    -- Nominal Tracking Scenario (84 Days): Range & Range Rate With 2 One Hour Contacts Per Day With Canberra, & 1 One Hour Contact Per Day With Both Goldstone & Madrid
    -- Before and After Trajectory Burn: Range & Range Rate With 3 One Hour Contacts Per Day With Canberra, & 2 One Hour Contacts Per Day With Both Goldstone & Madrid
    -- Continuous Tracking During Flyby
    -- DSN Requires ~ 45 - 60 Minutes Prepass & ~ 15 Minute Postpass Activities For Each Scheduled Pass (Independent Of Pass Duration)

- Optical & Radar Tracking Of Geographos Coordinated By JPL
  - Goldstone Radar Data Not Available Until ~ 1 Day Prior To Flyby
  - Optical Data Via TBD Observatories (World Wide)