

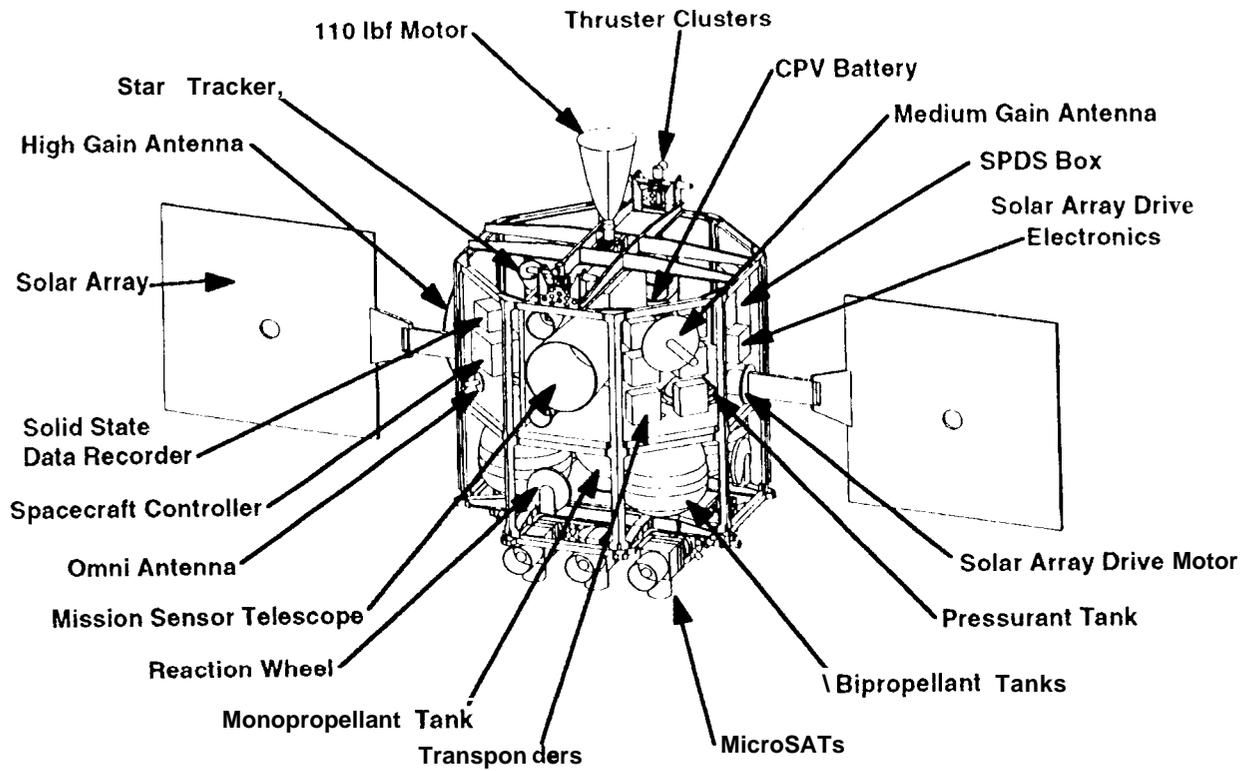
PROPOSED CLEMENTINE II MISSION
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The Commander, Air Force Space Command (AFSPC), and the Administrator, National Aeronautics and Space Administration (NASA), recognized that expanded cooperation between AFSPC and NASA is in the best interest of both organizations and have committed to a program of proactive coordination of activities in areas of mutual interest. The proposed Clementine 11 Mission has become a focus of this cooperation.

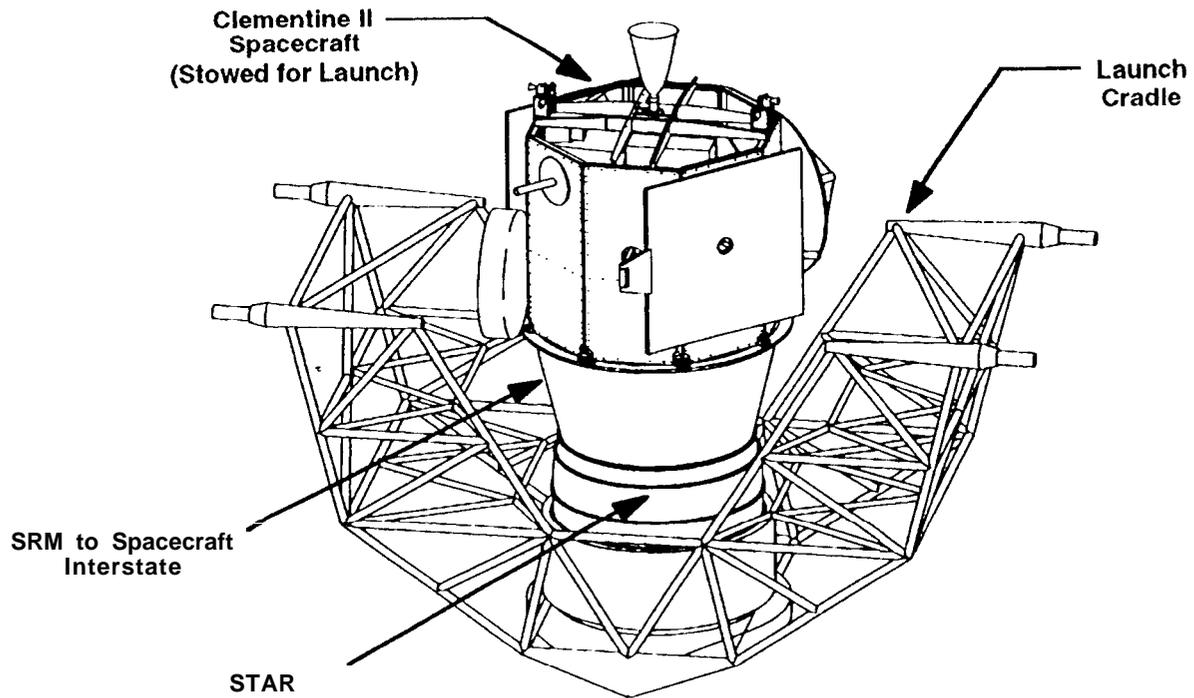
Clementine 11 is a Congressionally-directed program to fly an asteroid intercept mission by a microsatellite. The program is within the AFSPC authorization and the Clementine II Pre-project Team includes HQ AFSPC, Phillips Laboratory, Lawrence Livermore National Laboratory (LLNL), Naval Research Laboratory (NRL) and the NASA Science Community involved with near-Earth object research. Clementine II would continue the "faster, better, cheaper" legacy of Clementine I, providing important dual use benefits by advancing the microsat state-of-the-art, promoting technologies important to future space control architecture, demonstrating independent autonomous operations, rendezvous, inspection, and space surveillance technologies, providing advanced sensor remote and in-situ observations of asteroids in high spatial, spectral and time resolutions, and allowing for several additional scientific experiments.

The Clementine 11 program would be under the executive oversight of the AFSPC / Space Warfare Center (SWC) with Program Management headed by the Air Force Phillips Laboratory (AFPL). The Mothership would be designed, fabricated, tested and flown by the NRL. LLNL would provide the baseline scientific payload and the microsat. NASA would provide a Shuttle launch, the Science Team and an augmented instrument payload. After launch, the AFSPC would test a microsat in earth orbit and another at an asteroid, which completes the Nominal Mission. After the Nominal Mission, NASA would then be responsible for the Extended Mission which includes additional asteroid flybys.

This paper represents the results of work carried out at the Jet Propulsion Laboratory, California Institute of Technology under contract to the National Aeronautics and Space Administration to support Advanced Projects.



Proposed Clementine II Spacecraft



Proposed Clementine II Shuttle Launch Configuration

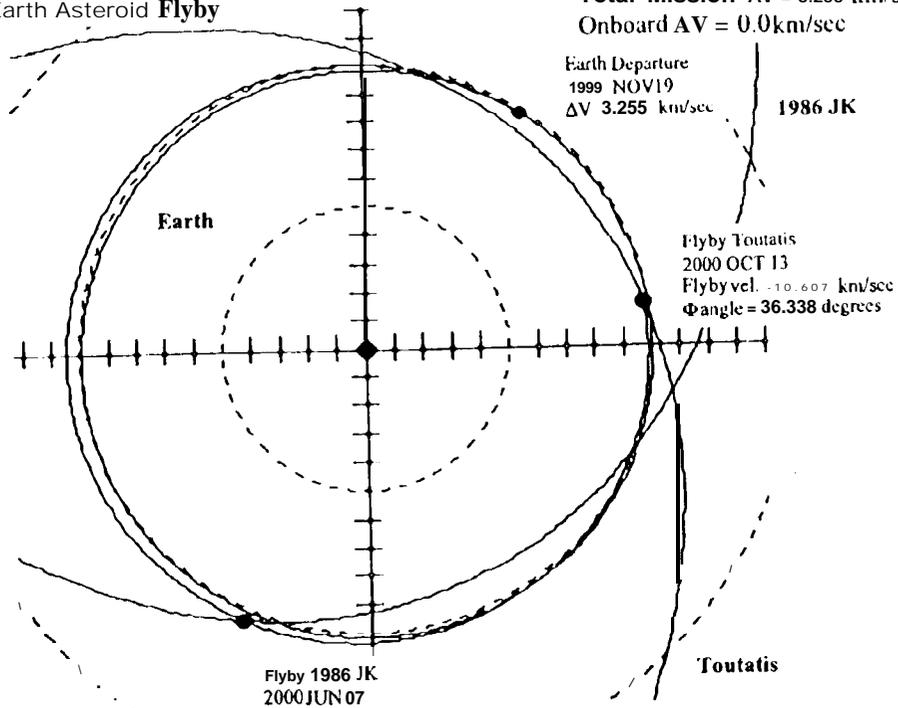
CLEMENTINE 2

Double Near-Earth Asteroid Flyby

$C3 = 0.799 \text{ km}^2/\text{sec}^2$

Total Mission $\Delta V = 3.255 \text{ km/sec}$

Onboard $\Delta V = 0.0 \text{ km/sec}$

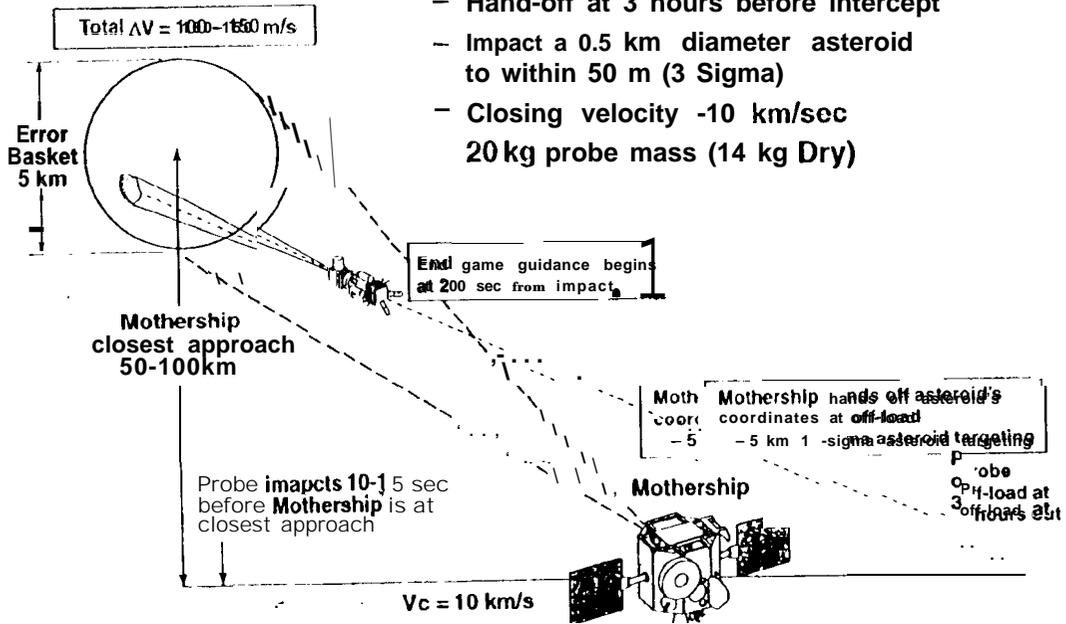


ΔV values do not include propellant margin. Flyby vel. $\approx 13.670 \text{ km/sec}$
 $\Phi \text{ angle} = 26.341 \text{ degrees}$

Nominal Mission

Assumptions:

- Hand-off at 3 hours before intercept
- Impact a 0.5 km diameter asteroid to within 50 m (3 Sigma)
- Closing velocity -10 km/sec
- 20 kg probe mass (14 kg Dry)



P00175-act1005

Typical Flyby Intercept Geometry

