NASA-CR-205085

Grant **NAGW-3380** Date Received: _____, 1997

FINAL REPORT TO: National Aeronautics and Space Administration
Solar System Exploration Division
Planetary Astronomy Program

TITLE: **Alt-Az Spacewatch Telescope**

SUBMITTED: July 30, 1997

START & END DATES OF GRANT: July 1, 1993 to April 30, 1997

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SUMMARY:

This grant funded about one third of the cost of the construction of a telescope with an aperture 1.8 meters in diameter to discover asteroids and comets and investigate the statistics of their populations and orbital distributions. This telescope has been built to the PI's specifications and installed in a dome on Kitt Peak mountain in Arizona. Funds for the dome and building were provided entirely by private sources. The dome building and telescope were dedicated in a ceremony at the site on June 7, 1997. The attached abstract describes the parameters of the telescope.

The telescope is a new item of capital property. It is permanently located in University of Arizona building number 910 in the Steward Observatory compound on Kitt Peak mountain in the Tohono O'odham Nation, Arizona. Its property tag number is A252107.

This grant did not include funds for the coma corrector lens, instrument derotator, CCD detector, detector electronics, or computers to acquire or process the data. It also did not include funds to operate the telescope or conduct research with it. Funds for these items and efforts are pending from NASA and other sources.

Abstract presented at the 28th annual meeting of the Division of Planetary Sciences of the American Astronomical Society in October, 1996 in Tucson, Arizona. Published in the *Bulletin of the American Astronomical Society* **28** (1996), p1096.

The Spacewatch 1.8-meter Telescope

M. L. Perry, R. S. McMillan, L. D. Barr, T. H. Bressi, & T. Gehrels (LPL/UAz)

The largest telescope in the world dedicated to the search for Earth-approaching asteroids and other previously unknown members of the solar system will soon be operational. Its 1.8-m aperture, large and sensitive CCD, and dedication to surveying will make it possible to find as many as 80,000 new asteroids per year.

The mechanical design by Barr is optimized by finite-element analysis to provide high resonant frequencies. The mount is an altitude-azimuth type for compatibility with the mirror support cell contributed by the Multi-Mirror Telescope Observatory. Both axes are driven by DC servo motors directly coupled to friction rollers. The CCD instrument stage will also be rotated under computer control. The telescope was fabricated in the University Research Instrumentation Center (URIC). Construction of the building began on Kitt Peak on 1996 July 1.

The optical configuration is f/2.7 folded prime focus with a flat secondary that locates the focal plane in the center of the optical truss near the altitude axis. This shortened the telescope enough to make the dome building affordable, and the flat secondary preserves the fast f/number of the primary mirror. The coma corrector designed by R. A. Buchroeder is a modified Klee design of 5 spherical lens elements plus a filter transmitting longward of the B bandpass. The filter greatly simplifies lens design and reduces sky background while not significantly reducing the brightness of asteroids. The distortion-free, flat, unvignetted field of view is 0.8 deg in diameter and the image scale is 1.0 arcsec/24 micron pixel.

Construction of the Spacewatch Telescope has been funded by grants from the DoD Clementine Program, NASA, the University of Arizona Foundation, and other private and corporate donors.