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SYSTEMS ENGINEERING
ORBITING OBSERVATORY PLAN DEVELOPED

Complete preliminary engineering and analytical design for a six-ton unmanned satellite were de-
veloped last year by a task force of seniors and graduate students.

The 28-man group presented a final report in Kresge Auditorium to representative of federal agen-
cies and of industry, and wrote a 300-page description of their work.

The satellite — called Advanced Orbiting Optical Astrophysical Observatory (AOAO) — was the second
so designed by a systems engineering class here. The first was an equatorial weather satellite.

The satellite was designed for

LAUNCH in 1975 on a Martin Com-
pany Titan III booster. It would go into a 500-mile orbit.

Basic AOAO form would be a hollow cylinder nine feet across and 38 feet high made from stainless
steel beryllium. This would be the bar-
rel of the AOAO's Cassegrain reflecting telescope with a 380-inch primary mirror at the bottom and a 180-inch secondary at the top. Three six-feet equipment lobes would be placed around the bar-
rel, giving AOAO the appearance of a highly-speed airplane with three converging delta wings converging toward
the fuselage.

A conventional two-mirror tele-
scope would project an image out its primary mirror end, but the students found locating image-re-
cording equipment there would give the vehicle an unfavorable weight distribution. The student design is for eight-inch indexes
mirror between the larger mir-
rors and positioned at a 45-degree angle to project the image side-
ways into the hole containing a TV camera and instruments to un-
align light from stars and planets.

Heat from a reactor known as MACE would produce 2000 watts of power.

The group calls the reactor MACE because critical covers over the converters would give it the appearance of a spired medieval battle castle. Before and during launch, the reactor would be held quiescent by removal of a control plug and would be inserted in the power-supply lobe in orbit. The reactor — plus an 18-inch tungsten-titanium-beryllium radiation shield would be deployed outward on a boom and the con-
trol plug inserted. The boom would be of wire mesh which would extend when filled with
polyurethane foam on signal.

The simulations and data processing lobe would contain a computer, memory storage reservoirs for delayed read-out of data, equipment for converting information gathered by the experiments into digital form, and both narrow band and wide band radio.

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