



Philco Corporation

COMET PROBER—The drawing is the anticipated design of a spacecraft which will closely study the true nature of the comet, the coma and the tail, to determine whether they contain organic compounds fundamental to life.

SPACE

Crowded Moon Foreseen

Numerous vehicles, shelters and mobile laboratories of various types are expected to crowd the surface of the moon, once man gains foothold there—By Jonathan Eberhart

See Front Cover

► THE SURFACE of the moon will be literally crawling with strange-looking research vehicles in a few years, judging by the reports of space scientists in Chicago. Almost half of all the research papers read at an "after-Apollo-then-what?" convention were devoted to different kinds of manned and unmanned lunar "trucks."

One, a lunar "sports car," complete with independent suspension and wire wheels, is Boeing Company's MOLAB, which stands for mobile lunar laboratory. MOLAB would be made in two cart-like segments, one with four wheels and one with two, joined by a flexible midsection. The huge wheels, five feet in diameter, are designed for traveling over rocky, pock-marked terrain.

A model of MOLAB seen on this week's front cover shows the major exterior components as they might appear when the vehicle is on the moon. The four-wheeled segment to the right is the cabin which is insulated and pressurized. The trailer at the left, joined to the cabin with a flexible link, carries two spherical tanks of cryogenic fuel. Two antenna project above the cabin while at the forward end are twin driving cameras. The thin flat roofs above the cabin and trailer serve as an environmental control systems radiator that controls the temperature by dumping excess heat.

The vehicle, with individual AC motors for each wheel to make it go and DC motors for the brakes to make it stop, will carry, for two weeks or longer, two men in relative comfort, compared to a Gemini

or Apollo capsule. During the "night," which will be determined by off-duty cycles rather than the position of the sun, a non-working crewman will sleep in a net hammock, wedged into tiny spaces left by the scientific equipment.

The other crewmen, along with their life support systems, data equipment, scientific experiments and airlock, will be housed in the forward, four-wheeled compartment, with battery power supplies riding along on the outside. Perched on top of the front compartment will be the various antennas. In the aft compartment will be the fuel cells, hydrogen and oxygen tanks, the drive control unit and a tiny, rocket-powered, emergency escape vehicle, in which the crew could travel to LEM, lunar excursion module, or some other already existent shelter.

This report on the continuing study of MOLAB was prepared by John H. Carr of the Boeing Company and Samuel Romano of General Motors Corporation. Several kinds of vehicles and fixed shelters have been combined in a project called LESA, or lunar exploration system for Apollo. LESA has been under study in one way or another for about two years and combines all sorts of Apollo capsules, LEMs, MOLABs, and silo-like, multi-man shelters in various combinations.

LESA will have to be flexible enough to convert Apollo missions into long-term exploration journeys, with crews staying on the moon for from 90 days to two years. William Henderson of the National Aeronautics and Space Administration discussed LESA at the symposium, which is spon-

sored by the American Astronautical Society and the I.I.T. Research Institute, Chicago, Ill.

In another phase of the symposium, unmanned missions to explore comets and asteroids, and gain insight into the structure of the universe, were described in a technical paper delivered by a Philco Corporation space programs manager.

G. O. Moore, manager of space vehicle operations programs at Philco's Western Development Laboratories Division in Palo Alto, Calif., said such space probes are feasible using a Mariner 1964 spacecraft with minimal modifications.

Objectives of such missions are to measure the type and distribution of particles of matter and the distribution of the magnetic field through the coma (atmosphere) of the selected comet, to observe the nucleus, to determine the chemical composition of cometary material, and to measure the physical and chemical properties of close-approach asteroids.

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SPACE

Moon May Give Evidence On How Stars Are Born

► THE MOON HOLDS CLUES to events that happened billions of years ago. It is not just a dead cinder.

When men land on the moon, they may find evidence about how stars are born, Nobelist Dr. Harold C. Urey of the University of California, San Diego, said in Washington, D.C. If the moon was captured by the earth, it holds the record of previous lunar history, Dr. Urey told a meeting of Overseas Writers.

If the moon escaped from earth while early life forms were evolving on this planet, then it is contaminated with primitive forms of life. Discovery of such precursors of living matter would be "exciting and fascinating," Dr. Urey said.

He said the photographs taken by the Ranger lunar probes gave information that was both "encouraging and discouraging" concerning manned landing on the moon. The definite answer concerning composition and strength of the lunar surface will not be known until direct observations are made, Dr. Urey said.

He credited "engineering, not science" for the many Russian space firsts, such as the first orbiting satellite, the first pictures of the previously unseen side of the moon, the first man in space. Russian engineering, Dr. Urey said, is "very good."

However, the Soviets have not done so well on the scientific side of space problems. As an example he cited the poor quality of the Lunik moon pictures, noting that only two-thirds of the unseen side was photographed. The Russians, Dr. Urey charged, "did not go back to finish the job or try to take better pictures."

The U.S. has a similar attitude toward its manned space program, Dr. Urey said—putting a man on the moon, not doing science. The venture will have enormous entertainment value on television, and Dr. Urey said not much work will be done while the landing is being televised.

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