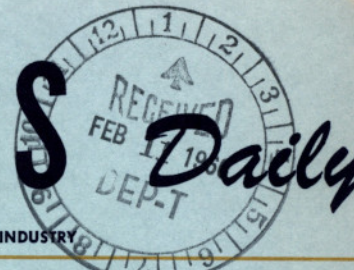


# SPACE BUSINESS



*Daily*

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Tuesday, February 8, 1966

Vol. 24, No. 26

## NASA TO INTEGRATE AA MAPPING/SURVEY INTO APOLLO.

North American Aviation, which has for several months been studying the engineering design definition of an **APOLLO** Mapping/Survey (AMS) system which was originally scheduled for implementation as a part of the early **AA** (**APOLLO** Applications) missions with first flight sometime after mid-1969 (**SPACE** Daily, March 27, '63 & March 11, '65), will now be asked to negotiate with NASA-Houston a contract for integrating this mapping and survey system into the **APOLLO** program. NAA was recently awarded \$800,000 for the design definition of the program (**SPACE** Daily, May 18). In the original planning **APOLLO** astronauts would survey the terrain from lunar orbit for possible landing sites after the first original landing missions. The Soviets have just reconfirmed that they intend to survey the terrain with manned circumlunar flights before the first landing (See yesterday's **SPACE** Daily). NASA has consistently shied away from discussion of possible plans to precede the first manned lunar landing with a manned circumlunar flight (**SPACE** Daily, May 19, '64).

## BSD SEEKS MIRV ROCKET SYSTEMS.

The Ballistic Systems Division plans to contract for an 8-month study program to define possible solid and liquid propulsion systems for the **MIRV** (Multiple Individually (Independently-targeted) Re-entry Vehicles) penetration system (**SPACE** Daily, April 21, '64). Three typical warhead payloads will be considered in the study seeking to obtain the optimum maneuvering and boost propulsion systems which have an immediate application on such missiles as the **MINUTEMAN II** and the **MINUTEMAN III** (**SPACE** Daily, Jan. 28) in order to offset the buildup of Soviet anti-missile missile systems (**SPACE** Daily, Jan. 31). Boeing was recently awarded a contract to modify the **MINUTEMAN I** for **MIRV** and **PBCS** (Post-Boost Control Systems) (**SPACE** Daily, Aug. 6 & 9).

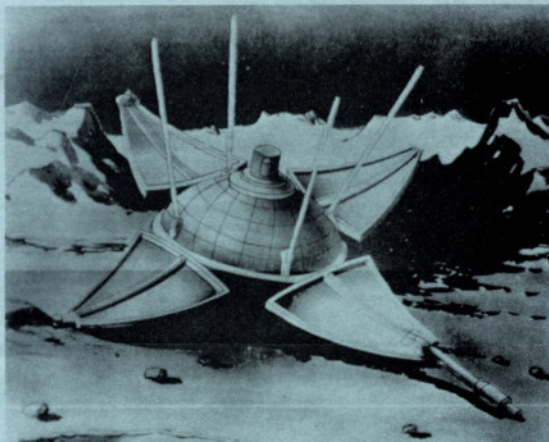
## LUNIK IX IS SIMPLEST SOFT-LANDER.

**LUNIK IX** illustrates that the Soviet Union has once again used the simplest and most direct approach for the development of otherwise complex spacecraft systems. The **LUNIK IX** system, under development for more than four years and believed demonstrated first with **LUNIK IV** early in April 1963 (**SPACE** Daily, April 3, '63), is like its manned spacecraft companions, **VOSTOK/VOSKHOD**, an optimum integration of the sciences of geometry and physics.

The design of the **LUNIK** soft-lander and the problems connected with it were first reported in **SPACE** Daily on October 22, 1962: "...the station would take photographs, and relay by television, the lunar surface. Payload would also include magnetic field, and temperature instrumentation. In addition, data would be stored and handled by an electronic computer. Power for transmitters would range from 10 to 100 watts.

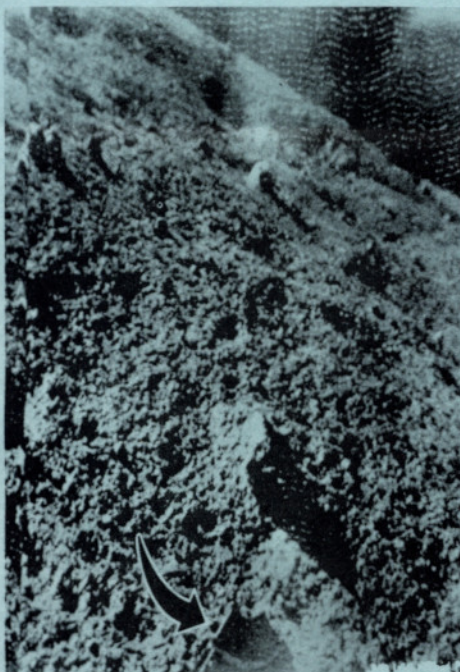


## LUNIK IX IS SIMPLEST SOFT-LANDER-Contd



"The most critical problem anticipated is the orientation of the payload's transmitting antenna. A possible solution discussed was the positioning of the center of gravity of the payload so that the antenna would automatically assume the correct position after landing. Russian engineers see an end to this problem once they send their mobile lunar payloads on their missions. These payloads will employ what they describe as the successful **LUNIK III** antenna orientation system."

**LUNIK IX Is "Stabilized Equalibrium" Configuration.** The positioning of the center of gravity to automatically orient the antenna appears to be exactly the success solution which Soviet engineers applied to **LUNIK IX**. Weighing 3482 pounds, more than 60 pounds heavier than **LUNIK III** and 350 pounds more than **LUNIK IV**, it is the heaviest of the lunar spacecraft. The 350-pound difference in weight between **LUNIK IV** and **IX**, the former considered to have been the first Soviet attempt to soft-land on the luran, may be justified either because **LUNIK IV** did not have a camera aboard or not of the same sophisticated type as aboard **LUNIK IX**. The system used for orientation is known as "stabilized equalibrium" and is used in the design of children's toys which, when toppled, right themselves as a result of their extremely low center of gravity.



**LUNIK IX**, minus its retro-rocket package which is disengaged and ejected just prior to landing, has a tear drop configuration. The necessity to separate the retro system from the lander package requires the design of the lander as a survivable package with a shock-absorbing capability. Once on the luran and upright the low density upper portion with its stabilizing rod opens in clam-shell fashion to expose the spring compressed antennas, which open automatically toward the zenith, the panoramic TV camera mounted on a rotating rod system, and the solar cells arrayed around the upper half of the package sphere. The transmitters, batteries and other heavy equipment is mounted in the shock absorbing base. (Note the tip of one of the clam-shell panels in the lower portion of luran photo. Other photos show what may be the retro system and shadows of camera and antenna system.)

**1/25-Inch Details Observed.** The Soviets say detail as small as 1/25-inch can be observed in the photos which show a luran which might

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be described as having an appearance of brown sugar with a scattering of small rough, jagged rocks and pebbles. The lurain, as viewed by **LUNIK IX**, appears to support the theories that it is comprised of volcanic matter heavily bombarded over the eons so that in some places the crunchy, compressible "dust" is a few inches thick while in others where the lurain is harder, very little "dust" is prevalent. This theory by **SPACE Daily** (Aug. 7, '64) lies between the theory expressed by NASA-Houston scientists of a six-inch layer of "dust" and the one by Dr. Gerard P. Kuiper of the University of Arizona of 1-2 inches of "crunchy" lava chips.

**Another Electronics Failure?** Apparently, **LUNIK IX** landed just a little bit too hard, disrupting the circuit between the batteries and the solar cell system and as a consequence reduced its lifetime from two weeks of lunar daylight to slightly more than 72 hours. This appears to be the only explanation for the reduced lifetime and the intermittent transmissions during the last two days. However, **LUNIK IX** highlights the advantages of optimum simplification of design and planning and provides another possible object lesson in our own future planning. While **LUNIK IX** might lie somewhere between a "semi-soft" lander and a soft-lander, **SURVEYOR** is an extremely sensitive soft-lander that demands an optimum of engineering performance to complete its mission.

**JODRELL/LOVELL CHARGED WITH SENSATIONALISM.** Anatoli Blagonravov, a leading Soviet space scientist, has charged Sir Bernard Lovell of Jodrell with sensationalism for releasing the **LUNIK IX** photos 24 hours before the Soviet Union. Blagonravov charged that "certain motives of a sensational nature apparently played some role" in the observatory's "hurry" to release the photos. The Soviet scientist also explained that the photos released by Jodrell had a horizontal scale reduced by 2.5 times (i.e., not having taken into consideration the panoramic lens of the camera). Jodrell has retorted that: "We considered the pictures of such international importance that their immediate release was justified."

**MANY MORE LUNIKS PLANNED.** Soviet officials say "many flights" of other soft-landing remote stations will be required for the study of the lurain in the vicinity where **LUNIK IX** landed and "other regions of the Moon." These officials explain that this operation of the one station "is not enough to form a conclusion about the character of soil on the Moon as a whole." The danger of the retro-rockets eroding a crater under the landing site was one of the problems Soviet scientists were concerned with in the programming of the retro-rocket sequence.

**LUNAR ORBITER READIED FOR SUMMER LAUNCH.** Compatibility testing of the **LUNAR ORBITER** photo-craft at the Goldstone tracking station has gone very well, Boeing, spacecraft prime, says. Quality of the **ORBITER**'s simulated Moon photos, in the tests, which have been going on for a month, were "very good." The **ORBITER** will be transported in a special van to Cape Kennedy later this year where it will be tested with special ground-test and launch facilities. Flight models will follow, with first launch scheduled for about June or July.

The 850-pound spacecraft is designed to orbit within 29 miles of the lurain and take photos that will show objects about a yard square. Russia's **LUNIK** soft-lander

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transmitted objects of "pebble size" (1/25-inch, see preceding report). The Hughes-**SURVEYOR** soft-lander, scheduled for first launch about April or May, will have a capability similar to **LUNIK**. **SURVEYOR** recently concluded its second drop test (SPACE Daily, Feb. 3). First **SURVEYOR** flight model is under thermal vacuum testing at Hughes.

**ALSEP STUDIES BEING EVALUTED.** The three \$500,000, six-month design development contracts for the **ALSEP** (**APOLLO** Lunar Surface Experiments Package) awarded in August (SPACE Daily, Aug. 5) to Bendix, Space-General and TRW Systems, have been completed and the reports are presently being evaluated by NASA-Houston. Selection of a single contractor for the next phase of design is expected within a few weeks.

**FIRST OPERATIONAL VERONIQUE-61 LAUNCH EXPECTED IN APRIL.** The first operational launch of France's trouble-plagued **VERONIQUE-61** single-stage sounding rocket is scheduled about April 1.

Three **VERONIQUE-61**s are being taken to France's Hammaguir, Algeria, launch range. One of the rockets will be launched late next month as a test vehicle. If all goes well, the operational launch will occur in early April. Final rocket is a backup.

The **VERONIQUE-61** has been undergoing modification since its first two technological flight prototypes were launched in June 1964 and proved unstable. A modified **VERONIQUE-61**, launched about a year later, also demonstrated instability. The new **VERONIQUE**s have been fitted with a weighted lead ring, which shifts the rocket's center of gravity. The rocket is heavier but the same length as earlier models. **VERONIQUE-61** has a thrust of about 13,200 pounds for a 54-second duration. Total length is 30.5 feet and weight with propellant is 3400 pounds. The rocket is designed to carry a 132-pound payload to 200 miles. Fifteen of the **VERONIQUE-61**s have been ordered by CNES, the French space agency, from LBRA. Space General is providing the attitude control system and parachute recovery system for the rocket (SPACE Daily, August 19, 1965).

**EXTRA-VEHICULAR PHASE II RFP ISSUED.** Both Bell Aerosystem and LTV have been requested to submit cost proposals for Phase II of the NASA-Langley RFP for an extra-vehicular activity simulator. The two firms earlier submitted technical proposals for the Phase I RFP and both were accepted. The simulator will be suspended from the roof of a hanger at Langley and will be operated in conjunction with the rendezvous and docking simulator to provide an apparatus for testing extra-vehicular propulsion devices.

**MARSHALL TO PROCURE NEW COMPUTER SYSTEM.** NASA-Marshall is planning to replace "every item" in its de-centralized computer complex with a new totally integrated "third generation" computer system. The system will include between 50 and 70 remote input-output stations located in all building complexes that require computing capability, and a direct full duplex transmission link to the Slidell facility.



### CAL AND SANDIA STUDYING NUCLEAR GENERATOR BURNUP

The Cornell Aeronautical Lab and the Sandia Corp. are investigating nuclear generator burnup under simulated re-entry conditions to help the AEC develop safe nuclear power systems for space applications. The study is being made under a \$90,000 AEC contract.

CAL is working with materials like zirconium and magnesium in its hypersonic tunnel to obtain data on environmental effects on the materials. For example, a method has been established to predict the maximum size of molten metal particles under a various aerodynamic flow situations. Motion picture cameras, heat-transfer and pressure gauges, and infrared pyrometers are among the instruments being used. The present program is an extension of work done during 1964 and '65.

### Soviets/West Germans Question Satellite Safety

The Soviet Union, and more recently West Germany, have commented on the possibility that nuclear-powered satellites that orbited improperly or re-entered the atmosphere might produce radioactivity that could be of sufficient quantity to be harmful to human life.

The Soviets have long contended that the **SNAP** nuclear power sources on the **TRANSIT** satellites have been contaminating the atmosphere (SPACE Daily, July 15 and Oct. 23, '64). The AEC discounted the claim (SPACE Daily, Jan. 11, '65).

The West German Science Ministry is investigating the possibility that a nuclear generator burnup caused the jump in radioactivity recorded for rain that fell on Bavaria during the latter half of last October. The rain contained 2.4 millicuries of alpha radiation per square kilometer--16 times the normal .15-millicurie level. The Ministry decided the jump was not due to an atomic blast because no beta radiation was detected and iodine and strontium levels were normal.

### MARTIN-DENVER ORDERS NEW SPACE CHAMBER

A new space chamber designed to accommodate test objects up to 25,000 pounds and up to 22 feet in diameter by 32 feet high is being built by Martin-Denver.

A \$2.5 million contract has been awarded to Chicago Bridge and Iron Co. to build the thermal-vacuum chamber. The new facility, 29 feet in diameter and 45 feet high, will include systems of mechanical and cryogenic pumps and an array of infrared heat lamps. Design provides for later addition of devices to simulate the Sun's light spectrum.

### BRAINERD HOLMES TO ADDRESS SPACE CLUB

The February 14 luncheon of the National Space Club will hear Dr. Brainerd Holmes, senior vice president of Raytheon, make "Reflections on Two Years with NASA." Holmes headed NASA's manned spaceflight operations before joining Raytheon.

Gorden E. MacDonald has been appointed vice president and controller of Hughes Aircraft. MacDonald's former position--controller of the aerospace group--has been filled by Jack Kuhner, formerly assistant controller.



### MARCONI TO BUILD BRITAIN'S IDCSP STATIONS

British government has contracted with Marconi, Ltd., for three air-transportable ground stations (SPACE Daily, Feb. 3) which will support the U. S. Initial Defense Communications Satellite Project (IDCSP). The stations will be in experimental operation later this year. First station will be used by the Signals Research and Development Establishment, Christchurch, Hants, England, and the others could be emplaced at Aden and Singapore. First IDCSP satellites, in a grouping of seven, will be launched by TITAN III-C this spring. The system will consist of 22 satellites in near-synchronous orbits.

### BAC TO BUILD HEOS ATTITUDE-SENSING SYSTEM

A contract of approximately \$700,000 has been awarded to British Aircraft's Guided Weapons Division for the attitude-sensing system of the ESRO HEOS (Highly Eccentric Orbit Satellite). The contract was awarded by Junkers Flugzeug und Motorenwerke A. G., Germany, HEOS prime. (See SPACE Daily, Dec. 9.)

HEOS I is scheduled for launch from Cape Kennedy in the latter half of 1968 to help study radiation and magnetic fields during intense solar activity. The 200-220 pound satellite will be placed in an extremely elliptical orbit by a THOR DELTA booster. HEOS is the second of the European Space Research Organization's (ESRO) satellite families. First is ESRO (SPACE Daily, June 18).

### NASA-MARSHALL MATERIALS DIVISION CHIEF NAMED

James E. Kingsbury has been named to succeed Dr. William R. Lucas, newly appointed director of the Propulsion and Vehicle Engineering Laboratory, as chief of NASA-Marshall's Materials Division. Kingsbury was previously head of the Division's Engineering Physics Branch.

### SEVEN NAMED TO GODDARD LIBRARY SPONSORS GROUP

Dr. Wernher von Braun, director of NASA-Marshall and chairman of the International Sponsors Committee of the Goddard Library, has named seven industrial, governmental and scientific leaders to membership on the committee.

They are: Dr. Edmund A. Brun, professeur à l'Ecole Nationale Supérieure de l'Aéronautique and directeur du Laboratoire d'Aérothermique du Centre de la Recherche Scientifique; Rep. Harold D. Donohue (D-Mass.); H. Dale Grubb, Washington representative, Avco and president of the National Space Club; S. Paul Johnston, director, National Air Museum; Harrison A. Storms, president, North American Aviation-Space and Information Systems Division; Thomas Turner, director of marketing, Fairchild Hiller-Republic Aviation Division and immediate past president of the National Space Club; and Albert L. Williams, president, IBM. These appointments bring to 14 the number of persons named as sponsors of the Goddard Library program.

**Robert E. McDonald**, previously vice president and general manager of the UNIVAC Defense Systems Division, has been named president of Sperry Rand-UNIVAC. **Gerald G. Probst** has been named to succeed McDonald in his old post. Probst was previously vice president-engineering for the division.



**Future Space Business****OPTICAL COMMUNICATIONS SYSTEM DEVELOPMENT**

NASA-Marshall is requesting quotations for the development, fabrication and delivery of a narrow beam, broad bandwidth optical communication system.

Contact: Purchasing Office; Marshall Space Flight Center, Huntsville, Ala., Attn: P. B. Higdon, Telephone: 842-2214. Reference: RFQ 1-3-40-64538. Due date: Feb. 21.

**ATS EXPERIMENTS DATA CORRELATION/COMPARISON**

NASA-Goddard is funding a documented study of the requirements for correlation and/or comparison of specific data between Applications Technology Satellite experiments. The study will include development of methodology for programming data which will be common to investigations between two or more experiments.

Contact: NASA, Goddard Space Flight Center, Glenn Dale Rd., Greenbelt, Md. 20771, Attn: T. J. Canning, Code 247. Reference: RFP 460-95299-238. Due date: Feb. 9.

**SOLAR CELL INTEGRAL COVER GLASS DEVELOPMENT SYSTEM**

NASA-Goddard is issuing RFPs for a solar cell integral cover glass development program.

The following firms have been invited to bid: International Rectifier Corp.; Hoffman Electronic Corp., Hoffman Semiconductor Division; Optical Coating Laboratory; Libbey-Owens-Ford Glass Co.; General Precision-Librascope; Bausch and Lomb; P. R. Mallory Research Laboratory, Corporate Research and Engineering; Textron Electronics, Heliotek Division; RCA; Electro-Optical Systems; Texas Instruments; Lockheed Missiles & Space; Bendix-Cincinnati; Tem Pres Research; Englehard Industries, Military Service Department; Zenith Optical Laboratory; Glass Technology Co.; Corning Glass Works; Glass/Tech, Inc.; and Glass Technologists, Inc.

Contact: NASA, Goddard Space Flight Center, Glenn Dale Rd., Greenbelt, Md. 20771, Attn: Gary B. Burkholder, Code 247. Reference: RFP 716-89290/-235. Due date: Feb. 18.

**HOLLOMAN ROCKET SLED TEST TRACKS MODIFICATION**

The Air Force Missile Development Center is initiating a study to determine the feasibility of modifying the Holloman test track for recoverable and nonrecoverable sled tests in the Mach 8 region.

Contact: Air Force Missile Development Center, Procurement Division, Attn: MDMKN-5, Holloman Air Force Base, N.M. 88330. Reference: Synopsis No. 17. Due date: Feb. 17.

**DOD NEGOTIATIONS**

Rohm & Haas Co. -- with Army Missile Command for research procurement (propulsion).

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**DOD NEGOTIATIONS-Contd.**

Aeronutronic Div. of Philco Corp. -- with Army Missile Command for additional research and development effort.

Aeronutronic Div. of Philco Corp. -- with Army Missile Command for **SHILLELAGH** transmitter alignment test sets.

Chrysler Missile Div. -- with Army Missile Command for the design, fabrication, and test of an integrated sensor controller under simulated flight conditions.

Thiokol Chemical Corp. -- with the Office of Naval Research for further research on the interaction of rocket exhaust.

RCA -- with the Army Electronics Command for a four-month extension of the program covering the development of a 100-watt thermoelectric generator.

United Technology Corp. -- with Ogden Air Materiel Area for rocket motors.

**NASA NEGOTIATIONS**

Cornell Aeronautical Laboratory -- with Marshall for base heating research.

General Electric Co. -- with Marshall for **SATURN** vehicle in-flight success probability.

Razdow Laboratories, Inc. -- with Houston for replacement spares for solar optical telescopes.

Cutler Hammer -- with Houston for replacement spares for solar radio telescopes.

General Precision, Inc., Aerospace Group -- with Marshall for periodic and almost periodic trajectories in cislunar space.

**DOD CONTRACTS****Navy**

Winterburn Construction Co., Port Townsend, Wash. -- \$52,900 for the construction of additional facilities for the **POLARIS** missile facility.

**NASA CONTRACTS****Marshall**

Boeing Co. -- \$89,698 for a cryogenic storage system study.

Philco Corp. -- \$36,990 for thermal radiation particle impingement heating and flow field analysis of solid propellant rocket exhausts study.