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Daily

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EIGHT BIDDING ON COMSAT MULTIPURPOSE SATELLITE.

At least eight companies (six domestic and two foreign) are competing for the development and fabrication contract from ComSat for its multipurpose satellite (SPACE Daily, Jan. 3). Hughes, TRW, RCA, ITT, GE, and Philco have submitted proposals, and at least two European firms are expected to file bids by next Monday. The multipurpose payload will have up to 6000 two-way channels and be orbited in 1969 or 1970. It will handle television, aircraft, and marine communications from a synchronous orbit and have a five-year lifetime.

EVINS REPLACES THOMAS AS NASA APPROPRIATIONS CHAIRMAN.

Rep. Joe L. Evins (D-Tenn.) is expected to take over the influential position of chairman of the House Appropriations Subcommittee on Independent Offices which was made vacant yesterday by the death of Rep. Albert Thomas (D-Tex.). Thomas, the thirteenth ranking member of the House, had held the Independent Offices chairmanship for some years to the considerable advantage of his district which includes Houston. The Independent Offices Subcommittee is responsible for considering the NASA budget, among others.

GENERAL SCHRIEVER TO GET PILOT PROPOSALS THIS MONTH.

The AFSC Aeronautical Systems Division has received the proposals from Martin and Northrop (SPACE Daily, Feb. 3) for **PILOT**, Phase III of the **START** (Spacecraft Technology and Advanced Re-entry Tests) program. ASD is expected to report its recommendations to General Bernard Schriever, AFSC commander, by the end of this month. The Air Force is anxious to begin work on the **SV-5P** (SPACE Daily, Sept. 20), the manned version of the space shuttle (**SV-5D**) that was developed under Phase II, **PRIME**, so consideration of the two bids is being expedited. AF secretary Harold Brown will probably review General Schriever's conclusions before the contract is initiated.

SEAMANS SELECTED AS FIRST GODDARD LECTURER.

The Goddard Lecture Committee of the National Space Club has selected Dr. Robert C. Seamans, Jr., deputy administrator of NASA, to present the first Goddard Lecture scheduled for March 15 at the Sheraton-Park hotel in Washington (SPACE Daily, Feb. 4). The selection committee is comprised of Dr. George E. Mueller, NASA associate administrator-Manned Spaceflight, chairman; Norman L. Baker, president and publisher, Space Publications, Inc.; D. Brainerd Holmes, senior vice president, Raytheon; and Rep. George P. Miller, chairman of the House Committee on Science and Astronautics.

TRADE MISSION REPORTS ON EUROPEAN SPACE BUSINESS.

"The Western European space industry, while small, is growing and offers a potentially attractive market." This is the primary conclusion of the first U. S. Space Industry Trade Mission, which visited Europe last summer under the sponsorship of the National Space Club, with the approval of the U. S. Department of Commerce.

"Because of nationalistic buying policies, few contracts will be let by European space agencies direct to United States contractors, and then only in the early stages of development of European space capability." Therefore, "the U. S. aerospace industry can best exploit its European space market potential by working with European industrial counterparts through: a) Sale of materials, components and subsystems. b) Licensing or technical support. c) Outright investment in European firms. d) And joint ventures with European firms."

NASA AWARDS FINAL LEM CONTRACT TO GRUMMAN/NEW PACT IS CPIF.

A new \$1.019 billion cost-plus-incentive-fee contract for development of the Lunar Excursion Module (LEM) through 1969 has been awarded to Grumman by NASA. The new contract will complete LEM requirements for the APOLLO lunar landing program.

In addition to converting contract terms from cost-plus-fixed-fee to CPIF, the new agreement calls for four additional flight model LEM spacecraft. Grumman will deliver 15 flight vehicles, 10 test vehicles and two mission simulators. The new contract provides profit incentive for outstanding performance, cost control and timely delivery, with similar profit reductions if performance, cost and schedule requirements are not met. Total cost of Grumman's LEM work, which was started in November 1962, will come to \$1.42 billion with the new contract.

The contract change is the second major APOLLO contract conversion by NASA this year. North American's \$2.2 billion APOLLO contract was converted to cost-plus-incentive-fee last month (SPACE Daily, Jan. 24), with estimated cost of the one-year conversion figured at \$671.3 million.

HUGHES WINS IDCSP TERMINAL FOLLOW-ON.

The Army Electronics Command has contracted with Hughes for four more Mark 1B (AN/MSC-46) ground stations for support of the IDCSP (Initial Defense Communications Satellite Project). The semi-fixed terminals have 40-foot antennas and require prepared sites for deployment.

Hughes and Radiation have been under Army contract for Mark 1B and Mark 5 stations respectively (SPACE Daily, Oct. 7) (Mark 5s are transportable). The new Hughes award, valued at \$5,888,450, also calls for equipment compliance reports and system summaries. The IDCSP satellite system will use 22 payloads in near-synchronous orbits, with the first seven to be launched in mid May on a TITAN III-C (SPACE Daily, Jan. 19 & Feb. 15).

AGENA TESTING HALTED.

Further testing of the AGENA target vehicle for the March GEMINI VIII mission "has been suspended pending a complete analysis" of the vehicle's "hard start" failure at Tullahoma, Tenn., Saturday (See yesterday's SPACE Daily).

NAS ROCKET/SATELLITE RESEARCH PROGRAM RECOMMENDATIONS--II. This is a continuation of Part III of the Woods Hole report prepared by working groups of the Space Science Board of the National Academy of Sciences. Included in Part III of the study, which was originated at the request of NASA, are recommendations concerning the role of the university in space research, and a detailed look at space biology.

NASA Funding for University Research Programs: NASA must turn to the universities not only for trained manpower but also for basic research. NASA should develop a program of university participation in space science and technology. Accordingly, NASA's budget for training should be increased from its present level of \$20 million, to \$30 million per year. The budget for facilities grants, which has been shrinking at the rate of \$2 million per year over the past two years to the current \$8 million level, should be increased to approximately \$15 million or \$20 million. Sustaining research grant funds should be doubled. As for a research program, the committee recommended:

1) Suitably space-oriented ground-based, balloon, and rocket programs should be expanded as promptly as possible. The present rocket program should be doubled or tripled as soon as possible.

2) Competition among various proposals should continue to be encouraged. Screening of proposals by competent experts is crucial. Therefore, formal panels of outside consultants should be established for the scientific screening of all specific research grants and in-flight experiments.

3) Consideration should be given to extending the NASA Sustaining University Program to engineering as well as research. This subject might well be studied by a committee of the Space Science Board.

In the area of biology, the report recommends:

1) Experimental studies on the synergistic or antagonistic effects between weightlessness and radiation should be supported.

2) Biorhythm studies in space flight should be conducted on an exploratory basis. Experiments should be to determine whether biorhythms are altered in near Earth orbit and in deep space.

3) Broad exploratory studies on effects of weightlessness on growth and development should be given high priority.

4) The NASA **BIOSATELLITE** program should be continued beyond the currently planned series (six flights scheduled at three month intervals, beginning in mid-1966). Follow-on biosatellite programs should be based on the use of a launch vehicle capable of boosting a several hundred pound scientific payload into orbit in a manner that avoids "the undersirable constraints" of the current program. A centrifuge should be included in at least some future biosatellite flights.

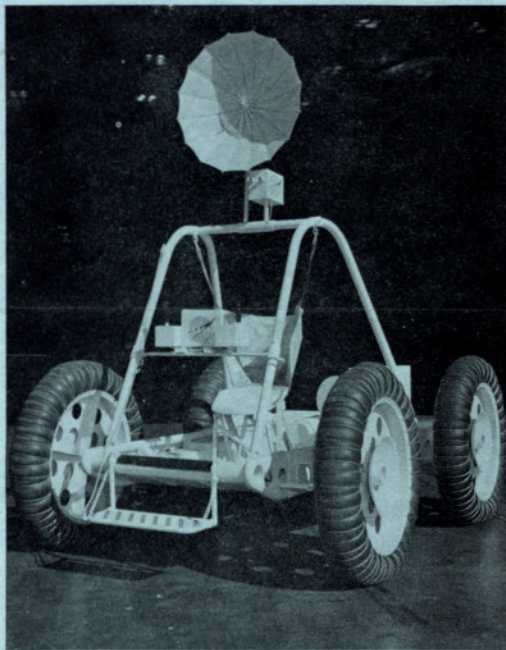
5) Biologist experimenters should have access to ample NASA engineering advice and aid in developing their experiments. One step would be increasing the number of personnel at NASA-Ames.

MORE

- 6) NASA should take immediate steps to develop a program to explore the biological effects of vibration.
- 7) If higher animals are placed in orbit to determine their tolerance to conditions of prolonged space flight, every effort should be made to acquire in-flight scientific data as well. "Before and after" measurements have little scientific value.
- 8) In the forthcoming unmanned and manned exploration of Mars, attention should be directed to the possibility that no extraterrestrial life exists there, and that therefore, studies should be made of all stages in the evolutionary development of life, with the prebiotic phase holding special interest.
- 9) Sterility precautions should be strictly enforced in the early stages of Martian exploration. Strict sterility enforcements should be an announced national policy.
- 10) NASA should develop a device to encapsulate, sterilely and hermetically, samples of the Martian surface (marain) and subsurface. Such devices should be sent with an early Martian lander to collect samples to be retrieved by later manned missions.
- 11) Reconnaissance by optical images be made in early as well as advanced phases of the unmanned exploration of Mars. NASA should make a major effort to remove critical limitations on communications of data over the Earth-Mars distance.
- 12) NASA should implement, as an item of great urgency, the development of a Mars lander--an Automated Biological Laboratory (ABL). In this connection, NASA should re-examine the feasibility of using the **SATURN V** for **VOYAGER** missions (**SATURN IB - CENTAUR** now planned). (*already done!*)
- 13) A continuing committee, advisory to NASA but preferably outside NASA; should be established to monitor and to advise on the scientific programs of planetary exploration.
- 14) Because investigations will ultimately require that scientists travel to Mars, NASA should continue to support research on bioregenerative life-support systems.
- 15) Safeguards should be incorporated into **VOYAGER** and **APOLLO** missions to prevent back contamination, chance of which is probably very small, but potentially catastrophic.
- 16) Scientist-passengers should be included in the program of the Office of Manned Space Flight for space travel.
- 17) Stronger research support be given to a NASA research center in order to meet the biological needs of the space program.
- 18) Formal panels of non-NASA scientists should be established to assign merit rating, exclusively on scientific grounds, to proposals for research and for in-flight biological experiments.

(This report to be continued.)

MARSHALL ORDERS EXPERIMENTAL LSSM MODEL



This is the full-size, experimental model of the Local Scientific Survey Module (**LSSM**) built by Brown Engineering Co. for the Advanced Studies Office of NASA-Marshall's Propulsion and Vehicle Engineering Laboratory (*SPACE Daily*, February 14). The model will be used to study the relationship of astronauts to an actual vehicle and the integration of power, telemetry, navigation and crew life equipment on the module. Actual design definition of the **LSSM** is being studied competitively by Boeing and Bendix. (See *SPACE Daily*, Sept. 9, and Oct. 1.)

Scale of the test model can be determined by the wheel height which is four feet. A roll bar, above the forward passenger seat, protects the astronaut in "the event the vehicle overturns or collides with another object." A dish-shaped antenna (an umbrella in the model built by Brown) is attached to the roll bar. The tires incidentally are made

of inner tubes from tractor tires, laced with nylon ski rope. Moon disc hubcaps from an auto shop are used to simulate the radiators for the wheel-driven motors. Either fuel cells or batteries will power the motors. Average speed of the vehicle is five miles an hour.

The **LSSM** is envisioned as a 750-1500 pound vehicle capable of carrying an astronaut plus scientific payload (or two astronauts) on five-mile, 2-6 hour excursions, designed for lunar exploration, survey and data acquisition. The **LSSM** could be unmanned and guided remotely from a lunar shelter or from Earth.

Brown-Huntsville is prime technical support contractor to Marshall's Propulsion and Vehicle Engineering Laboratory. The company's Manufacturing Department built the **LSSM** model, which was designed by the Advanced Studies Department of Brown's Space Vehicle Division.

ORBITAL INTERNATIONAL LABORATORY PROPOSED

Completely overlooked during the recent International Astronautical Federation Congress in Athens, where the major attention was on the **LIL** (Lunar International Laboratory) (*SPACE Daily*, Sept. 14), was a proposal submitted to the International Academy of Astronautics in session on the above date for the appointment of an **OIL** (Orbital International Laboratory) committee. The task of the committee, the proposal reads, "would give scientists from nations having no space-vehicle projects an opportunity to participate in orbital space research."

OIL would be modeled after **LIL** and among its first members would be Dr. Wernher von Braun and Leonid Sedov to represent their respective countries. (On November 30, *SPACE Daily* recommended the establishment of an International Astronaut Pool that would provide for full participation by non-space vehicle countries in the manned exploration of space.)

CONFERENCE TO REVIEW EUROPEAN SPACE PROGRAM

The 1966 National Telemetry Conference, set for May 10-12 in Boston, will include a special international session where "the first U.S. status report of the European space program" will be presented along with other papers on "The Status of Telemetry in Europe Today." The session is being organized in Paris and is recruiting speakers from ESRO (European Space Research Organization) and ELDO (European Development Organization).

NTC-66 will be sponsored by the American Institute of Aeronautics and Astronautics, the Institute of Electrical and Electronics Engineers, and the Instrument Society of America. To be held in the Prudential Center, it will have the theme "Telemetry--from Outer to Inner Space." Twenty-two sessions, over 90 paper presentations, three panels, over 100 industrial exhibits, two keynote addresses, two tours, and an awards banquet are planned.

The sessions are divided as follows according to subject: Telemetry Technology--"Sensors and Instrumentation," one session; "Modulation and Data Processing," six sessions; "RF Transmission," three; "Display and Utilization," one; Telemetry Application--"Aerospace," two; "Industrial," three; "Biomedical," three; "Oceanographic," two; and Special International Session.

The panel discussion on May 10 will treat the need for a common telemetry vocabulary and will begin with a summary of the Goddard Conference on Adaptive Telemetry by Dr. Rudolf Stampfl, the Conference's co-chairman. The May 11 panel will hear from representatives of the common carriers and some of their industrial customers on the matter of standards for industrial communications applications. And the panel on May 12 will focus on "on-line patient monitoring" and the oncoming technology in telemetered medical measurements.

LTV EARNINGS UP 22 PER CENT

Ling-Temco-Vought's preliminary earnings for 1965 were \$5,984,000, up approximately 22 per cent from 1964's \$4,904,000. Sales rose from \$322,859,000 to \$336,206,000. The consolidated sales figure included LTV's newest subsidiary--The Okonite Company--for the fourth quarter only.

Operating results for the first full year of the company's three publicly-owned subsidiaries were LTV Aerospace--earnings of \$3,616,000 on sales of \$195,262,000 (SPACE Daily, Feb. 10); LTV Electrosystems--earnings of \$2,205,000 on sales of \$80,995,000; and LTV Ling Altec--earnings of \$601,000 on sales of \$24,111,000.

ABC/ITT BOARDS APPROVE MERGER CONTRACT

The boards of directors of the American Broadcasting Company and International Telephone and Telegraph have approved a contract for the merger of the two firms with ABC becoming an autonomous subsidiary of ITT. The proposed merger (SPACE Daily, Dec. 3 & 9) would involve a stock exchange of between \$350 and \$400 million.

PACKARD BELL EARNINGS UP 123 PER CENT

Packard Bell Electronics' sales for the three months ended December 31 were \$12,172,000, up from the \$10,843,000 recorded for the same period last year. Earnings rose 123 per cent from last year's \$359,000 to \$804,000.

DEEP SPACE COMMUNICATIONS ADVANCE

Martin has made a significant advance in deep space communications by harmonic mixing of two coherent microwave signals by means of a silicon crystal and tungsten whisker which holds out the possibility of conventional superheterodyne telecommunication reception at 2100 gigacycles with possible extension to the region between light and microwaves.

The development was made under a contract with NASA-Cambridge for the experimental determination of the propagation characteristics of synthesized planetary atmospheres in the wavelength region extending between 3000 and 300 microns.

IMPROVED METHOD FOR AGENA SEPARATION STUDIED

Air Force Space Systems Division has given the go-ahead to Lockheed Missiles & Space to test an improved method for separating the **AGENA** stage from its booster. The new "zip cord" technique, proposed by the company last April, involves the use of an explosive charge which is enclosed in a plastic tube. On explosion the tube expands with enough force to shear the connecting aluminum or magnesium panels, but does not rupture itself, thus containing the gases and fragments resulting from the explosion. The technique can also be applied to such tasks as ejecting doors from a rocket or removing the shroud from a rocket payload after passage through the atmosphere.

SECOND 260 FIRING SET FOR FEBRUARY 23

The second firing of a half-length, 260-inch diameter solid propellant rocket motor by Aerojet-General will be held at their facility near Homestead, Florida on February 23. The first firing was held last fall (SPACE Daily, Oct. 4), producing a peak thrust of 3.6 million pounds over a two-minute burn period. The second 260 firing is expected to be a duplicate of the first, demonstrating the repeatability of the firing, the reliability of the manufacturing techniques, and the predictability of the cost of the motors. The 80-foot long motor is scheduled as the last demonstration firing in NASA's large solid program.

120 GIMBALLED SOLID FIRED

Thiokol Chemical has successfully test fired its high performance, three segment, 120-inch diameter solid propellant rocket motor using a 25-inch throat submerged omni-axis gimbal nozzle. The motor generated approximately 6000 degrees F. and about one million pounds thrust over a 70-second burn time. The test proved the feasibility of large submerged gimbaled nozzles in a high performance 120 motor for possible future large missile system applications.

Buford Smith Jr. has joined Brown Engineering's Electronic Systems Division as deputy division manager for engineering. Smith was previously director of engineering for the Astrionics Division of Space Craft Inc.

Future Space Business**SOLAR RADIATION/ENERGY TRANSFER SYSTEMS**

NASA-Lewis is funding the development of a solar radiation simulator system and a multichannel energy transfer system.

Contact: Lewis Research Center, 21000 Brookpark Rd., Cleveland, Ohio 44135, Telephone: (216) 433-4000, Extension: 522. Reference: IFB C-251694.
Due date: Mar. 2.

DOD NEGOTIATIONS

Sperry Gyroscope Company--with Army Missile Command for the development of a beacon (source) for the **SHILLELAGH** missile system.

Thiokol Chemical Corp., Reaction Motors Div.--with the Air Force Flight Test Center for combustion stability development and evaluation.

American Science and Engineering, Inc.--with Air Force Procurement and Production, Hanscom Field for further research directed toward nuclear weapons effect upon the ionosphere.

Douglas Aircraft Co., Inc.--with Air Force Systems Command for the inspection and repair as necessary (IRAN) of one G-135A aircraft for Project **ARIA**.

Texas Nuclear Corp., Austin, Texas--with the Air Force Aerospace Medical Division for nuclear radiation measurements and dosimetry research.

Hughes Aircraft Co., Space Systems Div.--with Air Force Systems Engineering Group for flexible integrated solar cell array.

Defense Research Corp.--with Air Force Ballistic Systems Div. for continuation of penetration system analysis studies.

Sperry Gyroscope Company--with the Navy Purchasing Office for services to provide the Naval Ship Missile Systems Engineering Station with original design data and logic on the **TALOS** equipment system.

NASA NEGOTIATIONS

Sperry Gyroscope Company--with Houston for the design, development and fabrication of a fluid sphere gyro.

Honeywell, Inc.--with Houston for the design, development and fabrication of a strap-down gas bearing gyro.

General Precision, Kearfott Div.--with Houston for the design, development and fabrication of a gas bearing-integrating gyro.