

SPACE BUSINESS



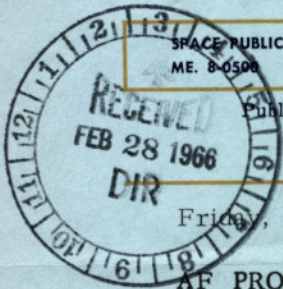
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Friday, February 25, 1966

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AF PROVIDES CONGRESS "STRONG CASE" FOR WTR MOL. Yesterday's special closed hearing on the Air Force decision to launch five Manned Orbiting Laboratories from Vandenberg AFB instead of Cape Kennedy (SPACE Daily, June 17, '64 & Feb. 14) tended to clarify and support the AF's reasoning for the congressional investigators. Senator Spessard Holland (D-Fla.), who called the hearings, told SPACE Daily that several of the Air Force's points were made clearer for him, and Representative Edward Gurney (R-Fla.), whom Holland had invited to sit in on the closed session, said the witnesses who testified (Dr. John Foster, DOD R&E director, and Dr. Alexander Flax, assistant AF secretary for R&D) "made a pretty strong case" for the validity of the decision.

Holland emphasized, however, that all the facts are not in and that he still "hopes" the decision will be reversed if subsequent evidence indicates it should. He said the Senate Space Committee will try to declassify "as much as possible" of the information being presented pro and con to allow the public to get facts instead of the "rumors and acid remarks" now in circulation. There have been reports that a variety of Cape Kennedy personnel were surprised at the AF move and, according to Holland, some scientists are questioning it. These scientists feel that nonpolar orbits would be suitable for MOL. He did not identify the scientists.

WYDLER SUSPECTS DYNA SOAR/LIFTING BODY PROGRAMS OVERLAP. Rep. John W. Wydler (R-N.Y.) asked Milton B. Ames Jr., director of space vehicles in NASA's Office of Advanced Research and Technology, some pointed questions about possible overlap in NASA's lifting body programs and the DOD's former **DYNA SOAR** program during Ames' appearance yesterday before the House Subcommittee on Advanced Research and Technology.

NASA's lifting body programs--**M-2**, **HL-10**, and Variable Geometry--are designed to investigate the maneuverability and landing ability of manned spacecraft after re-entering the Earth's atmosphere. Wydler sees no difference between this research and that done for the cancelled **DYNA SOAR** program. Ames skirted Wydler's assumption that there is no difference in the objectives of the two programs by telling the subcommittee that the materials and structures for the lifting bodies are substantially different from those used in the **DYNA SOAR**, and that these craft, which were never intended to serve as spacecraft, are serving a necessary research need for NASA in its program to determine the configurations of pilotable space shuttles. (Almost three years ago to the day, Feb. 27, '63, SPACE Daily reported under a "NASA 'DYNA SOAR'" headline that NASA-Ames was building a wingless, maneuverable lifting body spacecraft for testing controllable reentry, the

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M-2. SPACE Daily was chastised in the Senate legislative environment a few days later for this "unfair" comparison or inference of overlap and a special insertion into the record was made in an effort to discredit any such inference. This was two weeks after SPACE Daily had reported that **DYNA SOAR** was to be cancelled by Defense Secretary McNamara (Feb. 12).

NASA-HOUSTON TO CONTRACT FOR APOLLO LUNAR DRILL. NASA-Houston has issued Phase I RFPs to 20 firms for five APOLLO lunar surface drills. The following firms have until March 21 to submit their bids: Avco, Bendix Systems Division, Martin, Hughes, Northrop, Emerson Electric, McDonnell, Gardner-Denver Co., Sperry Rand-Vickers, E. J. Longyear (Minneapolis, Minn.), Joy Manufacturing (Houston, Tex.), Hughes Tool, Ralph Stone and Co. (Los Angeles), North American Aviation, Texaco Experiments, Philco, Mission Manufacturing (Houston, Tex.), Westinghouse, Space-General, and GCA Corp.

Last summer Northrop and Westinghouse (both on Houston's solicitation list) were awarded contracts from NASA-Marshall for an AES-ALSS lunar drill (SPACE Daily, Aug. 4). The Marshall drill will be carried by **AA** astronauts to sample the lunar surface to depths of 100 feet (SPACE Daily, May 13). Northrop and Westinghouse were among the eight who bid for the system from the 14 who received invitations (SPACE Daily, June 17).

NASA ORDERS NEW ATTITUDE CONTROL ENGINE. NASA-Houston has awarded a 14-month, \$309,000 contract to Curtiss-Wright for development of a new attitude control engine for space maneuvering.

The axially cooled engine (ACE) will be in the 100-pound thrust class and will be designed for use with high energy propellants. The engine will utilize pyrolytic graphite in wedge form in its combustion chamber and nozzle. It will be designed for continuous or pulsed operation.

SATURN IB RESCHEDULED FOR TODAY. Yesterday's planned launch of the first **SATURN IB**, carrying an **APOLLO** spacecraft, was cancelled by NASA due to weather conditions, and has been rescheduled for this morning. The launch had been originally set for Wednesday but was pushed back to yesterday because of heavy cloud cover which would have interfered with camera coverage of the flight.

UTC FIRES NONTOXIC SOLID. United Technology Center, as part of a program for the AFSC Rocket Propulsion Lab at Edwards AFB, has fired a solid-propellant rocket that achieved "the highest performance of any known rocket of comparable size employing a nontoxic solid propellant." This performance is attributed by UTC to a new chemical ingredient that improved the propellant's burning characteristics. The rocket used about 300 pounds of fuel.

ARC TESTS FRANGIBLE SOUNDING ROCKET. Atlantic Research has successfully flight tested its new frangible sounding rocket from Point Mugu, Calif. Called the Frangible **ARCAS** (All-purpose Rocket for Collection of Atmospheric Sounding), the rocket is designed to fragment into harmless particles after ejecting its payload, thus being suitable for use over populated areas. The regular steel **ARCAS** is not intended for such use.

'67/'68 MARINER MISSIONS PROBED

The necessity and requirements for the FY 1967 **MARINER** mission to Venus were one of the main objectives of the House Subcommittee on Space Sciences and Applications hearings this past week. Chairman Joseph E. Karth (D-Minn.) strongly questioned the need for the Venus probe, especially in view of the two Soviet Venus missions which are due to arrive at the second planet the latter part of the month.

Atmosphere Probe Needed But Starved

Continuing his investigation of the priorities of NASA OSA programs in the wake of the **VOYAGER**, **AOSO** and **AA (APOLLO Applications)** cancellations and deferrals, Karth also probed the wisdom of the objectives of the **MARINER '69** mission. Edgar M. Cortright disclosed that the Avco/NASA-Ames Mars probe (SPACE Daily, Feb. 1 & April 28, 1965) has been under consideration for the **MARINER '69** mission, that it is within the weight limitations of the **ATLAS/AGENA** launch vehicle, and that Ames has recommended that if it could be funded it should be flown on the mission. But he admitted the atmosphere probe, which would cost \$20 million in FY '67 & \$30 million in overall costs, was not going to be included in the mission because of lack of money. He also explained that a Mars atmosphere probe would give NASA much more accurate data on the profile of the atmosphere needed to design the **VOYAGER** landing capsule.

Karth declared that, in his opinion, the main objective of the '69 **MARINER** mission should be the acquisition of engineering data necessary to design the **VOYAGER**. On this premise, he felt that it would have been wiser to spend \$30 or \$40 million in upgrading the **MARINER '69** mission and including an atmosphere probe than to spend the money on a **MARINER '67** mission to Venus.

USSR Programs Triple U.S. Efforts

Cortright said the Soviet lunar and planetary program is operating at a level three times that of ours. On this basis he commented that he would expect about a dozen Soviet planetary probes during the period of our **MARINER '67** and '69 shots. He noted that they have been operating at this higher level since 1960.

The Subcommittee also probed into the necessity for later models of the **OA** (Orbiting Astronomical Observatory) and questioned whether some of the proposed **OA** experiments could not be flown on a manned **AA** mission similar to the **AA-ATOM (APOLLO Telescope Orientation Mount)** system to utilize the **AOSO** experiments. Karth pointed out that the fifth **OA** and the **AA-ATOM** flight are both scheduled for 1969. Cortright said that one of the problems prohibiting this scheme was the difference in pointing capability.

NEW MARS MISSION PROBE PLANNED

The House Space Science and Applications Subcommittee plans to follow-up with a closer study of NASA's plans for a Venus fly-by in 1967 and a Mars fly-by in 1969 in relation to other possible alternatives such as a Mars orbiter in 1969 or 1971 and a Mars atmosphere probe which could be carried on the **MARINER '69** mission (see above). Rep. Joseph E. Karth (D-Minn.), chairman of the subcommittee has requested that officials of NASA-Ames and NASA-JPL be available next week in order to discuss in detail proposals for the Mars atmosphere probe, which has been studied by Avco for Ames (SPACE Daily, Feb. 1 & Apr. 28, 1965).

Edgar M. Cortright, admitted to the committee that a Mars probe program for 1969 would help greatly in preparations for the 1973 **VOYAGER** mission. For example,

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NEW MARS MISSION PROBE PLANNED-Contd

he indicated that solving the problems of sterilization for such a probe would tell us much about the techniques needed for **VOYAGER** sterilization. Karth has again voiced his disapproval of the decision to defer initiation of the **VOYAGER** project until FY 1968 (SPACE Daily, Feb. 24) resulting in a possible repetition of previous NASA projects such as **RANGER**, **CENTAUR** and **SURVEYOR**, where insufficient engineering and design study resulted in expensive cost overruns and schedule slips. Karth pointed out that the **VOYAGER** would have a very strict launch window prohibiting any major schedule slip and the result might be one of NASA's most expensive projects.

Cortright admitted to Rep. Weston E. Vivian (D-Mich.) that there would be no technical problems to a Mars orbiter in '69 or '71, only a funding problem. However because NASA has already embarked on the **MARINER** program there would be a manpower problem. Vivian expressed his opinion that "there is a clear cut option" between the various plans for a Venus shot and Mars mission, and that the "Congress has a wide scope of authority" to determine what these priorities should be.

A good deal of committee questioning centered around ComSat (Communications Satellite Corp.) and NASA research services. Cortright testified that ComSat reimburses NASA for all direct costs, such as launch vehicles and launch services, connected with placing communications satellites in orbit. But he admitted that NASA is conducting around \$4.6 million in supporting research and technology in communications and navigation advanced systems which would be of direct benefit to ComSat. This is in addition to the approximately \$22 million being spent on the **ATS** (Applications Technology Satellite) program. Cortright also admitted that ComSat is at present the only major user of such research, but contended that the situation was similar to other areas where the government considers it in the national interest to advance the technology and a corporation is able to take advantage of this.

Rep. Barber B. Conable, Jr. (R-N.Y.) pointed out that the government would be the biggest single user of communications satellites. Karth, expressing the opinion that the government was providing a great deal of research that was turned over to ComSat free of charge when the government had to pay ComSat rates for the use of communications satellite services, said that ComSat should be required to pay for utilized NASA research.

NASA DEFENDS GEMINI PLANS

Dr. George E. Mueller, NASA associate administrator for manned space flight told Congress yesterday that the remaining five **GEMINI** flights "are a minimum" for proceeding into the **APOLLO** program.

Testifying before the House Manned Space Flight Subcommittee, Mueller admitted that medical data to be obtained from **GEMINI** was basically completed, but he said that more pilot training is essential. "Just on that basis alone we would want more flights rather than fewer." He said NASA has adequate ground simulators but he pointed out that there is "just no substitute for mission experience."

On other points the NASA manned space flight director: 1) Said that a 28-day mission would be the next major step for medical purposes; 2) Admitted that if an astronaut's suit be completely deflated while performing extra-vehicular activities "he probably would not survive"; 3) Indicated that fuel cells are "very attractive" for lunar vehicles; 4) Said that NASA is phasing equipment from **GEMINI** to the Defense Department's **MOL** (Manned Orbiting Laboratory) program "as fast as possible." He said the Air Force would pay only incremental costs for the equipment.

MCNAMARA'S POSITION FY 1967

(The following is a continuation of SPACE Daily's annual detail breakdown of Defense Secretary Robert McNamara's funding position for space and missile projects for the new fiscal year.)

SPACE

VELA. Approximately \$8 million is provided for the space portion of the **VELA** nuclear detection program which has a total budget of \$122.2 million, up from the \$113.5 million for FY '66.

MOL. A total of about \$249 million is available for the program in FY '67 (See SPACE Daily, Jan. 19) and includes some \$90 million carried over from the \$150 million allocated for FY '66 and an additional \$159 million for FY '67. Originally, the Air Force had sought about \$340 million for FY '67 (SPACE Daily, Sept. 22). "Design definition, system integration, development of specifications and determination of firm cost proposals are scheduled for completion during this coming spring and summer, after which contracts will be awarded for the full-scale development of hardware (SPACE Daily, Feb. 10)."

GEMINI. The \$2 million in the FY '66 budget completes the military experiments in this area ending this calendar year.

IDCSP/ADCSP. The defense communications satellite program is funded for \$62 million. The **IDCSP** (Initial) system will be launched into orbit over the next 6 months. After demonstration of operational feasibility, worldwide high priority traffic will be commenced in mid-1967. Until the next generation (**ADCSP**) is available, "we plan to be ready to launch additional satellites, as early as two years after the initial launches (i.e., 1968), should this prove necessary." About \$36 million of the \$62 million is for the AF space segment, the launch vehicles and the airborne terminals, \$18 million is for the Army ground terminals, \$5 million for Navy shipborne and shore terminals, and \$3.5 million for overall engineering and systems management.

TRANSIT. The Navy's navigational satellite system, vital to the **POLARIS** fleet ballistic missile system, is approved for \$21 million in FY '67. Of this, \$18 million is for operating costs, including launch vehicles. The remaining \$3 million will provide improvements in life and reliability of satellites. An almanac will be published providing orbital paths of the **TRANSIT** satellites over a 6-12 month period.

Geodetic Satellites. Military space geodesy is provided a total of \$7 million, \$2 million for the Army's program (**SECOR**) and \$5 million for the Navy's program of tracking network operation.

TITAN III. Development of this military space workhorse will cost another \$66 million in FY '67. The stretched-out schedule to meet the **MOL** requirements will require \$40 million of this amount, \$26 million will complete the development of the 120-inch seven-segment strap-on boosters and for improvement of the Aerojet first stage engines for the **TITAN II** core, necessary to meet the **MOL** weight requirements (SPACE Daily, Sept. 29). The total cost of the **TITAN III** is now listed at \$955 million. It is explained that \$84 million of this is credited to construction funds for the ETR and WTR, and, "Hence, the basic R&D program is still within the original estimate of \$800 to \$900 million

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(SPACE Daily, Feb. 4 & July 1, '63). (For the record: The original estimate was \$808.3 million and with facility construction added on, \$880 to \$890 million (SPACE Daily, May 19). Therefore, disregarding the facility cost, the **TITAN III** has now exceeded the original estimate by about \$50 million. Editor).

PRIME. The unmanned portion of the AF-Martin space shuttle development program (SPACE Daily, July 23 '64) is funded for \$16 million in order to demonstrate the feasibility of maneuvering a data capsule from orbit to selected landing. A small, still undefined portion is provided for the initial work on the **PILOT** (manned) portion of the space shuttle development program now underway (SPACE Daily, Sept. 20 & Feb. 3).

156. Without a line item allocation (SPACE Daily, Jan. 31), the 156-inch solid propellant rocket booster is the only major program now under 623A, which has a FY '67 budget of \$2 million. DOD is still confident it can meet its **MOL** commitments with the seven-segment 120-inch.

Advanced Space Guidance. For support of advanced manned orbiting systems and re-entry spacecraft, horizon sensing, space navigation, star tracking and sensors, and autonomous space navigation, \$2 million is provided in FY '67.

Liquid Rocket Engine. This program, that now includes advanced storable technology and high performance cryogenic liquids for the demonstration of the modular approach, is funded for \$15 million.

ETR. For support of the Eastern Test Range: \$134 million.

SPADATS. The **SPACETRACK** global network for detecting and tracking satellites (AF) will require \$33 million and the Navy's **SPASUR** warning screen is funded at \$6 million.

Satellite Control Facilities. Modernization and improvement of the six permanent tracking stations and one control center and a new permanent tracking station will cost \$59 million in FY '67.

(McNamara's Position, to be continued.)

AEROJET'S 260 TEST SUCCESSFUL/THIRD PROGRAMMED

The second test firing of Aerojet's half-length, 260-inch motor was successfully conducted at the company's test site south of Miami Wednesday night. The motor, positioned nozzle-up in a 160-foot deep well, generated 3.5 million pounds of thrust over a 136-second burn-time. The pressure was exactly as programmed. Overall performance rating: "Good." In the initial test conducted last fall, an Aerojet 260 developed 3.5 million pounds of thrust with a 110-second burning time. (See SPACE Daily, Sept 28 and Oct. 4)

NASA Orders Third Firing

Before Wednesday's test, NASA disclosed it has shuffled its funds to allow for a third 260-inch test, utilizing one of the two half-length cases already fired. Money for the test will come from "careful coordination with the DOD...from funds requested for FY '67, plus available funds from previous years."

The motor for the new test will be designed to generate 5 million pounds of thrust over an 80-second burn-time. This will be accomplished by using a larger (reentrant) nozzle diameter and modifying the propellant to give a higher burning rate.

Future Space Business

SATELLITE OZONE MEASUREMENT TECHNIQUE

NASA-Cambridge has invited 19 firms to submit proposals for a study to develop a technique for measurement of high altitude ozone parameters. Such information could be of use in a long-range weather prediction system based upon satellite observations of the Earth's atmosphere. Accordingly, a remote detection system, either passive or active, is sought for the purpose of measuring ozone profiles from a satellite. Proposed programs should be based on either a microwave-millimeter wave approach or an optical system.

The following firms are on the Center's original source list: American Science and Engineering (Cambridge, Mass.); Atlantic Research; Avco-Everett Research Laboratory; Beckman Instruments, Scientific and Process Instruments Division; Block Engineering; Boeing-Aerospace; Cornell Aeronautical Laboratory; Electro-Optical Systems; GCA Technology Division; General Dynamics/Convair; IIT Research Institute; Lockheed-California; Melpar; Mithras (Cambridge, Mass.); Parametrics (Waltham, Mass.); RCA-Princeton; Stanford Research Institute; Technical Operations Research (Burlington, Mass.); and Barnes Engineering.

IN-SPACE BLOOD FLOW REMOTE MEASUREMENT

NASA-Cambridge is initiating a program leading to the development of electronic instrumentation for the remote measurement of coronary and peripheral blood flow velocity during space flight.

Contact: NASA, Electronics Research Center, 575 Technology Square, Cambridge, Mass. 02139, Attn: Procurement Office. Reference: ERC/R&D 66-510. Due date: Mar. 5.

MICROELECTRONICS INTERCONNECTIONS ADVANCED TECHNOLOGY

NASA-Cambridge has invited 17 firms to submit proposals to investigate advanced interconnection techniques for silicon monolithic circuits from a metallurgical viewpoint in order to improve reliability and to characterize and identify interconnection failures.

The following firms have until March 14 to respond to RFP R&D 66-351: Autonetics; Boeing-Aerospace Group; Fairchild Semiconductor; GE, Valley Forge Space Technology Center; Honeywell, Aeronautical Division; Hughes-Microelectronics; IBM, East Fishkill Facility; P. R. Mallory & Co.; Melpar; Motorola-Semiconductor; United Aircraft-Norden; Philco-Lansdale; RCA-Princeton; Sperry Rand Research Center; Sylvania-Semiconductor; Texas Instruments; and Westinghouse.

DOD NEGOTIATIONS

Collins Radio Co.--with Army Missile Command for additional work on dazzle radar.

Raytheon Co.--with Army Missile Command for **HAWK** missile system modification kits.

Stanford Research Institute--with Air Force Systems Command, Norton for research on plasma diagnostics with electrostatic probes.

DOD NEGOTIATIONS - Contd

Sperry Gyroscope Co.--with Army Missile Command for research and development pertaining to a command guidance missile tracking source.

American Institute for Research--with Office of Naval Research for research on team training and guided missile operations.

Syracuse University Research Corp.--with Office of Naval Research for research on a ground intercept system.

Western Electric Co.--with Navy Purchasing Office, Los Angeles, for services to provide the U.S. Naval Ship Missile Systems Engineering Station, Port Hueneme, Calif. with interface data packages for sonar detection ranging sets AN/SQS-23, 23A, 23B, and 23C.

Western Electric Co.--with Navy Purchasing Office, Los Angeles, for design, fabrication and installation of telecommunications switching system for Pacific Missile Range facility.

DOD CONTRACTS

Army

Baifield Industries--\$1.4 million add-on contract for a classified weapon dispenser.

Cubic Corp.--\$1.4 million for two Sequential Collation of Range (SECOR) ground stations.

Ryan Aeronautical Co.--\$97,001 for flight services in support of MQM (FIREBEE target missile).

New Mexico State University--\$51,002 for optical instrumentation for HONEST JOHN missiles.

Martin-Marietta--\$54,686 for continuation of research studies directed toward development of a stabilizer oxidizer.

Westinghouse Electric Corp.--\$86,500 for modification of "splash detection radar system."

Navy

Space General Corp.--\$199,996 for R&D on a microwave sensor OFR missile guidance.

Battelle Memorial Institute--\$38,070 for surveying the current knowledge of the deformation processing characteristics of difficult-to-form metals.

Walter Dorwin Teague Associates--\$223,144 for review TERRIER/TARTAR/STANDARD missiles.

Raytheon Co.--\$1.2 million cost-plus-fixed-fee contract for research and development work on TARTAR missile control radar sets.