

SPACE BUSINESS



FIRST DAILY MANAGEMENT NEWS SERVICE FOR THE MISSILE / SPACE INDUSTRY

SPACE PUBLICATIONS, INC.
ME. 8-0500 ME. 8-1577

WASHINGTON, D. C.
Cable: SPACE

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TWX: 202 — 965-0765 (SPACE - WASHINGTON)

Published five times a week by Space Publications, Inc., at 1341 G St., N.W., Washington, D. C. 20005

Subscription rates: \$175.00 for one year, \$110.00 for six months, \$20.00 for one month.

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Tuesday, January 18, 1966

Vol. 24, No. 12

AF "OPTIMISTIC" OVER 156 FY '67 FUTURE. Air Force officials are now expressing "optimism" that funding will be provided in the FY '67 budget for a limited continuation of the 156-inch solid which could be the insurance for either an expanded or growing-weight **MOL** as well as for a variety of other missions such as a space rescue and shuttle vehicle transportation or a post-strike reconnaissance system.

Earlier the Air Force had prepared a budget request of \$12 million for the 156 and Program Area 623A. Later this was cut to \$6 million and then finally eliminated (SPACE Daily, Sept. 29 & Oct. 21). Since then a push has been on to reinstate the program with the assistance of a respectable Congressional pressure (SPACE Daily, Dec. 17). The progress of this pressure is believed responsible for the "optimism" among responsible Air Force officials as the budget is finalized.

NASA SEEKING DATA RELAY SATELLITE NETWORK -- II. NASA-Washington's projected ODRN (Orbiting Data Relay Network) (yesterday's SPACE Daily) will have at least two synchronous satellites, one for Atlantic and one for Pacific coverage, and probably three or more (for Indian Ocean coverage as well). The Network is being sought to handle voice and data communications between manned and unmanned spacecraft at up to 10,000 nautical miles and the mission control centers at Goddard, Houston, and JPL. It may also help determine orbital/trajectory parameters.

The ODRN RFP (yesterday's SPACE Daily) calls for a six-month study of how many satellites and ground stations will be necessary and what the overall net will cost (including land circuits to link the stations with the centers). The contractor will recommend a network configuration and a preliminary electronics system design (for satellites and stations). He will also study trade-offs in antenna, repeater, power supply, and related areas.

The Network will operate almost continuously (with two spacecraft simultaneously if necessary). Maximum use will be for 30-day periods with only one day between each period. The antenna for each ground station will have at least a 30-foot aperture and will be a multiple-beam, electronically-phased array. The difference between the ODRN satellite and ComSat's **BLUE BIRD** satellite is that the latter will receive transmissions from ground stations for relay to other ground stations while the former will receive directly from spacecraft for relay to stations. **BLUE BIRD** is also synchronous.

HIBEX TEST PROGRAM CONCLUDED. The Advanced Research Project Agency's **HIBEX** (**H**igh-**B**oost **E**Xperiment) test program was concluded last week. The ten-test series, a part of ARPA's Project **DEFENDER** ballistic missile defense test program, was designed to study problems connected with the boost phase of a high-acceleration interceptor missile. Boeing was prime contractor, with Hercules Powder as propulsion subcontractor.

"All test objectives of the **HIBEX** program were met," ARPA says, i.e. to demonstrate the feasibility of a high-acceleration booster and the ability to guide and control a high performance vehicle while undergoing trajectory maneuvers; to prove the feasibility of igniting, burning and launching a booster from an underground hardened silo; and to institute turning maneuvers to demonstrate structural integrity of both the vehicle and propellant.

HIBEX has been described by ARPA as one of its most significant programs (SPACE Daily, December 10). "In this program," ARPA said, "we are attempting to push the state of the art to the maximum because a high acceleration booster will permit delayed commitment of the defense, thus giving the computers in a ballistic missile defense system more opportunity and time to ferret out the weapon-carrying re-entry vehicle from the incoming decoys and missile debris."

In the final launch, conducted at White Sands Missile Range, the **HIBEX** booster was fired in a vertical trajectory from above ground, then responded in flight to pre-planned maneuvers. The program was managed for ARPA by the Army Missile Command.

156-INCH SECOND STAGE FIRING SUCCESSFUL. The static test firing of Lockheed-Propulsion's 156-inch second stage solid rocket motor with thrust vector control system (SPACE Daily, Jan. 17) was "fully successful."

With a burn time of 72 seconds, the 300,000 pounds of propellant in the 33-foot grain produced approximately one million pounds of thrust. The thrust vector control system successfully made three complete cycles as programmed with satisfactory side forces being generated.

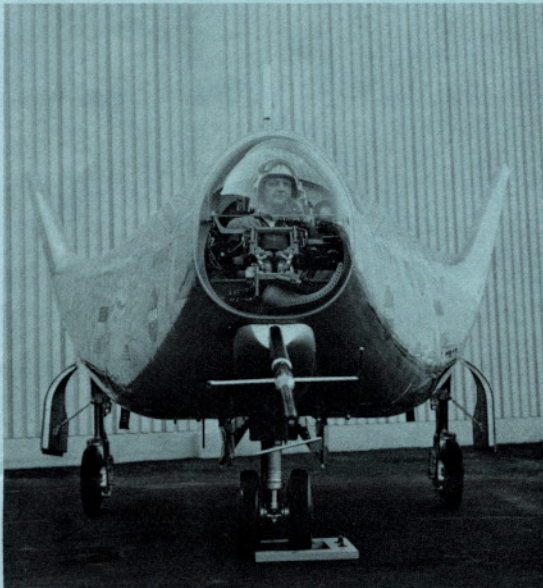
The flight-weight rocket motor, similar in thrust and weight to the motor which could be used for a solid second stage, was the second firing in Lockheed's recent series of tests for the Air Force. In December, Lockheed successfully tested a segmented, 75-foot 156 (SPACE Daily, Dec. 16), which produced three million pounds of thrust.

THIOKOL TO STATIC TEST 156-INCH FIBERGLASS CASE. Working under contract to the Air Force Space Systems Division, Thiokol is readying a monolithic 156-inch fiberglass case for static firing. Two of the cases have been built and shipped from Thiokol's Pocatello facility to the company's Wasatch Division, Utah. One of the cases has been hydrotested with a second such test planned. The second case will be proof tested to 790 psig, then lined, loaded with solid propellant, and static test fired "early this year." The 21-foot-long motor is expected to generate some 325,000 pounds of thrust over a 110-second burn time. **MORE**

The cases are planned to demonstrate the feasibility of large fiberglass motors for application as upper stages on possible future space launch vehicles.

Thiokol, along with five other companies, is also readying a proposal for a new AF program to hydrotest a 156-inch diameter solid propellant motor case (SPACE Daily, Jan. 10). RFP's on this program, issued by the AF Rocket Propulsion Laboratory at Edwards for the Air Force Materials Laboratory are due late next month. Others issued RFP's are Aerojet, Hercules, Lockheed, Rocketdyne, and United.

HL-10 DELIVERED TODAY. Northrop president Thomas Jones will formally deliver the **HL-10** lifting body to NASA-Edwards director Paul Bikle today as scheduled (SPACE Daily, Apr. 23). The ceremonies will take place at the Northrop-Norair plant in Hawthorne, Calif. **HL-10** is the NASA-Langley-designed space shuttle that, like its Ames-designed brother **M2**, is intended to be dropped from a B-52 aircraft for flight tests at 45,000 feet and Mach .8. It is 22 feet long and weighs about 4600 pounds.



Shown in the cockpit is NASA test pilot Milton Thompson, who has worked with the **X-15**, the Paraglider Research Vehicle, and **M2-F1** (the preliminary **M2** model). **M2** was delivered early last summer (SPACE Daily, June 16). It has only two tail fins to **HL-10**'s three. Both, in their present versions, are motorless, but later versions may be powered.

Northrop was intent on realizing delivery of **HL-10** before the New Year (SPACE Daily, Sept. 20), but January had been the expected date (SPACE Daily, Apr. 23). **HL-10** was built on the same jig as **M2**. Northrop received the lifting body contract in the spring of 1964 (SPACE Daily Apr. 22 and June 4, '64).

M2-F2, the model rolled out last summer, has been undergoing testing at NASA-Edwards and is set to begin flight operations this summer. **M2-F1** is also still being used, having completed over 500 flights since 1963.

NEW AA INSTRUMENT CONTRACT TO BENDIX. The NASA-Marshall is preparing to negotiate with Bendix Systems Division for an extension of the earlier contract or issue a new pact for the design development studies of what NASA identifies as Lunar Scientific Mission/Instrument Studies (LSM/IS) and also identified as Scientific Mission/Support Studies (SM/SS) which is a program to support the **APOLLO Applications (AA)** program. Bendix's earlier contract ended last Saturday, January 15.

HUGHES R&D DIVISION UPGRADED

In reinforcing its R&D position, Hughes has appointed Edwin H. Meier, vice president and general manager of the research and development division, as a corporate vice president. In the same reorganization Dr. Malcolm R. Currie, vice president and associate director of Hughes Research Labs, has been named associate manager of the aerospace research and development division.

Lawrence A. Hyland, vice president and general manager, says that, "These appointments are another step in the diversification and growth of the company's business. In the aerospace business the emphasis today is far greater on research and development than on production as it was a few years ago. This reflects the changing picture of the entire industry."

CEC COMBINES DATA PROCESSING OPERATIONS

Consolidated Electrodynamics Corp., Bell & Howell's electronics subsidiary, has combined all of its data processing operations into one division to be known as the Data Instruments Division. The new division comprises the former Data Recorders Division, Technical Suppliers Department, and Data Processing Sales Organization and will be headed by Henry S. Black who has been promoted to senior vice president and general manager of the division. Black was formerly vice president and general manager of the Data Recorders Division.

Other key appointments by Robert H. Garretson, CEC president, include: Donald W. Cook, formerly vice president and general manager, Transducer Division, named as vice president and assistant general manager--Transducer Products; Herbert I. Chambers, formerly assistant general manager, Data Recorders Division, assistant general manager--Data Tape products and assistant general manager--Datagraph products (acting); Nicholas G. Vracin, formerly manager, Technical Supplies, assistant general manager--Technical Supplies; Donald E. Stocking, formerly director of marketing, Data Recorders Division, national marketing manager; William G. Gavin, formerly general sales manager, Data Processing Sales, industrial sales manager; and Thomas I. Brown, Jr., formerly southern regional manager, Data Processing Sales, government sales manager.

MANAGER NAMED FOR AEROJET'S AEROVESSELS DIVISION

Bruce L. Baird has been named to manage the newly created Aerovessels Division at Aerojet-General's Downey, Calif., plant. Baird will be responsible for directing development programs relating to lightweight propellant and pressurization tanks, cryogenic storage systems, and positive-expulsion modules for both manned and unmanned vehicle applications.

Kenneth W. Yarnold has been appointed director of research at Systems Development Corp. Yarnold was formerly president of Dunlap and Associates, System Sciences Division.

Jay E. Miller, western public relations manager of B. F. Goodrich, has been appointed corporate director of public relations. Miller succeeds H. W. Maxson.

SIMMONDS PRECISION REORGANIZED INTO FOUR DIVISIONS

Simmonds Precision Products (Tarrytown, N. Y.) has been reorganized into four divisions--Simmonds Aerospace, Liquidometer Aerospace, Simmonds Industrial Division, and Liquidometer Industrial Division. President Geoffrey R. Simmonds says that "The new divisions were created to provide a base for the continued expansion of Simmonds Precision following acquisition of The Liquidometer Corp. in December 1965."

Appointed as general managers of the divisions were: Henry A. Kurowski, formerly vice president and general manager of Liquidometer division, becomes vice president and general manager of Liquidometer Aerospace; C. VanZandt McQuide, previously general manager of the Vermont manufacturing division, appointed general manager of Simmonds Aerospace; Tom S. Arthur, who was manager of the computer products department of the Vermont manufacturing division, appointed general manager of Simmonds Industrial Division; and Hurley J. Blakeney, formerly assistant to the corporate director of manufacturing, named general manager of Liquidometer Industrial Division.

AVCO GETS INCENTIVE AWARD FOR MARK IIA WORK

Air Force has given Avco-RAD a \$266,500 incentive award for the company's work on the qualification test program for the Mark IIA re-entry vehicle for the **MINUTEMAN II**. Avco said laboratory tests of the Mark IIA made it possible to reduce the number of flight test vehicles needed for performance analysis. Since starting work on the program in October 1962, Avco-RAD has been awarded \$592,000 in incentives from the AF. Other awards covered delivery of test hardware, certification of ground support equipment, and defining a procurement package and equipment specs.

SWISS BUY HUGHES AIR DEFENSE NET

Switzerland has ordered an air defense tactical control system from Hughes. The system, known by the Swiss as Project FLORIDA, will comprise a network of military radar stations and air defense direction centers throughout the country in combination with surface-to-air missiles and interceptor aircraft. The system will provide radar surveillance with automatic acquisition, tracking, and identification of targets, situation evaluation, and control to select targets for ground-based and airborne missiles employed in defense. Swiss personnel are scheduled to start training on the system later this year at Hughes' Fullerton, Calif., plant.

Hughes was chosen last year by the government of Belgium, the Netherlands and West Germany to provide similar systems for their countries. Hughes is also producing a tactical air weapons control system for Japan.

Paul H. Christensen, previously research and development marketing manager for the Guidance and Control Division of Litton Industries, has been named manager of the new Dayton, Ohio, Midwestern Regional Marketing Office for Sperry Rand's UNIVAC Defense Systems Division.

Charles F. Thomas has been named marketing manager of Raytheon's Space and Information Systems Division. Thomas was formerly corporate director of government marketing.

NAS RECOMMENDS POST-APOLLO SPACE PROGRAM (A Special Report) -Part II

(This is the second part of a three part report on the National Science Foundation's recommendations for a national space program to follow **APOLLO**.)

Upper Atmospheric Planetary Research

The Space Science Board reports no "urgent national motivation" for investigation of the upper atmospheres of the planets, but it does see, relative to this nation's overall planetary exploration effort, some "important," "desirable," and "interesting" motivations for such study (in that order).

It says, "There are valid practical reasons for considering upper atmosphere studies in a separate category, but...they constitute only one aspect of a complete study...Were the matter one of individual preference for research activity at rather modest costs, no problems would exist. But the emphasis here is on research that forms part of multi-billion-dollar programs, so that the matter of motivation ceases to be mainly private and individual."

The "important" motivations are exobiological. "The escape temperature of the planetary exosphere...governs the rate of loss of atmospheric constituents and is a basic parameter to the evolutionary study of a planet. It can be obtained directly from certain spectroscopic observations." Also, "upper-atmosphere studies may furnish information on atmospheric constituents that are important" to a general exobiological search for life.

The "desirable" motivations focus on Jupiter: "After the question of extraterrestrial life, the history of the solar system stands as probably the most important scientific question directly related to the space sciences. We suspect that Jupiter, as the largest and nearest of the major planets, may contain much hidden information bearing on this larger question...It will be important to understand the evolution of the Jovian atmosphere, and upper-atmosphere observations that bear on this study should now be considered especially desirable."

The "interesting" motivations concern the comparative composition of the planets' atmospheres. "A purely academic approach to research (in this area) could turn up the most exciting finds."

The Recommendations

The Board recommends a diversified program to study upper atmospheres. The program would involve small probes to at least Mars, Venus, and Jupiter; Earth orbiting laboratories; sounding rockets; balloons; and Earth observatories. It should be "flexible" and "based on minimum space hardware."

The probes should be launched "at every suitable opportunity over the next 10 years." Also, "to involve the academic community in an effective way, an organizational and engineering study should be made to determine the minimum possible lead time between submission of a good proposal and launch. A target of 2.5 years is suggested, and this is already so long as to be a serious impediment to the involvement of important sections of the scientific community."

The Earth orbiting labs should include 1) "at least one **OAO** (Orbiting Astronomical Observatory) with versatile spectrographic equipment" and 2) a platform with a 100-inch telescope, "preferably with manned support."

For the sounding rockets, "immediate steps (should) be taken to develop a fine pointing control...capable of guiding the entire payload to 10 seconds of arc with a maximum jitter of plus-or-minus 2 seconds and maintaining the orientation for 30 seconds of time."

MORE

NAS RECOMMENDS POST-APOLLO SPACE PROGRAM (A Special Report) - Part II Contd.

The recommended subjects and means of study are: 1) composition, temperature, and electron densities--orbiter or fly-by; 2) airglow--ground observatory or balloon; 3) densities (from drag measurements)--orbiters (Venus in particular); 4) magnetic fields--fly-by; 5) constitution and escape temperature (from resonance lines)--orbiter or fly-by; 6) raman spectra--rocket or Earth orbiter; 7) composition and density (from ultraviolet photometry)--Earth orbiter, rocket, balloon; 8) vertical distributions of absorbers--orbiter or fly-by; 9) composition (from far infrared emissions)--Earth orbiter; and 10) density (from occultations)--orbiter or fly-by.

MARQUARDT EARNINGS EXPECTED TO PASS \$900,000 MARK

On the basis of preliminary and unaudited year-end results, J. B. Montgomery, president of Marquardt, says that it is expected that consolidated net earnings for the year will exceed \$900,000, compared with last year's \$827,000. The increased profits will be achieved on a smaller volume of sales, predicted to be in the \$45-million range, down from 1964's \$56 million. Backlog at the end of the year exceeds \$40 million, up 60 per cent over the same date a year ago. Montgomery said that the large backlog is indicative of an improvement in 1966 sales volume.

RADIATION SALES/BACKLOG UP

Radiation Inc. had sales of \$12,984,000 for the 16 weeks ended December 17, an increase of \$1.6 million over the same period last year. Earnings for the period dropped 12 per cent from \$313,100 to \$278,000. Backlog as of December 17 was \$45 million, compared with \$41 million at the end of FY '65 and \$27 million in December 1964.

Dr. Joseph A. Boyd, president of the electronics firm, predicts sales on the order of \$47 million for the current fiscal year, compared with FY 1965's \$38.3 million. Boyd said that earnings were "influenced by high product development costs" which are expected to continue into the second period. Net income for the entire year, however, is expected to exceed the \$1.10 per share in fiscal 1965, he said.

AAI RECORDS LARGEST BACKLOG IN HISTORY

Aircraft Armaments Inc. (Cockeysville, Md.) has entered 1966 with the largest backlog in its history, approximately \$25 million. The following major contracts received in the last quarter of 1965 added almost \$10 million to the total: 1) Design and production of 94 electronic simulators for evaluation of radar system electronic counter-measures capability for Rome Air Development Center; 2) Materials handling equipment for installation aboard four of the Navy's new close combat support ships; and 3) Continued development of the Army's Special Purpose Individual Weapon (SPIW).

A. G. Handschumacher, chairman of the board and chief executive officer of Aeronca Manufacturing Corp., will succeed S. J. Kuderer as president of the firm. Kuderer, who has held the position since May 1963, is resigning as an officer and a member of the board.

DOD NEGOTIATIONS

TRW Systems Group--with Air Force Ballistic Systems Division for services in support of **TITAN II** data management program.

The Boeing Co.--with Air Force Ballistic Systems Division for additional **MINUTE-MAN** missile inter-stages and supporting aerospace ground equipment.

NASA NEGOTIATIONS

United Aircraft Corp.--with Langley for basic research on ingredient decomposition and composite propellant combustion zone structure.

LTV Aerospace Corp.--with Langley for the production of fifteen, four stage **SCOUT** vehicles including rocket motors.

Electronic Associates, Inc.--with Ames to conduct an analysis of a space flight guidance research facility.

Stanford Research Institute--with Ames to analyze twenty electron microscope grid surfaces flown aboard Project **LUSTER**.

RCA, Astro Electronics Division--with Goddard for integration support for the Apt camera subsystem for the **NIMBUS** satellite project.

Dynamic Science Corp.--with Western Operations for biopropellant instability model and steady state model for thermally unstable fuels.

Dynamic Science Corp.--with Western Operations for rocket performance standard prediction techniques.

DOD CONTRACTS

Navy

Aracon Geophysics Co.--\$45,472 for a study simulation of oceanographic and geophysical space-sensor displays.

Air Force

Atlantic Research Corp.--\$44,926 for research on hydrogen-fluorine reaction.

General Electric Co.--\$11.2 million increment to a previously awarded contract for research and development of the MARK 12 re-entry program.

Army

Global Associates, Oakland, Calif.--\$6.2 million modification to an existing contract for base logistics support, Kawajalein Test Site.