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NORMAN L. BAKER — Publisher & Editor  
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**AF FAILS TO SATISFY FLORIDA DELEGATION ON MOL PLANS.** The members of the Florida Congressional delegation are still "not satisfied" after a high-level Air Force briefing on plans to launch **MOL** manned flights from the WTR instead of Cape Kennedy (SPACE Daily, Feb. 14 & 15). Senator Spessard L. Holland (D-Fla.), who called the briefing complimented the Air Force on its "candor" but said that more information had been requested and would be presented at the special **MOL** hearings to be conducted by the Senate Space Committee.

Present to hear the Air Force planning were Senator George A. Smathers (D-Fla.), Rep. Edward J. Gurney (R-Fla.), Rep. Charles E. Bennett (D-Fla.), and Rep. A. Sidney Herlong Jr. (D-Fla.). The briefing was conducted by Dr. Alexander Flax, assistant secretary of the AF for R&D; Dr. Mike Yaramovich, **MOL** technical director; Col. Richard Dennin of the **MOL** Office; Col. Bruce Arnold of Air Force Legislative Liaison; Lt. Col. William Baxter; range safety officer for ETR; Capt. Howard Silberstein of the Office of the Director of Defense R&D; and Lt. Col. James Fitzpatrick of the Office of the Deputy Chief of Staff for AF R&D.

The **MOL** hearings next Thursday by the Senate Space Committee (SPACE Daily, Feb. 14) will hear a more complete explanation of the Air Force position. Testimony will be given by Dr. Robert C. Seamans, Jr., deputy administrator of NASA, Dr. John S. Foster Jr., director of defense R&E, Mr. Daniel J. Fink, deputy director of defense R&E for strategic and space systems, and Dr. Alexander Flax.

**SCRAMJET COMPOSITE ENGINES UNDER DEVELOPMENT.** The president of Marquardt Corp., prime contractor to the Air Force for development of the **SCRAMJET** (Supersonic Combustion Ramjet), disclosed today that "composite engines which incorporate rocket power in the **SCRAMJET** module" are under development. The engines will be used for accelerating **SCRAMJET**-powered vehicles to ignition velocity.

J. B. Montgomery, Marquardt chief executive, said engines of this nature will be used to propel aircraft and (with **SCRAMJET**) spacecraft over wide speed ranges and distances, including the **SPACE PLANE** concept (SPACE Daily, April 28). "I visualize the day when recoverable **SCRAMJET**-powered vehicles will launch spacecraft at costs drastically below present levels," Montgomery said. "I can visualize composite rocket and **SCRAMJET** engines powering aerospace planes capable of operating with ease in and out of orbit. We will see the day when our returning astronaut will land normally on airfields, and we will look back with amusement at the early days when he was tossed into the sea where a large contingent of the Navy was apprehensively standing by to retrieve him." **MORE**

*The Leader in Missile/Space Reporting*

**Warns Against Budget Cuts for SCRAMJET.** The Marquardt president said the **SCRAMJET** has placed the United States "on the threshold of a dramatic breakthrough in propulsion." He warned against budget cuts in the program. "We should not permit the tremendous pressures of short range expenditures of the Viet Nam war to allow this country to neglect this important investment in the future."

The **SCRAMJET** is rapidly approaching flight demonstration, Montgomery said. The first **SCRAMJET** flight test will take place at Vandenberg AFB "in the near future." In the test, a single stage solid motor will boost the **SCRAMJET** vehicle, which resembles a stubby surface-to-air defense missile with four air intakes and four stabilizing fins equally spaced about its body which is surmounted with a sharp spiked cone. The booster will then be separated and the vehicle will accelerate on **SCRAMJET** power alone. The flight test and feasibility demonstration is funded by the AF Aero Propulsion Laboratory, Dayton.

Marquardt was awarded a \$5 million AF contract last fall to evaluate **SCRAMJET** under flight conditions (SPACE Daily, Sept. 17). Teamed with Marquardt in the program are General Applied Science Labs and Lockheed-California.

**TWO-HOUR EXTRA-VEHICULAR MISSION PLANNED FOR GEMINI VIII.** Astronaut David Scott is scheduled to perform two hours of extra-vehicular activities during the upcoming **GEMINI VIII** rendezvous flight, which has been tentatively set for March 15. Problems with the **AGENA** target vehicle may cause a delay in the three-day flight.

**SEVEN BID ON ION THRUSTOR SYSTEMS TEST PROGRAM.** Seven companies--Hughes Research Laboratories, TRW Systems Group, Ion Physics Corp., General Dynamics/Ft. Worth, Douglas Missile & Space Systems, Electro-Optical Systems, and GE-Missile & Space--have submitted proposals to NASA-Lewis for an experimental and analytical testing program of electron-bombardment Kaufman-type ion thruster systems which use mercury as a propellant. Fifteen firms were on the Center's original invitation list (SPACE Daily, Jan. 13).

**ABC SATELLITE DECISION STILL DUE NEXT WEEK.** The FCC says it is still hopeful of ruling next Wednesday (SPACE Daily, Feb. 10) on ABC's request for the right to own and operate a communications satellite (SPACE Daily, Sept. 22). Among those parties especially anxious to learn the decision is the State of California, which would like to put up its own synchronous communications satellite for educational television transmissions

**JPL TO BUILD VOYAGER STERILIZATION LAB.** NASA has transferred \$940, -300 from FY 1966 R&D funds for lunar and planetary exploration to construction of facilities funds in order to provide for the construction of a Sterile Assembly and Development Laboratory for the **VOYAGER** project in the Spacecraft Development Engineering Building at JPL.

**James S. Sims Jr.** has joined Bowles Engineering Corp. (Silver Spring, Md.) as vice president-research and development. Sims previously was with the Hamilton-Standard Division of United Aircraft.

**ANACONDA ASTRODATA FORMED.** Anaconda Wire and Cable Company and Astrodata Inc., manufacturer of electronic data systems, computers and instrumentation, have announced formation of a new company. To be known as the Anaconda Astrodata Company, the new firm will enlarge the present activity of both participating partners in the communications industry. The company will operate initially at Astro's main plant complex in Anaheim, Calif.

A seven-member board of directors has been elected, comprising: Anaconda Wire and Cable's board chairman Richard B. Steinmetz, president Robert B. Fulton, administrative vice president William Grey and vice president for communications products division Robert Mc Ilvane; Astrodata's president Wallace Rianda, executive vice president Howard Libby and Astrodata's Lee Loomis, Jr.

**BENDIX NEGOTIATING FARO CONTRACT.** Air Force Special Weapons Center is negotiating a sole-source contract with Bendix Systems Division for fabrication of a solar flare detection system for the **FARO** (Flare Activity Radio biological Observatory) experiment. **FARO** will be carried aboard **OV1-9** next November and **OV1-11** or **-12** in May 1967. The experiment, which is in the FY '67 budget and will not be officially approved until July, is designed to measure solar flare activity in the 200-400 mile range.

**MSF TO PROBE AA DECISION POINTS.** The Manned Space Flight Subcommittee of the House Space Committee is expected to pay particular attention to the timing of the "critical decision points" for the **AA** (**APOLLO** Applications) during hearings beginning tomorrow. The program was scheduled by NASA for initiation this year, but the FY '67 budget request provides funding for only the long lead-time items. The amount of funds for **APOLLO** contingencies will also receive special attention.

Leading off the witnesses for the round of hearings on NASA's FY '67 authorization will be Dr. Robert C. Seamans Jr., deputy administrator, and Dr. George Mueller, associate administrator for manned space flight. The subcommittee, under the acting chairmanship of Rep. Emilio Q. Daddario (D-Conn.) in chairman Olin E. Teague's (D-Tex.) absence, will also hold hearings on February 24 and 25 and March 1-4.

**NASA CONFIRMS APOLLO SHIP COMSAT STATIONS.** NASA has formerly confirmed that \$22.5 million has been reprogrammed for outfitting three **APOLLO** tracking ships with ground stations to support ComSat's **BLUE BIRD** satellites (SPACE Daily, Dec. 1 & 16). Of that money, \$20.5 million has gone to General Dynamics, ship conversion contractor, for the station systems (SPACE Daily, Jan. 20 & 27). The funds were passed from NASA-Washington to NASA-Goddard to the Navy's ISPO (Instrumented Ships Project Office). They were originally assigned for FY '64 NASA construction of facilities R&D (SPACE Daily, Jan. 20).

**Andrew G. Demerjian** has been named head of the Manufacturing Division at Aerojet-General's Von Karman Center. Demerjian previously headed Manufacturing Division Administration.

**William G. Premaza** has been appointed director of contracts for Radiation's Systems Division. Premaza was formerly contracts manager for Major Programs.

**D-1A TO BE LAUNCHED TODAY.** France's second payload, **D-1A**, most recently set for launch yesterday morning (SPACE Daily, Feb. 15), is now due to lift off this morning. If it does not, tomorrow morning is the last chance in the near time period as indicated (SPACE Daily, Feb. 15). It was supposed to go aloft Friday (SPACE Daily, Jan. 7 & Feb. 7), but a faulty umbilical cord forced a postponement to Saturday (SPACE Daily, Feb. 14). At that time, however, the launch vehicle failed to fire, so the Wednesday date was scheduled to permit recharging the satellite's batteries and refueling the rocket.

If **D-1A** is successful, **D-1B**, scheduled for a summer launch (SPACE Daily, Jan. 19), will be cancelled and **D-1C** will be prepared for orbiting later this year as was tentatively planned. Also, **D-1D** will be readied for possible launch late this year. Its orbit will be less inclined than those of its older brothers. The **D-1s** ride **DIAMANT** (Diamond) vehicles from Pad Brigitte (whence France's first payload, **A-1A**, went aloft: SPACE Daily, Dec. 1) at the Hammaguir range in Algeria. **D-1A** is about the size and shape of a snare drum (SPACE Daily, Feb. 9).

The liftoff Friday was planned for 9 AM Hammaguir time (10 AM Paris time and 4 AM EST). The countdown began at 2:15 AM and proceeded properly until 8:29 (T-31) when mounting wind began to disturb the sand at the site. It was resumed at 8:45 (thus setting liftoff for 9:16--i.e. 8:45 plus 31). Twenty-two minutes later at T-9, it was stopped again and held for four minutes. The next stop came at 9:16, and a ten-minute delay followed (thus pushing liftoff to 9:30). Resumed at 9:26, the count continued normally until 20 seconds before ignition, at which time the umbilical fell away from the instrument unit (which **D-1A** was mounted on top of) prematurely due to a bad release.

The Saturday liftoff was set for 8:30 AM local time, and by 7:47 all was well enough to permit removal of the support tower. To avoid the umbilical trouble, the cord was taken away manually and the satellite was put on its batteries at the lowest power level of operation. Soon after 8 AM, however, problems arose, and the following series of stops and starts ensued (times approximate): stop 8:05 (T-25); start 8:09 (new lift-off 8:34); stop 8:23:30 (T-10:30); start 8:25:30 (new T-8:36); stop 8:27 (T-9); start 8:29 (new T-8:38); stop 8:30 (T-8); start 8:42 (new T-8:50); stop 8:48 (T-2); start 8:53 (new T-8:55). At 8:55, the two small roll rockets on the tail fins ignited, but a half-pound pyrotechnic device on the first stage malfunctioned, thus preventing ignition.

As **A-1A** was not officially named, so will **D-1A** go without a government label, but **A-1A** was nicknamed **CITRON** (SPACE Daily, Dec. 1), and two nicknames have already appeared for **D-1A**. The first is **ZEBULON** ("little thing"), the name of a toy popularized by a French TV show. The toy is a head attached to a spring, and **D-1A** is likewise fixed to a spring device between it and the instrument unit. The other name, **DIABLOTIN** ("little devil"), was proposed by SPACE Daily-France and is also derived from a toy, the jack-in-the-box.

**HL-10/M-2 CONTRACT EXTENSION TO NORTHROP.** Northrop has received a \$253,719 contract modification to provide for additional technical support for the **HL-10** and **M-2** manned lifting body space shuttle vehicles through September 1967. Both the **M-2**, now undergoing flight tests at NASA-Edwards, and the **HL-10**, presently being completed at the Northrop plant, were built by Northrop.

**NAS ROCKET/SATELLITE RESEARCH PROGRAM RECOMMENDATIONS--III.**

Concluding sections of Part III of the Woods Hole study, prepared by working groups of scientists under the Space Science Board of the National Academy of Sciences, deal with Medicine and Physiology, and the Role of Man in Space Research.

**Space Stations Needed to Close Biomedical Gaps:** The primary question in this area was whether knowledge and technology are or can become sufficient for flights lasting from 30 to 1000 days. The conclusion: While there "are gaps in biomedical knowledge that could affect the progress of the manned program," projects can be conducted in time "to allow for final system development of a manned planetary mission by 1980-1985." The recommendations:

- 1) A series of manned space flights specifically designed to study the biomedical (in opposition to engineering) prolonged space flight must be undertaken.
- 2) Before man can be safely included in missions of planetary duration, an orbiting research facility for the study of long-term space flight must be established. Therefore: Development of a series of manned orbiting research laboratories should be authorized to conduct the medical, physiological and behavioral research required for prolonged space flight up to 1000 days. Present spacecraft allocated to the manned program "are probably not capable of performing all the necessary research." Needed: Space laboratories which can accommodate at least six to eight men with room for experimentation. Twenty-one and 30 day primate flights will precede manned testing.)
- 3) Life-support systems currently in use or in advanced stages of development are inadequate for use in prolonged flights, and therefore, it is urgent that these systems be improved for long-term flights.
- 4) Supporting ground-based research must be broadened and accelerated.
- 5) A study should be initiated to find the best means to attract specialists in bioastronautics to NASA and training and retraining them.
- 6) Number of scientist-astronauts should be increased.
- 7) Results of research on the biomedical aspects of space flight should be consistently and promptly published in appropriate scientific journals.

**The Role of Man in Space Research. Conclusions:**

- 1) Scientifically satisfying studies of the planets will require the presence of scientists, preferably on the planetary surface. They should at least be in a spacecraft orbiting close to the planet. "It is clear that here man is essential."
- 2) There "are many ways" in which man can be usefully employed in space for scientific research, i.e. observers; for the assembly, placement, repair and operation of instruments; for preliminary analysis, screening, sampling, data collection storage and retrieval.
- 3) While the entire cost of manned space flight cannot be justified on the basis of scientific value alone, man should be utilized for scientific purposes "whenever it seems possible to do so."

MORE

4) Up to missions of the **APOLLO** duration there appears to be no apparent reason why man cannot survive and function effectively in space. Further it is believed that most physiological constraints will yield to work now in progress, and that man may in the future embark on longer missions "with reasonable confidence that he can perform meaningful scientific studies."

5) Four types of programs are visualized for utilizing man for scientific studies in space: a) Current **GEMINI** and **APOLLO**; b) Later manned orbiting laboratories, such as the Manned Orbiting Laboratory (**MOL**), **APOLLO** Applications (**AA**) spacecraft, or the Large Orbiting Research Laboratory (**LORL**); c) Large, complex, special purpose space assemblies, such as optical or radio-astronomical observatories; d) And scientific operations on lunar or planetary surfaces.

The Woods Hole study, conducted last summer, grew out of discussions between members of the Space Science Board and NASA. The talks indicated that "it was timely" for the Board to undertake a study of certain principal areas of space research. The purpose was three-fold: 1) To develop a program of planetary exploration and to recommend priority within it (*SPACE Daily*, Jan. 17, 18 and 19); 2) To determine the needs of astronomy in space (*SPACE Daily*, Feb. 2, 3, 4 and 7); 3) And to consider the role of man in space research. These factors were considered for the post-**APOLLO** period, extending through about 1985. Members of the working groups which prepared the various reports included many industry scientists, top-ranking NASA scientists and directors, and a great percentage of the leading university scientific investigators.

#### RESTARTABLE SECOND STAGE FOR TITAN III PROBED

Major General Benjamin Funk, commander of the AFSC Space Systems Division, says his Division is considering three basic ways to turn the **TITAN III-C** into a more advanced vehicle: 1) Use seven-segment 120-inch strap-on solid boosters instead of the **III-C**'s five-segment units, 2) use 156-inch solids instead of the 120s, or 3) convert the **III-C**'s second stage motor into a restartable system.

Such changes would produce a configuration that could put over 40,000 pounds into near-Earth orbit (which *SPACE Daily* identified as **TITAN IV**) (*SPACE Daily*, Feb. 4, '64). According to Funk, the changes "would upgrade our **TITAN III** capability to something like 44,000 pounds in a nominal Earth orbit, 18,000 pounds to escape, and more than 13,000 pounds in synchronous orbit."

Aerojet-General, builder of the **III-C**'s second stage liquid engine, has done some preliminary study of a restartable system for that stage but has not been approached by Martin to begin any serious work. The Advanced **TITAN III** vehicle has been included among those configurations designated **TITAN III-X** (*SPACE Daily*, Sept. 30).

Funk also notes that his staff is working to solve problems related to re-useable boosters, maneuvering re-entry vehicles, and advanced materials and fuels. He adds that incentive contracting at SSD has grown substantially: "76 per cent of our nearly 400 active contracts are incentive types... (compared with) 6.5 per cent in 1962."

**SAMOS-Class Launch From WTR.** An Air Force **ATLAS-AGENA** sent a **SAMOS-Class** satellite toward orbit from Vandenberg AFB late Tuesday.

### SPACECRAFT THERMAL CONVERSION BREAKTHROUGH

RCA reports development of a "heat pipe" which permits the transfer of thermal energy from a heat source to a thermionic device for direct conversion into electricity. The device, consisting of a molybdenum metal tube containing molten lithium metal, eliminates the need for inserting the thermionic converter into the nuclear reactor.

The development, under Air Force contract, marks an important advancement toward effective use of nuclear reactors as a direct source of energy onboard a spacecraft. The heat pipe recently successfully completed a 500-hour-test. Initial work on the heat pipe was carried out by Los Alamos Scientific Laboratory. RCA work was conducted by the company's Direct Energy Conversion Department, Lancaster, Pa.

### GRUMMAN EARNINGS UP 96 PER CENT

Grumman's sales for 1965 were \$852,100,952, compared to last year's \$599,241,047. Earnings for the period rose 96 per cent from \$599,241,047 to \$20,936,064. The company's board of directors has declared a 25-cent per share dividend on common stock payable March 21 to stockholders of record at close of business March 10. The dividend for the previous quarter was 22 cents per share.

### ROCKET RESEARCH SALES/EARNINGS UP

Rocket Research Corp. had sales of \$2,019,523 for FY '65, up 259 per cent from last year's \$562,281 while earnings rose 191 per cent from \$41,887 to \$122,014. As of February 1 the company's backlog had reached \$1 million as compared to the October 31 figure of \$652,469.

Dr. Vincent M. Jolivet, professor of finance and statistics at the University of Washington, has been elected to the office of vice president by the board of directors. Jolivet, a member of the board for the past three years, will direct business, financial, and administrative activities for Rocket Research. At the same time Wells McTaggart, vice president of Dempsey-Tegeler & Co., an investment house with headquarters in St. Louis, was elected to the board.

### ARMY TESTING TOW IN ALASKA

The Army and Hughes are testing the latter's TOW (Tube-launched, Optically-tracked, Wire-guided) missile at Fort Greeley, Alaska, to determine its operational capability under arctic conditions. Test firings are being conducted at temperatures down to -25 degrees F, and later trials will be run where the anti-tank weapon will be assembled, disassembled, and transported in the field. The missile can also be used against gun emplacements.

Herbert C. Knortz has been elected as senior vice president of ITT. Knortz, who has been a vice president and comptroller since July 1963, will retain his position of comptroller of the company.

Dr. Manfred Eimer has been appointed vice president-engineering of Space-General. Eimer has been director of engineering since 1963.

**WESTINGHOUSE EARNINGS PASS \$100-MILLION MARK**

Westinghouse's sales and earnings both rose to new heights in 1965, making the year the most profitable in the company's history. Sales were \$2,389,909,000, compared to 1964's \$2,271,190,000. Earnings crossed the \$100-million mark for the first time, rising 39 per cent from \$76,678,000 to \$106,903,000.

D. C. Burnham, president, says that in view of the company's present record backlog that "...with continuance of the prevailing healthy state of the general economy, I expect further improvement in both sales and income in 1966."

**GOODRICH EARNINGS UP 19 PER CENT**

B. F. Goodrich had sales of \$980,122,472 for 1965, up 12 per cent over the \$872,352,720 recorded in 1964. Earnings rose 19 per cent from \$33,973,630 to \$40,652,632. Sales set a new record for the fourth consecutive year, and earnings were the highest since 1956.

**BARDEN SALES/EARNINGS HIT 3-MONTH HIGH**

Barden Corp. has reached a new high in quarterly sales and earnings. The company's sales for the first quarter of its current fiscal year were \$6,225,520, up 48 per cent from the \$4,220,148 recorded in the 1965 period. Earnings climbed 127 per cent from \$281,778 to \$642,006. President J. Robert Tomlinson says that, based on the current backlog, the second quarter should compare favorably with the first, and that "the full year should show significant improvements over 1965 in both sales and earnings, provided of course, that general business conditions remain strong."

**NAA AWARDS MINUTEMAN II SUBCONTRACTS**

North American Autonetics has awarded \$5,210,000 in subcontracts for **MINUTEMAN II** guidance and control system components. Ling-Temco-Vought received \$1,930,000 for electrohydraulic servocylinders; Moog got \$1,400,000 for servoinjectors; Borg-Warner Werner's Presco Products got \$990,000 for auxiliary hydraulic power supplies; and Vickers-Aerospace got \$890,000 for the same thing. NAA Autonetics is associated prime contractor to the Air Force for **MINUTEMAN II** inertial guidance, flight control, and ground support equipment.

**George C. Tweed, Jr.**, previously corporate director of engineering, has been named vice president-engineering of Cubic Corp.

**Earl E. Spencer** has been appointed manager of communications planning for GE's Defense Electronic Division, and **John N. Dumas** has been named manager of Electronics, Aerospace and Consumer Advertising for the Advertising and Sales Promotion Department.

**Robert J. Garnett**, previously manager of Ling-Temco-Vought's Advanced Space Maneuvering Systems Programs (AMU and RMU), has been named assistant program manager for the Department of Space and Life Systems at United Aircraft's Hamilton-Standard Division.