

# SPACE BUSINESS *Daily*

FIRST DAILY MANAGEMENT NEWS SERVICE FOR THE MISSILE / SPACE INDUSTRY

SPACE PUBLICATIONS

WASHINGTON, D. C.

NORMAN L. BAKER — Publisher & Editor

Published five times a week by Space Publications at 1426 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.

Permission for reproduction of this publication should be obtained from the editors. ME. 8-0500 Cable: SPACE

Thursday, December 16, 1965

Vol. 23, No. 31

**GEMINI VII/VI RENDEZVOUS WITHIN 6 FEET.** Our national space program recorded a significant first yesterday when **GEMINI VI** maneuvered to within six feet of **GEMINI VII**, 5 hours and 50 minutes after lift-off of **GEMINI VI** from Cape Kennedy (See **GEMINI VII/VI** Log elsewhere in this issue.).

**NASA IMPLEMENTS AOSO CANCELLATION.** The NASA has finally implemented its plans for cancellation of the Advanced Orbiting Solar Observatory (**AOSO**), a plan reported by **SPACE Daily** on June 21. When the plan for cancellation first originated the **AOSO** was to be cancelled to "take care of certain contingencies which might arise during the fiscal year ('66). NASA now officially explains that its cancellation comes as the result of "budgetary considerations."

The **AOSO** is a victim of the BOB's tightening of the budget for FY '67 (**SPACE Daily**, Sept. 24 & Dec. 13). NASA had temporarily shelved the plans for cancellation after Congressional criticism from House Space Committee leaders Miller and Karth (**SPACE Daily**, June 23), and approved the initiation of the \$60 million Phase II program (**SPACE Daily**, July 16).

The Fairchild-Republic spacecraft, scheduled for first launch from Vandenberg in 1969, had been budgeted for \$39 million for FY '66. NASA hopes to recover a portion of the \$24.9 million already appropriated. This was the first year that the **AOSO** had been carried as a line item. NASA officials have expressed a desire to reinstate the program at some time in the future, an obituary which is becoming very familiar these last two years.

**RED CHINA MRBMS IN ONE YEAR.** Now, one year after the Administration's downgrading of the missile delivery potential of Red China (**SPACE Daily**, Oct. 19, '64), Defense Secretary Robert McNamara has made another belated disclosure regarding the strategic balance of power. McNamara now admits that Red China could have medium range missiles by 1967 and ICBMs within eight to nine years, by 1975.

The Defense Secretary chose the disclosure as an argument for seeking increased participation by NATO members in America's Asian involvement. Addressing the foreign and defense ministers of NATO, McNamara added that Red China will have nuclear material to make nuclear bombs for aircraft as well as missile warheads.

(**SPACE Daily** warning, in its analysis of the Chinese potential (Oct. 19, '64), that

*The Leader in Missile/Space Reporting*

MORE

downgrading of a possible early attainment of a delivery system was "a demonstration of a lack of knowledge or naivete of alarming proportions," assessed that "Besides the fact that Red China could deliver its nuclear devices with 'outmoded' aircraft until it gets more advanced systems in order. . . . There is still the other possibility--that the Red Chinese will develop and demonstrate their own missile delivery systems in a shorter time than we are led to believe.")

**JPL TO RENEGOTIATE SURVEYOR WITH HUGHES.** NASA-Washington has asked the Jet Propulsion Lab to prepare a new RFP for **SURVEYOR**-builder Hughes to "redirect" the program toward only the first configuration--i.e. toward the simplest spacecraft, which is best suited for early **APOLLO** employment. The RFP, expected to be issued January 15, will ask that all seven of the **SURVEYORs** presently under development be produced in this configuration. Once Hughes replies to the RFP, the current contract from JPL will be renegotiated. It now calls for three of the first-version **SURVEYORs** and four of the more advanced versions.

**NEW APOLLO SHIP ANTENNA AWARD DUE NEXT MONTH.** As indicated (SPACE Daily, Dec. 1), ISPO, the Navy's Instrumented Ships Project Office, will seek a contractor next month to supply the shipboard ground stations for the three **APOLLO** tracking ships General Dynamics is preparing. NASA-Washington is presently trying to reprogram \$22,500,000 to provide ISPO through NASA-Goddard for the procurement. The request for Congressional approval of the reprogramming went to Capitol Hill December 6 and is expected to be honored within about a month from then. The stations are needed because the ships will support a ComSat satellite system.

**TRW WINS "BIG THREE" COMSAT RACE.** ComSat has chosen TRW over Hughes and RCA as indicated (SPACE Daily, Dec. 13) to supply the "versatile" satellite for the Corporation's master global system. Negotiations will begin today or tomorrow to define the contract, which will call for the delivery of four synchronous/medium-altitude payloads within two years and three lots of three satellites each in 30, 37, and 42 months if required.

Each satellite will have a 1200-channel capacity and a five-year lifetime, will be 56 inches in diameter and 37 inches high, will weigh 234 pounds and be spin stabilized, and will be launched by an **ATLAS-AGENA** (probably in groups). Com-Sat began considering such a satellite early last spring (SPACE Daily, Apr. 28) and finally issued the RFP in mid August (SPACE Daily, Aug. 18).

**LOVELACE MISSING/PLANE FOUND.** Dr. W. Randolph Lovelace II, missing with his wife Mary and airplane pilot Milton Brown since Sunday night on a flight from Aspen, Colo., to Albuquerque, N. M., is believed to have been killed in a crash of a private plane in Independence Pass near Aspen. The wreckage of a plane similar to the space pioneer doctor's was sighted yesterday from the air. No life was observed.

### SG DESIGNS STOMPER LUNAR CAPSULE

An 8.5-pound device that will determine the bearing strength of pre-selected landing sites on the lunar surface has been proposed by Space-General to NASA for use on the **LEM** (Lunar Excursion Module). The device, called **STOMPER** (Soil Test Ordnance, Multi-Purpose Exploration Rocket), is designed to provide a direct simulation of a **LEM** landing.

Studies of a lunar survey capsule were undertaken by Space-General--and Philco Aeronutronics--late last year (SPACE Daily, July 24 & Dec. 3, '64) under separate, \$200,000 contracts from NASA-Washington. The Space-General contract called for the study of a survivable, instrumented capsule that could be ejected from the **LEM** and hard-landed on the Moon to study the lunar surface and radio data for evaluation prior to a manned landing attempt (SPACE Daily, Feb. 24).

Mounted on the **LEM**'s exterior, the **STOMPER** unit would drop to the lunar surface, erecting upon impact. The unit would fire and provide a go/no go visual signal within 3 seconds. (Visual signal would involve release of a marker dye after penetration is complete, one color indicating acceptable characteristics, another showing excessive penetration.) The unit could be released from up to 50 feet above the surface. A **STOMPER** package would consist of two units that function independently, providing a two-site test capability.

A typical **STOMPER** unit occupies a package volume of 6 inches diameter by 9 inches long. When extended the unit exerts a test force of 1180 pounds.

Space-General says tests have proved that **STOMPER** penetration is a valid approximation of soil strength, and that the unit will 1) erect on hard sand and on soft soils; and 2) function on any slope to 20 degrees relative to local gravity. The company has completed preliminary definition of the **STOMPER** and is ready to build a prototype package.

### NASA TO AWARD 1335 SPACE DOCTORAL GRANTS

As part of its graduate training program, NASA will award grants to 1335 graduate students next year for work toward doctoral degrees in space-related areas. One-hundred-fifty-two colleges and universities will participate in the program.

Participating students will be selected by the universities and will enter the program next September. The total to be selected at each school will vary from two to fifteen depending on the number of doctoral programs available in space-related areas, the adequacy of the school's facilities, and the extent of its participation in space activities.

Each graduate student chosen for the program will receive a stipend of \$2400 for 12 months of training, with an additional allowance for dependents of up to \$1000 a year under certain conditions. The grants will be renewable for three years if a student maintains a satisfactory record.

NASA Associate Administrator Dr. Homer E. Newell said the program would help develop a base of scientific and engineering talent for the space program as well as enhancing "the competence of universities to participate in and make important contributions" to the United States space effort.

The graduate training program is administered by the Office of Grants and Research Contracts in NASA's Office of Space Science and Applications. About 3100 graduate students are already in training under this program.

### GE ENDORSES REUSEABLE ABLATIVE HEAT SHIELD

Of the two heat shielding methods suitable for reusable space vehicles, reradiation and ablation, the latter is the better according to two General Electric scientists. Shields of elastomeric silicone ablators, adhered to the vehicle by a sticky substance or "loop and pile" fibers, could be readily removed and replaced at a cost that could lower the vehicle's original price by 10 to 30 per cent.

GE-Re-entry Systems' Dr. J. D. Stewart and H. L. Bloom, speaking to the Air Force's re-entry meeting in Miami, said that such an ablative shield could endure temporary extreme heat fluxes better than a reradiator and that refurbishment, while necessary for the ablator but not normally for the reradiator, would be offset in significance by the safety and simplicity of related inspection work. Stewart and Bloom were reporting the results of a shielding study.

GE-Re-entry was among those companies that sought the NASA-Langley contract for R&D of heat shields for reusable space vehicles (SPACE Daily, Mar. 23 and Apr. 21). Martin won the award (SPACE Daily, Aug. 5) and is studying, among others, elastomeric silicones (SPACE Daily, Oct. 4).

### CARRIERS OF S-IC STAGES CONTINUING

Four of the five nonflight models of the **S-IC** first stage (**SATURN V**'s booster)(SPACE Daily, Oct. 13) are fully employed at NASA-Marshall, and the fifth is now scheduled to be delivered to Cape Kennedy rather than to Marshall on or near January 20 as planned (SPACE Daily, Oct. 13).

**S-IC-C** (Container), a simple mockup, will be used until about this time next year; **S-IC-S** (Structural), a full version but not assembled, will aid tests until April of '67; **S-IC-T** (Tooling), a full version for static firing, is nearing the end of its test operations; **S-IC-D** (Dynamic), a full version, will soon be tested with models of the other two **SATURN V** stages, **S-II-T** and **S-IVB-D**; and **S-IC-F** (Functional or Facility), a special version, is still at its assembly site, Michoud Operations in New Orleans, and will be delivered to the Cape next month.

#### Flight Models Proceeding Too

The first of the 15 **S-IC** flight models has been completed and is awaiting the removal of **-T** (above) from the Marshall test stand so it can be mounted there and fired. **S-IC-2** is largely complete and has entered the preliminary checkout phase. Both **-1** and **-2** were assembled at Marshall with Boeing components and will remain there for static tests.

**S-IC-3**, like its 12 younger brothers (**-4** and **-15**), is being built at Michoud by Boeing but, unlike those 12, will probably be sent to Marshall for firing rather than to the still unfinished Mississippi Test Facility (MTF). Construction of **-3** should be over this month. If MTF is ready in time, **-4** will be the first **S-IC** flight model to be tested there.

Morris Katzman has joined Electro-Optical Systems as manager of the Optical Radar Section of the Optical Electronics Division. Katzman was formerly a supervisor of internal research projects on laser oscillators with the Army Electronics Laboratories.

## ESD TO CONTRACT FOR SPACE MEDICINE EDP EQUIPMENT

The AFSC's Electronic Systems Division is preparing to issue RFPs for the installation of electronic data processing equipment at the Human Engineering Division of the Behavioral Sciences Laboratory at Wright-Patterson's Aerospace Medical Research Laboratories.

Firms have been invited to submit letters of interest on the equipment, which will be used to support research on human performance in man-machine interaction environment. Basic requirements include a card read-punch capability, an on-line printer, two cathode ray tube display units with light pens, and a 16,000-word 18-bit core storage unit or equivalent. A console typewriter and interval timer are also required, and a paper tape input-output unit is considered desirable. Letters are due at Hanscom Field no later than December 20.

## 156 FIRING SUCCESSFUL -- II

Tuesday's demonstration firing of Lockheed's 156-inch-diameter, solid-fueled rocket motor (yesterday's SPACE Daily) was almost perfect, and, according to Colonel Harold Robbins, AFSC Space Systems Division director of the Large Solid Program, it "proved the feasibility of utilizing (such) motors on our launch vehicles." The only imperfection was the failure of the thrust vector control system to generate the proper pressure, with the result that lateral thrust forces were somewhat low.

The 75-foot-tall motor fired for approximately 58 seconds, developed over three million pounds of thrust, and produced about 750 psi of pressure. The vector control system went through its three programmed command cycles without trouble. Colonel David Miller, deputy SSD director for the program, said the "technology appears to be well ahead of the systems that have been assigned."

This was the fifth firing of a 156. The model used is a proposed first stage for a multipurpose launch vehicle. The next 156 firing will come next month at Lockheed's Potrero, Calif., facility, the site of the latest test. The model used for that firing will be a 35-foot-tall, one-million-pound-thrust unit that could serve as the second stage of the multipurpose vehicle. The propellant for 156-6 is presently being cured. The following firing, 156-7, will use a potential third stage that is 21 feet long and capable of 350,000 pounds of thrust. Thiokol will conduct that test early next year, probably after 156-6. All three models have submerged nozzles.

Lockheed performed 156-1 and -2 on May 28, 1964, and September 30, 1964, respectively. The models used were similar in size to 156-5's motor but developed only 800,000 and 1,200,000 pounds each respectively. Thiokol conducted -3 and -4 on December 12, 1964, and February 27, 1965, respectively--the first in Utah and the second in Georgia--with 1,400,000 and 3,100,000 pounds of thrust being developed respectively.

## PIONEER LAUNCH DUE TODAY

The launch of **PIONEER VI** from Cape Kennedy, originally set for yesterday (SPACE Daily, December 13), has been rescheduled for today. The delay was made to make way for the launch of **GEMINI VI** yesterday. **PIONEER VI (PIONEER A)** is the first of the new series of spacecraft to investigate interplanetary phenomena.

## TWO MORE SOLRAD SATELLITES PLANNED

The Naval Research Lab is planning two more of its **SOLRAD** (SOLar RADIation) payloads, with the launch of the first to come probably next fall and the second in 1968. The former will likely be orbited at a low altitude by a **SCOUT** vehicle from Wallops Island, while the latter, still in the preliminary design phase, is being considered for possible orbiting at a very high altitude (perhaps 60,000 nautical miles) to remove it from major radiation belts. This last may be a large stabilized platform with a relatively simple experimental package.

### SOLRADs Participated In Two U.S. Space "Firsts"

**SOLRADs** were involved in the first American "piggyback" launch and the first attempted American multipayload launch. **SOLRAD I** joined **TRANSIT IIA** in June of 1960 to go aloft piggyback, and **SOLRAD IVA** accompanied **LOFTI II**, **SURCAL I**, **SECOR V**, and **INJUN II** on an unsuccessful launch in January of 1962.

The history of **SOLRAD** is complicated by two factors: 1) one of the satellites never left the drawing boards, and 2) four of the numerical designations are divided into two pairs, each pair with the same numbers but different letter suffixes. Thus, for example, the latest **SOLRAD** is the tenth satellite but the ninth to be launched and is designated both **SOLRAD VIII** (because of factor 2 above) and **EXPLORER 30** (because it was launched by NASA). (Due to this confusion, the **SPACE Daily** articles on **SOLRAD VIII**--Nov. 12, 19, & 23--erroneously called it **IX**.) The two upcoming **SOLRADs** are tentatively designated **IX** and **X**.

### SOLRAD Began Life With Misnomer: GREB

**SOLRAD's** career has also been complicated by a naming mistake at the outset that has yet to be completely counteracted. The original name was **GRAB** (Galactic Radiation And Background), but what is called a "typographical error" for lack of more precise information changed the name to **GREB**, and NRL was soon behooved to pick a new label. **SOLRAD**, usually shortened to **SR**, was officially substituted, but **GREB** lingered and is still used on occasion.

## ITT DEVELOPING ATS CAMERA

ITT Industrial Laboratories Division is readying a continuous scanning meteorological camera system for the NASA **ATS** (Applications Technology Satellite). The camera, one of a number of systems to be tested on **ATS**, is being developed under a \$572,600 cost-plus-fixed-fee contract from NASA-Goddard. The camera weighs 15 pounds and is five by six by 12 inches, not including lens. It will operate only in the daytime.

A variety of missions are planned for the **ATS**, which is designed to test advanced new concepts and techniques in communications, meteorology, altitude stabilization, ion engine technology, and radiation damage (**SPACE Daily**, November 18). The first satellite in the program, **ATS-B**, is scheduled for launch late next year. Included in its payload will be a videcon-photo-multiplier photographic experiment, which could lead to development of a synchronous meteorological satellite system (**SPACE Daily**, November 15). The **DOD** (along with NASA and the Weather Bureau) is keeping close watch on this program.

### NASA AWARDS \$2 MILLION TO UNIVERSITIES

NASA has awarded \$2,038,603 to 18 universities, colleges and private research institutions for some 20 research grants and contracts.

Among those receiving the awards are: Vanderbilt University, \$22,657, for a new study of applications of calculus of variations to the optimization of multistage trajectories; University of Virginia, \$24,788, for a new study of wind tunnel effects in V/STOL model testing; College of William and Mary, \$28,152, to continue an investigation of ion and Moon beam transport systems; Hazelton Laboratories, Inc., \$59,100, to continue research on the Gulliver life detector; University of Utah, \$67,135, for a new study of investigation of the combustion chemistry of composite rocket propellants; and University of Washington, \$42,163, for continuation of an analytical and experimental study, using photoelastic methods, to establish a procedure for stress analysis of a viscoelastic model subjected to transient temperatures and time-dependent loading.

Institute for Medical Research, \$78,120, to continue a study of measurement techniques for determining cardiac performance; The Rand Corp., \$350,000, to continue studies of operational and technological factors of communication satellites; Stanford University, \$100,000, for spectroscopic studies in infrared and optical quantum electronics; Case Institute of Technology, \$72,720, for continuation of a study of application of structural synthesis to aerospace vehicle structure; University of Illinois, \$215,000, to continue investigations of the D and E regions of the ionosphere by ground and rocket methods; and Yale University, \$32,400, for new lunar test flow studies and \$72,920, for continuation of electro-physiological studies of the brain.

New York University, \$600,000, for new multidisciplinary research in space science and engineering; Columbia University \$41,111, for new studies of development of a passive lunar seismic system, and \$33,100, for a new study of a passive lunar seismic system for the APOLLO program; Princeton University, \$65,000, for continuation of research on ignition and combustion stability and efficiency of solid propellants at low pressures; Texas A&M University, \$32,752, for a new analysis of structurally orthotropic shells by means of the compliance method; University of Toronto, \$17,911, for continuation of studies of failure mechanisms and statistical aspects of metal fatigue; University of Chicago, \$83,574, for continuation of a theoretical investigation of upper atmosphere dynamics.

### MASON-RUST AWARDED NEW MICHoud SUPPORT CONTRACT

NASA-Marshall has awarded a one year \$13,121,252 renewal contract to Mason-Rust for support services to the Michoud complex in New Orleans. The contract provides for transportation, port operations, security and safety, fire protection, photography, medical, food, supply, messenger and mail, communications, custodial, maintenance and repair, engineering, reproduction and documentation services.

James R. Ambrose has been appointed director-corporate technical planning for Philco. Ambrose was formerly director of the Development Planning office at the Aeronutronic Division.

## THE LOG OF GEMINI VII/VI

December 15, 1965--8:37 AM (EST)--The **GEMINI VI**, carrying astronauts Walter Schirra and Thomas Stafford, is lifted off its launch pad at Cape Kennedy by its **TITAN II** booster.

8:43 AM--**GEMINI VI** is in orbit. Perigee: 100 miles; apogee: 166 miles. **GEMINI VII** is entering its 162nd orbit and is about 1150 miles from **VI**.

10:11 AM--**GEMINI VI** astronauts start maneuvers designed to put their orbital path in line with **GEMINI VII**.

11:50 AM--**GEMINI VI** is within 192 miles (slightly behind and below) **GEMINI VII**.

12:23 PM--"Have visual contact," **GEMINI VI** reports. Radar contact has already been made.

2:27 PM--The **GEMINI VII** and **GEMINI VI** spacecraft maneuver into a near-docking orbit 6-10 feet apart, 185 miles out from the Earth. The **GEMINI VII** astronauts said they can see in the windows of **GEMINI VI**. Close-in maneuvers by **GEMINI VI** continue.

## NEW OFFICERS ELECTED BY GARRETT BOARD

The board of directors of Garrett has elected James V. Crawford, vice president and manager of the Los Angeles AiResearch Manufacturing Division, to the position of group vice president of the following manufacturing divisions: LA AiResearch Manufacturing Division, AiResearch Manufacturing Division of Arizona, Garrett Manufacturing Limited (Toronto, Canada), and Garrett GmbH (Raunheim, West Germany).

The board also promoted Henry W. Feil, controller, to vice president and controller, and Carl F. Fisher, treasurer, to vice president and treasurer. Other appointments included: Richard E. Palmer, assistant manager of AiResearch of Arizona, to become vice president and manager of Los Angeles AiResearch; Robert L. Daniels, manager of Garrett Supply Division, will become vice president and manager; and Jack P. Wright, manager of Air-supply Division, will become vice president and manager. Gen. Mark E. Bradley, presently assistant to the president, has also been named a vice president.

## DOD CONTRACTS

## Army

Radiation Inc.--\$1.9 million modification to an existing contract for satellite communications terminal Mark VI.

## Air Force

Sylvania Electric Products--\$2.4 million increment to an existing contract for ground electronics for **MINUTEMAN** Wing VI.

The RAND Corp.--\$15 million for studies and research on aerospace power.